



RAM PUMPS
Meeting The Toughest Challenges

RAM Pumps Ltd
Unit 14 Hazelwood
Trading Estate
Worthing
West Sussex
BN14 8NP

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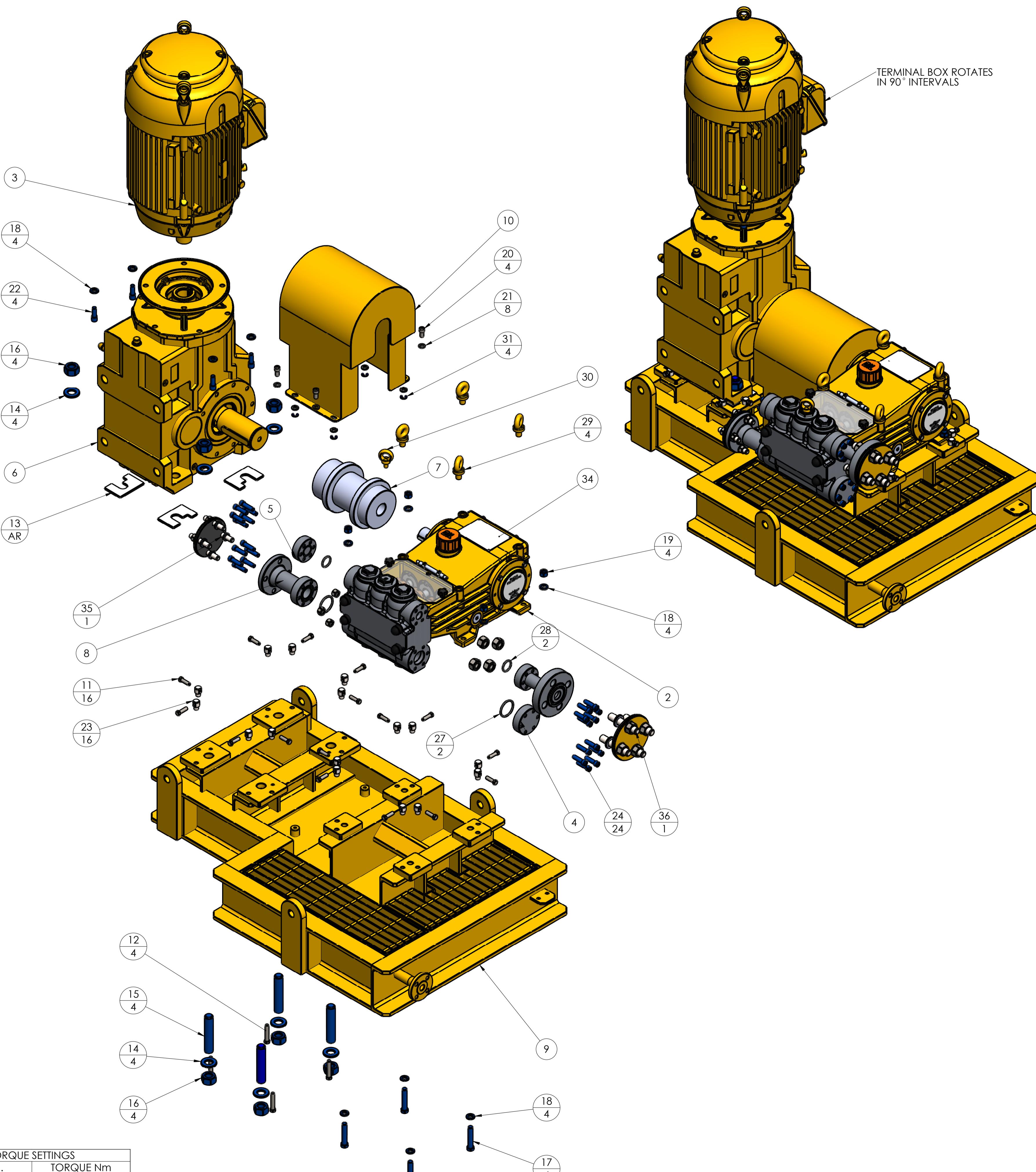
OPERATING & MAINTENANCE MANUAL / OPERATION & MAINTENANCE DATABOOK INDEX

Client	<i>L&T Hydrocarbon Saudi</i>
Project Title	<i>Marjan Increment Program – Offshore Oil Facilities</i>
Ram Project Reference	<i>016867s</i>
Equipment Title	<i>Slops Pumps</i>
Equipment Tag No's.	<i>G75-44-G-0138A/B, G75-45-G-0156A/B, G75-46-G-0149A/B G75-47-G-0164A/B, G75-49-G-0143A/B, G75-52-G-0133A/B</i>
Pump Serial Numbers	<i>016867A/B, 016867C/D, 016867E/F 016867Y/Z, 016867AA/AB, 016867AC/AD</i>
Purchase Order Number	<i>L&T Hydrocarbon Saudi/83000-00192/SD</i>

Sequence	Component	Description	Material Number	Heat Number	Certificate Number	Global number	RAM Build Number	File Reference
9	FLI15249	FLANGE RAM54 2" 150# RF	UNS N06630	61091A2	1938	26485	017546B	26485
8	FLD15248	FLANGE RAMS4 1.5" 1500# RTJ	UNS N06629	326940	183545/0	26485	017545B	26485
5	FLG15247	BLANKING FLANGE DISCHARGE RAM54 HCH	UNS N06628	326413	17747S/0	26308	017431B	26308
4	FLG15246	BLANKING FLANGE SUCTION RAM54 HCH	UNS N06627	319939	176057/0	26308	017430B	26308

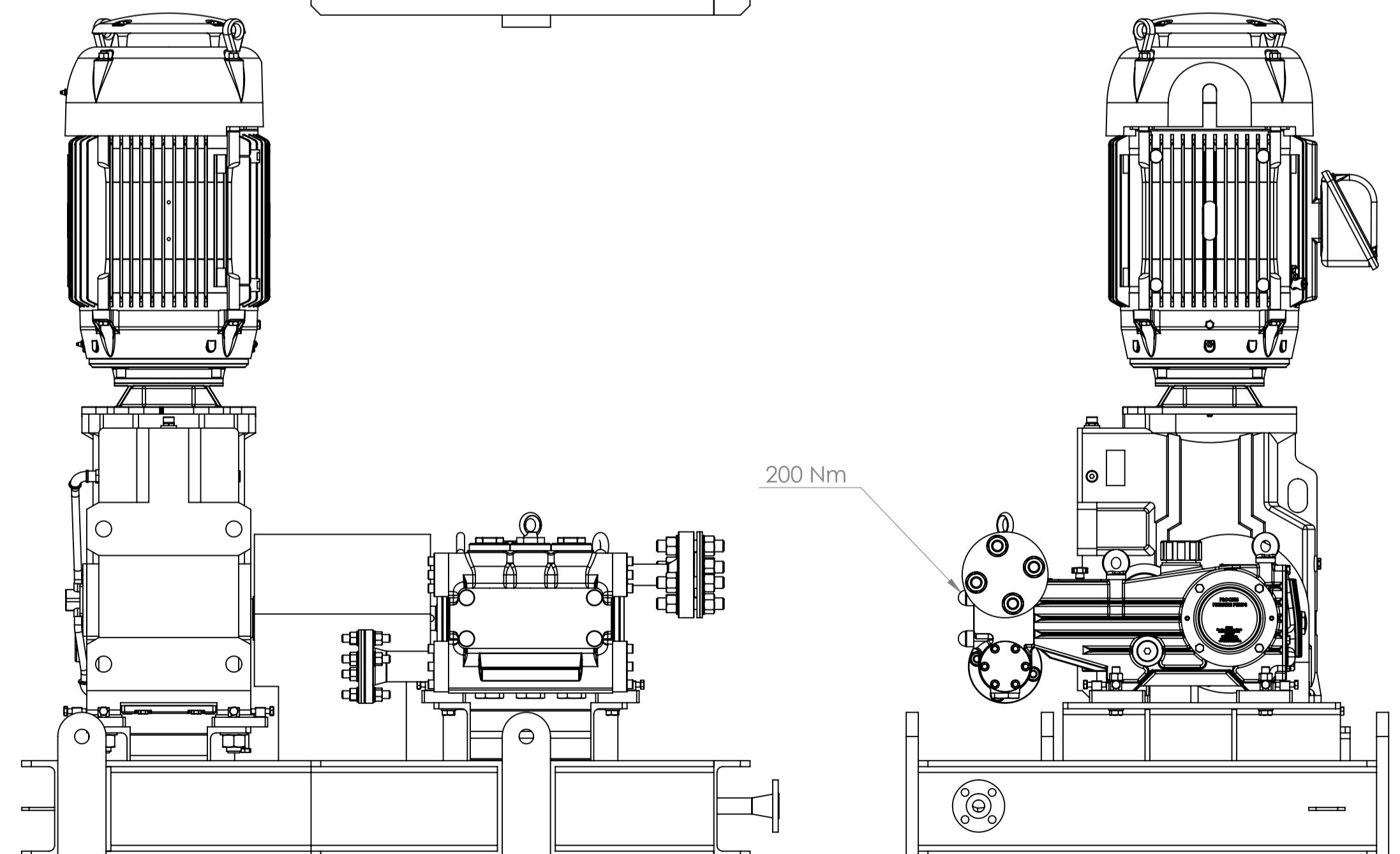
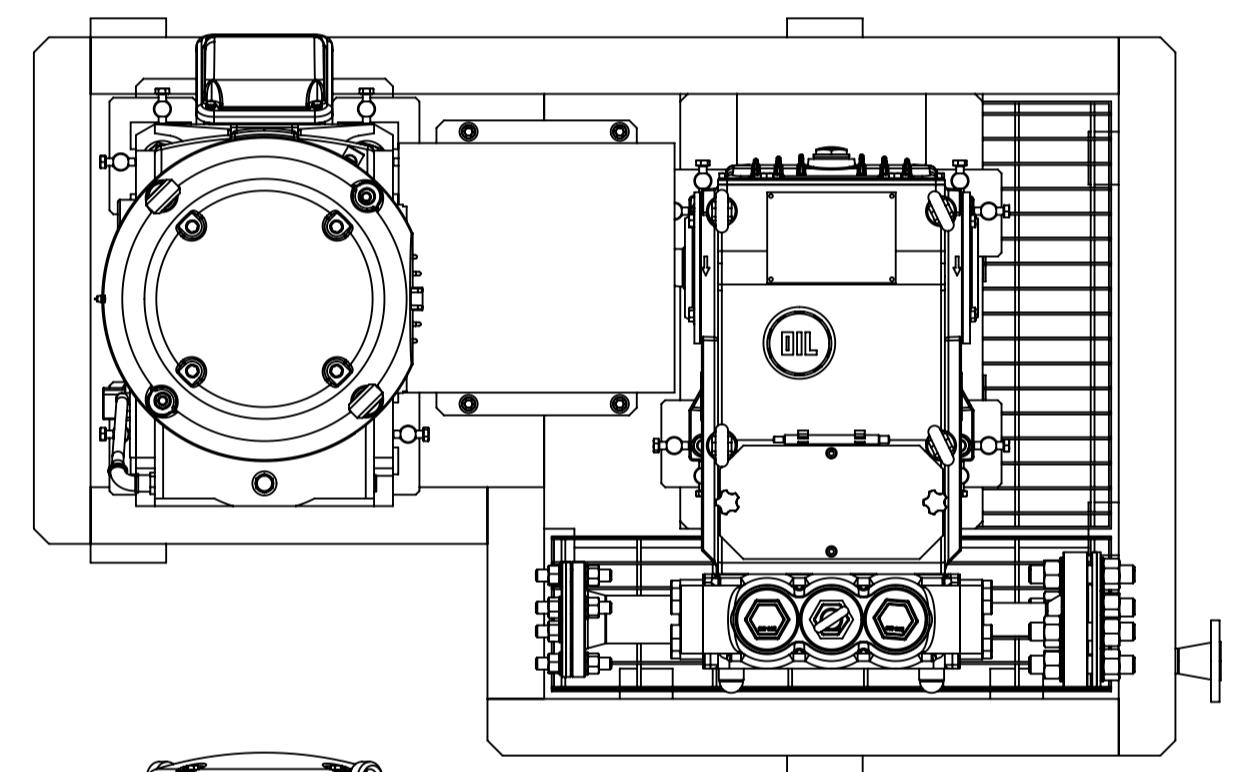
**RAM
PUMPS**

DO NOT ACCEPT HAND MARK-UPS UNLESS SIGNED AND STAMPED BY THE ENGINEERING DEPT OF RAM PUMPS LTD.



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL
1	GAD16167	G. A. DRAWING FOR PUMPS TAG A - 016358s	N/A
2	PP15820	PUMP ASSEMBLY RAM54R055 HCH/SL/V	N/A
3	MTR16169	MOTOR BALDOR 40HP 480/60Hz/3P (LHS BOX)	CAST IRON
4	FLG15246	BLANKING FLANGE SUCTION RAM54 HCH	ASTM B166 N06625 (INCONEL 625)
5	FLG15247	BLANKING FLANGE DISCHARGE RAM54 HCH	ASTM B166 N06625 (INCONEL 625)
6	GBX16248	GEARBOX RADICON K10318.0BAENS-B 8.26:1	CARBON STEEL
7	CPG16255	COUPLING KTR RIGIFLEX-N 110 A	CARBON STEEL
8	FLI15249	FLANGE INLET RAM54 2" 150# RF	ASTM B166 N06625 (INCONEL 625)
9	BFF15832	BASEFRAME FABRICATION VERTICAL GEARBOX (LHD)	BS EN 10025 S355JR
10	GU14252	GUARD PUMP-GBX	NON SPARKING ALUMINIUM
11	BLT10A40C SET	HEX HEAD SET BOLT M10 X 40 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
12	BLT12A70C SET	HEX HEAD SET BOLT M12 X 70 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
13	SHM14256	SHIM SET	ASTM A276 GR.316
14	WSH30KC	WASHER M30 C/S	CARBON STEEL
15	STD30160C	STUD BOLT M30 X 160 LONG	GR. 8.8 C-S
16	NUT30KC	NUT M30 ST.THICKNESS C/S GR.8	ISO 898-2 GR.8 C-S
17	BLT16A90C	HEX HEAD BOLT M16 X 90 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
18	WSH16KC	WASHER M16 C/S	CARBON STEEL
19	NUT16KC	NUT M16 ST.THICKNESS C/S GR.8	ISO 898-2 GR.8 C-S
20	BLT12B25C	HEX SOCKET HEAD BOLT M12 X 25 LG GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
21	WSH12KC	WASHER M12 C/S	CARBON STEEL
22	BLT5-8N-11B38C	CAP HEAD BOLT UNC 5/8"-11X1.5" LONG C/S	ISO 898-1 GR.8.8 C-S
23	TST14961	BASEFRAME ADJUSTING BLOCKS 15mm	ASTM A276 GR.316
24	BLT12B50C 12.9	HEX SOCKET HEAD BOLT M12 X 50 LG GR.12.9 C-S	ISO 898-1 GR.12.9 C-S
25	PDR15281	FG-30-207-FPM-625-AX-C-1 1/2" 1500# RTJ	ASTM B446 GR.1 UNS N06625
26	PDR15282	FG-30-17-FPM-625-AX-C-1 1/2" 150# RF	ASTM B446 GR.1 UNS N06625
27	ORG22975V	O-RING	ASTM D1418 FKM
28	ORG22275V	O-RING	ASTM D1418 FKM
29	LPT11380	M18 LIFTING EYE	ISO 3266:2010
30	LPT4997	LIFTING EYEBOLT M12	ISO 3266:2010
31	WSH12EC	M12 E-CLIP RETAINING WASHER	CARBON STEEL
32	BOX15527S	BOX FOR TRANSPORT	WOOD
33	NPTPROJECT	NAME PLATE FOR PROJECT	316 ST/ST
34	PTFECoat	PTFE COATING FOR PROJECT BOLTS	PTFE
35	CVR16265	SHIPPING FLANGE COVER KIT 2" 150#	SEE PARTS LIST
36	CVR16267	SHIPPING FLANGE COVER KIT 1.5" 150#	SEE PARTS LIST
37	FLD15248	FLANGE DISCHARGE RAM54 1.5" 150# RTJ	ASTM B166 N06625 (INCONEL 625)

ITEMS SUPPLIED LOOSE: 26 27
BOX FOR SHIPPING: 33



06	21/05/2020	M2690	ES	ES	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES: LINEAR: $+/- 0.3\text{mm}$ $0.0 = +/- 0.1\text{mm}$ $0.0 = +/- 0.04\text{mm}$ ANGULAR: $+/- 0.5\text{ DEGREES}$	MATERIAL:	SEE BOM	THIS DRAWING IS CONFIDENTIAL AND MUST NOT BE COPIED, LOANED OR TRANSFERRED WITHOUT PERMISSION OF: © 2019 RAM PUMPS LTD WORTHING SUSSEX	DRAWN (1st): ES	APPROVED (1st): SS	DATE: 21-08-2019	SHEET SIZE: A1	ORIGINAL SCALE: 1:8	INDICATES MODIFICATION ISSUE NUMBER	1st USED ON: 016358s	RAM DWG NO. PK16166	SHT 1 OF 1
04	10/10/2019	M2658	ES	ES	FOR EXPLANATION OF NOTES ETC SEE B.S. 308	FINISH:	TREATMENT:										
03	25/09/2019	M2650	ES	ES													
02	03/09/2019	M2639	ES	ES													
01	21/08/2019	INITIAL RELEASE	ES	SS	Unless otherwise stated												
ISSUE	DATE	MOD	DRAWN	APRVD													

TORQUE SETTINGS	
ITEM No.	TORQUE Nm
16	1400
18	200
23	190
25	130

FLG15246

GN26308

017430B

GIN 26308

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate

176057/0

DIN EN 10204/01.05

3.1

Page:

1 / 2

Order No.

Purchase Order No.

528182

PO0018424KW / LB 11547

printed:

23. NOV 2018

NeoNickel Ltd.

First Avenue
GB - DY6 7TG Kingswinford

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100

LRQA Approval

KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.9.15)

add. customer requirement: impact test

Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

**Item** **Pcs** **Wht [kg]** **Dimension [mm]** **Cast** **Lot** **Delivery No.**

14	2	843	114,30 Ø x 2000-6000	Cast	319939	104854354	8681937863	4-1/2" dia
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Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	top	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319939	VIM/ESR	top	0,25	<0,01	3,47
		Meth	RF	RF	RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	Hardness Test
104854354	1-A1							1 ASTM E10 - 17
104854354	1-A1							2 ASTM E18 - 17et
104854354	2-A1	1 RT	459		891	40 50,5 5 47,6 60		HBW 10/3000/A HRC
104854354	2-A1							1 277 surface
								2 27,4 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Üçüncü, authorized inspection representative

Date of release: 23.11.2018

Q

* 1760570-1

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or signatures on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdekl
Postbox 1820, D-58778 Werdekl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Möller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, 85327
Company domicile: Werdekl



FLG15246.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
DIN EN 10204/01.05 3.1Page: 2 / 2
printed: 23. NOV 2018Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing						Grain Size	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm²]	Lateral Exp. [mm]				1 ASTM E112 - 13
					2	3	4	5	
104854354	1-A1	2	-46	84	91	85			
104854354	1-A1	2	-46	87	86	89			
104854354	2-A1	1	-46	137	133	144			
104854354	2-A1								1 No 7.5

Sample Condition annealed		Corrosion Test	
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
104854354	1-A1	1 without objection : 0,41 mm/a	
104854354	1-A1		
104854354	2-A1		
104854354	2-A1		

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory

Heat Treatment

920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

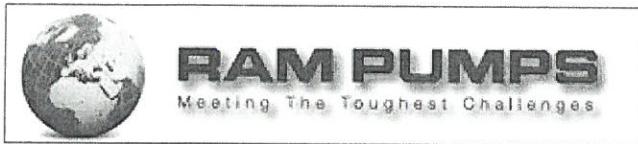
GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

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Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	top	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	top	0,25	0,04	<0,01
		Meth	RF	RF	RF

Sample Condition

annealed

Lot	Sample No.	Tensile Test							Hardness Test			
		Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	1	ASTM E10 - 17	2	ASTM E18 - 17e1	
104854379	I-A1	1	RT	534	910	40	52,3	5	47,9	59	HBW 10/3000/ A	HRC
104854379	I-A1							1	281	surface		29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Unal Ocuncu, authorized inspection representative

Date of release: 04.01.2019

Mark of the
Inspector

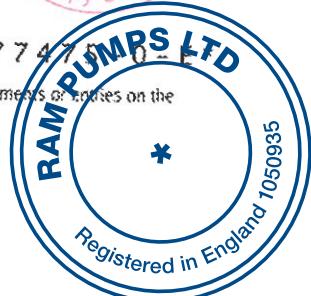
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* 1774750-1

VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werden
 Postbox 1820, D-58778 Werden
 Telephone: 02392 55-41, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Isenbüttel local court, #5327
 Company domicile: Werden



FLG15247.M

FLG15246 GN26308 017430B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment	Lot
920°C/00:45h/Water	104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
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Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl/ Number of Quante Numero pezzli	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEOC
INTERNATIONAL



TOV NORD
TOV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19308-02(SW)

Inspection No.

Central N

Nº 61 000000

Teil

५७८

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Part

Anlage - Annex - Anrixxe - Allegato: 1

Blatt-Nr. 1 of 1

Sheets

Baru N^o.

१३०

Mechanische Prüfungen

Fréquent - TÉMOIGNAGE - L'ADOLESCENCE - LE DÉBUT DE LA VIE ADULTE - PROBLEME SOCIAUX

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Taille de la pioche: Type di provaletto Probenzustand - Specimen condition - Etat d'éprouvette - Stato della provetta - Etat d'éprouvette - Stato delle provette -				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE							
Probe-Nr. Test No. Nº d'éprouvette Nº di prova	Probennahmemaßnahme Dim. of specimen Dim. de l'éprouvette Dim. della provetta		Probennahme Specimen Prélèvement Prelevamento														
Schmelze-Nr. Heat No. Nº Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite, Ø Width, Ø Largeur, Ø Largh. Ø	U.L. Spannung U.L. Stress Tension U.L. Tensione U.L.	Drehzahl Drehzahl Vitesse Velocità	Länge, Länge Length, Length Longueur Lunghezza	Temperatur Temperature Température Temperatura	Streckgrenze Yield strength Tension de résistance Tensione di resistenza	0.2 N/mm²	Charakteristik Characteristic Caractéristique Caratteristica	RM N/mm²	A Lox	50mm % Z %	Prüfungstemperatur Temperature of testing Température de la vérification Temperatura di prova	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori Σ/n	Bemerkung Remarks Remarques Osservazioni
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Req'ts / Anforderung																	
Mechanical				1	2	3	20	415	830	30							
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																	
Results																	
326413	12.50	Ø		1	2	3	20	503	874	49							
325867	12.51	Ø		1	2	3	20	452	865	51							
361682	12.46	Ø		1	2	3	20	446	869	51							
Notes				1	From Bar end												
4				2	L=Longitudinal												
5	Visual and dimensional checks - Satisfactory Chemical / See manufactures certificate and Anlage 2																

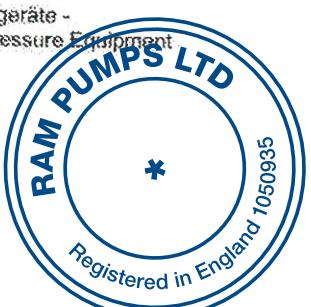
Ort - location - lieu - località

(Datum/Date/Stata)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S. Worrall

LONDON

30/05/19



FLG15246

GN26308

017430B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	-

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

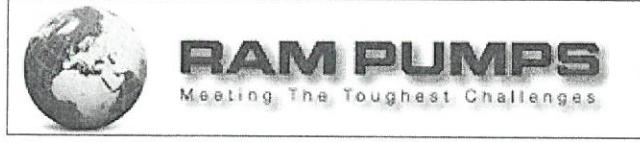
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No 24
Mode General Metals
Time 2019-07-10 14:47
Duration 10.75
Units %
Sigma Value 2
Sequence Final
Alloy1 Alloy 625 : 0.01
SAMPLE FLG15247.M
HEAT
LOT
BATCH
MISC
NOTE

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test	
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
Lot	Sample No.		
104927536	105-F02	1	without objection : 0,77 mm/a
104927536	105-F03		

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130	149	131	1,45 1,68 1,44



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

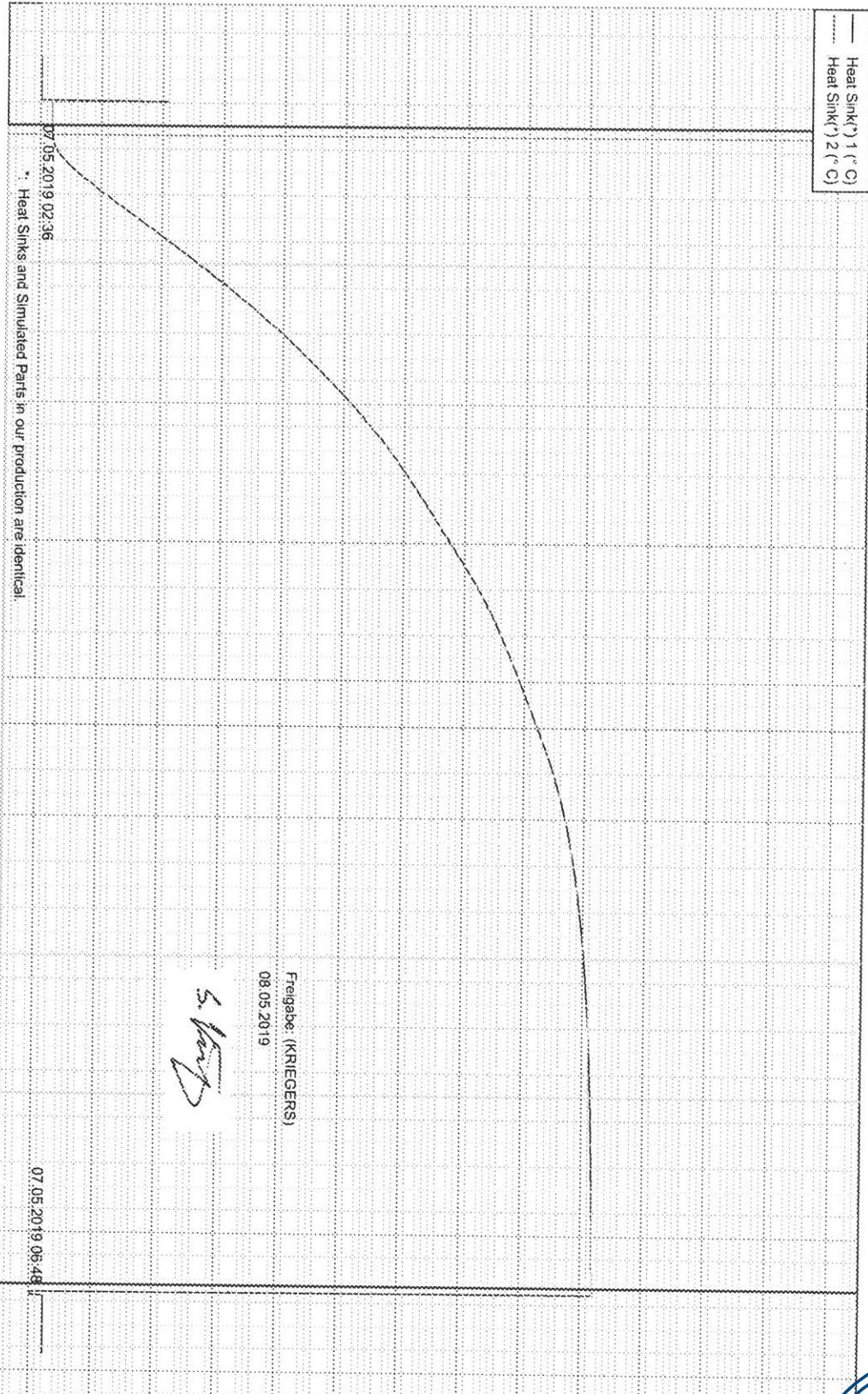
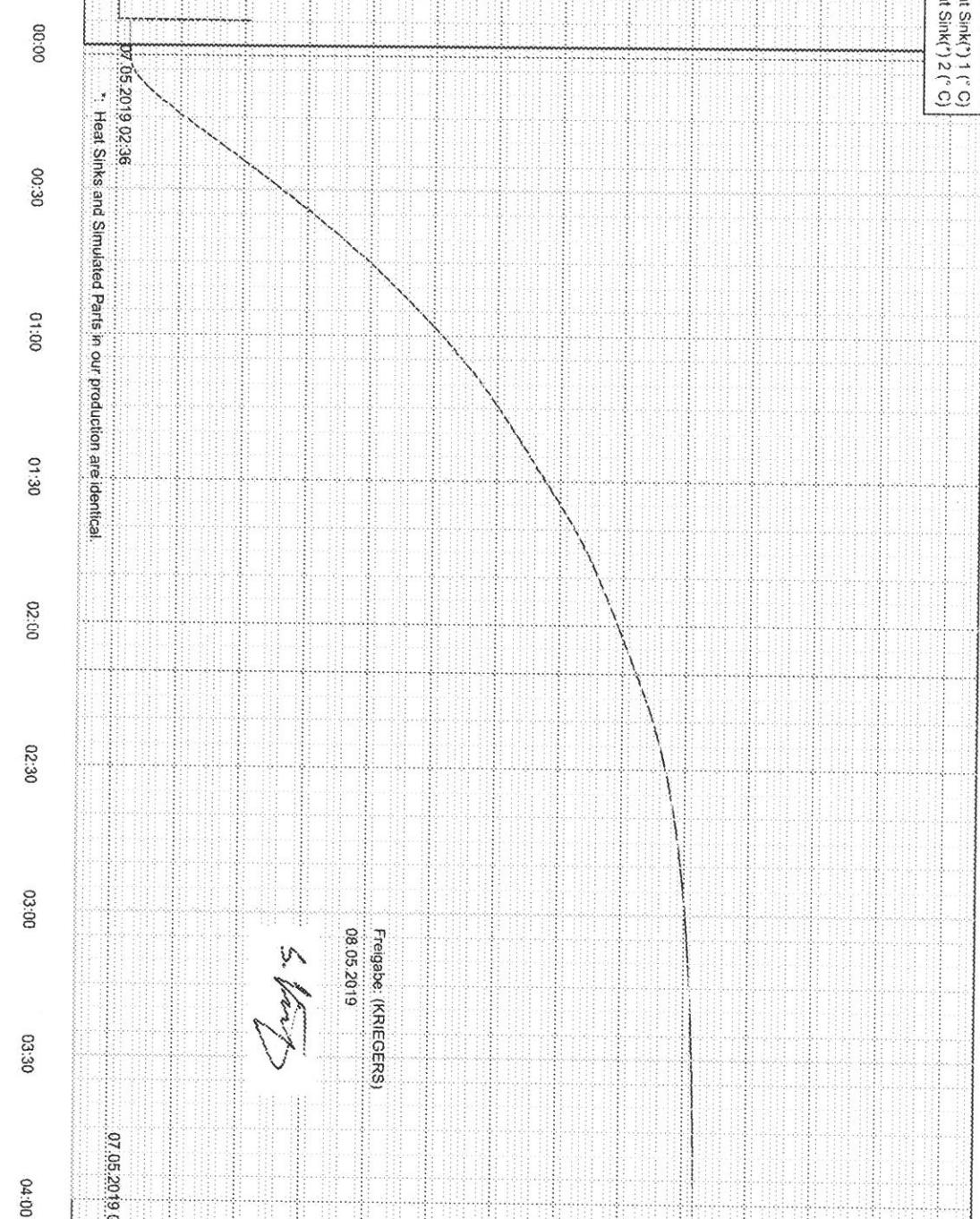
FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

VDM Metals GmbH

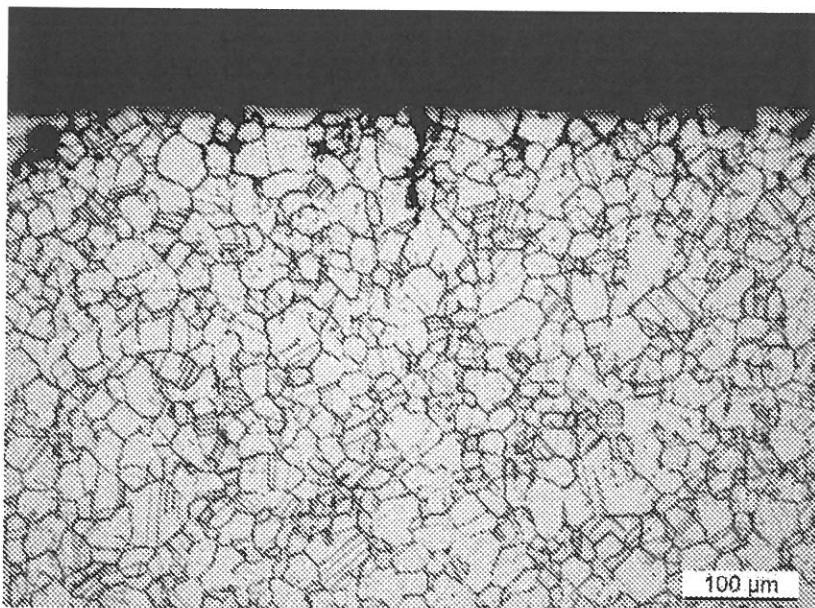
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE VIM/VAR

H/T LOT NO 104927536

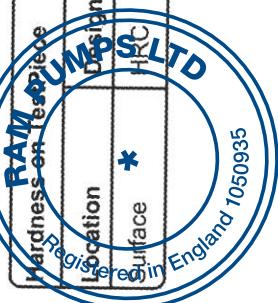
TEST COUPON SIZE PROLONGATION

Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong	
											5.8	0

Impact Tests

Test No.	Location	Orientation	Temp	Charpy V	130	149	131	Joules	1	2	3	Min Av	1	2	3	Min Av	Lateral Expansion
																	% Reduction of Area

Hardness on Specimen	Location	Designation	Requirements	Results			
				Surface	HRC	22.3	23.4
						22.3	23.7



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099880	2	2	426862	
Reduction Ratio:	4.26:1		Customer O/No. P00020371KW	
Test	Location	Specification	Result	Value

Heat No.	C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	Max Report No
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27	9.14	0.22	3.36	0.02	0.33	4.52	NT

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

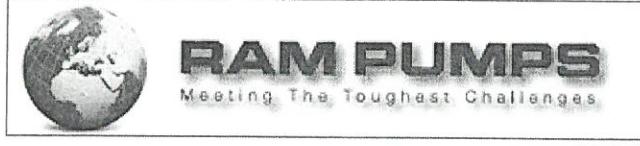
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer

John Davies





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

26



Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings
 BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy
 Nb+Ta =SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test									
Lot	Sample No.	1 ASTM E8/E8M - 16a / longitudinal specimen									
		Temp.	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA				
		[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]	A [%]			
104820039	107-E01	RT	517		916	4D	43,1				54
104820039	107-F03										

Sample Condition annealed		Notched Bar Impact Testing						Grain Size		
Lot	Sample No.	1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₈ 450/10						1 ASTM E112 - 13		
		Temp.	KV	aK	Lateral Exp.					
		[°C]	[J]	[J/cm ²]	[mm]					
104820039	107-E01	1 -110	111	116	115			1,37	1,44	1,4
104820039	107-F03									

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the
Inspector

Q

E

Enclosures: 4

* 173434/1-E

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLI15249.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
527148 402338

Page: 2 / 2
printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	1 without objection: 1,38 mm/anno
104820039	107-F03	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

SUPER ALLOYS
t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	Customer O/No.	PO0020371KW

Report No.	098861	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	PO0020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	0.45	WATER

MELTING PRACTICE VIM/ESR
H/T LOT NO 104820039

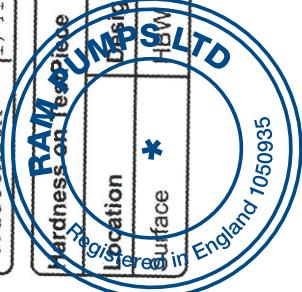
TEST COUPON SIZE Prolongation

Test No.	Location	Orientation	Temp 20 °C	0.20% Proof	Result 517 MPa	UTS 916 MPa	Spec-Min 43.1	Result 43.1	%Elong		% Reduction of Area	
									Spec-Min	Result	Spec-Min	Result
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1	2	3	Min Av

Impact Tests

Test No.	Location	Orientation	Temp -110 C	Energy				Shear %				Lateral Expansion	
				1	2	3	Min	1	2	3	Min	1	2
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1	2	3	Min Av	1.37 1.44 1.4 1.4 mm

Hardness on Testpiece	Designation	Requirements		Results	
		Surface	Requirement	Surface	Requirement
	*	HBW	222		222



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

Test	Location	Specification	Result						Value	Min	Max	Report No				
			C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	NT
Heat No.			0.03	0.10	0.05	0.001	0.005	59.59	22.27	9.16	0.25	3.40	0.15	0.34	4.59	3.41
319837																
			Ta													

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer

J. A. Holden



Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

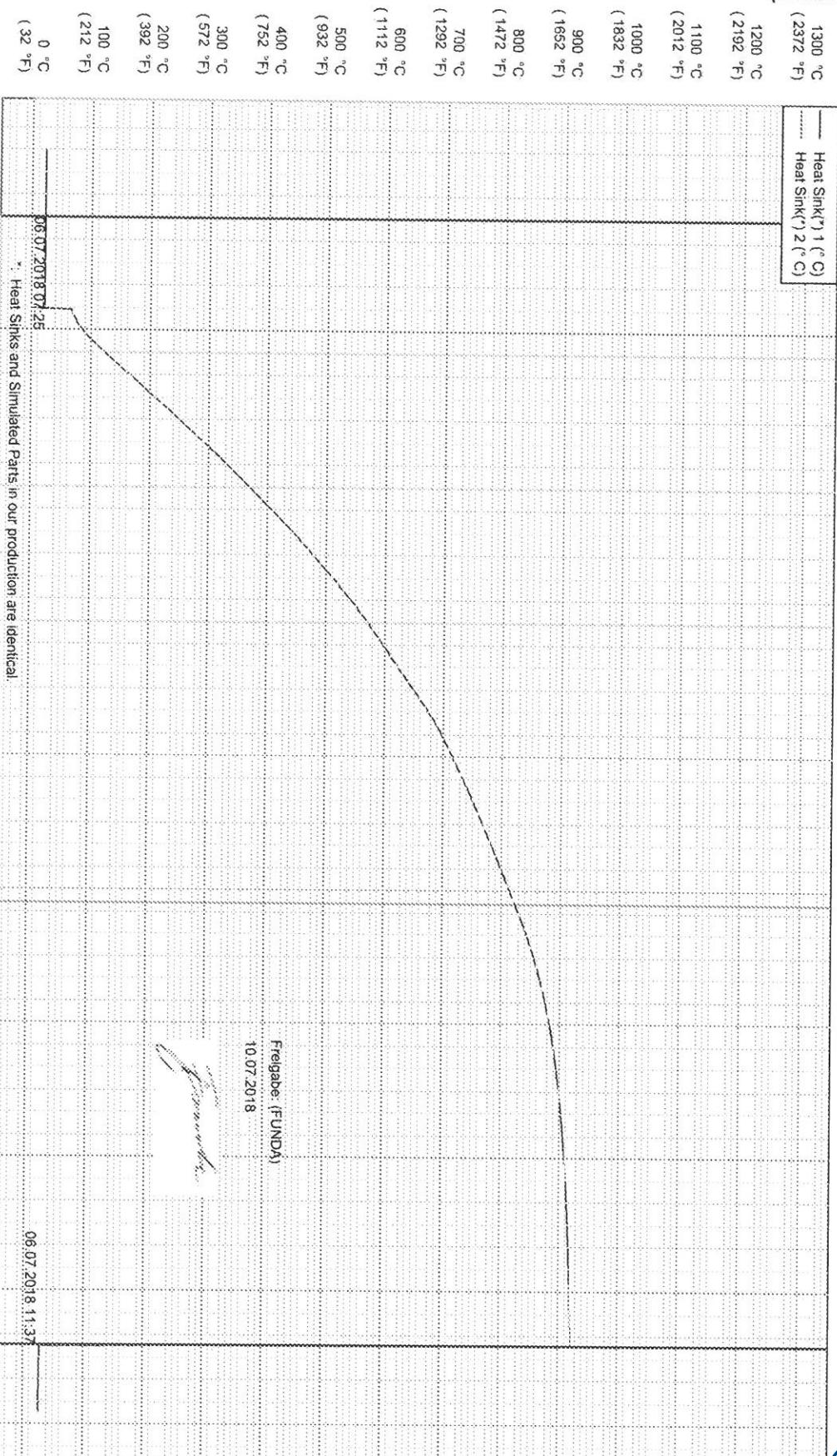
VDM Metals

Enclosure for inspection certificate
DIN EN 10204/01.05

173434/1

3.1

Enclosure: 2
Page: 1 / 1
printed: 11. DEC 2018

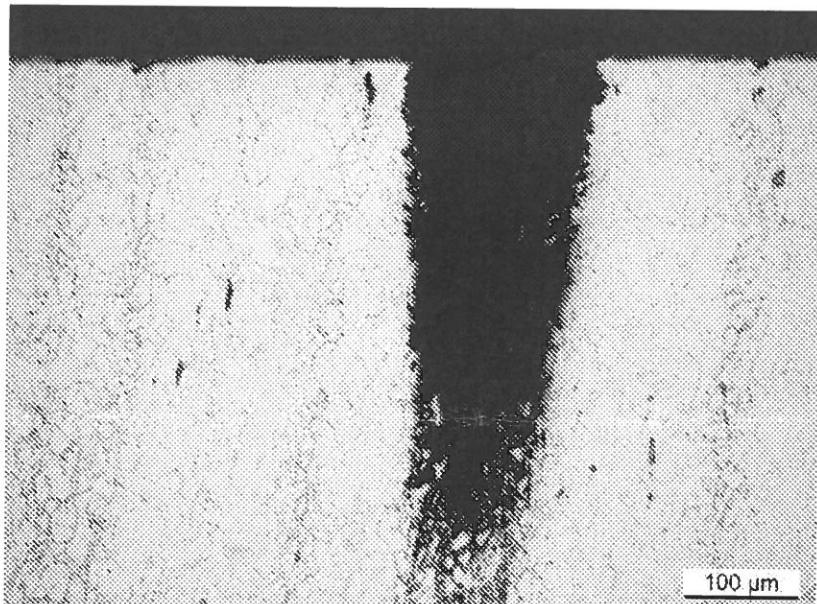


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2015-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

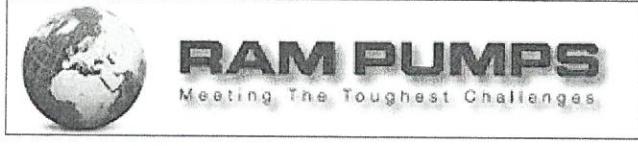
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S.Talbot

26



FLG15247

GN26308

017431B

GIN 26308

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate

176057/0

DIN EN 10204/01.05

3.1

Page:

1 / 2

Order No.

Purchase Order No.

528182

PO0018424KW / LB 11547

printed:

23. NOV 2018

NeoNickel Ltd.

First Avenue
GB - DY6 7TG Kingswinford

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100

LRQA Approval

KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.9.15)

add. customer requirement: impact test

Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

**Item** **Pcs** **Wht [kg]** **Dimension [mm]** **Cast** **Lot** **Delivery No.**

14	2	843	114,30 Ø x 2000-6000	Cast	319939	104854354	8681937863	4-1/2" dia
----	---	-----	----------------------	------	--------	-----------	------------	------------

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	top	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319939	VIM/ESR	top	0,25	<0,01	3,47
		Meth	RF	RF	RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	Hardness Test	
104854354	1-A1							1 ASTM E10 - 17	
104854354	1-A1							2 ASTM E18 - 17et	
104854354	2-A1	1 RT	459		891	40 50,5 5 47,6 60		HBW 10/3000/A HRC	
104854354	2-A1							1 277 surface	
								2 27,4 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Üçüncü, authorized inspection representative

Date of release: 23.11.2018

Q

* 1760570-1

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or signatures on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdeohl
Postbox 1820, D-58778 Werdeohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Möller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, 85327
Company domicile: Werdeohl



FLG15246.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 2 / 2
 printed: 23. NOV 2018

Sample Condition annealed		Notched Bar Impact Testing					Grain Size			
Lot	Sample No.	Temp.	KV	aK	Lateral Exp.	1 ASTM E112 - 13				
		[°C]	[J]	[J/cm ²]	[mm]	1 No 7.5				
104854354	1-A1	2	-46	84	91	85				
104854354	1-A1	2	-46	87	86	89				
104854354	2-A1	1	-46	137	133	144				
104854354	2-A1									

Sample Condition annealed		Corrosion Test	
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
104854354	1-A1	1 without objection : 0,41 mm/a	
104854354	1-A1		
104854354	2-A1		
104854354	2-A1		

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory

Heat Treatment Lot

920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TUV-Systems-Certification body for pressure equipment of the TUV NORD GROUP: notified body, reg-no. 0045.

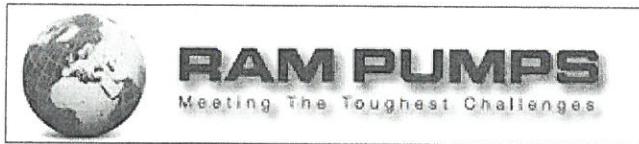
Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

26



FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56	0,007
	top Meth	LE	LE	RF		RF						

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	0,25	0,04	<0,01	3,45
	top Meth	RF	RF	RF	

Sample Condition
annealed

Lot	Sample No.	Tensile Test							Hardness Test			
		Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	1	ASTM E10 - 17	2	ASTM E18 - 17e1	
104854379	I-A1	1	RT	534	910	40	52,3	5	47,9	59	HBW 10/3000/ A	HRC
104854379	I-A1							1	281	surface		29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

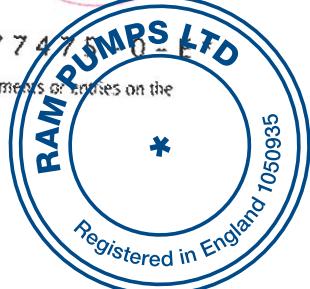
Unal Ocuncu, authorized inspection representative

Mark of the Inspector

Date of release: 04.01.2019



* 1774750-1



VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werden
 Postbox 1820, D-58778 Werden
 Telephone: 02392 55-41, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Isenbüttel local court, #5327
 Company domicile: Werden

FLG15247.M

FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment	Lot
920°C/00:45h/Water	104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl/ Number of Quante Numero pezzli	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNACIONAL



TOV NORD
TOV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19308-02(SW)

Inspection No

Certified No.

ନୂ ହେ ଅଧିକାରୀ

Teil

५७८

83

Part

Anlage - Annex - Anhang - Allegato: 1

Blatt-Nr. 1 of 1

Sheets

Baru N^o.

Digitized by

Mechanische Prüfungen

Fréjus - Toulon - Hyères - Cannes - Saint-Tropez - Grimaud - Sainte-Maxime

Probenart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Taille de la prothèse Probenzustand - Specimen condition - Etat d'éprouvette - Stato della provetta Etat d'éprouvette - Stato delle provette				TENSILE TEST / ZUGVERSUCH					HARDNESS/HÄRTE										
Probe-Nr. Test No. Nº d'éprouvette Nº di prova	Probennahmemaßung Dim. of specimen Dim. de l'éprouvette Dim. della provetta		Probennahme Specimen Prélèvement Prelevamento		Temperatur Température Temperatura Temperatura	Spannung Strength Énergie Tensione	Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza	Geschwindigkeit Speed Vitesse Velocità	RM N/mm ²	A Lox	Z %	Werte / Values / Valeurs / Valori 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17						Bemerkung Remarks Remarques Osservazioni	
Schmelze-Nr. Heat No. Nº Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	U.L. Unter en de in	U.L. Unter en de in	richtung Direction Direction Direz. <td> <p>Temperatur Température Temperatura Temperatura</p> <p>Spannung Strength Énergie Tensione</p> <p>Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza</p> <p>Geschwindigkeit Speed Vitesse Velocità</p> </td> <td>0.2 N/mm²</td> <td>50mm</td> <td>50mm</td> <td>%</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	<p>Temperatur Température Temperatura Temperatura</p> <p>Spannung Strength Énergie Tensione</p> <p>Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza</p> <p>Geschwindigkeit Speed Vitesse Velocità</p>	0.2 N/mm ²	50mm	50mm	%									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
Reg'ts / Anforderungen																			
Mechanical				1	2	3	20	415	830	30									
Analysis % - Max unless Stated																			
C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																			
Results																			
326413	12.50 Ø			1	2	3	20	503	874	49									
325867	12.51 Ø			1	2	3	20	452	865	51									
361682	12.46 Ø			1	2	3	20	446	869	51									
Notes																			
4	Visual and dimensional checks- Satisfactory																		
5	Chemical / See manufactures certificate and Anlage 2																		

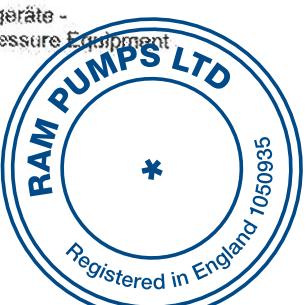
Ort - location - lieu - località

(Datum Date, Stata)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S. Worrall

LONDON

30/05/19



FLG15247

GN26308

017431B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	-

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

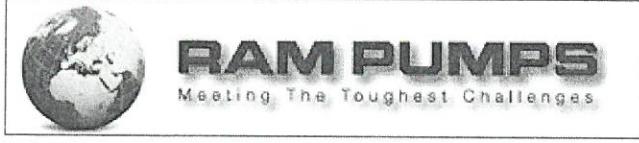
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	24
Mode	General Metals
Time	2019-07-10 14:47
Duration	10.75
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.01
SAMPLE	FLG15247.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15247

GN26308

017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
 printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
 GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09
 However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

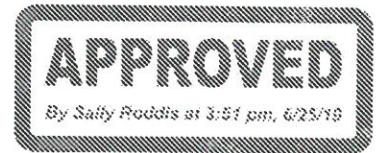
UNS N06625

UNS N06625

UNS N06625

Item	Pcs	Wht [kg]	Dimension [mm]
150	2	2548	190,50 Ø x 3000-6000

Cast	Lot	Delivery No.
326940	104927536	8681961277

**Analysis (weight %)**

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test								Grain Size		
Lot	Sample No.	Temp [°C]	Yield [MPa]	0.2% Yield [MPa]	1.0% Yield [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	1	No 6.5	
104927536	105-F02	1	RT	440		862	4D	54,7				
104927536	105-F03											

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Enclosures: 3

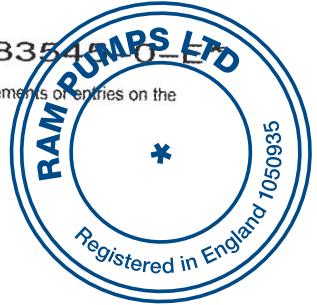
Q

* 183545/0-ETD

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Frank Morris, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLD15248.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130	149	131	1,45 1,68 1,44



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III



FLG15247 GN26308 017431B

VDM Metals GmbH

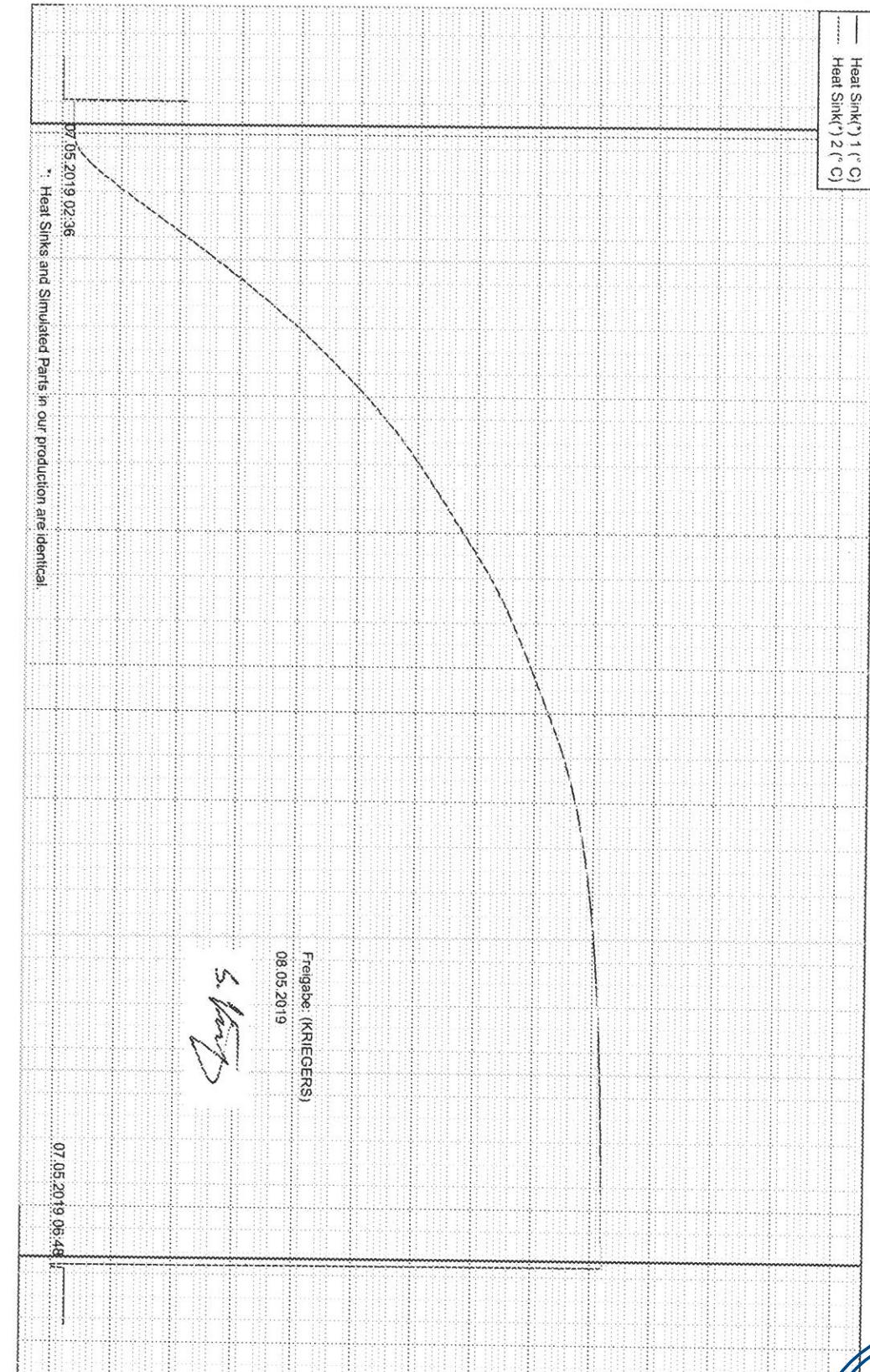
on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

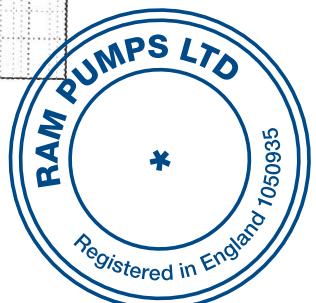
VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

00:00 00:30 01:00 01:30 02:00 02:30 03:00 03:30 04:00



Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

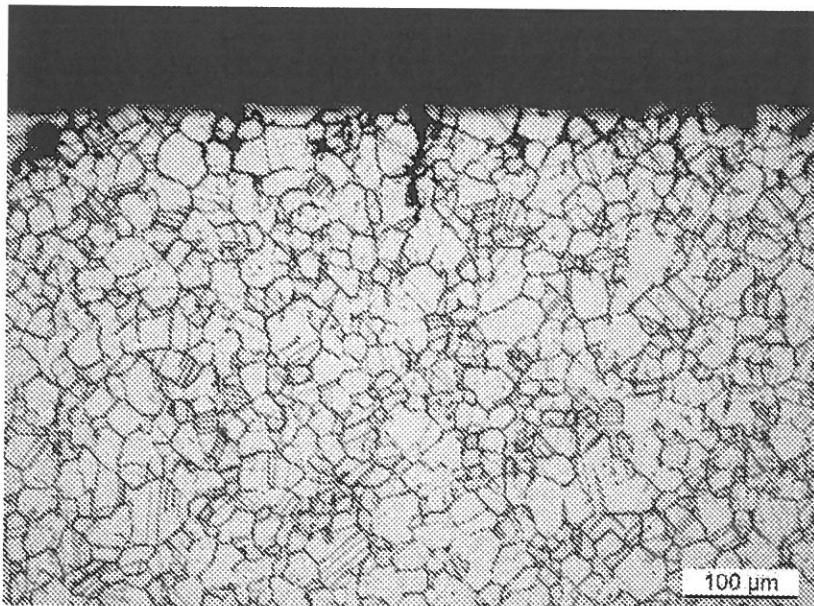
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE VIM/VAR

H/T LOT NO 104927536

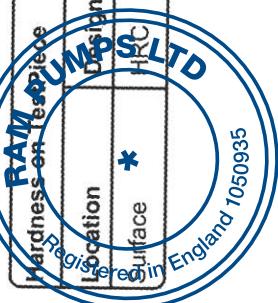
TEST COUPON SIZE PROLONGATION

Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong	
402468A15A	1/4T	Long	20 C	440	440	440	862	862	54.7	54.7	5.8	0

Impact Tests

Test No.	Location	Orientation	Temp	Energy				Shear %				Lateral Expansion	
				1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	1.44 mm

Hardness on Specimen	Location	Designation	Requirements		Results	
			Surface	HRC	Surface	HRC
					22.3	23.4 23.7



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099860	2	2	426862	04/07/19
Reduction Ratio:	Customer O/No.		PO0020371KW	Line: 2

Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C	Si	Mn	S	P	Ni	Cr
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27
			Ta				9.14
				0.010			0.22
						3.36	0.02
						0.33	0.02
							4.52
							3.37C

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

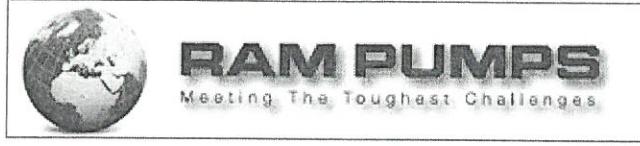
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer







RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

26



Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings

BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed

Lot	Sample No.	Tensile Test							
		Temp [°C]	Yield 0.2% [MPa]	Yield 1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	
104820039	107-E01	RT	517		916	4D	43,1		54
104820039	107-F03								

Sample Condition annealed

Lot	Sample No.	Notched Bar Impact Testing						
		Temp. [°C]	KV [J]	aK [J/cm²]	Lateral Exp. [mm]			
104820039	107-E01	-110	111	116	115		1,37	1,44
104820039	107-F03						1,4	

Grain Size
 1 ASTM E112 - 13

1 No 8

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the Inspector

Q

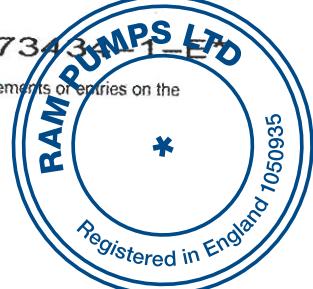
E

Enclosures: 4

* 173434/1-E

VDM Metals GmbH
 Division Bar and Forgings
 Plattenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLI15249.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 2 / 2
 printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	1 without objection: 1,38 mm/anno
104820039	107-F03	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
 Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

SUPER ALLOYS
t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	Customer O/No.	PO0020371KW

Report No.	098861	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	PO0020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type
ANN
Temp
920C
Soak Hours
0.45
Quench/Cooling
WATER

MELTING PRACTICE VIM/ESR
H/T LOT NO 104820039

TEST COUPON SIZE				Prolongation				%Elong				% Reduction of Area			
Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	Result	Spec-Min	Result	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	20 C	517	MPa	916	MPa	43.1	0	54	0	37	1.44	1.4	mm

Tensile Tests

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Impact Tests

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Lateral Expansion

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Hardness on Testpiece

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Requirements

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Results

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Surface

Test No.	Location	Orientation	Temp	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1

Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

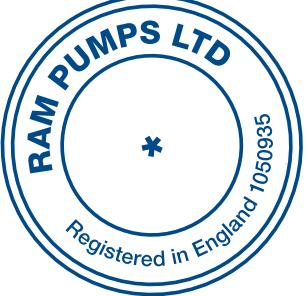
Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C Si Mn P Ni Cr Mo Al Nb Co Ti Fe NT	0.03 0.10 0.05 0.005 59.59 22.27 9.16 0.25 3.40 0.15 0.34 4.59 3.41					

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer

Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

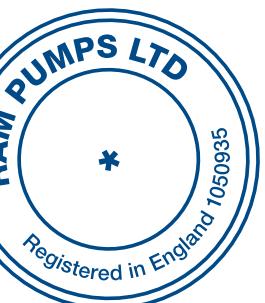
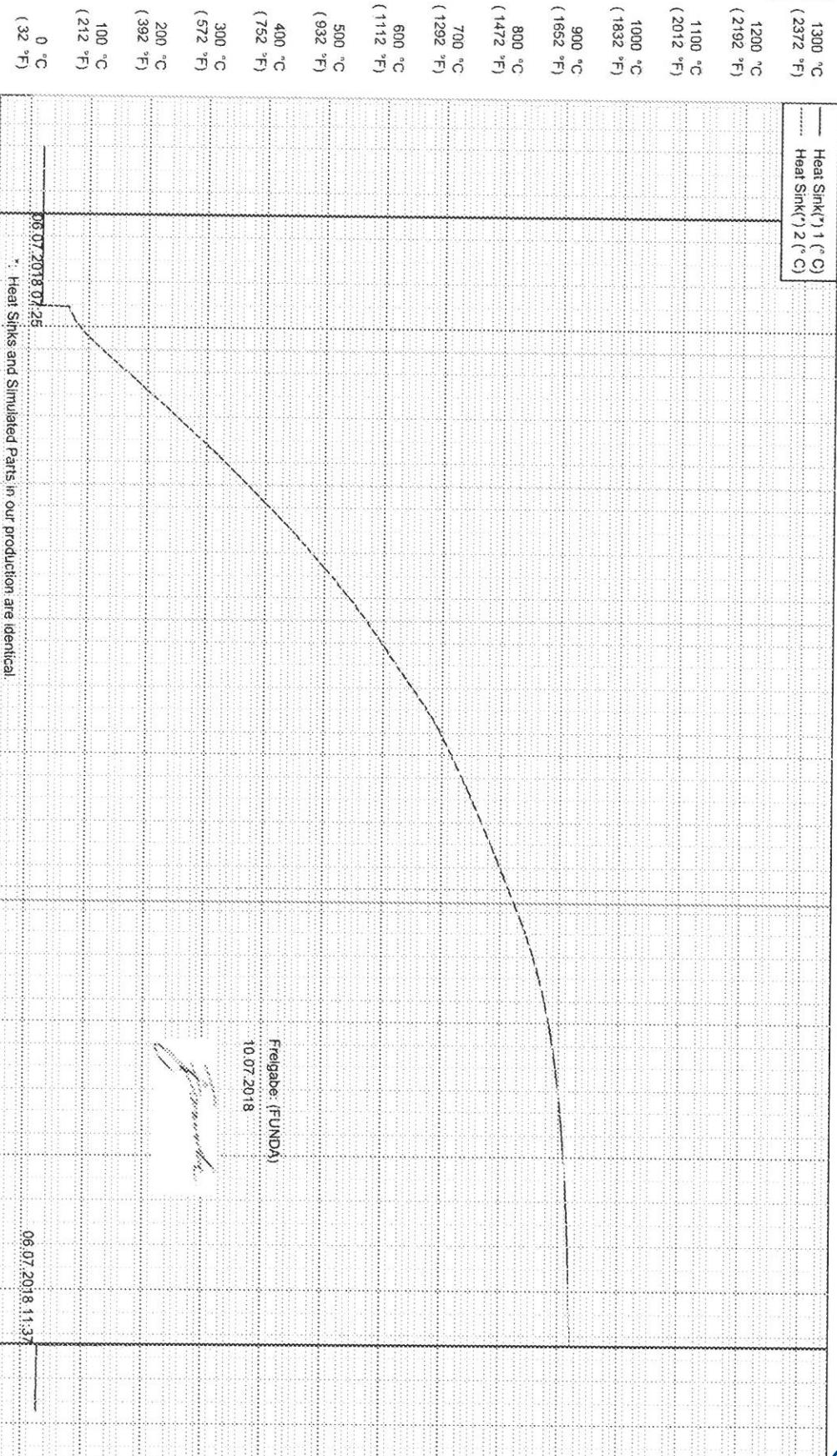
Enclosure for inspection certificate
DIN EN 10204/01.05

173434/1

3.1

Enclosure:
Page:
printed:

2
1 / 1
11. DEC 2018

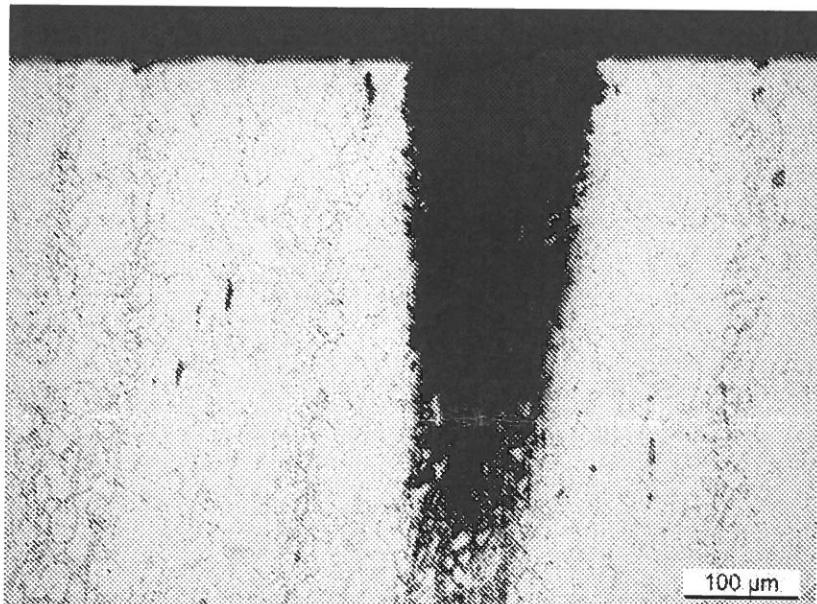


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2016-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

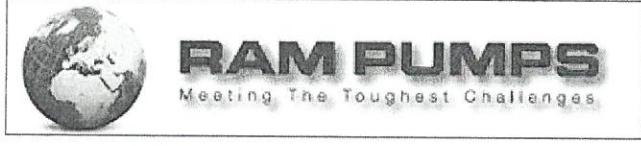
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S .Talbot

26



FLD15248

GN26485

017545B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)	Dim. grano ASTM E112		
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * RAM PUMPS LTD Registered in England 1050935

FLD15248

GN26485

017545B



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING

ULTRASONIC TEST

CERTIFICATE-No :

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)

ORDER : PO0018455KW

ORDER CONFIRMATIO :

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

ULTRASONIC TEST REPORT

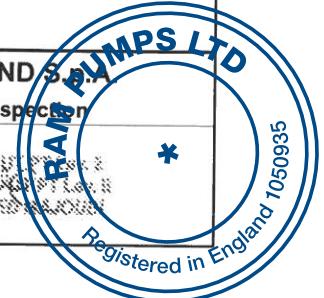
EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS

CUSTOMER INSPECTION

ITALFOND S.p.A.

NDE Inspection

 ISO 9712 - UNI EN 10204-2-3
 ENI-TESLA - VATTENFELT
 MCNAUTEC




Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION****ITALFOND S.p.A.****Quality Assurance**

* Registered in England 1050935



FLD15248

Tracer: 23519

GN26485

017545B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AFNeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	.

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

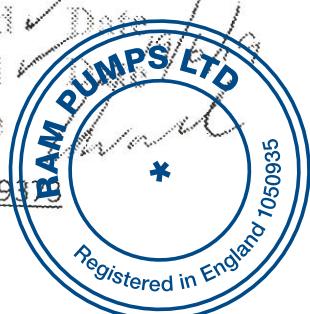
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate,
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/04/2019</i>
Item	<i>AS LISTED</i>	Material	<i>AS LISTED</i>
Order number	<i>PO0020043KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>AS LISTED</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>		
Sensitivity for DAC	<i>4.0 - 4.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>M. TATTERSALL</i>
Date		Qualification	<i>PCN II (103685) SNT-TC-1A II</i>
Signature		Signature	

Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

**Abnahmeprüfzeugnis**

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Probe-Nr. Test No. N° d'éprouvette Nº di prova.		Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta		Probenentnahme Specimen Prélèvement Prelevo		Tensile Testtemperatur Test Temperature Température d'essai Temperatura di prova		HARDNESS/HÄRTE		1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rottura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resistenza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporcione cristalina 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza						
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	Längs-Zone Richtung Direction Lunga	Richtung Direction Lunga	Streckenrichtung Tensile direction Yield direction Tensile direction Lunga	Temperatur °C N/mm²	RM 50mm N/mm²	A Lox % Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rottura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resistenza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporcione cristalina 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza		Bemerkung Remarks Remarques Osservazioni					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Reg's / Anforderung																
Mechanical			1	2	3	20	345	758	25							
Analysis % - Max unless Stated C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0,Mo 8.0-10.0,Nb+Ta 3.15-4.15,Co 1.0 ,Ni 58.0 ,Al 0.40,Ti 0.40,Fe 5.0																
Results																
361506	12.48 Ø		1	2T	3	20	518	906	34							
61091A2	12.47 Ø		1	2T	3	20	480	827	52							
Notes																
4			1	From Bar end												
5			2	L=Longitudinal												
			3	Mid thickness section												
Visual and dimensional checks- Satisfactory																
Chemical / See manufactures certificate and Anlage 2																

Ort -Location -Lieu - Località)

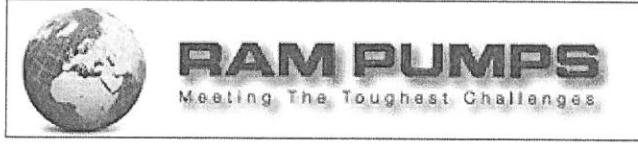
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	0,005

Cast	Melting Pr.	AI	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen									
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation	RoA		
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
1	RT	440			862	4D	54,7		58

Grain Size
1 ASTM E112 - 13

1 No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

Enclosures: 3

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl

* 183545-0 E *



FLD15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

Page: 2 / 2
printed: 06. JUN 2019

Sample Condition		Corrosion Test	
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
Lot	Sample No.		
104927536	105-F02	1 without objection : 0,77 mm/a	
104927536	105-F03		

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.

VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

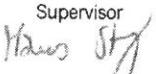
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

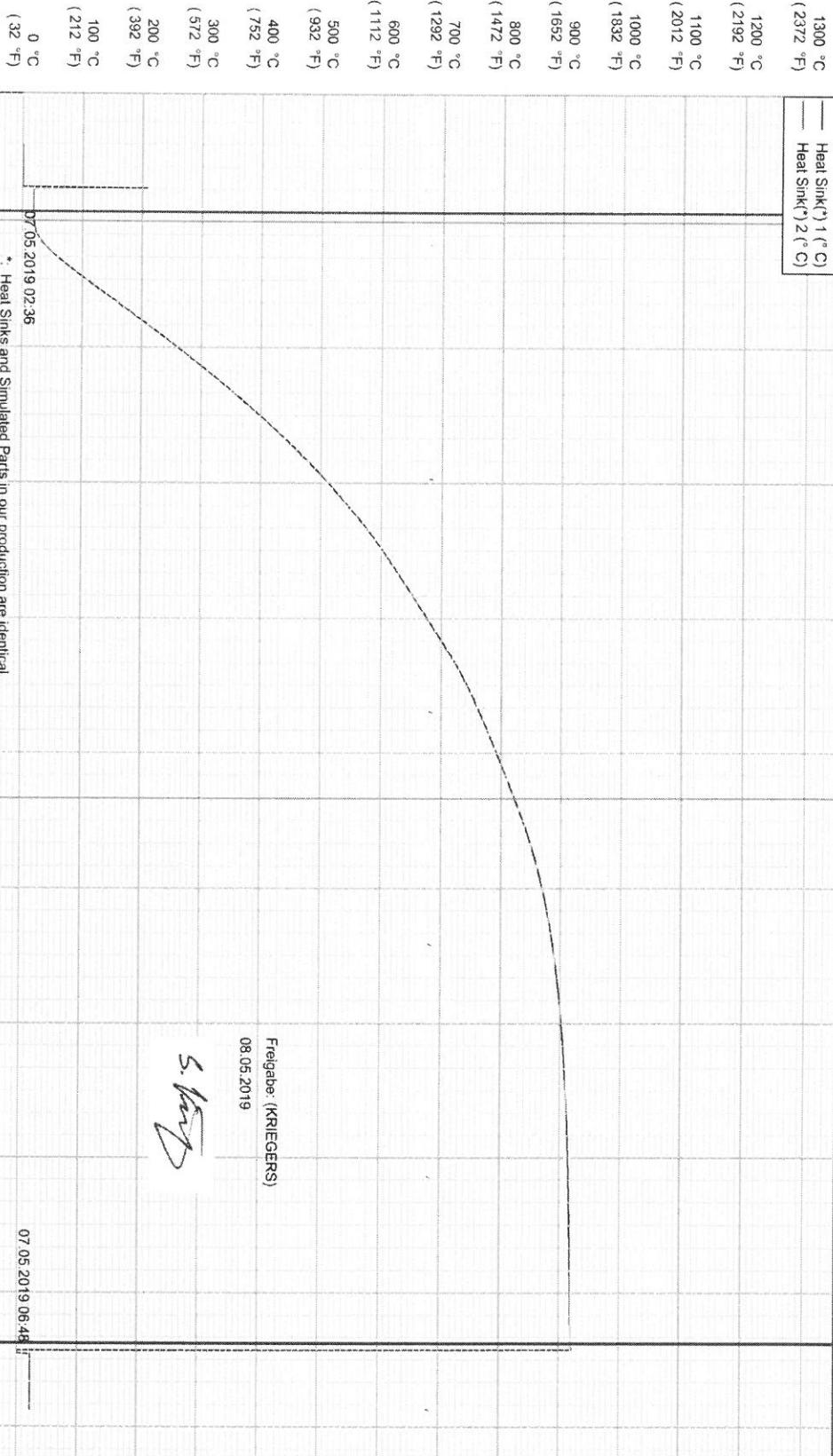
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1

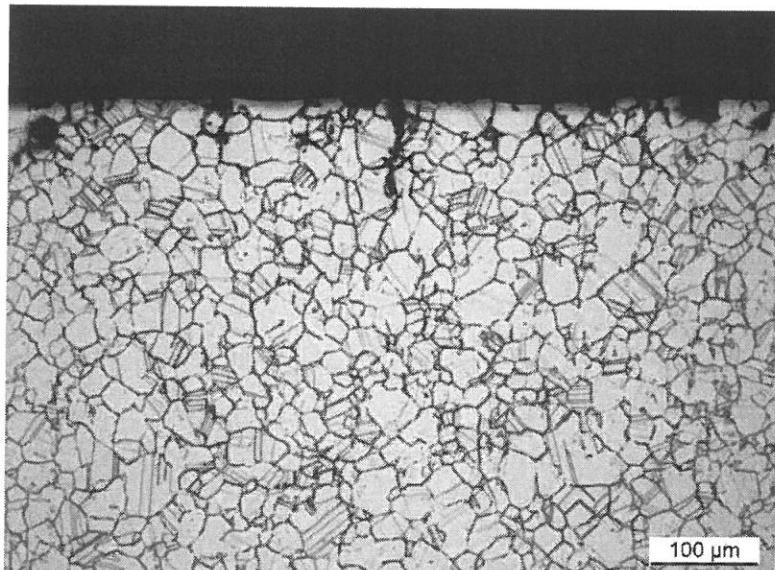


Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

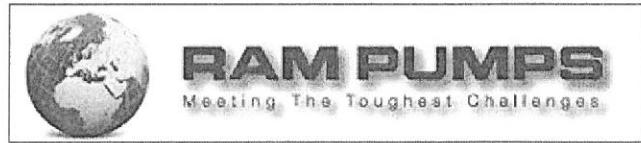
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____



FLI15249

GN26485

017546B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)			Dim. grano ASTM E112
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * RAM PUMPS LTD Registered in England 1050935



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**ULTRASONIC TEST****CERTIFICATE-No :**

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)**ORDER : PO0018455KW****ORDER CONFIRMATIO :**

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**ULTRASONIC TEST REPORT**

EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. NDE Inspection
		ISO 9712 - NDT Level I ENI-TESLA - NDT Level II MCNAUTON - NDT Level III Registered in England 1050935



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

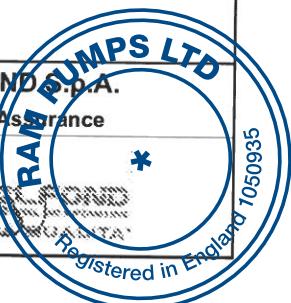
according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION****ITALFOND S.p.A.**

Quality Assurance



FLI15249

GN26485

017546B

Tracer: 23519



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AFNeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

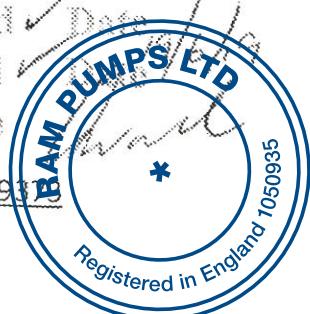
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193



FLI15249

GN26485

017546B

Tracer: 23519



ScanTech Inspection Services
 Unit 13, The Wallows Industrial Estate,
 Fenspool Avenue, Brierley Hill
 West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	NEO NICKEL LTD	Date	12/04/2019
Item	AS LISTED	Material	AS LISTED
Order number	PO0020043KW	Job reference	N/A.

Drawing number	N/A.	Material	AS LISTED
Weld process	N/A.	Thickness	AS LISTED
Surface condition	GOOD	Stress relief	N/A.

Procedure number	DEF STAN 02-729 PART 5 ISS 3 ASTM A388	Couplant	OIL.
Equipment	USM 36 (14077642)		
Sensitivity for DAC	4.0 - 4.5mm F.B.H	Cal. Block	AS PROC.
Acceptance criteria	DEF STAN 02-862 PART 3 ISS 3		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

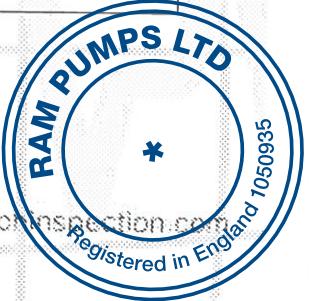
Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	M. TATTERSALL
Date		Qualification	PCN II (103685) SNT-TC-1A II
Signature		Signature	

+44 (0)1384 79924

enquiries@scantechinspection.com

www.scantechinspection.com

Registered in England 1050935



Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment
S Worrall



Document ID: 001 Rev 4

Registered in England 1050935

TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Probenart - Test type - Type d'essai - Tipo di prova:		TENSILE TEST / ZUGVERSUCH							HARDNESS/HÄRTE							
Probe-Nr. Test No. N° d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevoamento	Längs-Zone Richtung Zone Largh. Zona Direktion Längs-Richtung Largh. Zona	Temperatur Temperature Température Temperatura	Prüftemperatur Test Temperature Température de test Temperatura di prova	Streckgrenze Yield Strength Strength de seuil Tensione di resistenza Tensile Strength	0.2 N/mm²	RM N/mm²	Bruchdehnung Elongation at break Étirement à la cassure Elongazione alla rottura	A Lox 50mm	Bruchdehnung Elongation at break Étirement à la cassure Elongazione alla rottura	5 % %	Z % %	Werte Values Valeurs Valori	Bemerkung Remarks Remarques Osservazioni	
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh. Z.														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Reg's / Anforderung							min	min	min							
Mechanical			1	2	3	20	345	758	25							
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																
Results																
361506	12.48 Ø		1	2T	3	20	518	906	34							
61081A2	12.47 Ø		1	2T	3	20	480	827	52							
Notes																
4	Visual and dimensional checks- Satisfactory															
5	Chemical / See manufactures certificate and Anlage 2															

Ort -Location -Lieu - Località)

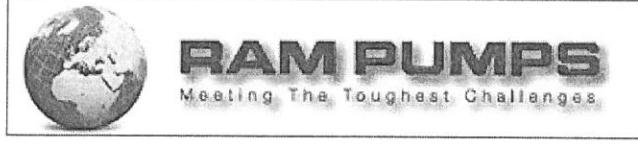
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

APPROVED

By Sally Roddis at 3:51 pm, 6/25/19

Heat #
326940

Tracer #
26550

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52	0,005
	top	LE	LE	RF		RF						
	Meth											

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	0,22	0,02	0,010	3,370
	top	RF	RF	RF	
	Meth				

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen		RoA							
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation	A	A	A
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
1	RT	440			862	4D	54,7		58

Grain Size	
1 ASTM E112 - 13	
1	No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

Enclosures: 3

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl

Date of release: 06.06.2019

183545-0-E



FLD15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 06. JUN 2019

Order No. Purchase Order No.
538839 402468 (LB 11904)

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.

VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

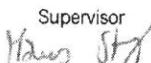
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor


Stahlberg, Level III

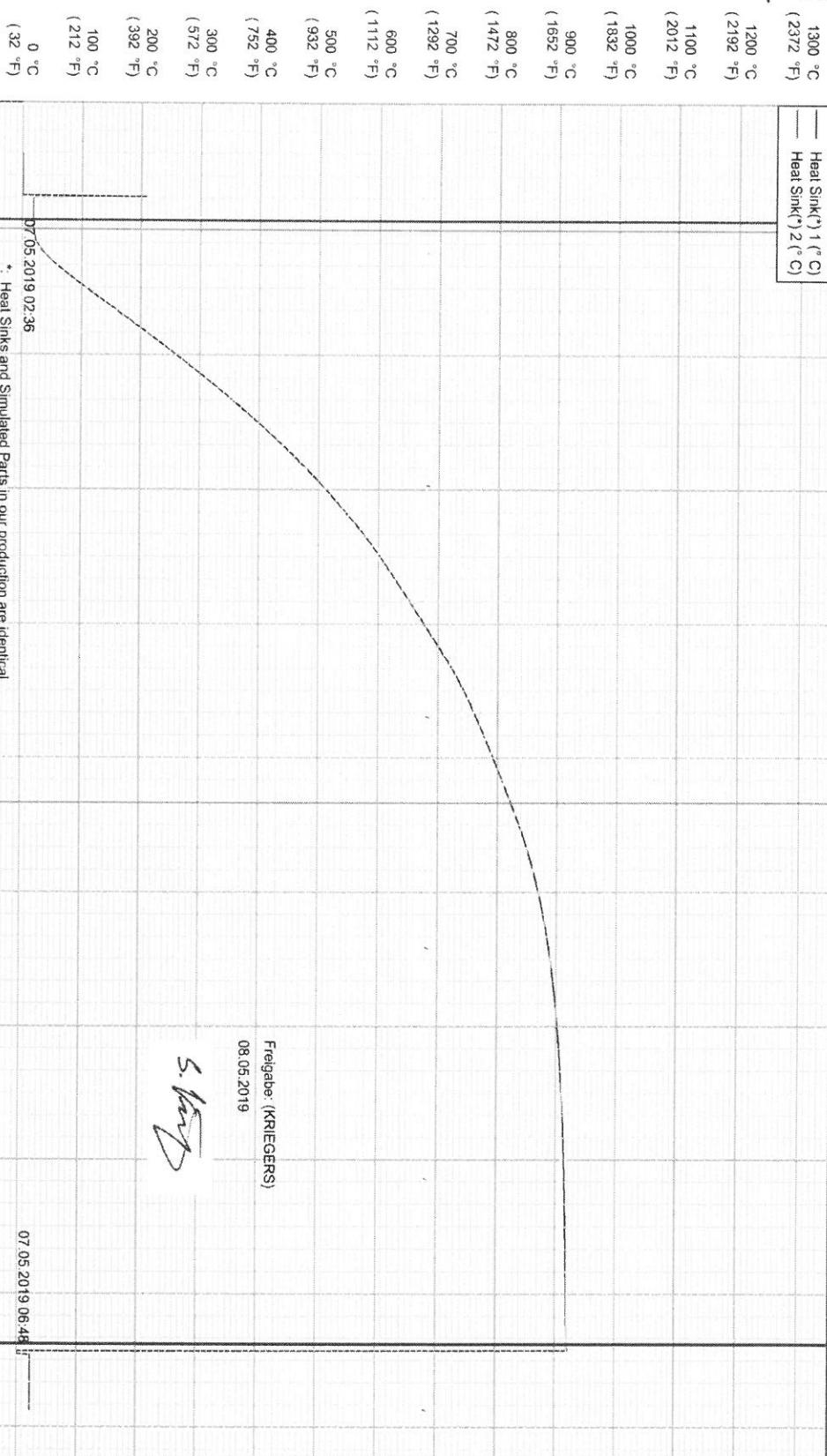
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

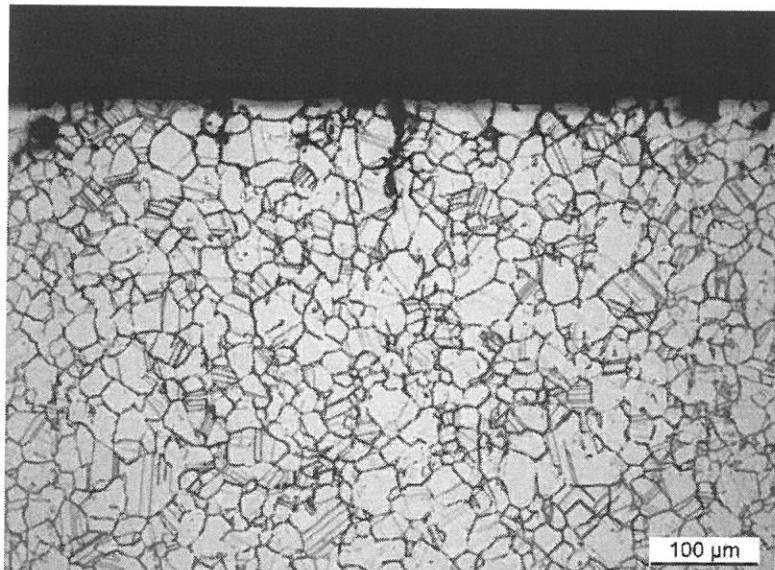
Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1



VDM Metals GmbH

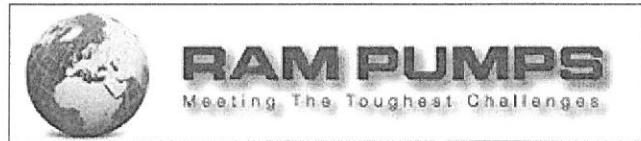
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____





RAM PUMPS
Meeting The Toughest Challenges

RAM Pumps Ltd
Unit 14 Hazelwood
Trading Estate
Worthing
West Sussex
BN14 8NP

Tel: +44 (0) 1903 206622
Fax: +44 (0) 1903 205511

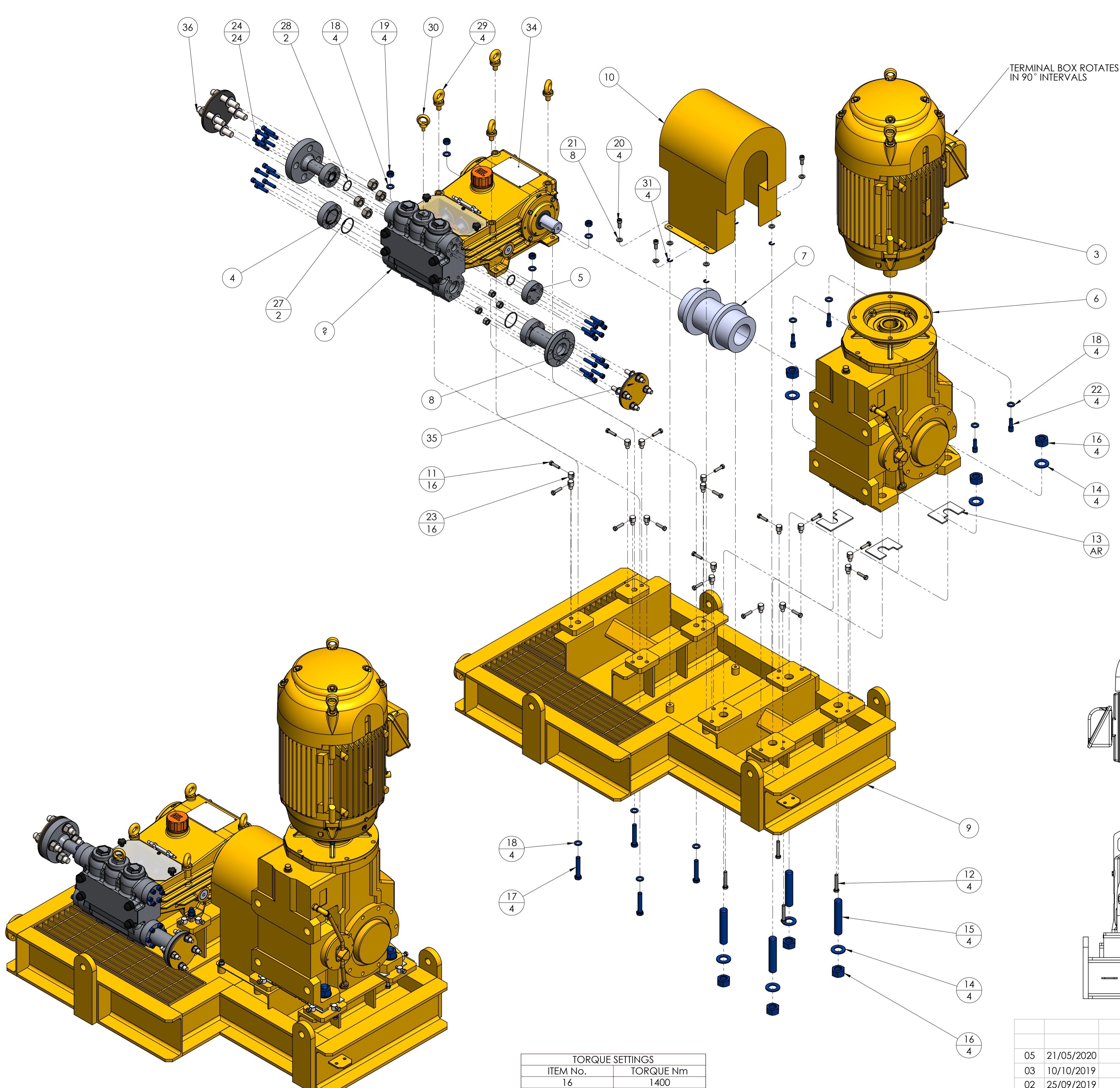
OPERATING & MAINTENANCE MANUAL / OPERATION & MAINTENANCE DATABOOK INDEX

Client	<i>L&T Hydrocarbon Saudi</i>
Project Title	<i>Marjan Increment Program – Offshore Oil Facilities</i>
Ram Project Reference	<i>016867s</i>
Equipment Title	<i>Slops Pumps</i>
Equipment Tag No's.	<i>G75-44-G-0138A/B, G75-45-G-0156A/B, G75-46-G-0149A/B G75-47-G-0164A/B, G75-49-G-0143A/B, G75-52-G-0133A/B</i>
Pump Serial Numbers	<i>016867A/B, 016867C/D, 016867E/F 016867Y/Z, 016867AA/AB, 016867AC/AD</i>
Purchase Order Number	<i>L&T Hydrocarbon Saudi/83000-00192/SD</i>

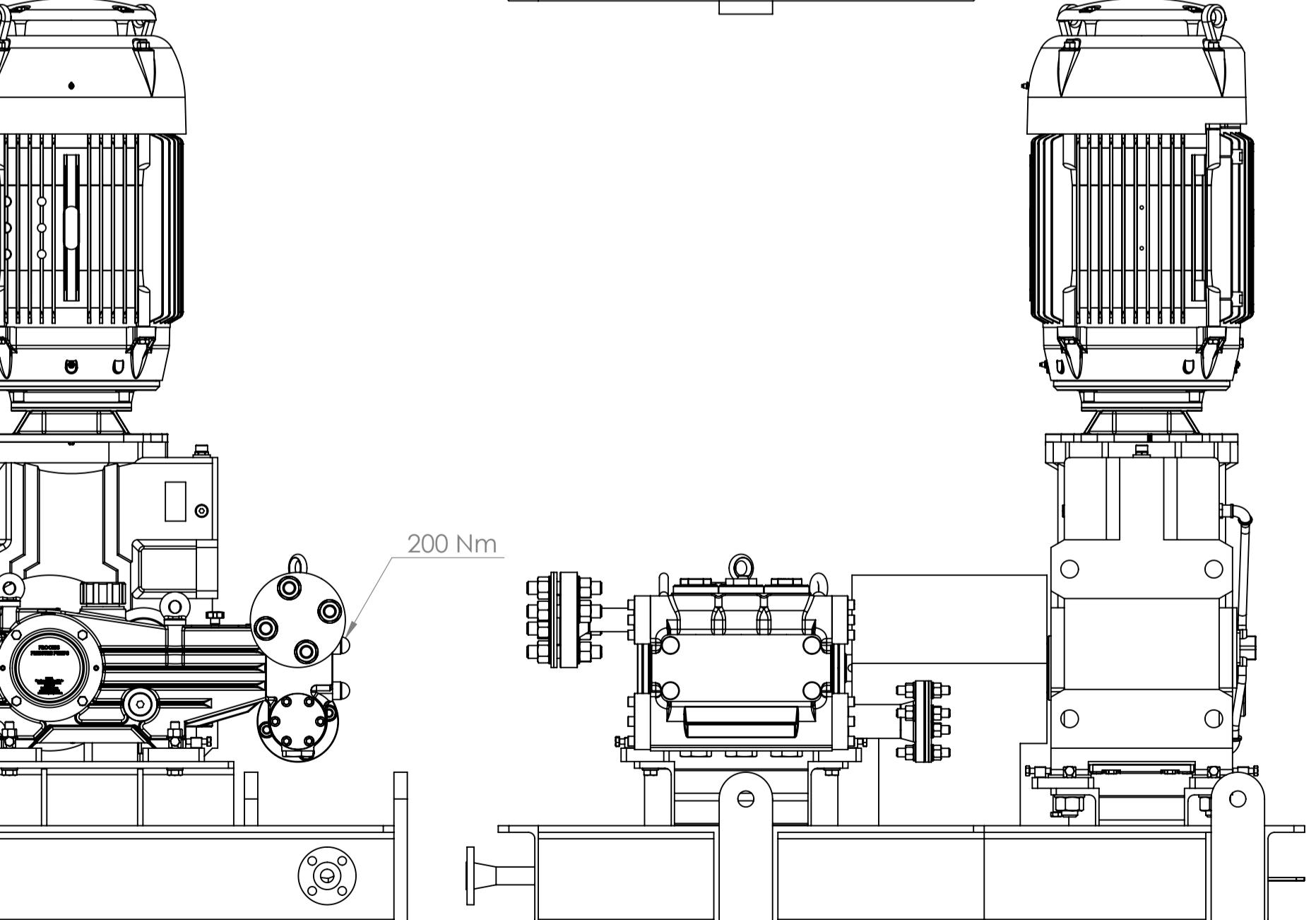
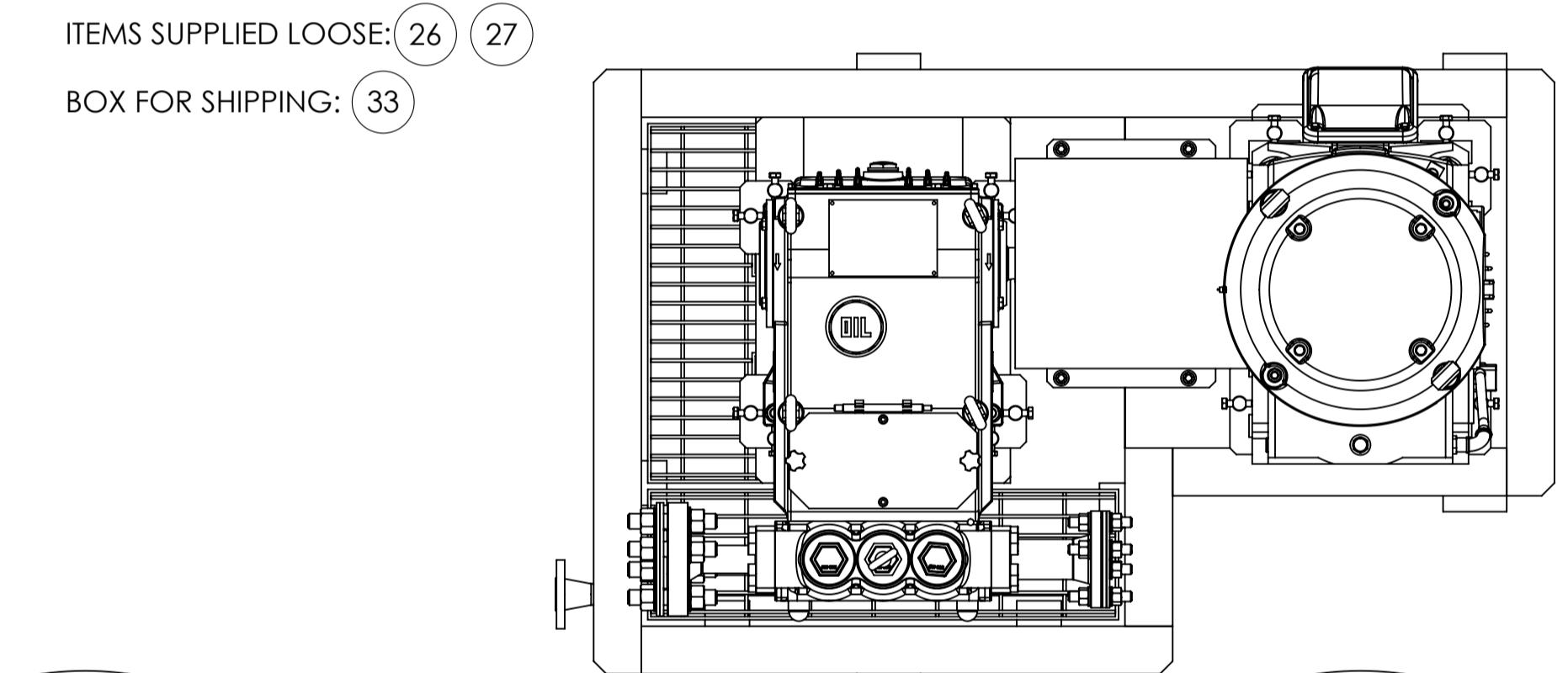
Sequence	Component	Description	Material Number	Heat Number	Certificate Number	Global number	RAM Build Number	File Reference
9	FLI15249	FLANGE RAM54 2" 150# RF	UNS N06630	61091A2	1938	26485	017546B	26485
8	FLD15248	FLANGE RAMS4 1.5" 1500# RTJ	UNS N06629	326940	183545/0	26485	017545B	26485
5	FLG15247	BLANKING FLANGE DISCHARGE RAM54 HCH	UNS N06628	326413	17747S/0	26308	017431B	26308
4	FLG15246	BLANKING FLANGE SUCTION RAM54 HCH	UNS N06627	319939	176057/0	26308	017430B	26308
9	FLI15249	FLANGE RAM54 2" 150# RF	UNS N06630	61091A2	1938	26485	017546B	26485
8	FLD15248	FLANGE RAMS4 1.5" 1500# RTJ	UNS N06629	326940	183545/0	26485	017545B	26485
5	FLG15247	BLANKING FLANGE DISCHARGE RAM54 HCH	UNS N06628	326413	17747S/0	26308	017431B	26308
4	FLG15246	BLANKING FLANGE SUCTION RAM54 HCH	UNS N06627	319939	176057/0	26308	017430B	26308

**RAM
PUMPS**

DO NOT ACCEPT HAND MARK-UPS UNLESS SIGNED AND STAMPED BY THE ENGINEERING DEPT OF RAM PUMPS LTD.



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL
1	GAD16183	G. A. DRAWING FOR PUMPS TAG B - 016358s	N/A
2	PP16186	PUMP ASSEMBLY RAM54R055 HCH/SL/V/RHD	N/A
3	MTR16169	MOTOR BALDOR 40HP 480/60Hz/3P (LHS BOX)	CAST IRON
4	FLG15246	BLANKING FLANGE SUCTION RAM54 HCH	ASTM B166 N06625 (INCONEL 625)
5	FLG15247	BLANKING FLANGE DISCHARGE RAM54 HCH	ASTM B166 N06625 (INCONEL 625)
6	GBX16185	GEARBOX RADICON K10318.0BACN5-B 8.26:1	CARBON STEEL
7	CPG16255	COUPLING KTR RIGIFLEX-N 110 A	CARBON STEEL
8	FUI15249	FLANGE INLET RAM54 2" 150# RF	ASTM B166 N06625 (INCONEL 625)
9	BFI16181	BASEFRAME FABRICATION VERTICAL GBX RHD	S355 JR
10	GUA14252	GUARD PUMP-GBX	NON SPARKING ALUMINIUM
11	BLT10A40C SET	HEX HEAD SET BOLT M10 X 40 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
12	BLT12A70C SET	HEX HEAD SET BOLT M12 X 70 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
13	SHM14256	SHIM SET	ASTM A276 GR.316
14	WSH30KC	WASHER M30 C/S	CARBON STEEL
15	STD30160C	STUD BOLT M30 X 160 LONG	GR. 8.8 C-S
16	NUT30KC	NUT M30 ST.THICKNESS C/S GR.8	ISO 898-2 GR.8 C-S
17	BLT16A90C	HEX HEAD BOLT M16 X 90 GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
18	WSH16KC	WASHER M16 C/S	CARBON STEEL
19	NUT16KC	NUT M16 ST.THICKNESS C/S GR.8	ISO 898-2 GR.8 C-S
20	BLT12B25C	HEX SOCKET HEAD BOLT M12 X 25 LG GR.8.8 C-S	ISO 898-1 GR.8.8 C-S
21	WSH12KC	WASHER M12 C/S	CARBON STEEL
22	BLT5-8N-11B38C	CAP HEAD BOLT UNC 5/8"-11X1.5" LONG C/S	ISO 898-1 GR.8.8 C-S
23	TST14961	BASEFRAME ADJUSTING BLOCKS 15mm	ASTM A276 GR.316
24	BLT12B50C 12.9	HEX SOCKET HEAD BOLT M12 X 50 LG GR.12.9 C-S	ISO 898-1 GR.12.9 C-S
25	PDR15281	FG-30-207-FPM-625-AX-C-1 1/2" 1500 RTJ	ASTM B446 GR.1 UNS N06625
26	PDR15282	FG-30-17-FPM-625-AX-C-1 1/2" 150#RF	ASTM B446 GR.1 UNS N06625
27	ORG22975V	O-RING	ASTM D1418 FKM
28	ORG2275V	O-RING	ASTM D1418 FKM
29	LPT11380	M18 LIFTING EYE	ISO 3266:2010
30	LPT4997	LIFTING EYEBOLT M12	ISO 3266:2010
31	WSH12EC	M12 E-CLIP RETAINING WASHER	CARBON STEEL
32	BOX015527S	TRANSPORT BOX	WOOD
33	NPTPROJECT	NAME PLATE FOR PROJECT	316 ST/ST
34	PTFECOAT	PTFE COATING PROJECT BOLTS	PTFE
35	CVR16265	SHIPPING FLANGE COVER KIT 2" 150#	SEE PARTS LIST
36	CVR16267	SHIPPING FLANGE COVER KIT 1.5" 1500#	SEE PARTS LIST
37	FLD15248	FLANGE DISCHARGE RAM54 1.5" 1500# RTJ	ASTM B166 N06625 (INCONEL 625)



05	21/05/2020	M2690	ES	ES	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES: LINEAR: $+/- 0.5\text{mm}$ $0.0 = +/- 0.1\text{mm}$ $0.0 = +/- 0.04\text{mm}$ ANGULAR: $+/- 0.5\text{ DEGREES}$	MATERIAL:	THIS DRAWING IS CONFIDENTIAL AND MUST NOT BE COPIED, LOANED OR TRANSFERRED WITHOUT PERMISSION OF: © 2019 RAM PUMPS LTD WORTHING SUSSEX
03	10/10/2019	M2658	ES	ES	FOR EXPLANATION OF NOTES SYMBOLS ETC SEE B.S. 308	FINISH:	DRAWN (1st): ES APPROVED (1st): SS
02	25/09/2019	M2650	ES	ES	(N) INDICATES MODIFICATION ISSUE NUMBER	TREATMENT:	DATE: 21/08/2019
01	21/08/2019	INITIAL RELEASE	ES	SS	UNLESS OTHERWISE STATED	SHEET SIZE: A1	ORIGINAL SCALE: 1:8
ISSUE	DATE	MOD	DRAWN	APRVD	TITLE: PACKAGE ASSY RAM54R055 HCH/SL/V/RHD	1st USED ON: 016358s	RAM DWG NO.:

PK16184

FLG15246

GN26308

017430B

GIN 26308

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate

176057/0

DIN EN 10204/01.05

3.1

Page:

1 / 2

Order No.

Purchase Order No.

528182

PO0018424KW / LB 11547

printed:

23. NOV 2018

NeoNickel Ltd.

First Avenue
GB - DY6 7TG Kingswinford

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100

LRQA Approval

KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.9.15)

add. customer requirement: impact test

Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

**Item** **Pcs** **Wht [kg]** **Dimension [mm]** **Cast** **Lot** **Delivery No.**

14	2	843	114,30 Ø x 2000-6000	Cast	319939	104854354	8681937863	4-1/2" dia
----	---	-----	----------------------	------	--------	-----------	------------	------------

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	top	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319939	VIM/ESR	top	0,25	<0,01	3,47
		Meth	RF	RF	RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	Hardness Test	
104854354	1-A1							1 ASTM E10 - 17	
104854354	1-A1							2 ASTM E18 - 17et	
104854354	2-A1	1 RT	459		891	40 50,5 5 47,6 60		HBW 10/3000/A HRC	
104854354	2-A1							1 277 surface	
								2 27,4 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Üçüncü, authorized inspection representative

Date of release: 23.11.2018

Q

* 1760570-1

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VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdekl
Postbox 1820, D-58778 Werdekl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Möller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, 85327
Company domicile: Werdekl



FLG15246.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 2 / 2
 printed: 23. NOV 2018

Sample Condition annealed		Notched Bar Impact Testing						Grain Size	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 ASTM E112 - 13
					2	3	4	5	
104854354	1-A1	2	-46	84	91	85			
104854354	1-A1	2	-46	87	86	89			
104854354	2-A1	1	-46	137	133	144			
104854354	2-A1								1 No 7.5

Sample Condition annealed		Corrosion Test	
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
104854354	1-A1	1	without objection : 0,41 mm/a
104854354	1-A1		
104854354	2-A1		
104854354	2-A1		

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory

Heat Treatment Lot

920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TUV-Systems-Certification body for pressure equipment of the TUV NORD GROUP: notified body, reg-no. 0045.

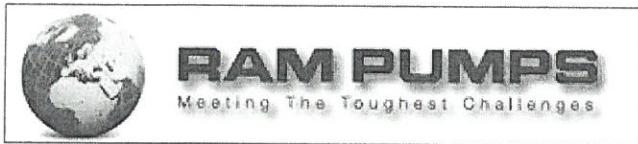
Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

26



FLG15246 GN26308 017430B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56	0,007
	top Meth	LE	LE	RF		RF						

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	0,25	0,04	<0,01	3,45
	top Meth	RF	RF	RF	

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA
			[°C]	[MPa]	[MPa]	A [%]	
104854379	I-A1	1	RT	534	910	40	52,3
104854379	I-A1				5	47,9	59

Hardness Test1 ASTM E10 - 17
2 ASTM E18 - 17e1

HBW 10/3000/A HRC

1 281 surface 29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Unal Ocuncu, authorized inspection representative

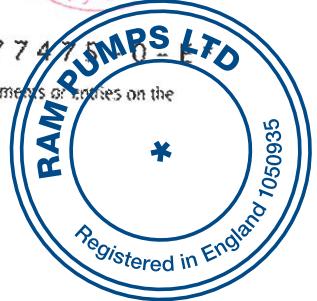
Date of release: 04.01.2019

Mark of the Inspector

Q

E
True Copy Of Original
Verified

* 1774750-1

VDM Metals GmbH
Division Bar and Forgings
Pfeifferberger Straße 2, D-58791 Werden
Postbox 1820, D-58778 Werden
Telephone: 02392 55-41, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Isenbüttel local court, #5327
 Company domicile: Werden

FLG15247.M

FLG15246 GN26308 017430B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			1 No 7.5
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment	Lot
920°C/00:45h/Water	104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl/ Number of Quante Numero pezzli	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEOC
INTERNACIONAL



TOV NORD
TOV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19308-02(SW)

Inspection No.

ચેતનાં નું

Nº 51 CONFERENCIA

Teil

५७८

83

Part

Anlage - Annex - Anhang - Allegato: 1

Blatt-Nr. 1 of 1

Sheets

Baru N^o.

Digitized by

Mechanische Prüfungen

Fréquent - TÉMOIGNAGE - L'ADOLESCENCE - LEURS EXPÉRIENCES - FRÈRE MAGISTRAL

Probenart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Taille de la prothèse Probenzustand - Specimen condition - Etat d'éprouvette - Stato della provetta Etat d'éprouvette - Stato delle provette				TENSILE TEST / ZUGVERSUCH					HARDNESS/HÄRTE										
Probe-Nr. Test No. Nº d'éprouvette Nº di prova	Probennahmemaßung Dim. of specimen Dim. de l'éprouvette Dim. della provetta		Probennahme Specimen Prélèvement Prelevamento		Temperatur Température Temperatura Temperatura	Spannung Strength Énergie Tensione	Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza	Geschwindigkeit Speed Vitesse Velocità	RM N/mm ²	A Lox	Z %	Werte / Values / Valeurs / Valori 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17						Bemerkung Remarks Remarques Osservazioni	
Schmelze-Nr. Heat No. Nº Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	U.L. Unter en de in	U.L. Unter en de in	richtung Direction Direction Direz. <td> <p>Temperatur Température Temperatura Temperatura</p> <p>Spannung Strength Énergie Tensione</p> <p>Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza</p> <p>Geschwindigkeit Speed Vitesse Velocità</p> </td> <td>0.2 N/mm²</td> <td>50mm</td> <td>50mm</td> <td>%</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	<p>Temperatur Température Temperatura Temperatura</p> <p>Spannung Strength Énergie Tensione</p> <p>Streckgrenze Yield strength Tension de résistance Tensione di resistenza Tensore di resistenza</p> <p>Geschwindigkeit Speed Vitesse Velocità</p>	0.2 N/mm ²	50mm	50mm	%									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
Reg'ts / Anforderungen																			
Mechanical				1	2	3	20	415	830	30									
Analysis % - Max unless Stated																			
C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																			
Results																			
326413	12.50 Ø			1	2	3	20	503	874	49									
325867	12.51 Ø			1	2	3	20	452	865	51									
361682	12.46 Ø			1	2	3	20	446	869	51									
Notes																			
4	Visual and dimensional checks- Satisfactory																		
5	Chemical / See manufactures certificate and Anlage 2																		

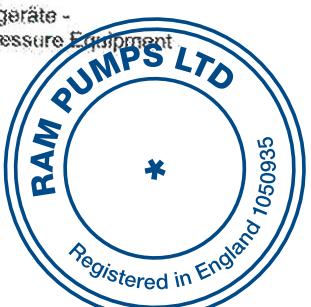
Ort - location - lieu - località

(Datum/Date/Stata)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S. Worrall

LONDON

30/05/19



FLG15246

GN26308

017430B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	-

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

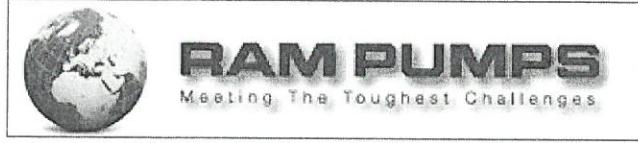
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No 24
Mode General Metals
Time 2019-07-10 14:47
Duration 10.75
Units %
Sigma Value 2
Sequence Final
Alloy1 Alloy 625 : 0.01
SAMPLE FLG15247.M
HEAT
LOT
BATCH
MISC
NOTE

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
 printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
 GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09
 However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

UNS N06625

UNS N06625

Item	Pcs	Wht [kg]	Dimension [mm]
150	2	2548	190,50 Ø x 3000-6000

Cast	Lot	Delivery No.
326940	104927536	8681961277

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89;
 AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test								Grain Size		
Lot	Sample No.	Temp [°C]	Yield [MPa]	0.2% Yield [MPa]	1.0% Yield [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	1	No 6.5	
104927536	105-F02	1	RT	440		862	4D	54,7				
104927536	105-F03											

APPROVED

By Sally Reddick at 3:51 pm, 6/23/19



We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Enclosures: 3

Q

* 183545/0-ETD

Ünal Ücüncü, authorized inspection representative Date of release: 06.06.2019

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68 1,44	



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

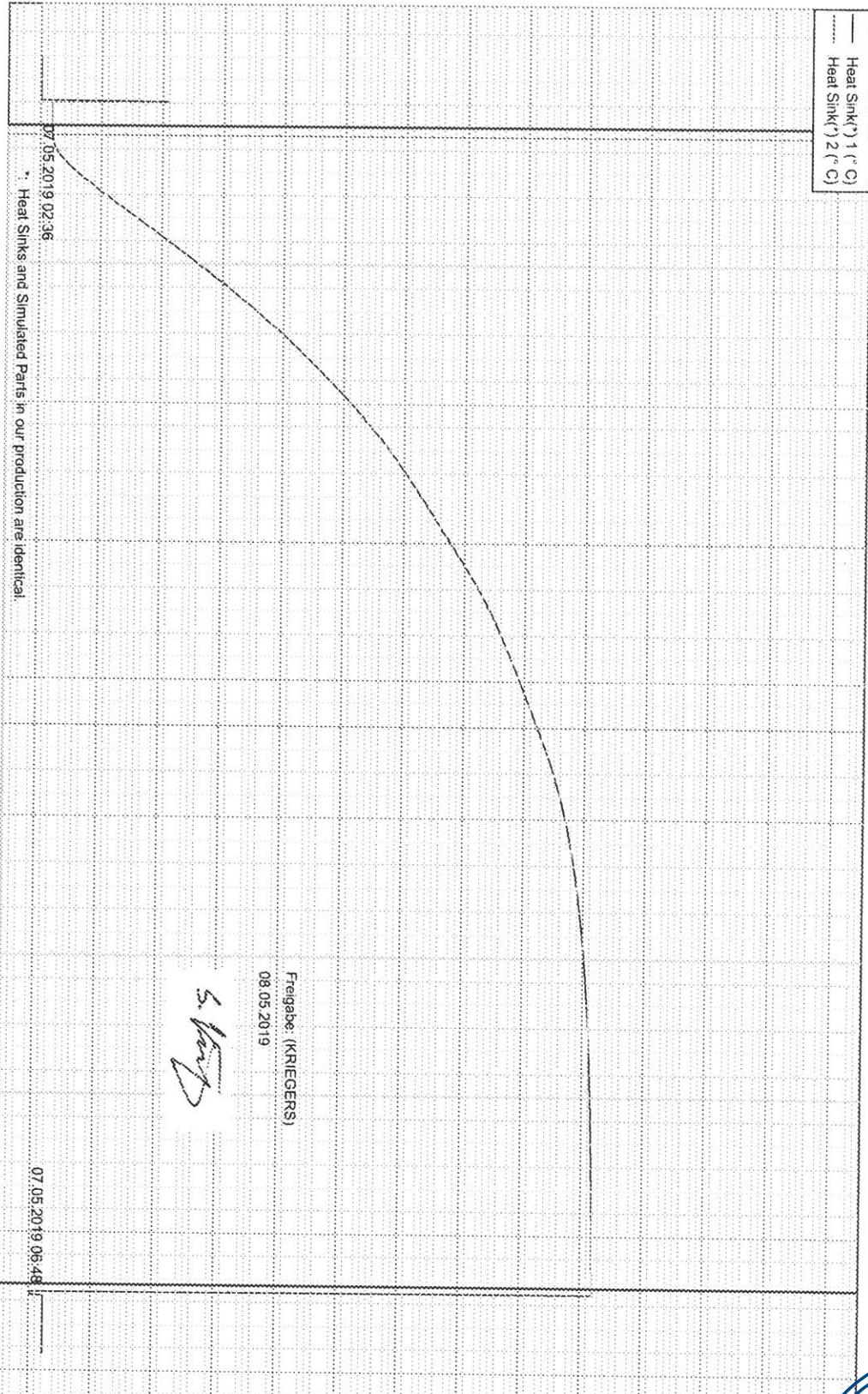
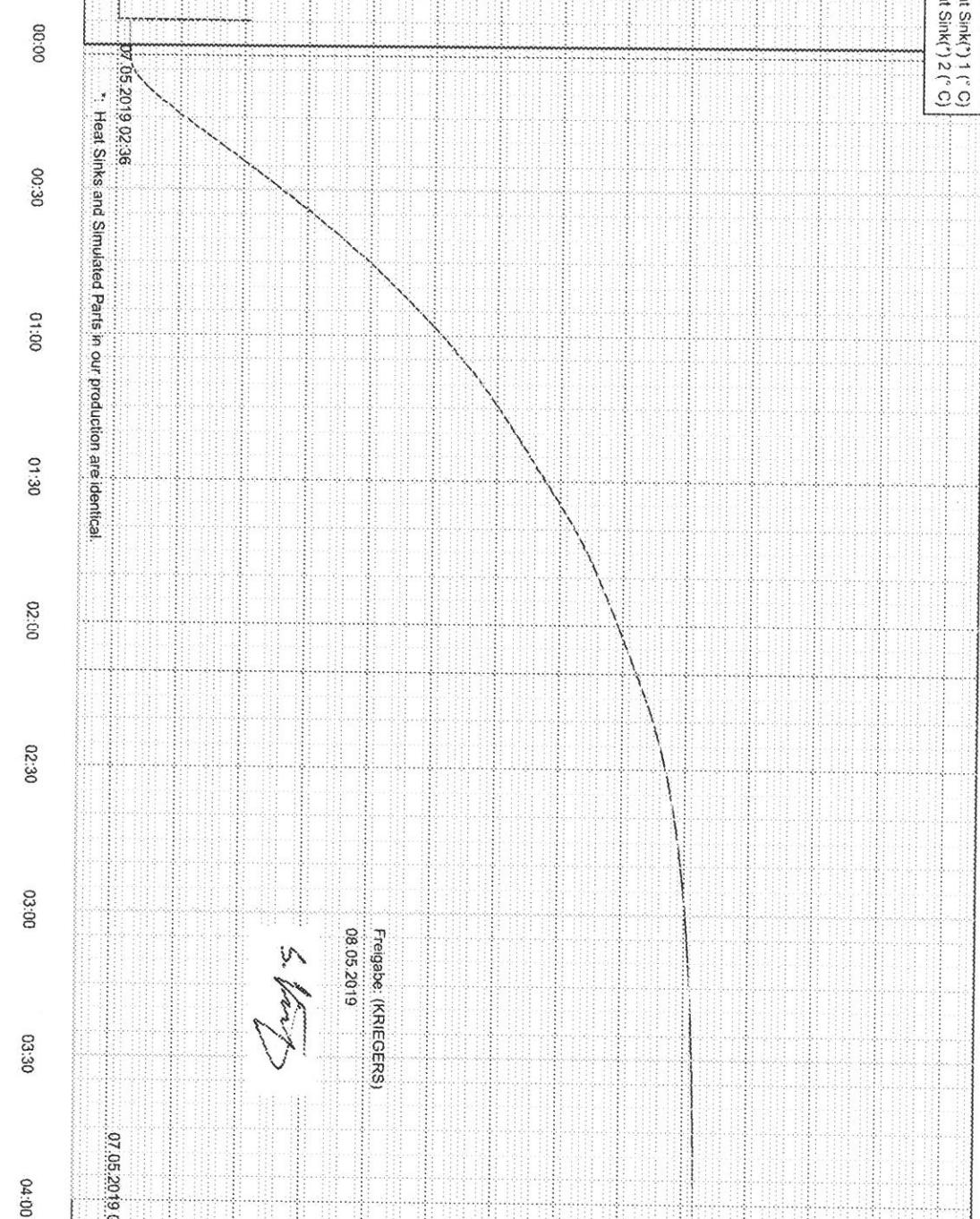
FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

VDM Metals GmbH

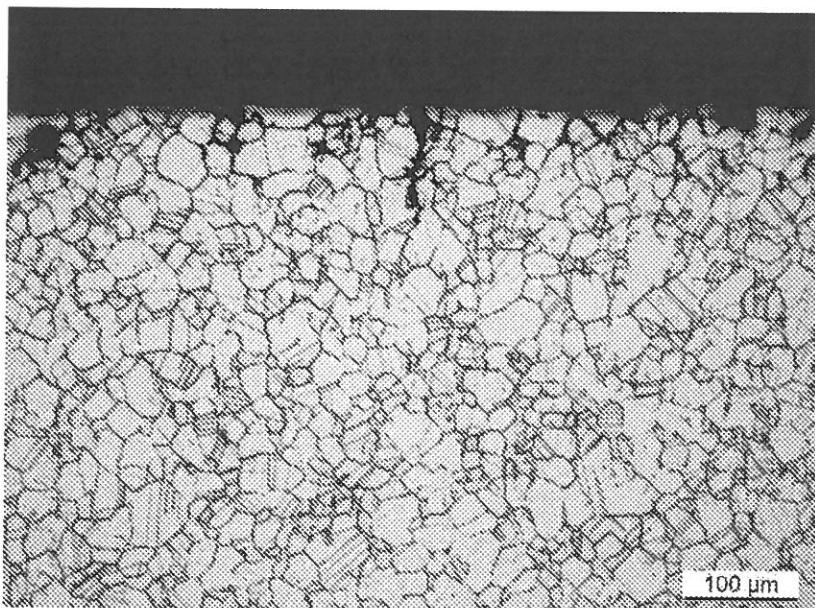
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE VIM/VAR

H/T LOT NO 104927536

TEST COUPON SIZE PROLONGATION

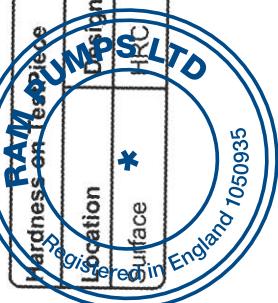
Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong	
											5.8	0

Impact Tests

Test No.	Location	Orientation	Temp	Charpy V	130	149	131	Joules	1	2	3	Min Av	1	2	3	Min Av	Lateral Expansion

Test No.	Location	Orientation	Temp	Charpy V	130	149	131	Joules	1	2	3	Min Av	1	2	3	Min Av	Lateral Expansion

Hardness on Specimen	Designation	Requirements	Results				
			Surface	HRC	22.3	23.4	23.7



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099880	2	2	426862	04/07/19
Reduction Ratio:	Customer O/No.		PO0020371KW	Line: 2

Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C	Si	Mn	S	P	Ni	Cr
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27
			Ta				9.14
				0.010			0.22
						3.36	0.02
						0.33	0.02
							4.52
							3.37C

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

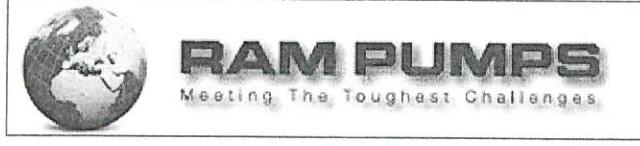
This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

26



Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings
 BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy
 Nb+Ta =SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed

Lot	Sample No.	Tensile Test									
		Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]			
104820039	107-E01	RT	517		916	4D	43,1				54
104820039	107-F03										

Sample Condition annealed

Lot	Sample No.	Notched Bar Impact Testing						
		Temp. [°C]	KV [J]	aK [J/cm²]	Lateral Exp. [mm]			
104820039	107-E01	-110	111	116	115		1,37	1,44
104820039	107-F03						1,4	

Grain Size
 1 ASTM E112 - 13

1 No 8

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the Inspector

Q

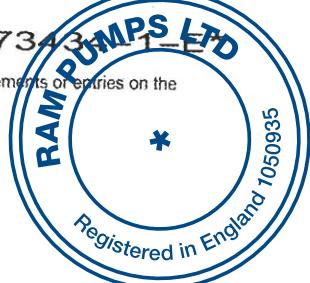
E

Enclosures: 4

* 173434-1-E

VDM Metals GmbH
 Division Bar and Forgings
 Plattenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLI15249.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
527148 402338

Page: 2 / 2
printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	1 without objection: 1,38 mm/anno
104820039	107-F03	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

SUPER ALLOYS
t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	Customer O/No.	PO0020371KW

Report No.	098861	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	PO0020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	0.45	WATER

MELTING PRACTICE VIM/ESR
H/T LOT NO 104820039

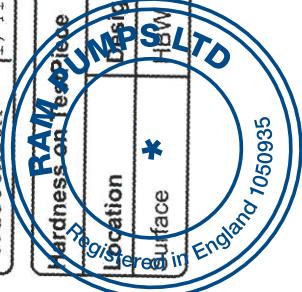
TEST COUPON SIZE Prolongation

Test No.	Location	Orientation	Temp 20 °C	0.20% Proof	Result 517 MPa	UTS 916 MPa	Spec-Min 43.1	Result 43.1	%Elong		% Reduction of Area	
									Spec-Min	Result	Spec-Min	Result

Impact Tests

Test No.	Location	Orientation	Temp -110 °C	Charpy V	111 116 115 Joules	Energy			Shear %			Lateral Expansion		
						1	2	3	Min Av	1	2	3	Min Av	1
402338A10A	1/4T	Long	-110 C	Charpy V	111 116 115 Joules					1.37	1.44	1.4	mm	54 0

Hardness on Testpiece	Designation	Requirements	Results	
			Surface	Overall
	*		222	222



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

Test	Location	Specification	Result						Value	Min	Max	Report No				
			C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	NT
Heat No.			0.03	0.10	0.05	0.001	0.005	59.59	22.27	9.16	0.25	3.40	0.15	0.34	4.59	3.41
319837																
			Ta													
				0.01												

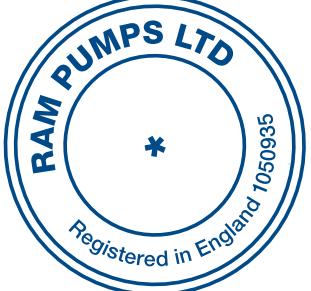
We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer

J. A. Holden



Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

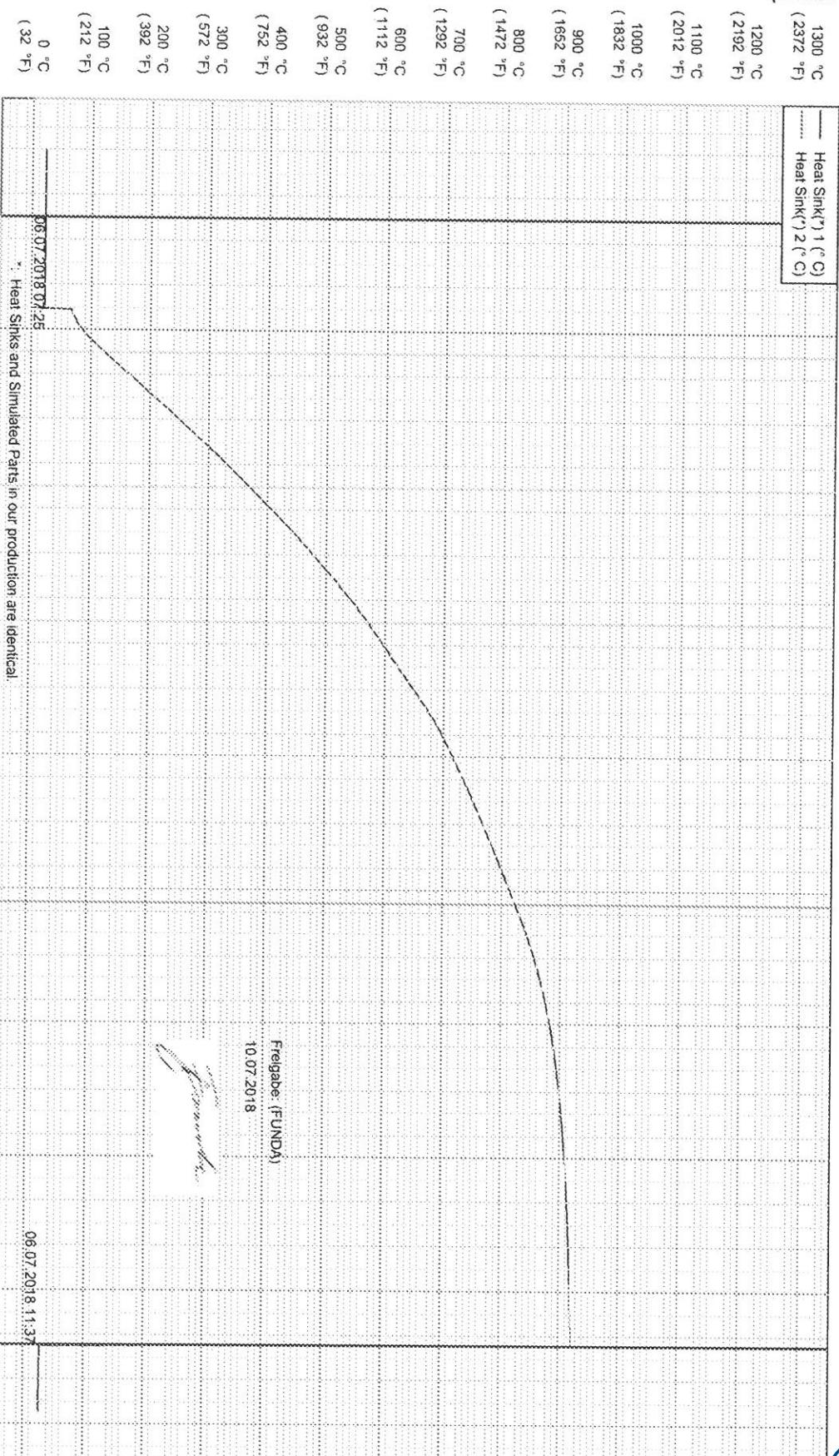
VDM Metals

Enclosure for inspection certificate
DIN EN 10204/01.05

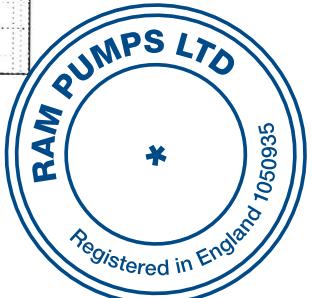
173434/1

3.1

Enclosure: 2
Page: 1 / 1
printed: 11. DEC 2018



Ofen / Furnace : 10 – Gluehlos / Batch : 2073

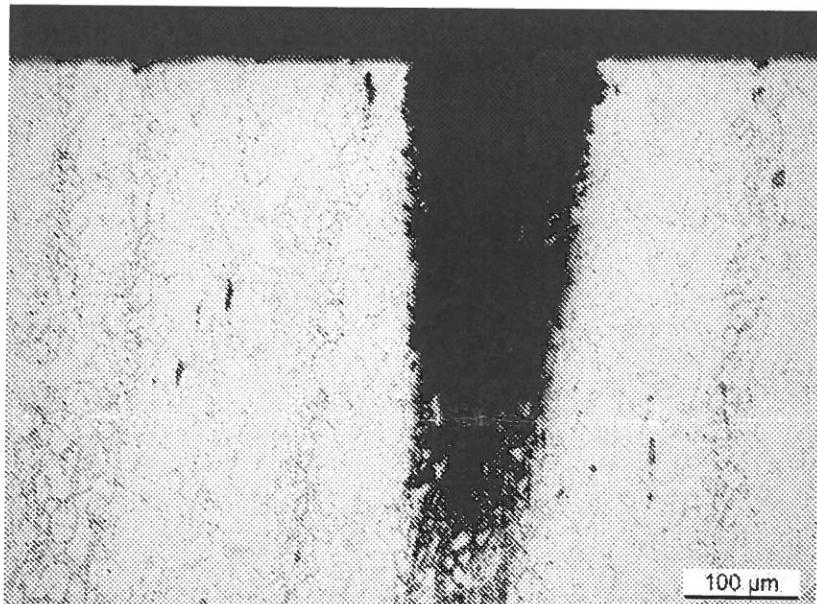


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2016-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

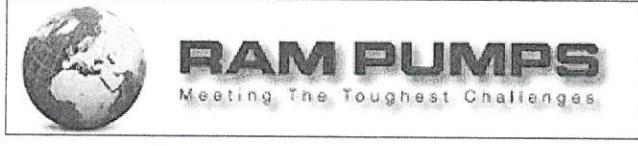
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S.Talbot

26



FLG15247

GN26308

VDM Metals GmbH
on behalf of VDM Metals International GmbH

GIN 26308

VDM Metals

Inspection certificate 176057/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 23. NOV 2018

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined



Specification

ASTM B 446-03 (reapproved 14)
 ASME BPVC.II.B-2017 SB-446
 AMS 5666 J
 ASTM B 564-17a applicable for forgings
 ASME BPVC.II.B-2017 SB 564 applicable for forgings
 BS 3076-89
 NACE MR0175 / ISO 15156-3 2015
 NACE MR0103-2012
 US-test acc. to API 6A PSL3 (7.4.2.9.15):
 add. customer requirement: impact test
 Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625
 UNS N06625
 UNS N06625
 UNS N06625
 UNS N06625
 NA 21

Item

Pcs

Wht [kg]

Dimension [mm]

Cast

Lot

Delivery No.

14

2

843

114,30 Ø x 2000-6000

319939

104854354

8681937863

4-1/2" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	top	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319939	VIM/ESR	top	0,25	<0,01	3,47
		Meth	RF	RF	RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot

Sample No.

Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	Hardness Test
[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]	
1 RT	459		891	40	50,5	5
				47,6	60	1 ASTM E10 - 17
						2 ASTM E18 - 17et

104854354

1-A1

104854354

1-A1

104854354

2-A1

104854354

2-A1

Hardness Test

HBW 10/3000/A HRC

1 277 surface

2 27,4 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Üçüncü, authorized inspection representative

Date of release: 23.11.2018

Q

* 1760570-1

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or signatures on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werdekl
 Postbox 1820, D-58778 Werdekl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, 85327
 Company domicile: Werdekl



FLG15246.M

FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
DIN EN 10204/01.05 3.1Page: 2 / 2
printed: 23. NOV 2018Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing					Grain Size	
Lot	Sample No.	Temp.	KV	aK	Lateral Exp.	1 ASTM E112 - 13		1 No 7.5
		[°C]	[J]	[J/cm²]	[mm]			
104854354	1-A1	2	-46	84	91	85		
104854354	1-A1	2	-46	87	86	89		
104854354	2-A1	1	-46	137	133	144		
104854354	2-A1							

Sample Condition annealed		Corrosion Test	
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
104854354	1-A1	1 without objection : 0,41 mm/a	
104854354	1-A1		
104854354	2-A1		
104854354	2-A1		

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory

Heat Treatment Lot

920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TUV-Systems-Certification body for pressure equipment of the TUV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

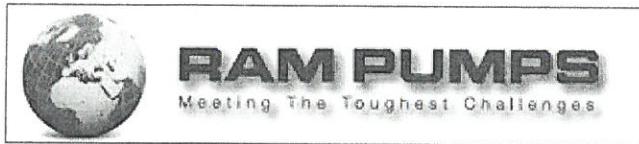
GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

26



FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56	0,007
	top Meth	LE	LE	RF		RF						

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	0,25	0,04	<0,01	3,45
	top Meth	RF	RF	RF	

Sample Condition		Tensile Test						Hardness Test		
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E10 - 17 2 ASTM E18 - 17e1		
Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	HBW 10/3000/ A	HRC	
104854379	I-A1	RT	534		910	40	52,3	5	47,9	59
104854379	I-A1							1281	surface	
								2		29,2 surface

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Hardness Test

1 ASTM E10 - 17

2 ASTM E18 - 17e1

HBW 10/3000/ A HRC

1281 surface

2 29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

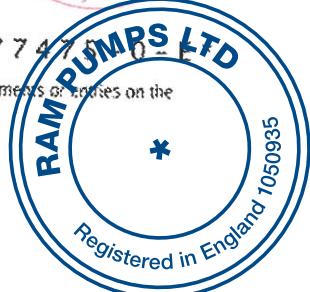
Unal Ocuncu, authorized inspection representative

Mark of the Inspector

Date of release: 04.01.2019



* 1774750-1



VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werden
 Postbox 1820, D-58778 Werden
 Telephone: 02392 55-41, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Isenbüttel local court, #5327
 Company domicile: Werden

FLG15247.M

FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment	Lot
920°C/00:45h/Water	104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl/ Number of Quante Numero pezzli	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEOc
INTERNATIONAL



Ergebnis der Prüfungen

Test Results

Résultats des Essais

Resultati delle Probe

Prüf-Nr. 19308-02(SW)

Inspection Nr.

Certifikat N°

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°

Pag N°

Mechanische Prüfungen

- Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:			TENSILE TEST / ZUGVERSUCH										HARDNESS/HÄRTE																			
Probe-Nr. Test-Nr. Nº d'éprouvette Nº di prova.	Probennahmemaßung Dim. of specimen: Dim. de l'éprouvette Dim. della provetta	Probennahme Specimen Prélèvement Prelevamento:	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	richtung Orientation Référence Direzione	Spannungstemperatur Tension temperature Température d'épreuve Temperatura di prova	Streckgrenze Yield Strength Seuil de résistance Limite di resistenza	Dehnungsgrenze Tensile Strength Tension limite Limite di tensione	Materialzähligkeit Impact Strength Résilience - Resilienza Proprietà di resistenza	A Lox	50mm	G HV Kv A Brinell Rockwell Knoop Shore A Ariani	Z %	1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm] Kerbschlagzähigkeit - Impact Strength 3 = [%] Krist. Bruchanteil - Cryst. proportion 4 = [mm10^-2] Breitung - Expansion 5 = [%] Elongissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Werte - Values - Valeurs - Valori	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Reg'ts / Anforderung																																
Mechanical				1	2	3	20	415	830	30																						
Analysis % - Max unless Stated	C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																															
Results																																
326413	12.50 Ø		1	2	3	20	503	874	49																							
325867	12.51 Ø		1	2	3	20	452	865	51																							
361682	12.46 Ø		1	2	3	20	446	869	51																							
Notes							From Bar end 1 2 L=Longitudinal 3 Mid thickness section																									
4																																
5	Visual and dimensional checks - Satisfactory																															
	Chemical / See manufactures certificate and Anlage 2																															

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall



FLG15247

GN26308

017431B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	-

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

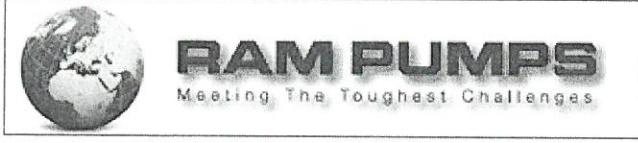
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	24
Mode	General Metals
Time	2019-07-10 14:47
Duration	10.75
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.01
SAMPLE	FLG15247.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15247

GN26308

017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
 printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
 GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09
 However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

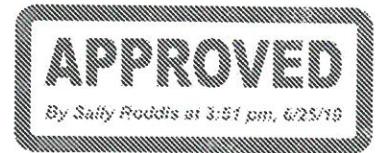
UNS N06625

UNS N06625

UNS N06625

Item	Pcs	Wht [kg]	Dimension [mm]
150	2	2548	190,50 Ø x 3000-6000

Cast	Lot	Delivery No.
326940	104927536	8681961277

**Analysis (weight %)**

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test								Grain Size		
Lot	Sample No.	Temp [°C]	Yield [MPa]	0.2% Yield [MPa]	1.0% Yield [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	1	No 6.5	
104927536	105-F02	1	RT	440		862	4D	54,7				
104927536	105-F03											

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Enclosures: 3

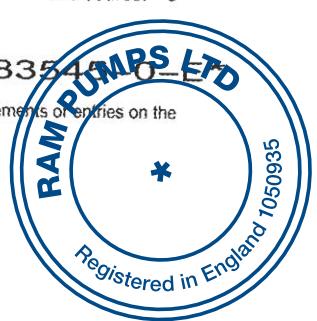
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* 183545/0-ETD

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Frank Morris, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLD15248.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130	149	131	1,45 1,68 1,44



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

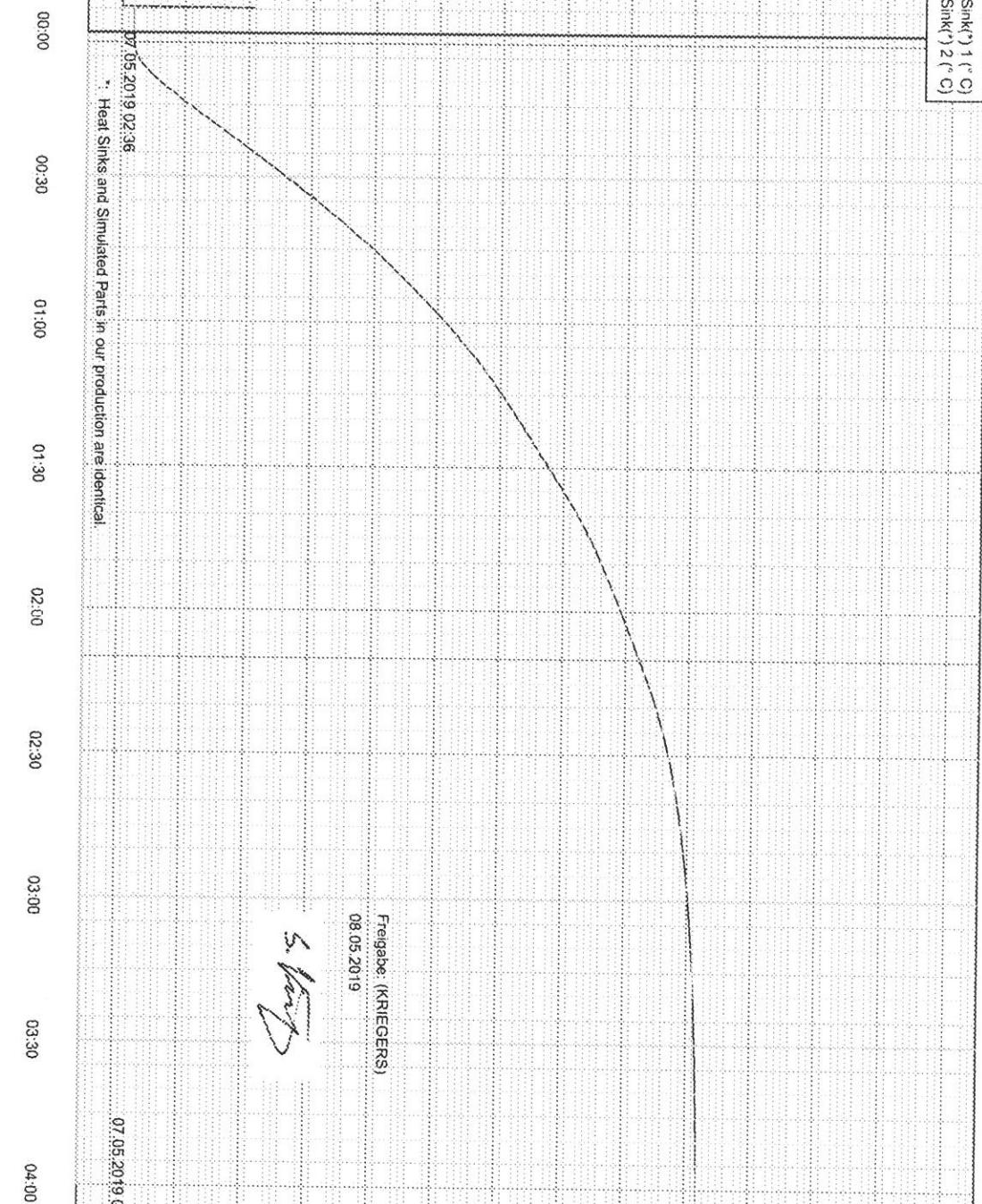
FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

VDM Metals GmbH

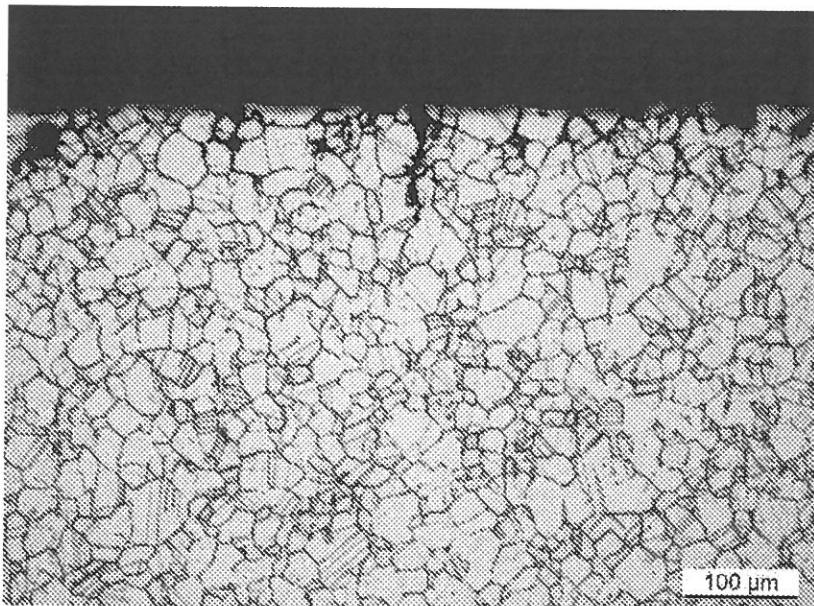
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE VIM/VAR

H/T LOT NO 104927536

TEST COUPON SIZE PROLONGATION

Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong	
402468A15A	1/4T	Long	20 C	440	440	440	862	862	54.7	54.7	5.8	0

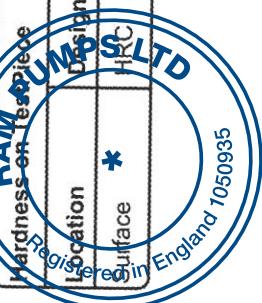
Impact Tests

Test No.	Location	Orientation	Temp	Energy				Shear %				Lateral Expansion	
				1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	1.44 mm

RAM PUMPS LTD
Hardness on Specimen

Location	Designation	Requirements	Results
Surface *	HRC		22.3 23.4 23.7

Registered in England 1050935



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099860	2	2	426862	04/07/19
Reduction Ratio:	Customer O/No.		PO0020371KW	Line: 2

Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C	Si	Mn	S	P	Ni	Cr
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27
			Ta				9.14
				0.010			0.22
						3.36	0.02
						0.33	0.02
							4.52
							3.37C

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

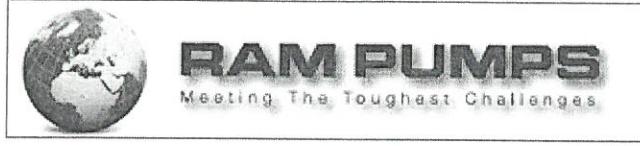
This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

26



Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings

BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy
 Nb+Ta =SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test									
Lot	Sample No.	1 ASTM E8/E8M - 16a / longitudinal specimen									
		Temp.	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA				
		[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]	A [%]			
104820039	107-E01	RT	517		916	4D	43,1				54
104820039	107-F03										

Sample Condition annealed		Notched Bar Impact Testing							Grain Size		
Lot	Sample No.	1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₀ 450/10							1 ASTM E112 - 13		
		Temp.	KV	aK	Lateral Exp.						
		[°C]	[J]	[J/cm ²]	[mm]						
104820039	107-E01	-110	111	116	115			1,37	1,44	1,4	
104820039	107-F03										

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the
Inspector

Q

E

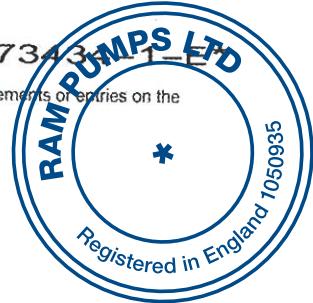
Enclosures: 4

* 173434

VDM Metals GmbH
 Division Bar and Forgings
 Plattenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

FLI15249.M

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 2 / 2
 printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	
104820039	107-F03	
1	without objection : 1,38 mm/anno	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
 Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

SUPER ALLOYS
t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	Customer O/No.	PO0020371KW

Report No.	098861	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	PO0020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	0.45	WATER

MELTING PRACTICE VIM/ESR
H/T LOT NO 104820039

TEST COUPON SIZE

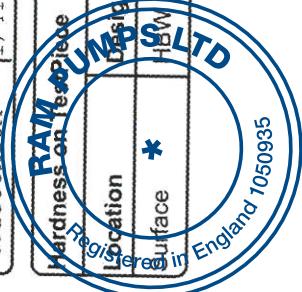
Prolongation

Test No.	Location	Orientation	Temp 20 °C	0.20% Proof	Result 517 MPa	UTS 916 MPa	Spec-Min 43.1	Result 43.1	%Elong	% Reduction of Area 54						
									Spec-Min							
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1	2	3	Min Av	1.37	1.44	1.4	mm

Impact Tests

Test No.	Location	Orientation	Temp -110 C	1 Charpy V	2 Min	3 Joules	Av 1	Shear %	Lateral Expansion			
									1	2	3	Min Av
402338A10A	1/4T	Long	-110 C	Charpy V	111	116	115	Joules	1	2	3	Min Av

Hardness on Testpiece	Location	Designation	Requirements	Results	
				Surface	HRW
		*		222	



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C Si Mn P Ni Cr Mo Al Nb Co Ti Fe NT	0.03 0.10 0.05 0.005 59.59 22.27 9.16 0.25 3.40 0.15 0.34 4.59 3.41					

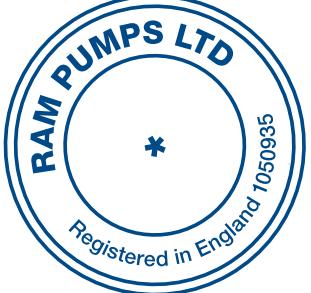
We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer



Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

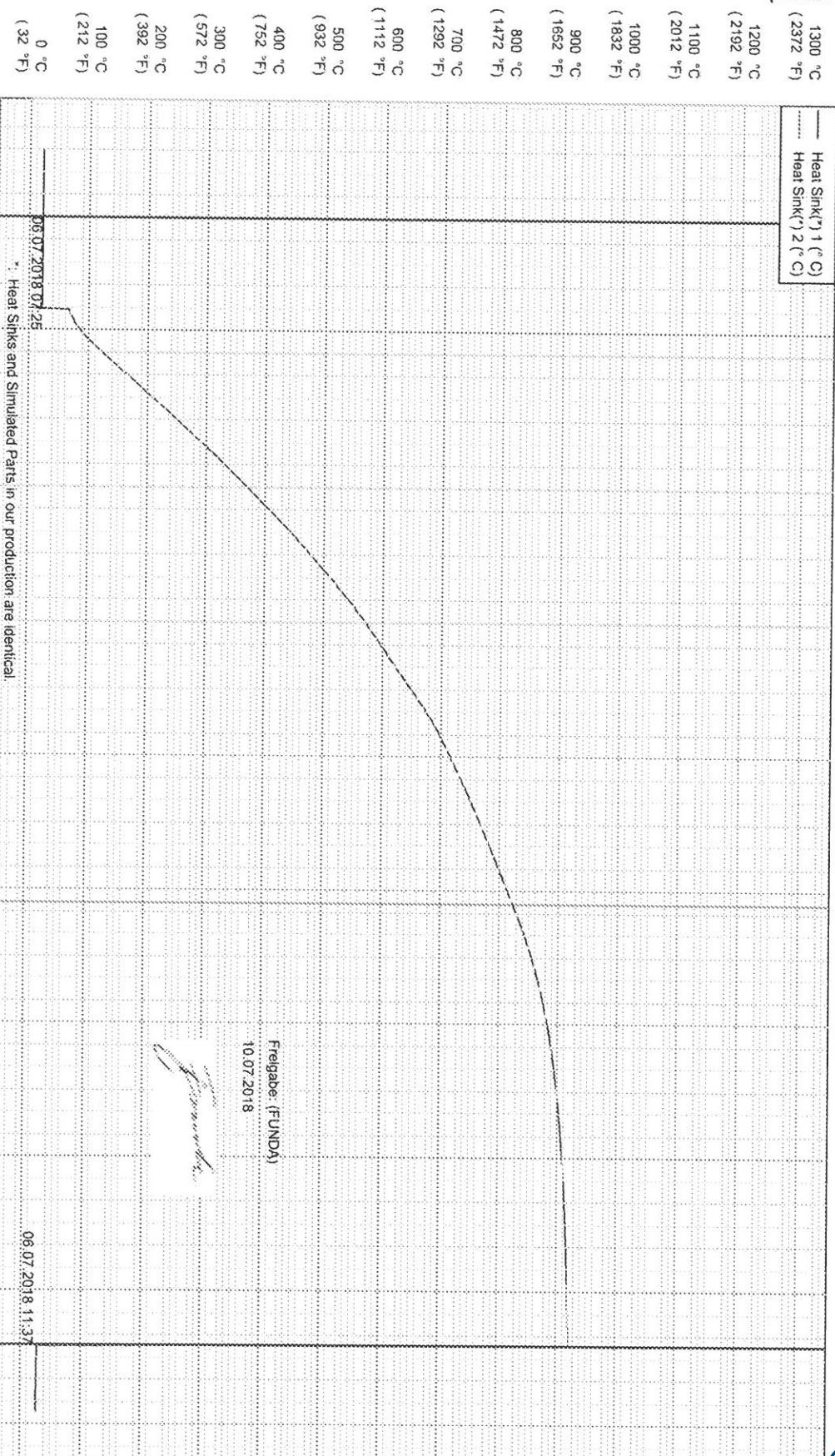
VDM Metals

Enclosure for inspection certificate
DIN EN 10204/01.05

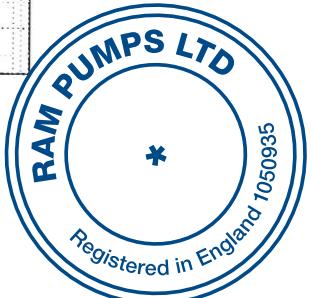
173434/1

3.1

Enclosure: 2
Page: 1 / 1
printed: 11. DEC 2018



Ofen / Furnace : 10 – Gluehlos / Batch : 2073

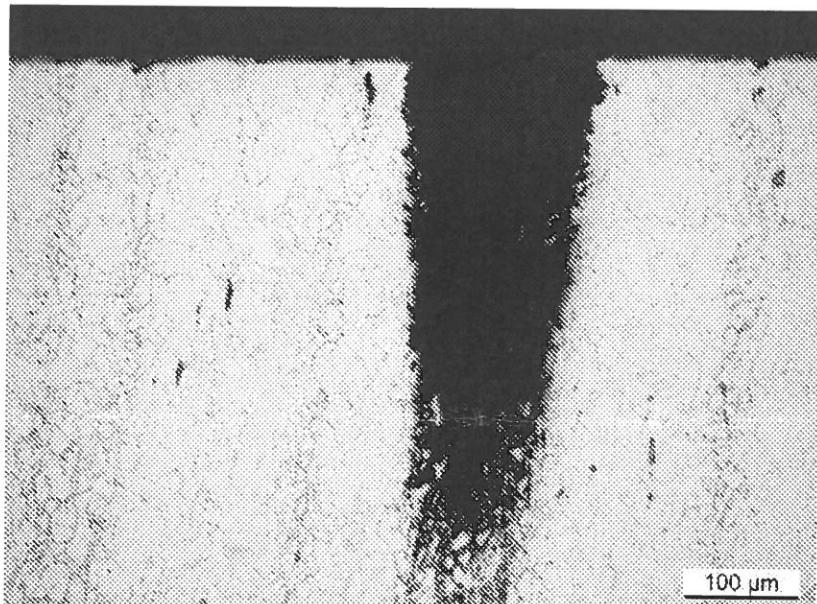


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2016-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

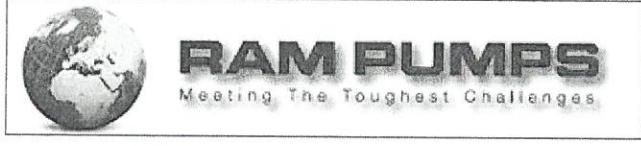
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S.Talbot

26



FLD15248

GN26485

017545B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)	Dim. grano ASTM E112		
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * RAM PUMPS LTD Registered in England 1050935

FLD15248

GN26485

017545B



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING

ULTRASONIC TEST

CERTIFICATE-No :

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)

ORDER : PO0018455KW

ORDER CONFIRMATIO :

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

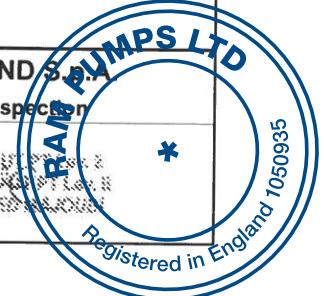
H.T. CONDITION : Annealed 980°C + water quenched

ULTRASONIC TEST REPORT

EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS

CUSTOMER INSPECTION

ITALFOND S.p.A.
NDE InspectionISO 9712 - UNI EN 10204-2-3
ENI-TESLA - VATTENFELT
ASME SB-564



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION****ITALFOND S.p.A.****Quality Assurance**

* Registered in England 1050935



FLD15248

Tracer: 23519

GN26485

017545B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	.

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

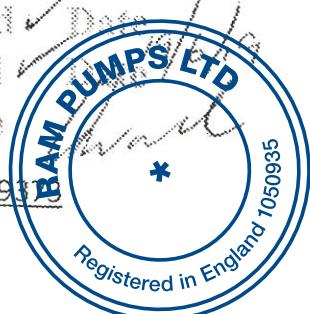
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate,
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/04/2019</i>
Item	<i>AS LISTED</i>	Material	<i>AS LISTED</i>
Order number	<i>PO0020043KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>AS LISTED</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>		
Sensitivity for DAC	<i>4.0 - 4.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>M. TATTERSALL</i>
Date		Qualification	<i>PCN II (103685) SNT-TC-1A II</i>
Signature		Signature	

Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

**Abnahmeprüfzeugnis**

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

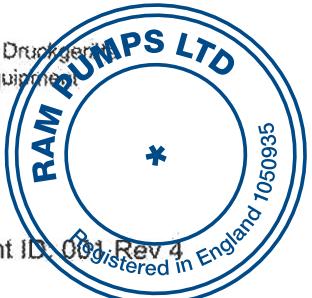
LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall



Document ID: 001 Rev 4
Registered in England 1050935

TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

		TENSILE TEST / ZUGVERSUCH							HARDNESS/HÄRTE							1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength 3 = [%] Krist.Bruchanteil - Cryst. proportion 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Expansion 6 = Härte (Einheiten) - Hardness - Duréte - Durezza				
Probe-Nr. Test No. N° d'éprouvette Nº di prova	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevoamento			Temperatur Temperature Température Temperatura			Streckgrenze Yield Strength Strength de serrage Tensile Strength Tensile Strength			Elastizität Elasticity Élasticité Elasticità			Härteprüfung Hardness Test Test de durabilité Prova di durezza			1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength 3 = [%] Krist.Bruchanteil - Cryst. proportion 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Expansion 6 = Härte (Einheiten) - Hardness - Duréte - Durezza			
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	Längs-Zone Längs-Zone Zone L	Richtung Direction Direction Direzione	Längs Längs Longitudinal Longitudinal Longitudinal	Trans Trans Transverse Transversal Transversale	0,2 % %	RM N/mm² N/mm²	50mm mm mm	A Lox % %	Z % %	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Werte Values Valeurs Valori	Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
Reg's / Anforderung																				
Mechanical			1	2	3	20	345	758	25											
Analysis % - Max unless Stated C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0, Mo 8.0-10.0,Nb+Ta 3.15-4.15,Co 1.0 ,Ni 58.0 ,Al 0.40,Ti 0.40, Fe 5.0																				
Results																				
361506	12.48 Ø		1	2T	3	20	518	906	34											
61091A2	12.47 Ø		1	2T	3	20	480	827	52											
Notes																				
4	Visual and dimensional checks- Satisfactory																			
5	Chemical / See manufactures certificate and Anlage 2																			

Ort -Location -Lieu - Località)

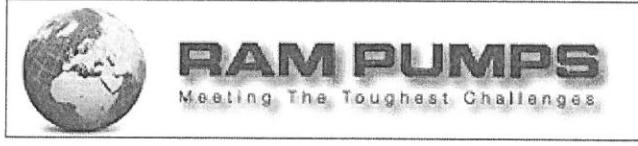
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856

Product
Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	0,005

Cast	Melting Pr.	AI	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen									
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation	RoA		
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
1	RT	440		862	4D	54,7			58

Grain Size
1 ASTM E112 - 13

1 No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

Enclosures: 3

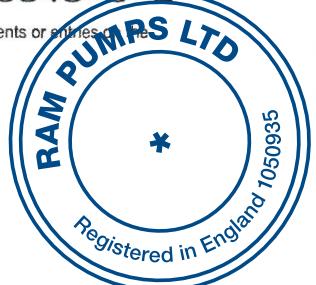
This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl

Date of release: 06.06.2019

183545-0-E



FLD15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

Page: 2 / 2
printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

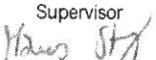
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor


Stahlberg, Level III

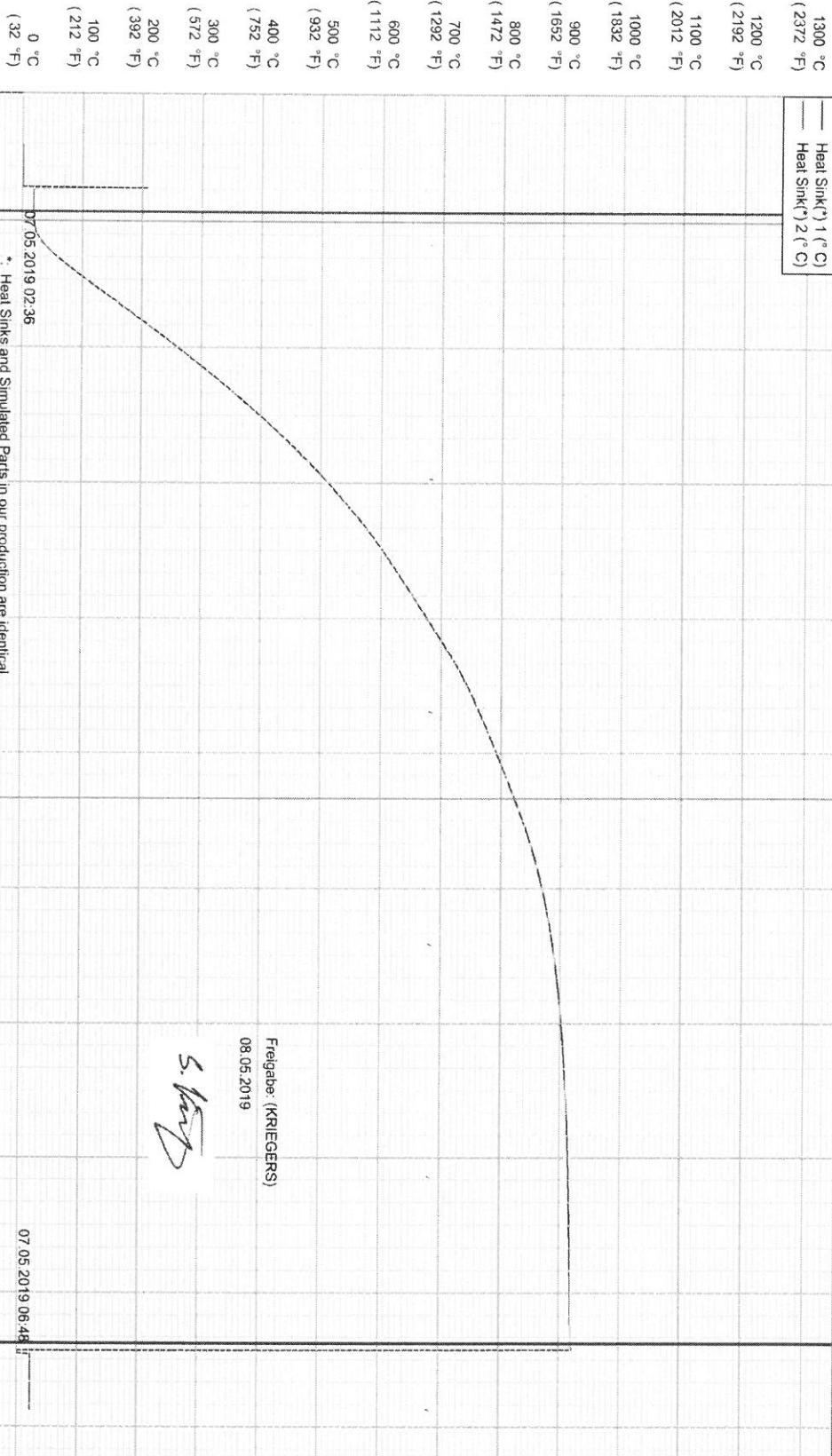
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1

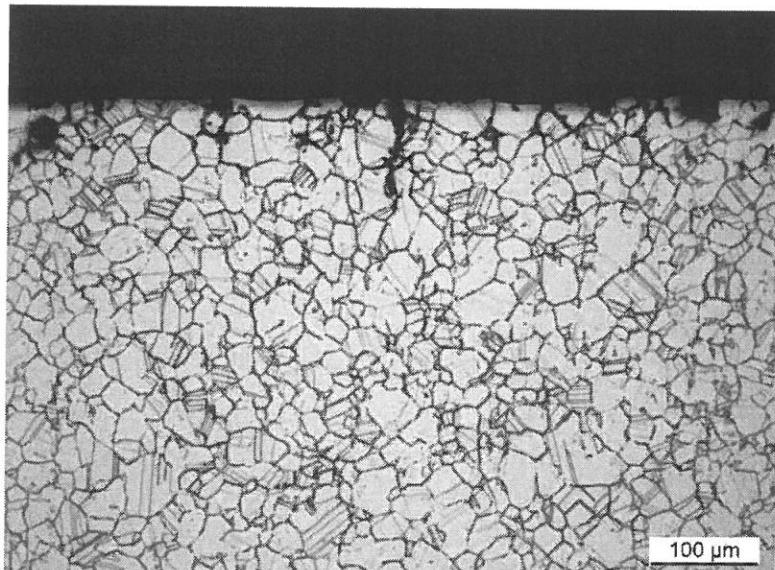


Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

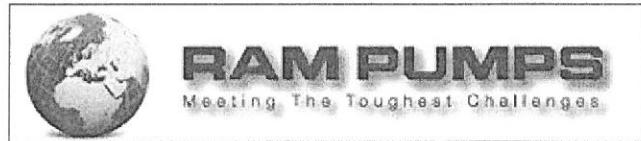
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____



FLI15249

GN26485

017546B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)			Dim. grano ASTM E112
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * RAM PUMPS LTD Registered in England 1050935



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**ULTRASONIC TEST****CERTIFICATE-No :**

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)**ORDER : PO0018455KW****ORDER CONFIRMATI O :**

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**ULTRASONIC TEST REPORT**

EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. NDE Inspection
		ISO 9712 - NDT Level I ENI-TESLA - NDT Level II MCNAUTON - NDT Level III  Registered in England 1050935



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION****ITALFOND S.p.A.****Quality Assurance**

* Registered in England 1050935

FLI15249

GN26485

017546B

Tracer: 23519



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AFNeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

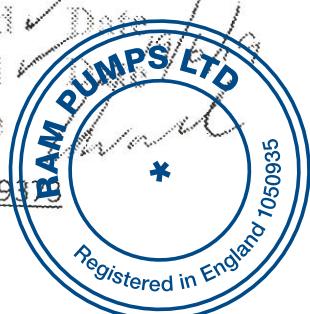
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193



FLI15249

GN26485

017546B

Tracer: 23519



ScanTech Inspection Services
 Unit 13, The Wallows Industrial Estate,
 Fenspool Avenue, Brierley Hill
 West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	NEO NICKEL LTD	Date	12/04/2019
Item	AS LISTED	Material	AS LISTED
Order number	PO0020043KW	Job reference	N/A.

Drawing number	N/A.	Material	AS LISTED
Weld process	N/A.	Thickness	AS LISTED
Surface condition	GOOD	Stress relief	N/A.

Procedure number	DEF STAN 02-729 PART 5 ISS 3 ASTM A388	Couplant	OIL.
Equipment	USM 36 (14077642)		
Sensitivity for DAC	4.0 - 4.5mm F.B.H	Cal. Block	AS PROC.
Acceptance criteria	DEF STAN 02-862 PART 3 ISS 3		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

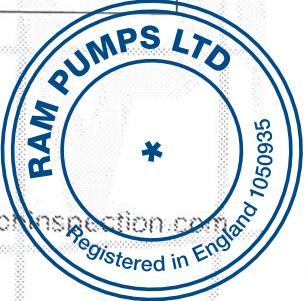
Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	M. TATTERSALL
Date		Qualification	PCN II (103685) SNT-TC-1A II
Signature		Signature	

+44 (0)1384 79924

enquiries@scantechinspection.com

www.scantechinspection.com

Registered in England 1050935



Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall



Document ID: 001 Rev 4
Registered in England 1050935

TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Probenart - Test type - Type d'essai - Tipo di prova:		TENSILE TEST / ZUGVERSUCH							HARDNESS/HÄRTE						
Probe-Nr. Test No. N° d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevoamento	Längs-Zone Richtung Zone Largh. Zona Direktion Längs Dirigente	Temperatur Temperature Température Temperatura	Prüftemperatur Test Temperature Température d'essai Temperatura di prova	Streckgrenze Yield Strength Strength d'élasticité Fuerza de resistencia	Dehnungsgrenze Tensile Strength Strength d'élongation Fuerza de estiramiento	Streckgrenze Yield Strength Strength d'élasticité Fuerza de resistencia	Bruchdehnung Elongation at break Elongation à la cassure Elongación a rotura	Bruchdehnung Elongation at break Elongation à la cassure Elongación a rotura	Bruchlast Breakload Charge de cassure Carga de rotura				
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	1 2 3	4 5 6	7	8	9	10	11	12	13	14	15	16	17
Reg's / Anforderung															
Mechanical				1	2	3	20	345	758	25					
Analysis % - Max unless Stated															
C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0															
Results															
361506	12.48 Ø		1	2T	3	20	518	906	34						
61081A2	12.47 Ø		1	2T	3	20	480	827	52						
Notes															
4															
5	Visual and dimensional checks- Satisfactory														
	Chemical / See manufactures certificate and Anlage 2														

Ort -Location -Lieu - Località)

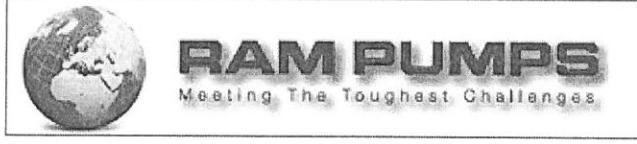
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

Item Pcs Wht [kg]

Dimension [mm]

Cast

Lot

Delivery No.

150 2 2548

190,50 Ø x 3000-6000

326940

104927536

8681961277

APPROVED

By Sally Roddis at 3:51 pm, 6/25/19

Heat #
326940

Tracer #
26550

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	0,005

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	3,370

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen									
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation			
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
					RoA				
1	RT	440		862	4D	54,7			58

Grain Size	
1 ASTM E112 - 13	
1	No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

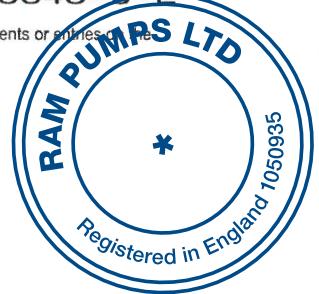
Enclosures: 3

* 183545-0 E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries in this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



FLI15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 06. JUN 2019

Order No. Purchase Order No.
538839 402468 (LB 11904)

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.

VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

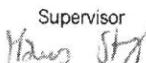
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor


Stahlberg, Level III

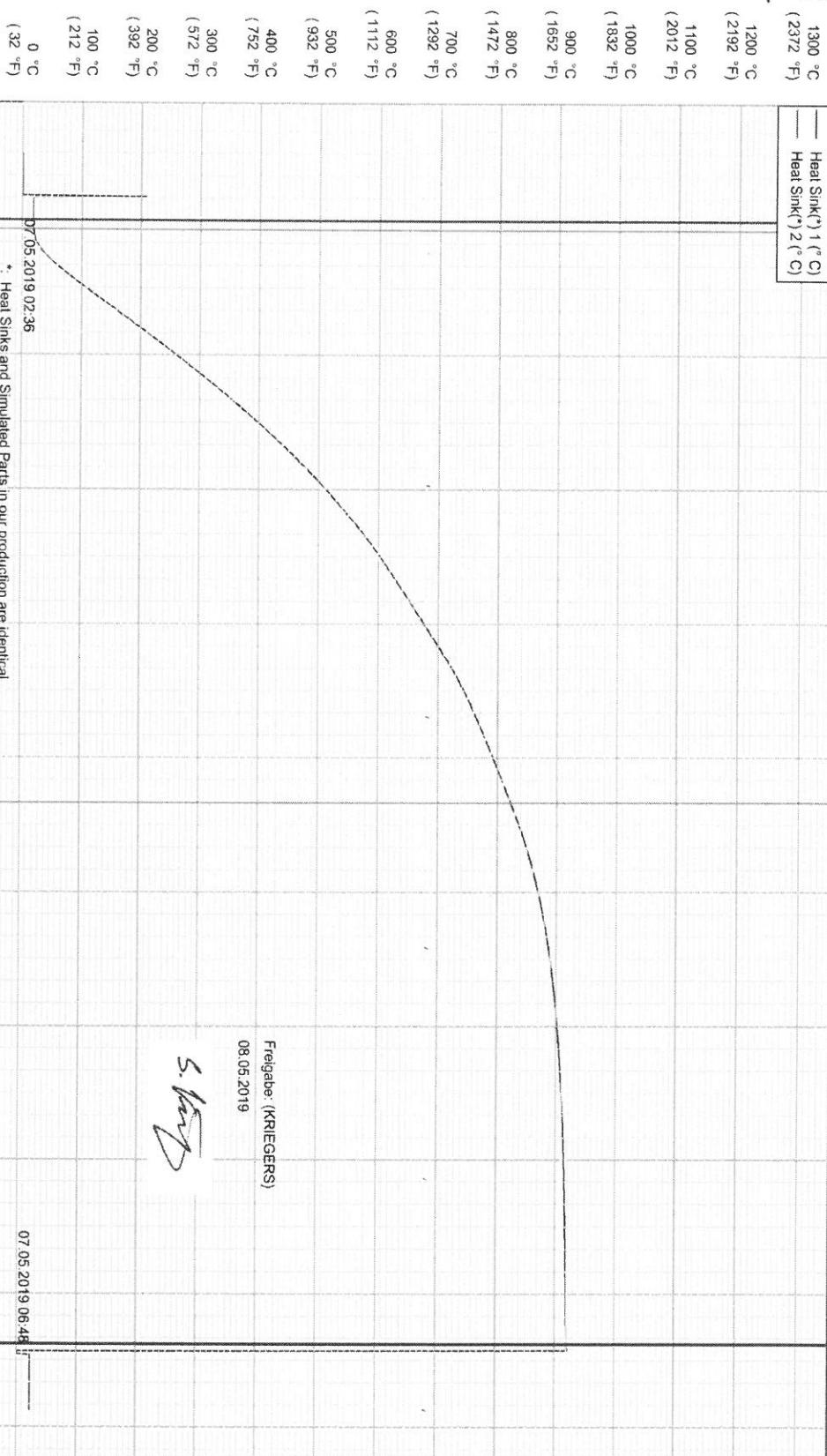
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1

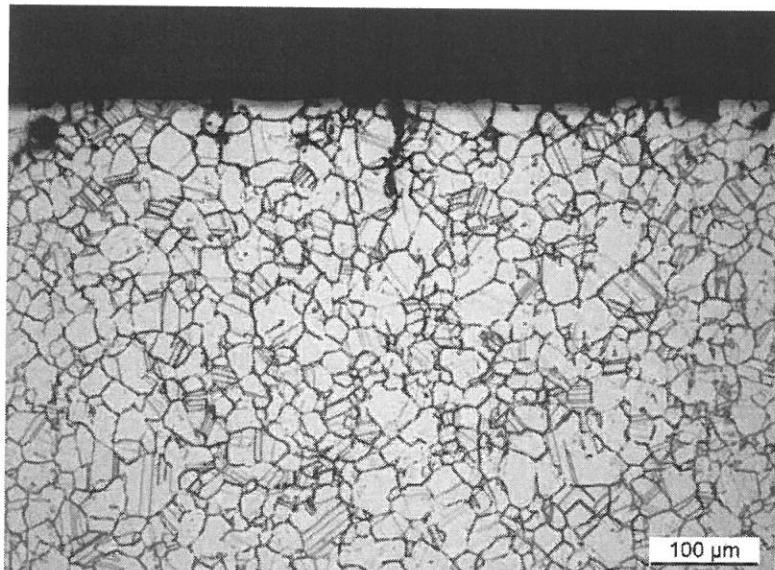


Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

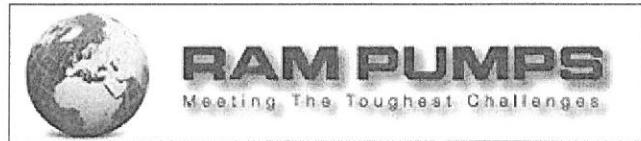
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____



FLG15246

GN26308

017430B

GIN 26308

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate

176057/0

DIN EN 10204/01.05

3.1

Page:

1 / 2

Order No.

Purchase Order No.

528182

PO0018424KW / LB 11547

printed:

23. NOV 2018

NeoNickel Ltd.

First Avenue
GB - DY6 7TG Kingswinford

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100

LRQA Approval

KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.9.15)

add. customer requirement: impact test

Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

**Item** **Pcs** **Wht [kg]** **Dimension [mm]** **Cast** **Lot** **Delivery No.**

14	2	843	114,30 Ø x 2000-6000	Cast	319939	104854354	8681937863	4-1/2" dia
----	---	-----	----------------------	------	--------	-----------	------------	------------

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	top	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319939	VIM/ESR	top	0,25	<0,01	3,47
		Meth	RF	RF	RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	Hardness Test	
104854354	1-A1							1 ASTM E10 - 17	
104854354	1-A1							2 ASTM E18 - 17et	
104854354	2-A1	1 RT	459		891	40 50,5 5 47,6 60		HBW 10/3000/A HRC	
104854354	2-A1							1 277 surface	
								2 27,4 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Üçüncü, authorized inspection representative

Date of release: 23.11.2018

Q

* 1760570-1

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or signatures on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdekl
Postbox 1820, D-58778 Werdekl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Möller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, 85327
Company domicile: Werdekl



FLG15246.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
DIN EN 10204/01.05 3.1Page: 2 / 2
printed: 23. NOV 2018Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing					Grain Size			
Lot	Sample No.	Temp.	KV	aK	Lateral Exp.	1 ASTM E112 - 13				
		[°C]	[J]	[J/cm ²]	[mm]	1 No 7.5				
104854354	1-A1	2	-46	84	91	85				
104854354	1-A1	2	-46	87	86	89				
104854354	2-A1	1	-46	137	133	144				
104854354	2-A1									

Sample Condition annealed		Corrosion Test
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
104854354	1-A1	1 without objection : 0,41 mm/a
104854354	1-A1	
104854354	2-A1	
104854354	2-A1	

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	

Heat Treatment Lot
920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TUV-Systems-Certification body for pressure equipment of the TUV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

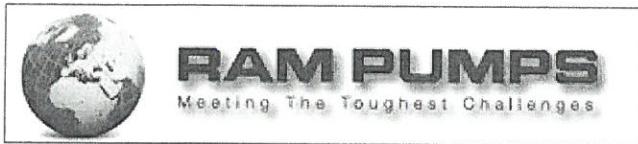
GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

26



Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56	0,007
	top Meth	LE	LE	RF		RF						

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	0,25	0,04	<0,01	3,45
	top Meth	RF	RF	RF	

Sample Condition annealed

Lot	Sample No.	Tensile Test							Hardness Test		
		Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	1	ASTM E10 - 17	2	ASTM E18 - 17e1
104854379	I-A1	1	RT	534	910	40	52,3	5	47,9	59	HBW 10/3000/A HRC
104854379	I-A1							1	281 surface	2	29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Unal Ocuncu, authorized inspection representative

Date of release: 04.01.2019

Mark of the
Inspector

Q



* 1774750-1



VDM Metals GmbH
Division Bar and Forgings
Pfeifferberger Straße 2, D-58791 Werden
Postbox 1820, D-58778 Werden
Telephone: 02392 55-41, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Möller
Andrea Bauer, Rolf Schencking
Commercial register: Isenbüttel local court, #5327
Company domicile: Werden

FLG15247.M

FLG15246 GN26308 017430B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment Lot
920°C/00:45h/Water 104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl Number of Quante Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEOc
INTERNATIONAL



Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Probe

Prüf-Nr. 19308-02(SW)

Inspection Nr.

Certificate N°

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen

- Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:		TENSILE TEST / ZUGVERSUCH							HARDNESS/HÄRTE							
Probe-Nr. Test-Nr. Nº d'éprouvette Nº di prova.	Probennahmemaßnung Dim. of specimen: Dim. de l'éprouvette Dim. della provetta	Probennahme Specimen Prélèvement Prelevamento	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	richtung Orientation Référence Direzione	Spannungstemperatur Tension temperature Température d'épreuve Temperatura d'esercizio	Streckgrenze Yield Strength Limit d'élasticité Limite d'elasticità	Geschwindigkeit Speed Vitesse Velocità	A Lox	50mm	g % %	Z %	1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist. Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10 ⁻²] Breitung - Expansion 5 = [%] Elongissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Werte - Values - Valeurs - Valori	Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Req'ts / Anforderung																
Mechanical			1	2	3	20	415	830	30							
Analysis % - Max unless Stated		C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0,Mo 8.0-10.0,Nb+Ta 3.15-4.15,Co 1.0 ,Ni 58.0 ,Al 0.40,Ti 0.40,Fe 5.0														
Results																
326413	12.50 Ø		1	2	3	20	503	874	49							
325867	12.51 Ø		1	2	3	20	452	865	51							
361682	12.46 Ø		1	2	3	20	446	869	51							
Notes			1	From Bar end		2	L=Longitudinal		3	Mid thickness section						
4																
5																
Visual and dimensional checks- Satisfactory																
Chemical / See manufactures certificate and Anlage 2																

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -

Notified Body for Pressure Equipment

S Worrall

FLG15246

GN26308

017430B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

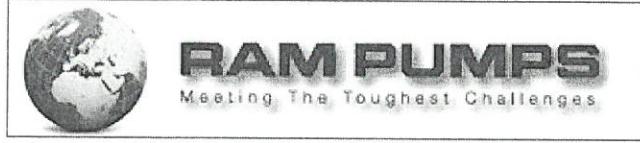
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	24
Mode	General Metals
Time	2019-07-10 14:47
Duration	10.75
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.01
SAMPLE	FLG15247.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15246 GN26308 017430B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09
 However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

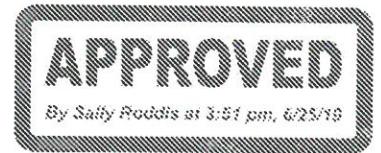
UNS N06625

UNS N06625

UNS N06625

Item	Pcs	Wht [kg]	Dimension [mm]
150	2	2548	190,50 Ø x 3000-6000

Cast	Lot	Delivery No.
326940	104927536	8681961277

**Analysis (weight %)**

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test								Grain Size		
Lot	Sample No.	Temp [°C]	Yield [MPa]	0.2% Yield [MPa]	1.0% Yield [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	1	No 6.5	
104927536	105-F02	1	RT	440		862	4D	54,7				
104927536	105-F03											

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Mark of the
Inspector

E

Enclosures: 3

Q

* 183545-0-ETD

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Frank Morris, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLD15248.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test	
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
Lot	Sample No.		
104927536	105-F02	1	without objection : 0,77 mm/a
104927536	105-F03		

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130	149	131	1,45 1,68 1,44



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

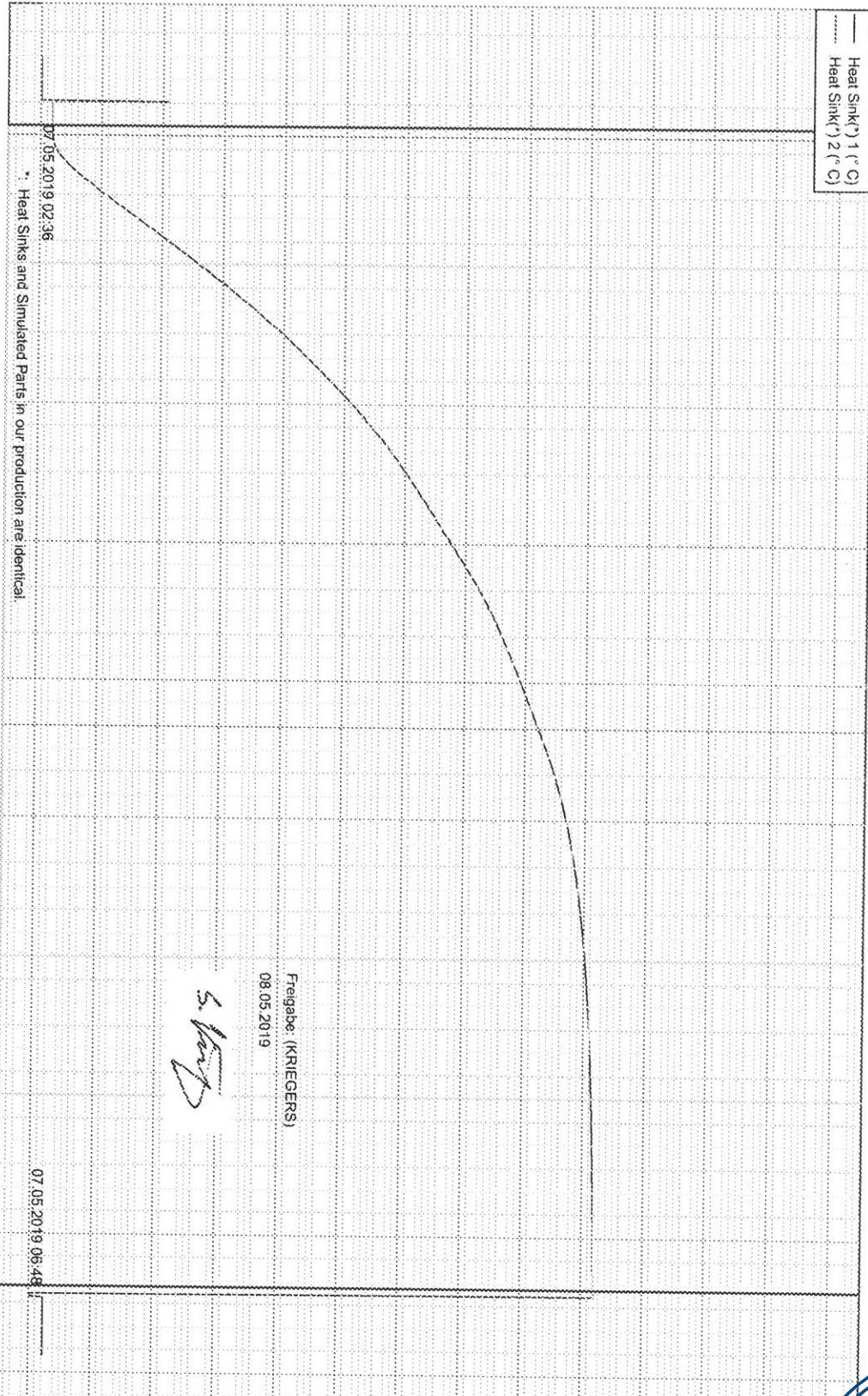
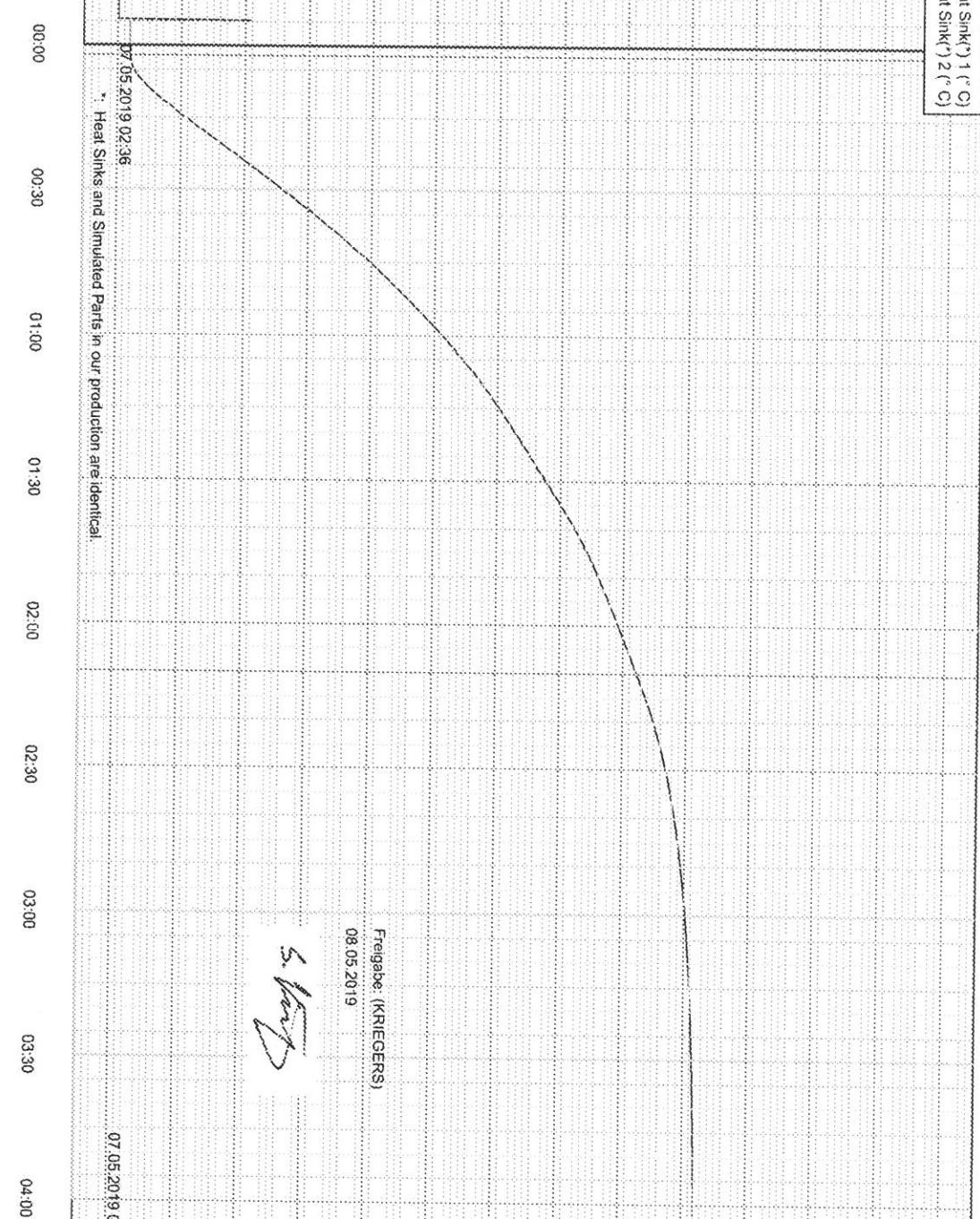
FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

VDM Metals GmbH

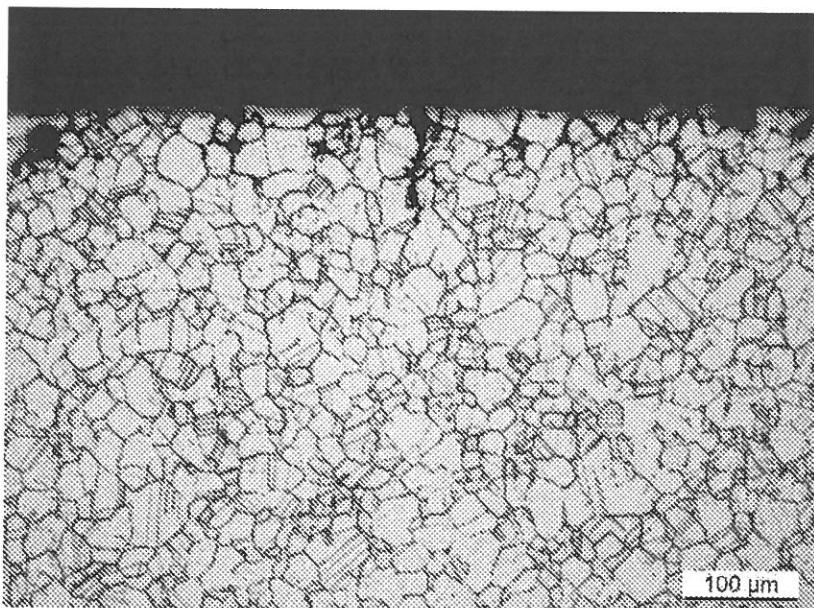
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE VIM/VAR

H/T LOT NO 104927536

TEST COUPON SIZE PROLONGATION

Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong		
											5.8	0	
Energy													

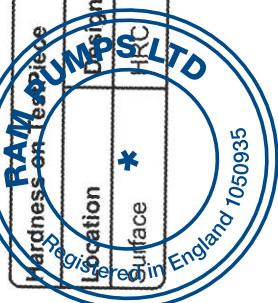
Impact Tests

Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

Hardness on Specimen
Location: Surface

* HRC

Registration No.	Designation	Requirements	Results
22.3	23.4	23.7	



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099880	2	2	426862	04/07/19
Reduction Ratio:	Customer O/No.		PO0020371KW	Line: 2

Test	Location	Specification	Result	Value	Min	Max	Report No
Heat No.	C	Si	Mn	S	P	Ni	Cr
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27
			Ta				9.14
				0.010			0.22
						3.36	0.02
						0.33	0.02
							4.52
							3.37C

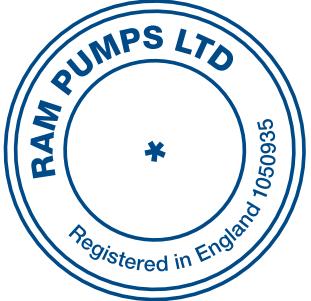
We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

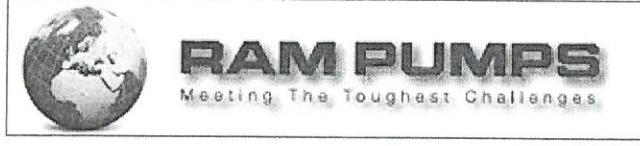
This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

26



Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings

BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy
 Nb+Ta =SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed

Lot	Sample No.	Tensile Test										
		Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	A [%]	RoA [%]	Ti	Nb	Fe
104820039	107-E01	RT	517		916	4D	43,1			54		
104820039	107-F03											

Sample Condition annealed

Lot	Sample No.	Notched Bar Impact Testing						
		Temp. [°C]	KV [J]	aK [J/cm²]	Lateral Exp. [mm]			
104820039	107-E01	-110	111	116	115		1,37	1,44
104820039	107-F03							1,4

Grain Size
 1 ASTM E112 - 13

1 No 8

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the Inspector

Q

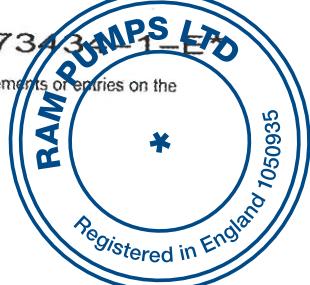
E

Enclosures: 4

* 173434/1-E

VDM Metals GmbH
 Division Bar and Forgings
 Plattenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLI15249.M

FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
527148 402338

Page: 2 / 2
printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	1 without objection: 1,38 mm/anno
104820039	107-F03	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

SUPER ALLOYS
t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	Customer O/No.	PO0020371KW

Report No.	098861	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	PO0020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	0.45	WATER

MELTING PRACTICE VIM/ESR
H/T LOT NO 104820039

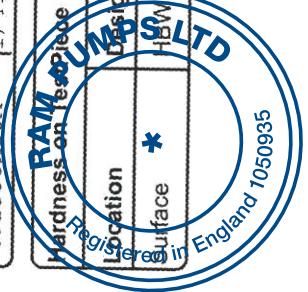
TEST COUPON SIZE Prolongation

Test No.	Location	Orientation	Temp 20 °C	0.20% Proof	Result 517 MPa	UTS 916 MPa	Spec-Min 43.1	Result 43.1	%Elong		% Reduction of Area	
									Spec-Min	Result	Spec-Min	Result

Impact Tests

Test No.	Location	Orientation	Temp -110 C	Charpy V	111 116 115 Joules	Energy			Shear %			Lateral Expansion		
						1	2	3	Min Av	1	2	3	Min Av	1
402338A10A	1/4T	Long	-110 C	Charpy V	111 116 115 Joules					1.37	1.44	1.4	mm	54 0

Hardness on Testpiece	Designation	Requirements	Results	
			Surface	Overall
	*		222	222



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

Test	Location	Specification	Result						Value	Min	Max	Report No				
			C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	NT
Heat No.			0.03	0.10	0.05	0.001	0.005	59.59	22.27	9.16	0.25	3.40	0.15	0.34	4.59	3.41
319837																
			Ta													
				0.01												

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer




FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15246 GN26308 017430B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

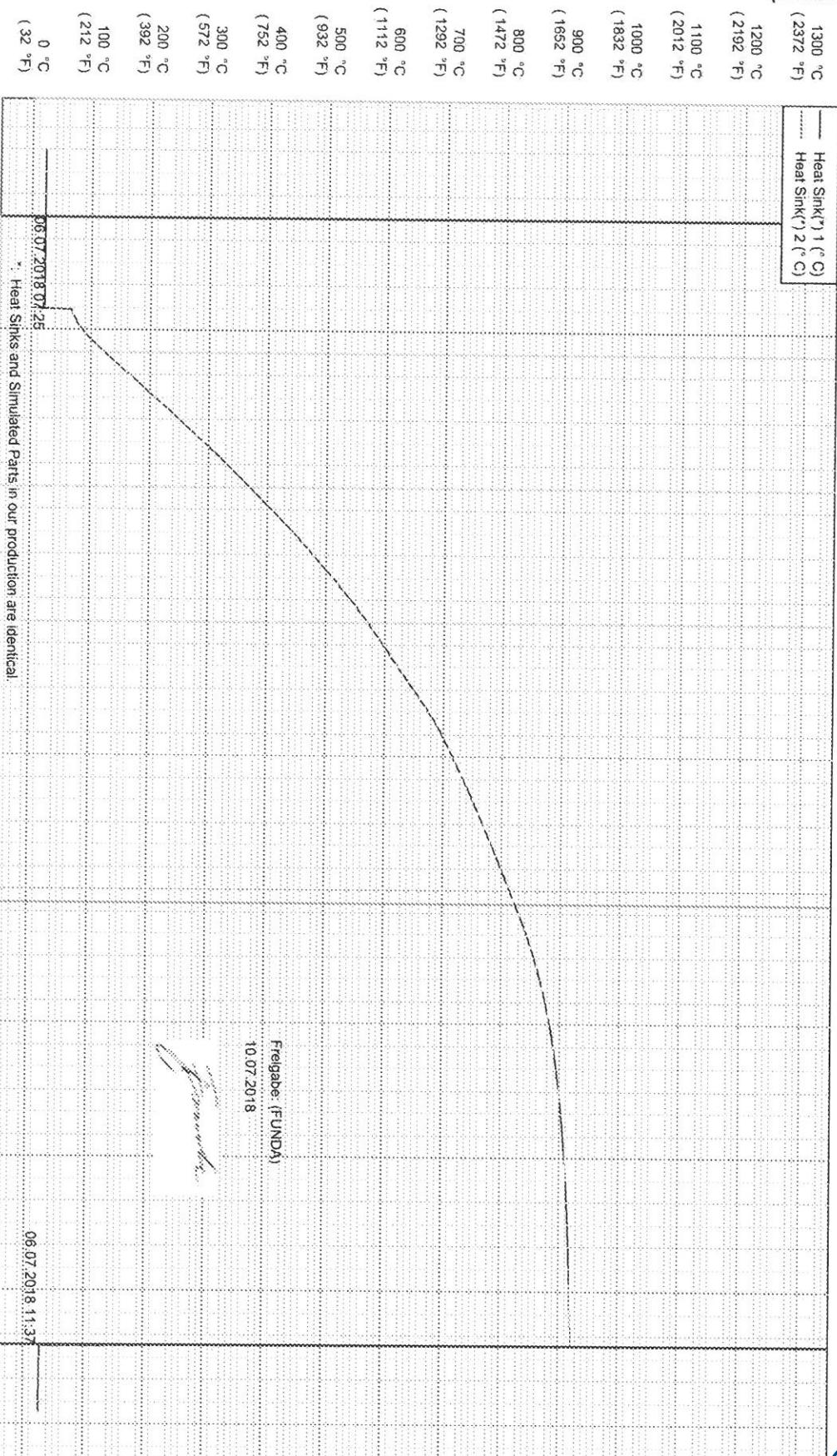
VDM Metals

Enclosure for inspection certificate
DIN EN 10204/01.05

173434/1

3.1

Enclosure: 2
Page: 1 / 1
printed: 11. DEC 2018

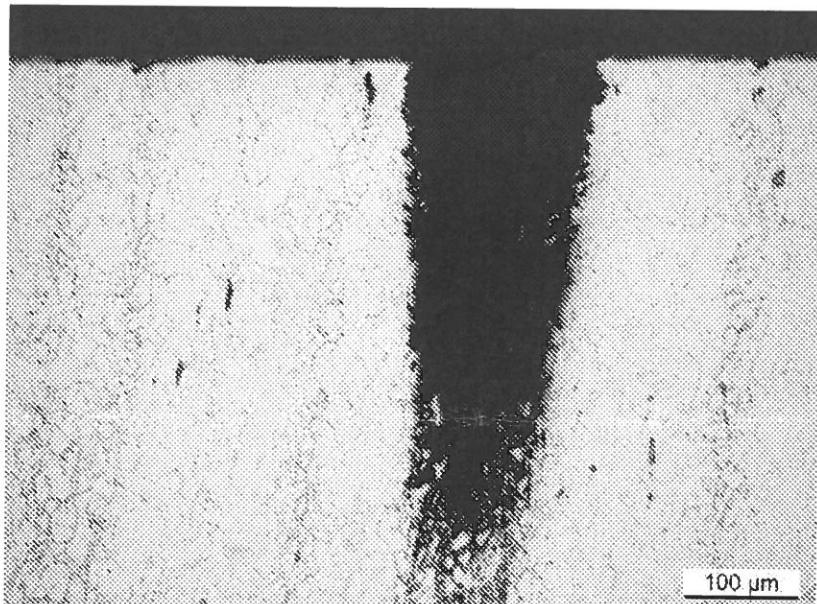


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2016-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

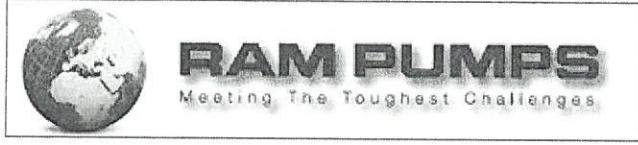
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S.Talbot

26



FLG15247

GN26308

VDM Metals GmbH
on behalf of VDM Metals International GmbH

GIN 26308

VDM Metals

Inspection certificate 176057/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 23. NOV 2018

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined



Specification

ASTM B 446-03 (reapproved 14)
 ASME BPVC.II.B-2017 SB-446
 AMS 5666 J
 ASTM B 564-17a applicable for forgings
 ASME BPVC.II.B-2017 SB 564 applicable for forgings
 BS 3076-89
 NACE MR0175 / ISO 15156-3 2015
 NACE MR0103-2012
 US-test acc. to API 6A PSL3 (7.4.2.9.15):
 add. customer requirement: impact test
 Flowguard FSD-1-2 Rev. A1: Item 3

Material

UNS N06625
 UNS N06625
 UNS N06625
 UNS N06625
 UNS N06625
 NA 21

Item

Pcs

Wht [kg]

Dimension [mm]

Cast

Lot

Delivery No.

14

2

843

114,30 Ø x 2000-6000

319939

104854354

8681937863

4-1/2"

dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319939	VIM/ESR	0,02	0,001	22,30	R59,57	0,06	0,16	9,12	0,34	3,46	4,58	0,005
	top Meth	LE	LE	RF		RF						

Cast

Melting Pr.

Al

Co

Ta

Nb+Ta

319939

VIM/ESR

top

Meth

0,25

RF

0,02

RF

<0,01

RF

3,47

RF

Sample Condition

annealed

Tensile Test

1 ASTM E8/E8M - 16a / longitudinal specimen

Hardness Test

1 ASTM E10 - 17

2 ASTM E18 - 17et

Lot

Sample No.

Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	HBW 10/3000/A	HRC
[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]		
104854354	1-A1						
104854354	1-A1						
104854354	2-A1	RT	459	891	40 50,5 5 47,6 60	1 277 surface	
104854354	2-A1						

104854354

1-A1

104854354

1-A1

104854354

2-A1

104854354

2-A1

1

RT

459

891

40

50,5

5

47,6

60

A [%]

A [%]

A [%]

1

277

surface

2

27,4

surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueanal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Unal Ocuncu, authorized inspection representative

Date of release: 23.11.2018

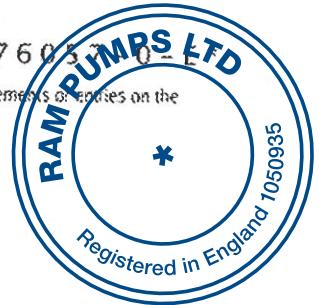
Q

* 1760570-1

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werdehol
 Postbox 1820, D-58778 Werdehol
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, 85327
 Company domicile: Werdehol



FLG15246.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 176057/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 2 / 2
 printed: 23. NOV 2018

Sample Condition annealed		Notched Bar Impact Testing						Grain Size	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 ASTM E112 - 13
					2	3	4	5	
104854354	1-A1	2	-46	84	91	85			
104854354	1-A1	2	-46	87	86	89			
104854354	2-A1	1	-46	137	133	144			
104854354	2-A1								1 No 7.5

Sample Condition annealed		Corrosion Test	
Lot	Sample No.	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition	
104854354	1-A1	1	without objection : 0,41 mm/a
104854354	1-A1		
104854354	2-A1		
104854354	2-A1		

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
14	104854354	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory

Heat Treatment Lot

920°C/0:45h/Water 104854354

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TUV-Systems-Certification body for pressure equipment of the TUV NORD GROUP: notified body, reg-no. 0045.

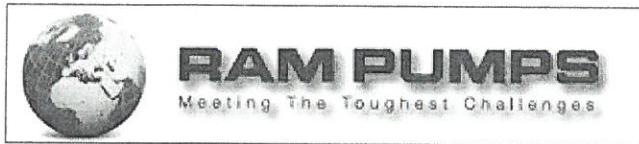
Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A10L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	5
Mode	General Metals
Time	2019-07-10 14:39
Duration	12.18
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.54
SAMPLE	FLG15246.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.118	+/-	0.166
W	0.000	+/-	0.074
Cu	0.000	+/-	0.138
Ni	60.598	+/-	0.397
Co	0.000	+/-	0.105
Fe	4.953	+/-	0.213
Mn	0.000	+/-	0.190
Cr	21.756	+/-	0.366
V	0.000	+/-	0.188

Supervised By: S .Talbot

26



FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 528182 PO0018424KW / LB 11547

Page: 1 / 2
 printed: 04. JAN 2019

NeoNickel Ltd.
 First Avenue
 GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product
 Bar, round, forged, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)

ASME BPVC.II.B-2017 SB-446

AMS 5666 J

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB 564 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

US-test acc. to API 6A PSL3 (7.4.2.3.15)

add. customer requirement: impact test

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

NA 21

Item	Pcs	Wt: [kg]	Dimension [mm]	Cast	Lot	Delivery No.
13	2	592	101,60 Ø x 3000-6000	326413	104854379	8681941415 4" dia

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326413	VIM/ESR	top	0,03	<0,001	22,32	R59,63	0,07	0,12	9,14	0,32	3,44	4,56
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Ca	Ta	Nb+Ta
326413	VIM/ESR	top	0,25	0,04	<0,01
		Meth	RF	RF	RF

Sample Condition
annealed

Lot	Sample No.	Tensile Test							Hardness Test		
		Temp	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA	1	ASTM E10 - 17	2	ASTM E18 - 17e1
104854379	I-A1	1	RT	534	910	40	52,3	5	47,9	59	HBW 10/3000/A HRC
104854379	I-A1							1	281 surface	2	29,2 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Unal Ocuncu, authorized inspection representative

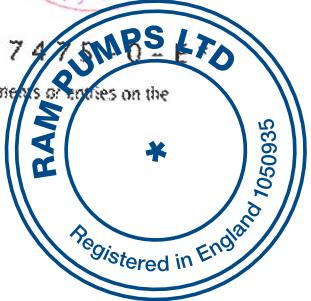
Date of release: 04.01.2019

Mark of the
Inspector

Q



* 1774750-1



VDM Metals GmbH
 Division Bar and Forgings
 Pietzenberger Straße 2, D-58791 Werden
 Postbox 1820, D-58778 Werden
 Telephone: 02392 55-41, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Nicolas Möller
 Andrea Bauer, Rolf Schencking
 Commercial register: Isenbüttel local court, #5327
 Company domicile: Werden

FLG15247.M

FLG15247 GN26308 017431B

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177475/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 04. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV _a 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104854379	1-A1	1	-46	130	133	131		
104854379	1-A1							
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015; Method A - delivery condition)						
Lot	Sample No.	1 without objection: 0,56 mm/a						
104854379	1-A1							
104854379	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL 3 Test on 100% of surface: satisfactory						
13	104854379							

Heat Treatment	Lot
920°C/00:45h/Water	104854379

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

CE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020
CE S-1000 approved. Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Matériel - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pulszonaturate :
Material UNS N06625
Cast Nr – 325867,326413,361682

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspector
stamp
Sceau de l'expert - Punzone dell'ispettore



Pos.-Nr./Item No. Poste-Nr. No pos	Stückzahl/ Number of Quante Numero pezzli	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Cuotida No Cottata	Probe-Nr. Test No. No d'approvista No di prova
01	1	4.0" Ø Bar x 687 mm	325867	325867
02	1	4.0" Ø Bar x 2053 mm	326413	326413
03	1	4.0" Ø Bar x 4070 mm	352975	352975

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: R01 Rev 4
Registered in England 1050935



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen

Test Results

Résultats des Essais

Resultati delle Probe

Prüf-Nr. 19308-02(SW)

Inspection Nr.

Certificat N°

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°

Pag N°

Mechanische Prüfungen

- Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:			TENSILE TEST / ZUGVERSUCH										HARDNESS/HÄRTE								
Probe-Nr. Test-Nr. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen: Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento:	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	richtung Orientation Référence Direzione	Temperatur Temperature Température Temperatura	Prüftemperatur Test temperature Température d'essai Temperatura di prova	Streckgrenze Yield Strength Seuil de résistance Tensione di resistenza	Dehnungsgrenze Tensile strength Tension de résistance Tensione di resistenza	Bruchdehnung Elongation at break Élongation à la cassure Allungamento a rottura	A Lox	50mm	G HV 0.05 HV 0.05 HV 0.05 HV 0.05 HV 0.05 HV 0.05	Z %	1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist. Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10 ⁻²] Breitung - Expansion 5 = [%] Elongissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Werte - Values - Valeurs - Valori	Bemerkung Remarks Remarques Osservazioni				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
Req'ts / Anforderung																					
Mechanical			1	2	3	20	415	830	30												
Analysis % - Max unless Stated			C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																		
Results																					
326413	12.50 Ø		1	2	3	20	503	874	49												
325867	12.51 Ø		1	2	3	20	452	865	51												
361682	12.46 Ø		1	2	3	20	446	869	51												
Notes			1	From Bar end 2 L=Longitudinal 3 Mid thickness section																	
4	Visual and dimensional checks - Satisfactory																				
5	Chemical / See manufactures certificate and Anlage 2																				

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -

Notified Body for Pressure Equipment

S Worrall

FLG15247

GN26308

017431B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9455 - 9457	O/No.	P00020153KW	Date Received	15.05.2019
Page 1 of 1				Tested/Reported	29.05.2019

Item

4" Round bar -

- 1) Cast No: 326413 2) Cast No: 325867 3) Cast No: 361682

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.50 Ø	122.7	503	874	49	59
2) L 12.51 Ø	122.9	452	865	51	57
3) L 12.46 Ø	121.9	446	869	51	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 214 HBW 3) 211 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.033	.11	.080	.006	<.003	21.42	9.10	60.2	.31	.087	4.69	3.52	.003	.26
2)	.029	.10	.077	.003	<.003	21.61	9.14	60.0	.29	.060	4.76	3.52	.003	.27
3)	.035	.16	.073	.004	<.003	21.54	9.07	60.5	.33	.058	4.33	3.53	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

TÜV UK LTD

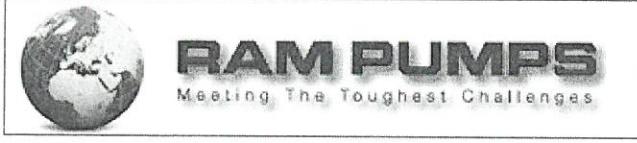
Witnessed / Date

Reviewed

Signature

TUV 19308





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	24
Mode	General Metals
Time	2019-07-10 14:47
Duration	10.75
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.01
SAMPLE	FLG15247.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.953	+/-	0.255
W	0.000	+/-	0.001
Ni	61.143	+/-	0.681
Co	0.000	+/-	0.175
Fe	4.725	+/-	0.227
Mn	0.000	+/-	0.222
Cr	21.680	+/-	0.451
V	0.000	+/-	0.470
Re	0.000	+/-	0.128
Ta	0.000	+/-	0.087
Hf	0.000	+/-	0.080

Supervised By: S .Talbot

26



FLG15247

GN26308

017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
 538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
 printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
 GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625

NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09
 However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

UNS N06625

UNS N06625

Item	Pcs	Wht [kg]	Dimension [mm]
150	2	2548	190,50 Ø x 3000-6000

Cast	Lot	Delivery No.
326940	104927536	8681961277

APPROVED

By Sally Roddis at 3:51 pm, 6/23/19

**Analysis (weight %)**

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition		Tensile Test								Grain Size	
annealed											
Lot	Sample No.	Temp	Yield0.2%	Yield1.0%	Tensile	Elongation				RoA	
104927536	105-F02	[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]				
104927536	105-F03	1	RT	440	862	4D	54,7			58	1 No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Mark of the Inspector

E

Enclosures: 3

A. Üncü

Ünal Üçüncü, authorized inspection representative

Date of release: 06.06.2019

Q

* 183545/0-ETD

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Frank Morris, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLD15248.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 538839 402468 (LB 11904)

Page: 2 / 2
 printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	Ultrasonic Examination: see enclosure
150	104927536	

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 1 / 2
 printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-F01	surface	HBW 10/3000/ A	259	257	253
104927536	106-K02	surface	HBW 10/3000/ A	275	270	272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HBW 10/3000/ A	262	261	264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104927536	105-E01	surface	HRC	22,3	23,7	23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV₀ 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130	149	131	1,45 1,68 1,44



Enclosure for inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Ultrasonic Examination Report

Specification

ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

FLG15247 GN26308 017431B

VDM Metals GmbH

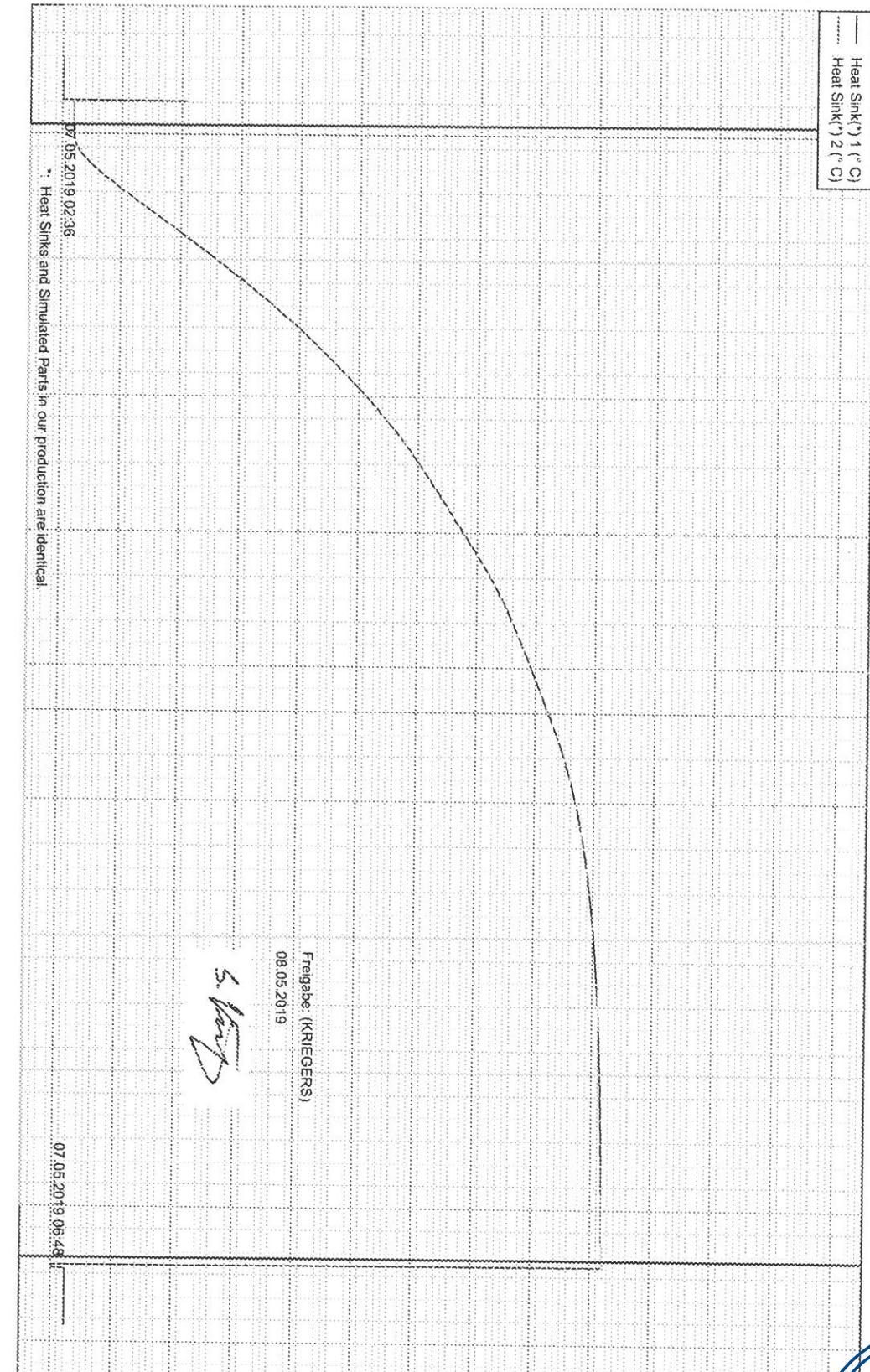
on behalf of VDM Metals International GmbH

Enclosure for Inspection certificate
DIN EN 10204/01.05183545/0
3.1

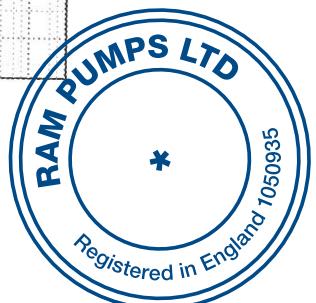
VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

00:00 00:30 01:00 01:30 02:00 02:30 03:00 03:30 04:00



Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

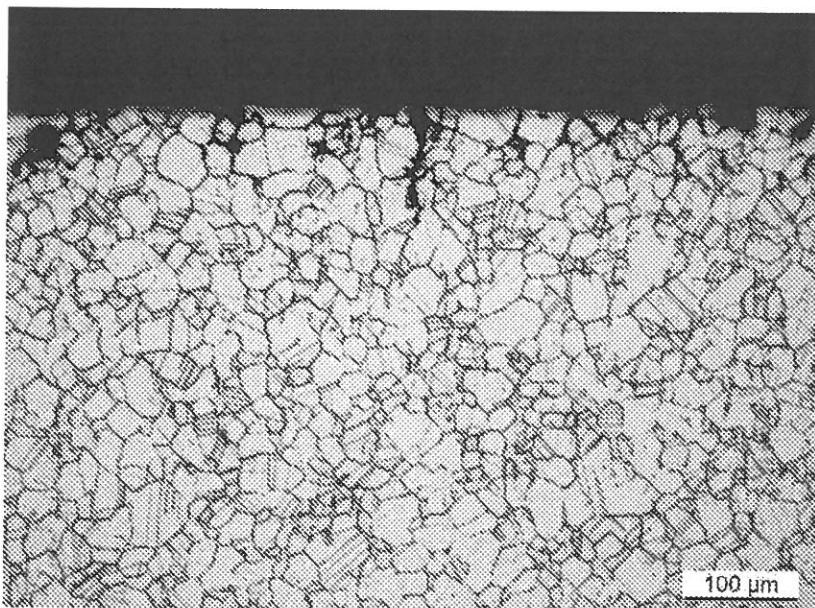
VDM Metals

Microstructure Examination

Metallography Job No.: 8459
Lot No.: 104927536
Heat: 326940

Inspection Certificate No.: 183545

Enclosure: 3
Page: 1 of 1



100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	099880	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
002	14		326940	402468A15A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 7 1/2" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type	Temp	Soak Hours	Quench/Cooling
ANN	920C	1.00	WATER

MELTING PRACTICE

VIM/VAR

H/T LOT NO 104927536

TEST COUPON SIZE

PROLONGATION

Test No.	Location	Orientation	Temp	0.20% Proof	Result	Spec-Min	UTS	Spec-Min	Result	Spec-Min	%Elong		
											5.8	0	
Energy													

Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

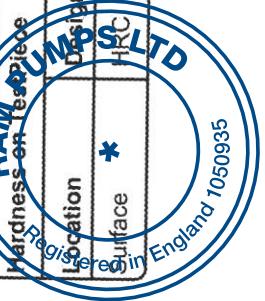
Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av

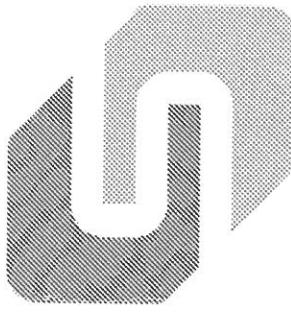
Test No.	Location	Orientation	Temp	1	2	3	Min	Av	1	2	3	Min	Av
402468A15A	1/4T	Long	-110 C	Charpy V	130	149	131	Joules	1	2	3	Min	Av



In England 1050935

Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG	NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG

Report No.	Page	of	Our Ref.	Date
099860	2	2	426862	
Reduction Ratio:	4.26:1		Customer O/No. P00020371KW	
Test	Location	Specification	Result	Value

Heat No.	C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	Max Report No
326940	0.02	0.13	0.05	0.001	0.005	59.85	22.27	9.14	0.22	3.36	0.02	0.33	4.52	NT

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.

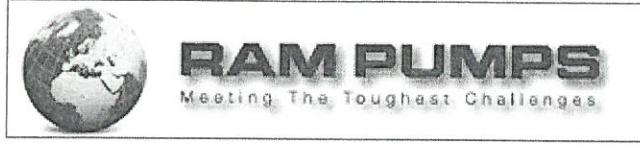
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer

John Davies





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	57
Mode	General Metals
Time	2019-07-10 15:04
Duration	11.51
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.12
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.269	+/-	0.306
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.642	+/-	0.791
Co	0.000	+/-	0.128
Fe	4.619	+/-	0.215
Mn	0.000	+/-	0.304
Cr	20.951	+/-	0.445
V	0.000	+/-	0.394

Supervised By: S .Talbot

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Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 1 / 2
 printed: 11. DEC 2018

SSS BATCH 402338A10A

SSS Super Alloys LTD
 58 Newhall Road
 GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
 Product
 Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
 LRQA Approval
 KLN 4000941/E

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
 the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-17a applicable for forgings

BS 3076-89

NACE MR0175-2003

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

Material
 UNS N06625



UNS N06625
 UNS N06625
 NA 21

UNS N06625

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy
 Nb+Ta =SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; BS 3076-89;
 AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319837	VIM/ESR	top	0,03	0,001	22,27	R59,58	0,05	0,10	9,16	0,34	3,40	4,59
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319837	VIM/ESR	top	0,25	0,15	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test									
Lot	Sample No.	1 ASTM E8/E8M - 16a / longitudinal specimen									
		Temp.	Yield0.2%	Yield1.0%	Tensile	Elongation	RoA				
		[°C]	[MPa]	[MPa]	[MPa]	A [%]	A [%]	A [%]			
104820039	107-E01	RT	517		916	4D	43,1				54
104820039	107-F03										

Sample Condition annealed		Notched Bar Impact Testing						Grain Size		
Lot	Sample No.	1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₀ 450/10						1 ASTM E112 - 13		
		Temp.	KV	aK	Lateral Exp.					
		[°C]	[J]	[J/cm ²]	[mm]					
104820039	107-E01	-110	111	116	115			1,37	1,44	1,4
104820039	107-F03									

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

EMail ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü, authorized inspection representative

Date of release: 11.12.2018

Mark of the
Inspector

Q

E

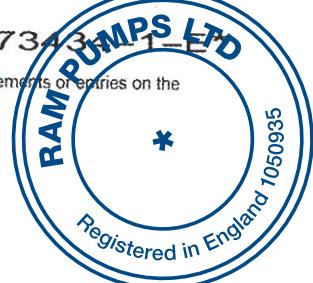
Enclosures: 4

* 173434/1-E

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
 Division Bar and Forgings
 Plettenberger Straße 2, D-58791 Werdohl
 Postbox 1820, D-58778 Werdohl
 Telephone: 02392 55-0, Fax: 02392 55-2217
 Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
 Management Board: Dr. Niclas Müller
 Andrea Bauer, Rolf Schencking
 Commercial register: Iserlohn local court, #5327
 Company domicile: Werdohl



FLI15249.M

FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1
 Order No. Purchase Order No.
 527148 402338

Page: 2 / 2
 printed: 11. DEC 2018

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104820039	107-E01	1 without objection: 1,38 mm/anno
104820039	107-F03	

Item	Lot	Ultrasonic Examination: see enclosure
10	104820039	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104820039

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25,0°C and 25,0°C at completion of quench.

Hot forming: Reduction ratio: 5,92:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals GmbH has complied with all producer requirements of AS6279

Modification history

Rev.: 1 11.12.2018 Customer request: Ultrasonic examination report corrected
Rev.: 0 11.09.2018



Test Certificate / Certificate of Conformity

EN10204 3.1

sss Super Alloys Ltd
Newhall 1A & 1B
58 Newhall Road
Sheffield
S9 2QD

t: +44 (0) 8433 625718
f: +44 (0) 1142 424422
w: www.sss-superalloys.com



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 1 of 2	Our Ref.	426862	Date	04/07/19
			Customer O/No.	E00020371KW	Specification	625

Item	Quantity	Part No.	Heat No.	Batch No.	Description
001	14		319837	402338A10A	ALLOY 625 ASTM B446 GRADE 1 UNS N06625 MIN HARDNESS 180BHN 14 PCS 6.1/4" DIA X 180mm LG

HEAT TREATMENT PARAMETERS

Type
ANN
Temp
920C
Soak Hours
0.45
Quench/Cooling
WATER

MELTING PRACTICE
VIM/ESR
H/T LOT NO 104820039

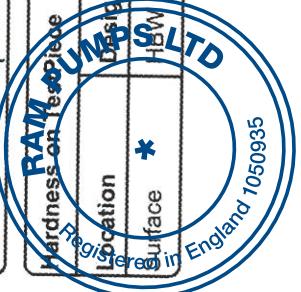
TEST COUPON SIZE
Prolongation

Test No.	Location	Orientation	Temp 20 C	0.20% Proof 517 MPa	UTS 916 MPa	Spec-Min 43.1	Result 43.1	%Elong	% Reduction of Area
								Spec-Min	Result
402338A10A	1/4T	Long						54	0

Impact Tests

Test No.	Location	Orientation	Temp -110 C	Charpy V	111 116 115 Joules	1 2 3 Min Av	1 2 3 Min Av	Shear %	Lateral Expansion
402338A10A	1/4T	Long	-110 C	Charpy V	111 116 115 Joules	1 2 3 Min Av	1 2 3 Min Av	1.37 1.44 1.4	1.4 mm

Hardness on Test Piece	Designation	Requirements	Results	
			Surface	Overall
	*		222	222



Test Certificate / Certificate of Conformity

EN10204 3.1



Customer	Delivery Address	
NEONICKEL LIMITED BUILDING 8 FIRST AVENUE THE PENSNETT ESTATE KINGSWINFORD WEST MIDLANDS DY6 7TG		

Report No.	099881	Page 2 of 2	Our Ref.	426862	Date Specification	04/07/19
Reduction Ratio:	5.92 : 1		Customer O/No.	E00020371KW	Line:	1

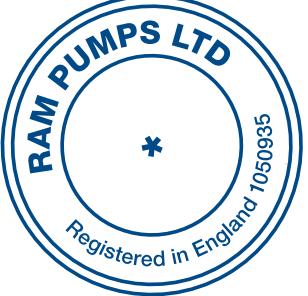
Test	Location	Specification	Result						Value	Min	Max	Report No				
			C	Si	Mn	S	P	Ni	Cr	Mo	Al	Nb	Co	Ti	Fe	NT
Heat No.			0.03	0.10	0.05	0.001	0.005	59.59	22.27	9.16	0.25	3.40	0.15	0.34	4.59	3.41
319837																
			Ta													
				0.01												

We hereby certify that the whole of the above mentioned materials and the inspection results detailed, have been manufactured, inspected and tested in full accordance with the contract/ order and referenced standards/ specifications and that, unless otherwise stated above, conform fully with the requirements.

This certificate shall not be reproduced, except in full, without the written approval of SSS Super Alloys Ltd.
* Long = Longitudinal; Trans = Transverse
NT=Nb+Ta (Cb+Ta)

Signature

Position
Quality Engineer



Enclosure for Inspection certificate 173434/1
 DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
 527148 402338

Enclosure: 1
 Page: 1 / 1
 printed: 11. DEC 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224
104820039	108-E01	surface	HBW 10/3000/ A	225	227	228
104820039	109-K01	surface	HBW 10/3000/ A	228	229	231

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104820039	107-F01	surface	HBW 10/3000/ A	222	221	224

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values		
104820039	109-K01	surface	HRC	22,7	22	21,2



FLG15247 GN26308 017431B

VDM Metals GmbH

on behalf of VDM Metals International GmbH

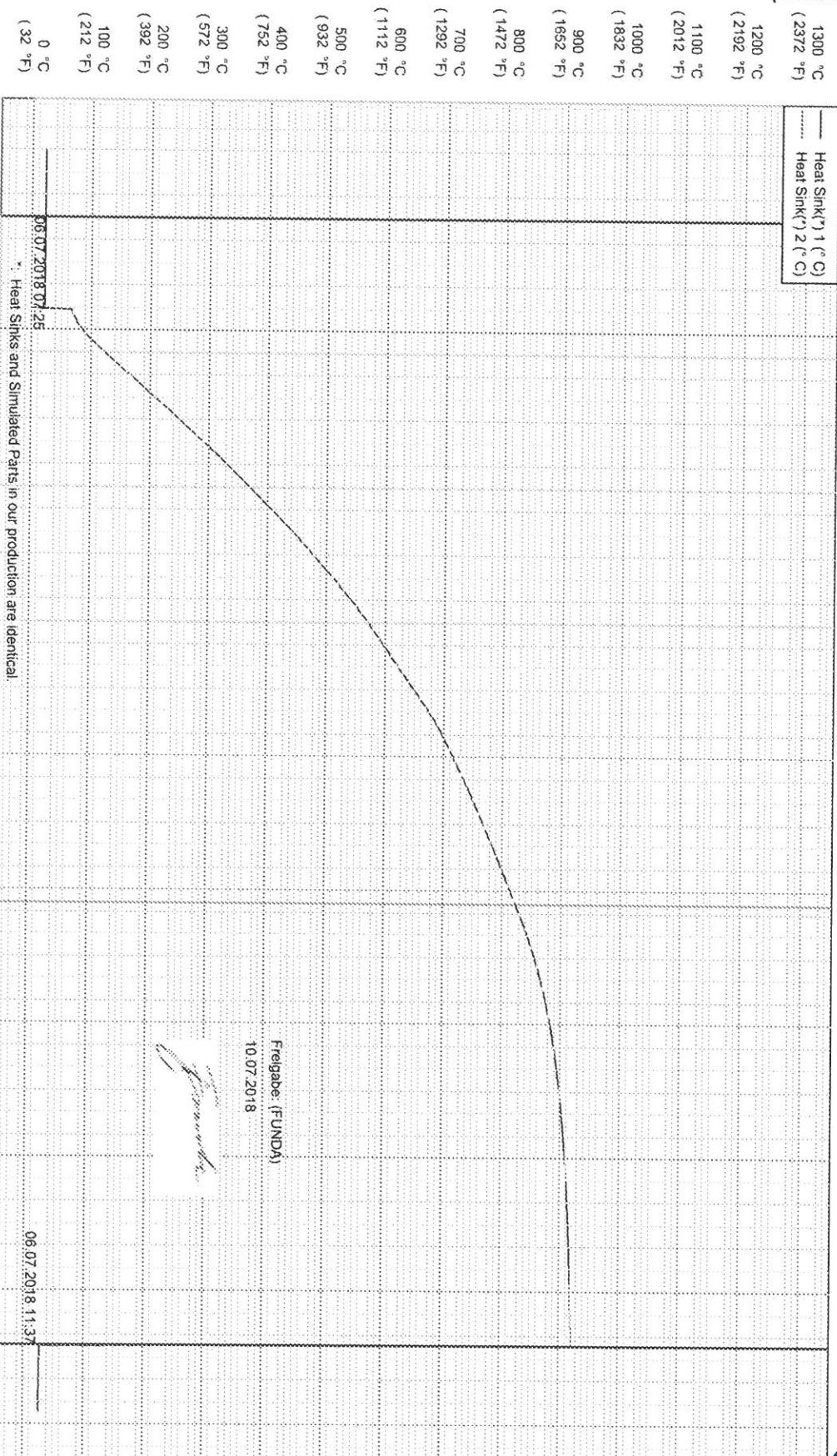
VDM Metals

Enclosure for inspection certificate
DIN EN 10204/01.05

173434/1

3.1

Enclosure: 2
Page: 1 / 1
printed: 11. DEC 2018

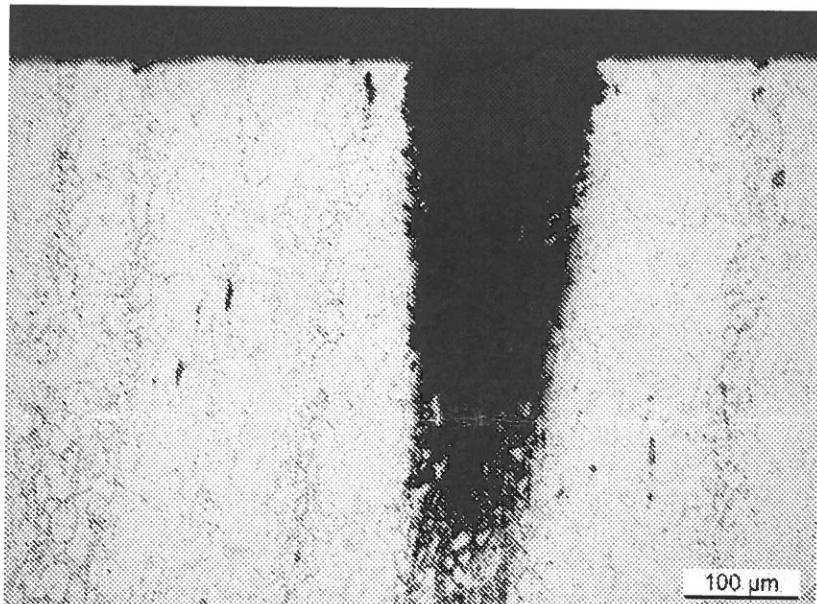


VDM Metals GmbH

VDM Metals

Microstructure Examination

Metallography Job No.: 7517
Lot No.: 104820039
Heat: 319837

Inspection Certificate No.: 173434/1**Enclosure:** 3
Page: 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 107-E01 Chg.:319837

Adress: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327



**Ultraschallprüfbericht
Ultrasonic Examination Report
Rapport de contrôle U.S.**

Besteller Purchaser / Client No. Cde	Bestell-Nr. P.O. No./No. Commande	Auftrags-Nr. Order No./No. cde	Zeugnis-Nr. Certificate No.	Datum Date	Seite Page	von of
SSS Super Alloys Ltd.	402338	527148	173434/1	06.12.18	1	1

Lieferform Product / Produit	bar
Werkstoff Material / Nuance	Nicrofer 6020 hMo / VDM® Alloy 625
Wärmebehandlung Heat Treatment / Traitement thermique	annealed
Oberfläche Surface Condition / Aspect surface	machined
Prüfspezifikation Test Specification	SSS Super Alloys SSS-SA625 Grade 1, Rev. 09 ASTM A388 (2016-a); API 6A PSL3 ISO 10423 Sections 7.4.2.3.15
Prüfgerät Test Apparatus / Appareil	Karl Deutsch Echograph 1090/21369
Ankopplungsmittel Couplant / Agent Couplant	water
Prüftechnik Inspection Technique / Technique	straight beam in radial direction
Prüfkopftyp/Freq./Abm. Type of Probe/Freq./Dim. / Palper Freq.	Karl Deutsch S24W4 / 4,0 MHz / dia. 24,0 mm
Prüfumfang Scanning % Contrôle	100% on all surfaces
Kalibrierung Calibration / Calibrage de la sensibilité	recording sensitivity of \varnothing 6.4 mm FSB + 6dB
Methode Method:	
Prüfergebnis Test Result / Résultat	No recordable or rejectable indications, the material is in compliance with the test specification

Geprüfte Menge / quantity Inspected

Auftr.-Pos. Order Item	Menge Quantity	Abmessung [mm] Dimension	Charge Nr. Heat No. Cauée	Los-Nr. Lot No.	
10	3	158,75 Ø x 3000-6000	319837	104620039	107-109

Prüfer
Inspector/VérificateurPrüfaufsicht
SupervisorAbnahmegesellschaft
Inspecting Authority

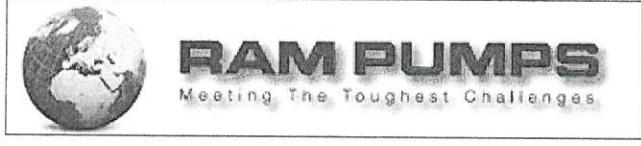
06.12.2018

Kayacan, Level II

06.12.2018

Stahlberg, Level III





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	46
Mode	General Metals
Time	2019-07-10 14:56
Duration	11.44
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.17
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.241	+/-	0.301
W	0.000	+/-	0.101
Ni	60.953	+/-	0.771
Co	0.158	+/-	0.119
Fe	4.861	+/-	0.222
Mn	0.000	+/-	0.238
Cr	21.256	+/-	0.417
V	0.000	+/-	0.064
Re	0.000	+/-	0.078
Ta	0.000	+/-	0.091
Hf	0.000	+/-	0.111

Supervised By: S .Talbot

26



FLD15248

GN26485

017545B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)	Dim. grano ASTM E112		
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * RAM PUMPS LTD Registered in England 1050935

FLD15248

GN26485

017545B



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING

ULTRASONIC TEST

CERTIFICATE-No :

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)

ORDER : PO0018455KW

ORDER CONFIRMATIO :

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

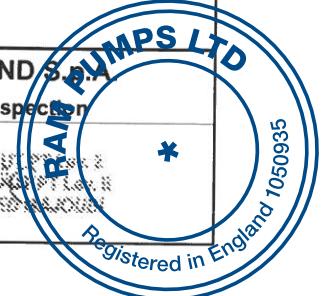
H.T. CONDITION : Annealed 980°C + water quenched

ULTRASONIC TEST REPORT

EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS

CUSTOMER INSPECTION

ITALFOND S.p.A.
NDE InspectionISO 9712 - UNI EN 10204-2-3
ENI-TESLA - VATTI Lec. II
ASME SB-564



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION**
ITALFOND S.p.A.
 Quality Assurance


FLD15248

Tracer: 23519

GN26485

017545B



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AFNeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

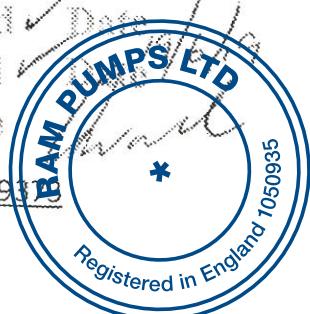
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate,
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/04/2019</i>
Item	<i>AS LISTED</i>	Material	<i>AS LISTED</i>
Order number	<i>PO0020043KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>AS LISTED</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>		
Sensitivity for DAC	<i>4.0 - 4.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>M. TATTERSALL</i>
Date		Qualification	<i>PCN II (103685) SNT-TC-1A II</i>
Signature		Signature	

Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

**Abnahmeprüfzeugnis**

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

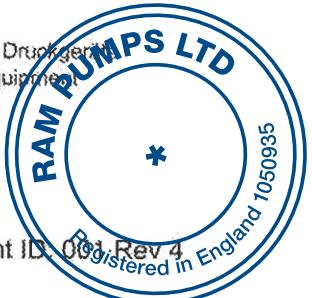
LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall



Document ID: 001 Rev 4
Registered in England 1050935

TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Probe-Nr. Test No. N° d'éprouvette Nº di prova.		Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta		Probenentnahme Specimen Prélèvement Prelevo		Tensile Testtemperatur Test Temperature Température d'essai Temperatura di prova		HARDNESS/HÄRTE		1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rottura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resistenza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporcione cristalina 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza						
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	Längs-Zone Richtung Direction Lunga	Richtung Direction Lunga	Streckenrichtung Tensile direction Yield direction Tensile direction Lunga	Temperatur °C N/mm²	RM 50mm N/mm²	A Lox % Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rottura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resistenza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporcione cristalina 4 = [mm10^-3] Breitung - Expansion 5 = [%] Elangissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Reg's / Anforderung																
Mechanical			1	2	3	20	345	758	25							
Analysis % - Max unless Stated C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0,Mo 8.0-10.0,Nb+Ta 3.15-4.15,Co 1.0 ,Ni 58.0 ,Al 0.40,Ti 0.40,Fe 5.0																
Results																
361506	12.48 Ø		1	2T	3	20	518	906	34							
61081A2	12.47 Ø		1	2T	3	20	480	827	52							
Notes																
4	Visual and dimensional checks- Satisfactory															
5	Chemical / See manufactures certificate and Anlage 2															

Ort -Location -Lieu - Località)

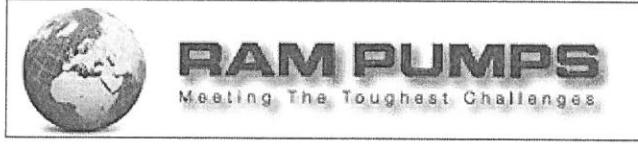
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856

Product
Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

APPROVED

By Sally Roddis at 3:51 pm, 6/25/19

Heat #
326940

Tracer #
26550

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	top	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	0,005

Cast	Melting Pr.	AI	Co	Ta	Nb+Ta
326940	VIM/ESR	top	0,22	0,02	0,010
		Meth	RF	RF	RF

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen									
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation	RoA		
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
1	RT	440			862	4D	54,7		58

Grain Size	
1 ASTM E112 - 13	
1	No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email ueenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

Enclosures: 3

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



FLD15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Purchase Order No.
538839 402468 (LB 11904)

Page: 2 / 2
printed: 06. JUN 2019

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

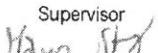
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor

 Stahlberg, Level III

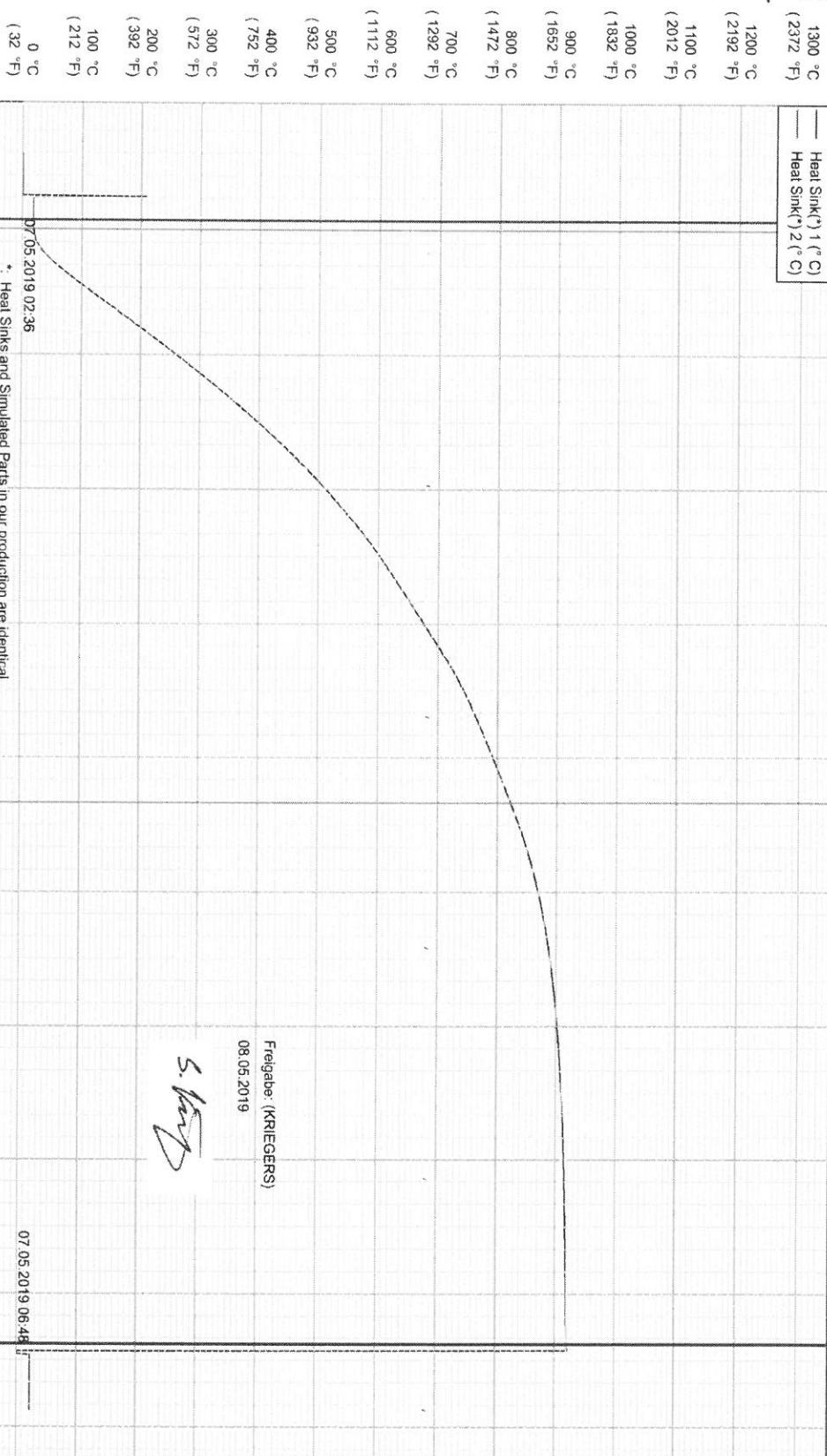
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1

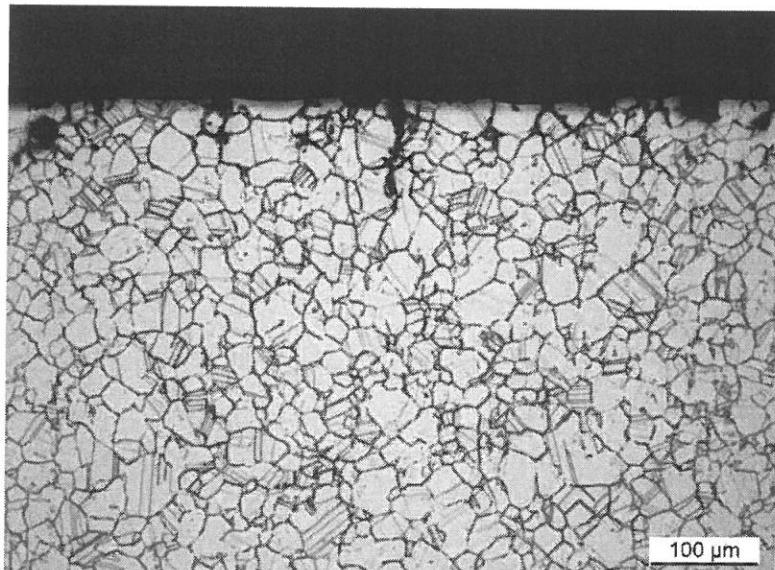


Ofen / Furnace : 10 – Gluehlos / Batch : 2437



VDM Metals GmbH

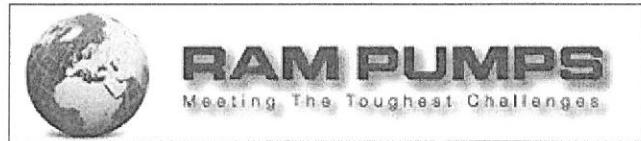
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____



FLI15249

GN26485

017546B



Tel. (+39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

GIR 26485

CERTIFICATE OF QUALITY AND MATERIAL TESTING

CERTIFICATE N.

AC/ 1938

DATE : 29/05/18

according to EN 10204.3.1

FIRM :

NEONICKEL LTD - KINGSWINFORD (GB)

ORDER :

PO0018455KW

ORDER CONFIRMATION : 206297

HEAT	N.of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched

CHEMICAL ANALYSIS

C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Sn
0,019	0,06	0,08	0,007	0,0005	21,54	61,51	8,67	0,078	
Ca	Al	V	Ti	W	Ta	As	Co	Nb	Pb
		0,138		0,188		0,0027		0,018	3,604
B	N	Zr	Nb+Ta	Fe	PRE	Ferrite (%)			Dim. grano ASTM E112
				3,61	3,33				5

TEST RESULTS ON ACTUAL BAR PROLUNGATION

Temp. [°C]	Direction Position	Rp _{0,2} [MPa]	Rp ₁ [MPa]	Rm [MPa]	A [%]	Z [%]	KV (10 X 10 mm) [J]	Hardness HB
RT	(1)T 1/2r	422		813	53,7	55,8		207
RT	**T 1/2r	433		835	53,3	56,8		
RT	L 1/2r	448		853	59,0	62,8		
-46	L						214,7-225,4-219,7	

Steelmaking process E.A.F. + A.O.D. + V.A.R.

HRc 15

No welding performed on material

Material free from Mercury contamination

Material inspected with a gamma spectrometer and with no radioactive contamination beyond the limits provided for by the EU-Radiation Protection 122-part 1, when relevant

Mechanical tests performed according to ASTM A370 (Probe/tensile Ø12,5mm-50mm length) + ASTM E23, ASTM E10
ASTM E18 and FSD-1-2 Rev.A1

** Test performed at 90° compared to (1)

Chemical analysis according to AMS 5666J and DIN 17744 W.2.4856

Issued in agreement with TÜV Süd Industrie Service GmbH (March 1995)

QMS approved according to PED 2014/68/EU, Annex I, Para. 4.3 by Notified Body 0036
(Certification no. DGR-0036-QS-W 55/2002/MUC)

SURVEYORS	CUSTOMER INSPECTION	ITALFOND S.p.A. Quality Assurance
FLI15249.M		 * Registered in England 1050935



Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**ULTRASONIC TEST****CERTIFICATE-No :**

UT/ 1938

DATE : 29/05/18

Inspection certificate according to EN 10204.3.1

FIRM : RIGANTI S.p.A. - SOLBIATE ARNO (VA)**ORDER : PO0018455KW****ORDER CONFIRMATIO :**

206297

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

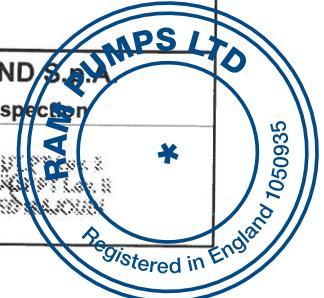
H.T. CONDITION : Annealed 980°C + water quenched**ULTRASONIC TEST REPORT**

EQUIPMENT	:	KRAUTKRAMER USN 58L
CALIBRATION METHOD	:	API 6A 7.4.2.3.15 B)1)
COUPLANT	:	GEL
KIND OF PROBE	:	B2S
SURFACE CONDITION	:	PEELED
TESTING PROCEDURE	:	ASTM A388
ACCEPTANCE CRITERIA	:	API 6A PSL 3
TEST RESULT	:	No recordable indication found

SURVEYORS**CUSTOMER INSPECTION**

ITALFOND S.p.A.

NDE Inspection

 ISO 9712 - UNI EN 10604
 ENI-TSI-001-A-001 Rev. B
 MCN-00000000000000000000000000000000




Tel. (39).(030).6829911

Fax. (39).(030).6820616

Via Industriale, 1 - 25021 BAGNOLO MELLA (BS) ITALY

CERTIFICATE OF QUALITY AND MATERIAL TESTING**CORROSION TEST****INSPECTION CERTIFICATE N.****CO/ 1938****DATE : 29/05/18**

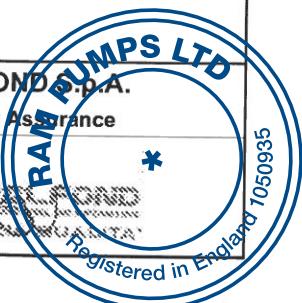
according to EN 10204.3.1

FIRM : NEONICKEL LTD - KINGSWINFORD (GB)**ORDER : PO0018455KW****ORDER CONFIRMATION: 206297**

HEAT	N. of PCS	MATERIAL DESCRIPTION	MATERIAL GRADE
61091A2	1	FORGED ROUND PEELED BAR Ø165,1mm	UNS N06625 Grade 1 ASTM B564 ASTM B446 ASME SB564 ASME SB446 NACE MR0175/ ISO 15156:2015 NACEMR 0103:2015

H.T. CONDITION : Annealed 980°C + water quenched**CORROSION TEST****TEST PROCEDURE** ASTM G28 method A**TEST DURATION** 120h , 120°C**SAMPLE DIMENSIONS** 2,49 2,48 1,00 [cm]**STARTING WEIGHT** 49,6307 [g]**WEIGHT AFTER TEST** 49,5758 [g]**WEIGHT LOSS** 0,0549 [g]**CORROSION RATE:** 0,0177 [mm/month]**SURVEYORS****CUSTOMER INSPECTION****ITALFOND S.p.A.****Quality Assurance**

* Registered in England 1050935



FLI15249

GN26485

017546B

Tracer: 23519



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AFNeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

TEST CERTIFICATE

Test Certificate No.	0619 / 0380 - 0381	O/No.	P00020264KW	Date Received	12.06.2019
Page 1 of 1				Tested/Reported	19.06.2019

Item

625 - Round bar - 6.1/2"

1) Heat No: 361506 2) Heat No: 61091A2

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370: 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) T 12.48 Ø	122.3	518	906	34	32
2) T 12.47 Ø	122.1	480	827	48	52
Spec: 102 - 254mm Ø		345 min	758 min	25 min	.

Hardness Test ASTM E10: 2018

Brinell 10/3000kgs 1) 259 HBW 2) 216 HBW

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.029	.14	.098	.004	<.003	21.42	9.22	60.1	.28	.059	4.85	3.41	.003	.28
2)	.027	.12	.070	.010	<.003	20.76	8.98	62.4	.15	.065	3.28	3.66	.003	.20
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	-	3.15	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	.40	

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

* Not currently UKAS accredited for this material type

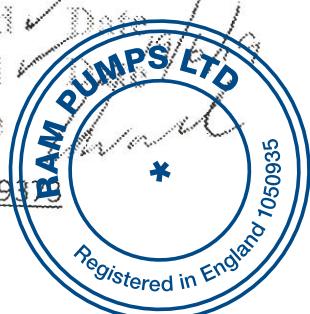
TÜV UK LTD

Witnessed ✓ Date

Reviewed ✓

Signature

TÜV 193



FLI15249

GN26485

017546B

Tracer: 23519



ScanTech Inspection Services
 Unit 13, The Wallows Industrial Estate,
 Fenspool Avenue, Brierley Hill
 West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U037

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/04/2019</i>
Item	<i>AS LISTED</i>	Material	<i>AS LISTED</i>
Order number	<i>PO0020043KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>AS LISTED</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>		
Sensitivity for DAC	<i>4.0 - 4.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	MATERIAL	HEAT NO	TRACER
1 LENGTH (5275MM)	6.1/2" DIA BAR	INC 625	61091A2	23519
1 LENGTH (2315MM)	9" DIA BAR	ALLOY 22	XLT3508-02	23123
1 LENGTH (866MM)	11" DIA BAR	ALLOY 22	XLH8655-02	23128
1 LENGTH (842MM)	10" DIA BAR	C276	319458	23179

THE ITEMS LISTED ABOVE WERE FOUND TO BE **ACCEPTABLE TO SPECIFICATION.**

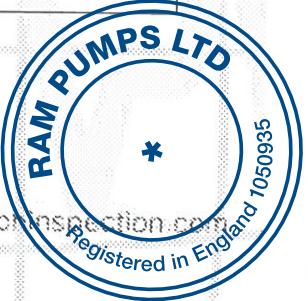
Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>M. TATTERSALL</i>
Date		Qualification	<i>PCN II (103685) SNT-TC-1A II</i>
Signature		Signature	

+44 (0)1384 79924

enquiries@scantechinspection.com

www.scantechinspection.com

Registered in England 1050935



Tracer: 23519

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004-3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Comprimenta:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale:

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Pausznatura:

Material UNS NO6625

Cast Nr – 361506,61091A2

Herstellerzeichen -Brand of the manufacturer -

Marcue du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors



Pcs.-Nr./Item No. Poste-No No pos	Stückzahl/ Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	6.5" Ø Bar x 848 & 1965 mm	361506	361506
02	1	6.5" Ø Bar x 5275 mm	61091A2	61091A2

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazioni:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegato

(Ort - Location - Lieu - Località)

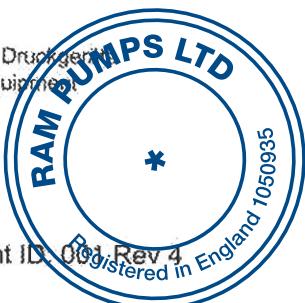
LONDON

(Datum - Date - Data)

19/06/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035

CEO
INTERNATIONAL



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen

Test Results

Résultats des Essais

Risultati delle Prove

Prüf-Nr. 19373-02(SW)

Inspection No.

Certificate N°

N° di collaudo

Teil

Part

Parte

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Probenart - Test type - Type d'essai - Tipo di prova:		TENSILE TEST / ZUGVERSUCH							HARDNESS/HÄRTE						
Probe-Nr. Test No. N° d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevoamento	Längs-Zone Richtung Zone Largh. Zona Direktion Längs Dirigente	Temperatur Temperature Température Temperatura	Prüftemperatur Test Temperature Température d'essai Temperatura di prova	Streckgrenze Yield Strength Strength d'élasticité Fuerza de resistencia	Dehnungsgrenze Tensile Strength Strength d'élongation Fuerza de deformación	Streckgrenze Yield Strength Strength d'élasticité Fuerza de resistencia	Bruchdehnung Elongation at break Elongation à la cassure Elongación a rotura	Bruchdehnung Elongation at break Elongation à la cassure Elongación a rotura	Bruchlast Breaking load Charge de cassure Carga de rotura	Bruchdehnung Elongation at break Elongation à la cassure Elongación a rotura	Bruchlast Breaking load Charge de cassure Carga de rotura	Werte Values Valeurs Valori	Bemerkung Remarks Remarques Osservazioni
Schmelze-Nr. Heat No. N° Coulée Colata N°	Dicke Thickness Epaisseur Spessore	Breite Width Largeur Largh.	1 2 3	4 5 6	7	8 mm	9 %	10 mm	11 %	12 mm	13 %	14 mm	15 %	16 mm	17
Reg's / Anforderung															
Mechanical				1	2	3	20	345	758	25					
Analysis % - Max unless Stated															
C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0															
Results															
361506	12.48 Ø		1	2T	3	20	518	906	34						
61091A2	12.47 Ø		1	2T	3	20	480	827	52						
Notes															
4	Visual and dimensional checks- Satisfactory														
5	Chemical / See manufactures certificate and Anlage 2														

Ort -Location -Lieu - Località)

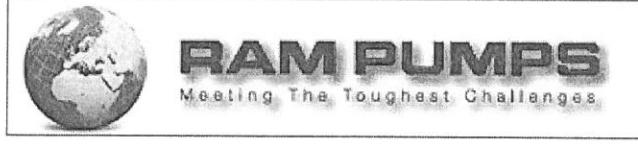
(Datum Date -Data)

LONDON

19/06/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	36
Mode	General Metals
Time	2019-09-02 09:55
Duration	11.89
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.00
SAMPLE	FLI15249.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	8.742	+/-	0.197
W	0.000	+/-	0.151
Ni	63.232	+/-	0.529
Co	0.000	+/-	0.128
Fe	3.383	+/-	0.190
Mn	0.000	+/-	0.282
Cr	20.885	+/-	0.407
V	0.000	+/-	0.338
Re	0.000	+/-	0.153
Ta	0.000	+/-	0.056
Hf	0.000	+/-	0.088

Supervised By: S .Talbot



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
538839 402468 (LB 11904)

SSS BATCH 402468A15A

Page: 1 / 2
printed: 06. JUN 2019

SSS Super Alloys LTD

58 Newhall Road
GB - S9 2QD Sheffield

Trademark

VDM® Alloy 625
NICROFER 6020 HMO

2.4856

Product

Bar, round, forged, annealed, machined

Specification

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09

However annealing parameters after VDM specifications
the Additional Heat Treatment Certification are excluded

ASTM B 446-03 (reapproved 14)

ASTM B 564-18 applicable for forgings

BS 3076-89

NACE MR0175 / ISO 15156-3 2015

ASTM G 28 - 02 (Reapproved 2015) - Method A max. 3,0 mm/anno

AMS 5666 J

ASME BPVC.II.B-2017 SB-446

NACE MR0103/ ISO 17945-2015

Norsok M630 (only for dia. < 67 mm)

Norsok MDS-N01 Rev. 5 without point 6

Material

UNS N06625

UNS N06625

UNS N06625

NA 21

UNS N06625

APPROVED

By Sally Roddis at 3:51 pm, 6/25/19

Heat #
326940

Tracer #
26550

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SSS Super Alloys SSS-SA 625 Grade 1, Alloy 625 Annealed Bar, Rev. 09; ASTM B 446-03 (reapproved 14); ASTM B 564-18 applicable for forgings; BS 3076-89; AMS 5666 J; ASME BPVC.II.B-2017 SB-446; Norsok MDS-N01 Rev. 5 without point 6

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
326940	VIM/ESR	0,02	<0,001	22,27	R59,85	0,05	0,13	9,14	0,33	3,36	4,52	0,005
	top	LE	LE	RF		RF						
	Meth											

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
326940	VIM/ESR	0,22	0,02	0,010	3,370
	top	RF	RF	RF	
	Meth				

Sample Condition	
annealed	
Lot	Sample No.
104927536	105-F02
104927536	105-F03

Tensile Test									
1 ASTM E8/E8M - 16a / longitudinal specimen									
Temp	Yield	0.2%	Yield	1.0%	Tensile	Elongation	RoA		
[°C]	[MPa]	[MPa]	[MPa]	[MPa]	A	[%]	A	[%]	[%]
1	RT	440			862	4D	54,7		58

Grain Size	
1 ASTM E112 - 13	
1	No 6.5

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Fax

Email uenal.uecuencue@vdm-metals.com

Ünal Üçüncü , authorized inspection representative

Mark of the Inspector

Q

E

Enclosures: 3

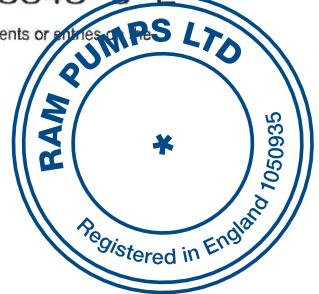
Date of release: 06.06.2019

183545-0-E

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telefon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Nicolas Müller
Frank Morris, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



FLI15248.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 183545/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 06. JUN 2019

Order No. Purchase Order No.
538839 402468 (LB 11904)

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104927536	105-F02	1 without objection : 0,77 mm/a
104927536	105-F03	

Item	Lot	
150	104927536	Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/1h/Water	104927536

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

The quench bath water temperature was at start of quench 25°C and 27°C at completion of quench.

Hot forming: Reduction ratio: 4,26:1

Material was heat treated in furnaces to comply with API6A 20. Ed. Appendix M

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.

VDM Metals GmbH
on behalf of **VDM Metals International GmbH**

VDM Metals

Enclosure for Inspection certificate 183545/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
538839 402468 (LB 11904)

Enclosure: 1
Page: 1 / 2
printed: 06. JUN 2019

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-F01	surface	HBW 10/3000/ A	259 257 253
104927536	106-K02	surface	HBW 10/3000/ A	275 270 272

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HBW 10/3000/ A	262 261 264

annealed ASTM E18 - 17e1

Lot	Sample No.	Location	Method	Values
104927536	105-E01	surface	HRC	22,3 23,7 23,4

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104927536	105-F03	-110	130 149 131		1,45 1,68	1,44

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 1
 Page: 2 / 2
 printed: 06. JUN 2019

Enclosure for Inspection certificate 183545/0
 DIN EN 10204/01.05 3.1
 Order No. Delivery No. Purchase Order No.
 538839 402468 (LB 11904)

Ultrasonic Examination Report

Specification

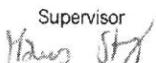
ASTM A 388-2018 // PSL 3

Inspection Technique	straight beam in radial direction
Surface Condition	peeled
Inspection Scope	circumferential 360° / 15% overlap
Test Apparatus	KD Echograph 1090/21369
Couplant	water
Type of Probe / Frequency / Dim.	S24W4 183786 / 4,00 MHz / 24,0 mm
Calibration Block/sound path	TB 8: 20 / 60 / 105 / 150 / 191,4
Recording Level	4,52 mm
Acceptance Level	6,00 mm
Scanning Speed	150
Loss Of Back Reflection	<=50

Cast - Product-ID	Reportable Indications		
	count	Inspector	level
326940 - 105; 106	0	Kayacan	Level II

Date of inspection 09.05.2019

The material is compliance with the test specification

Supervisor


Stahlberg, Level III

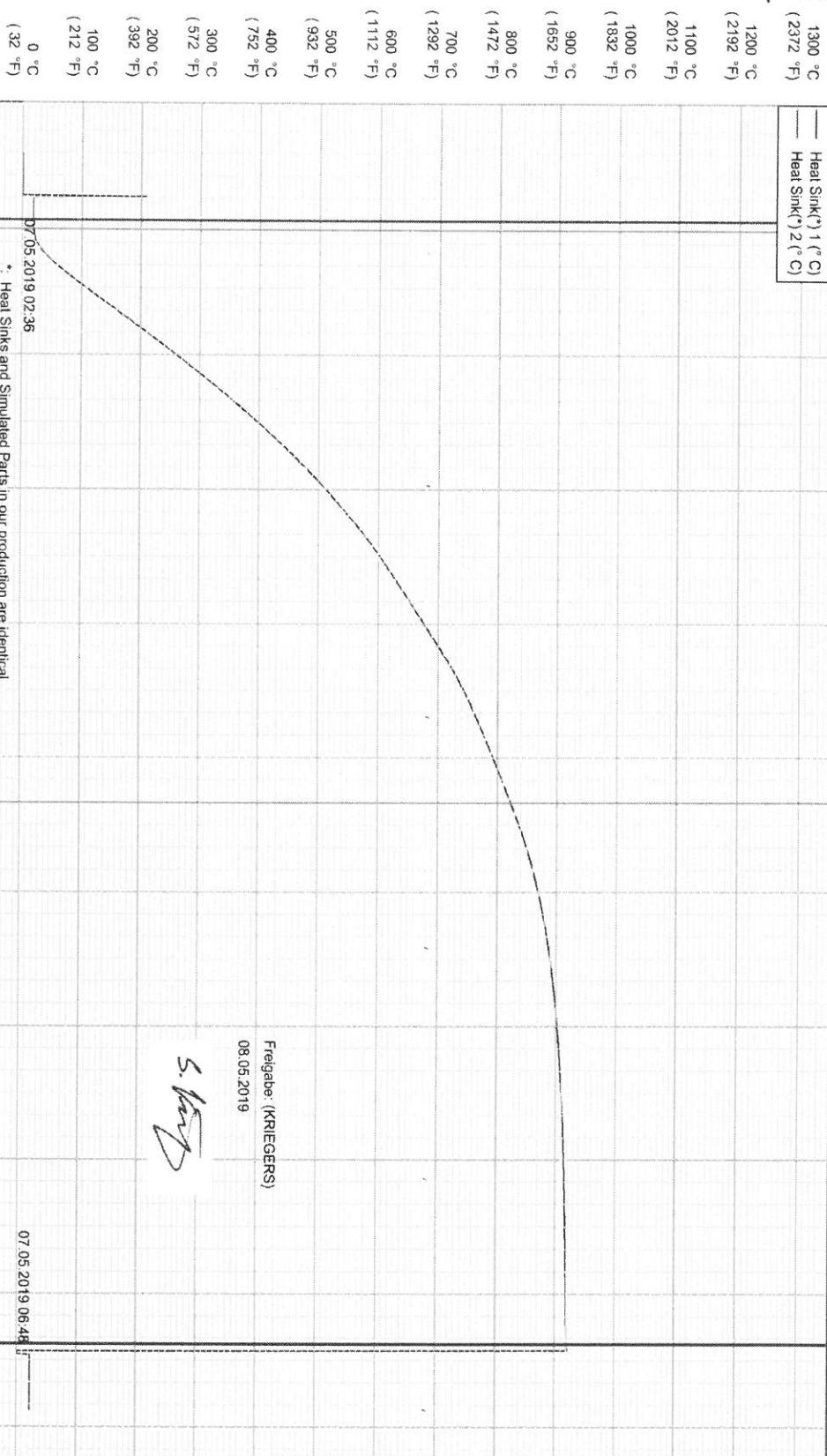
VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure: 2
Page: 1 / 1
printed: 05. JUN 2019

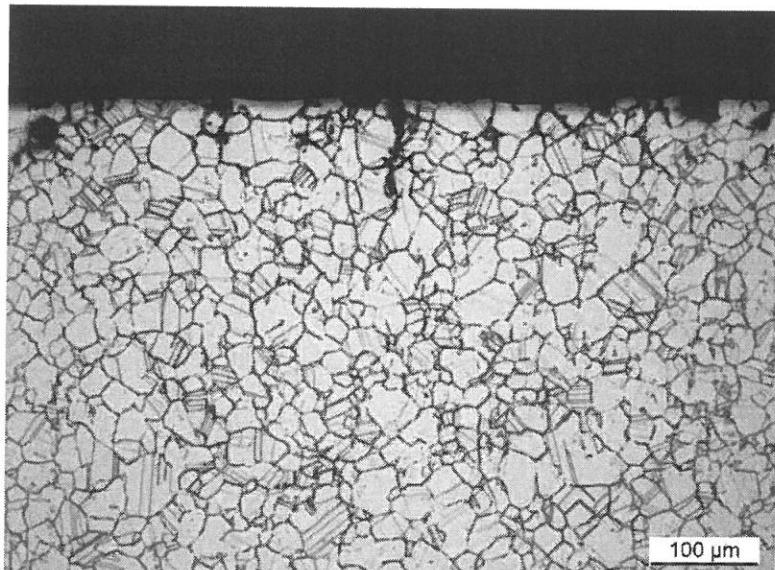
Enclosure for Inspection certificate
DIN EN 10204/01.05

183545/0
3.1



VDM Metals GmbH

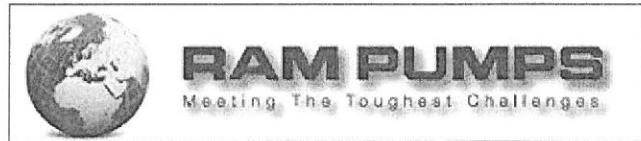
VDM Metals

Microstructure Examination**Metallography Job No.:** 8459**Lot No.:** 104927536
Heat: 326940**Inspection Certificate No.:** 183545**Enclosure:** 3**Page:** 1 of 1

100:1 VDM® Alloy 625 / Nicrofer 6020 hMo SMT 105-F02 Chg.:326940

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Frank Morris; Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	43
Mode	General Metals
Time	2019-09-02 09:59
Duration	11.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.20
SAMPLE	FLD15248.M
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.190	+/-	0.318
W	0.000	+/-	0.071
Cu	0.000	+/-	0.144
Ni	61.412	+/-	0.825
Co	0.000	+/-	0.110
Fe	4.865	+/-	0.221
Mn	0.200	+/-	0.185
Cr	20.791	+/-	0.435
V	0.000	+/-	0.337

Supervised By: S .Talbot _____





RAM PUMPS
Meeting The Toughest Challenges

RAM Pumps Ltd
Unit 14 Hazelwood
Trading Estate
Worthing
West Sussex
BN14 8NP

Tel: +44 (0) 1903 206622
Fax: +44 (0) 1903 205511

OPERATING & MAINTENANCE MANUAL / OPERATION & MAINTENANCE DATABOOK INDEX

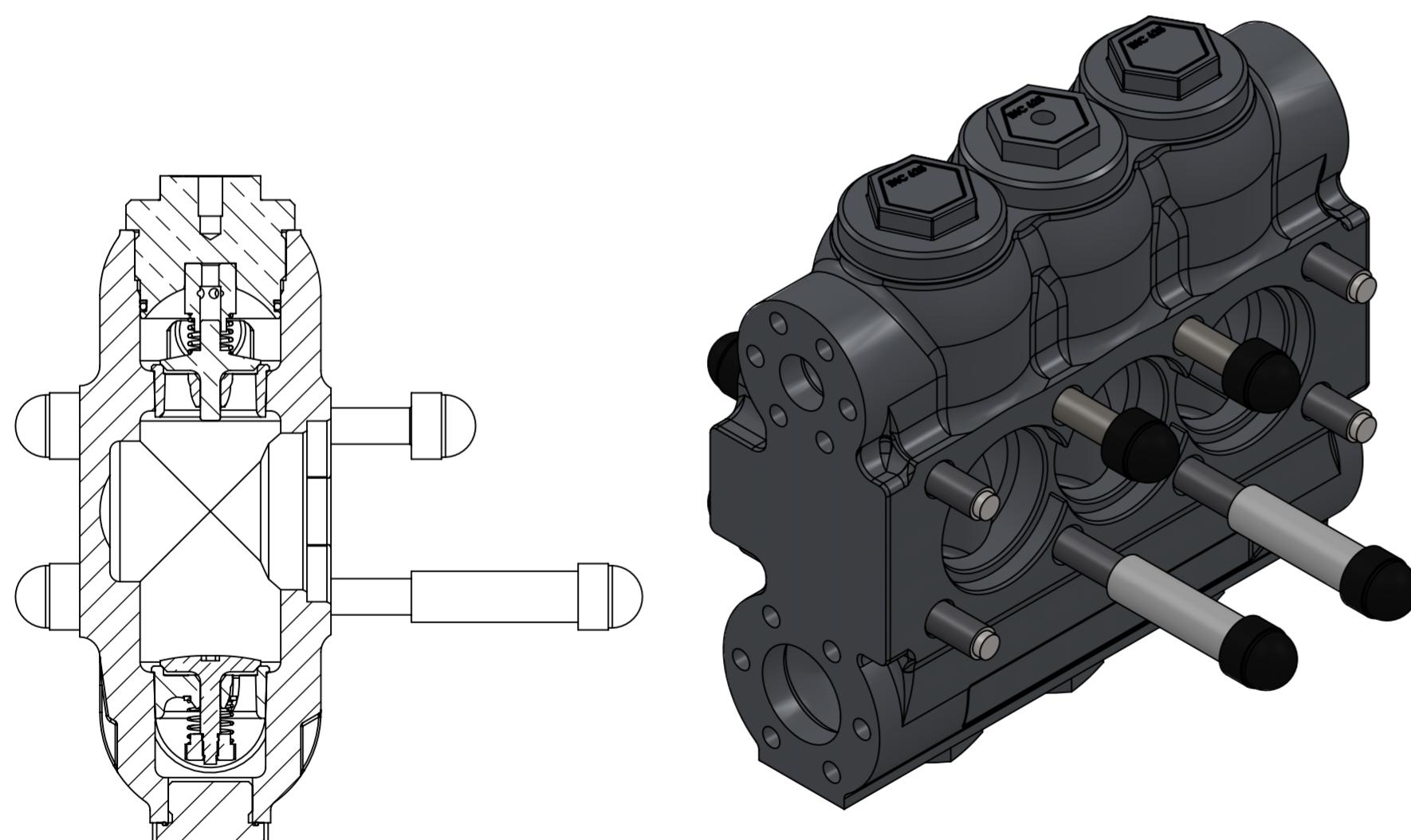
Client	<i>L&T Hydrocarbon Saudi</i>
Project Title	<i>Marjan Increment Program – Offshore Oil Facilities</i>
Ram Project Reference	<i>016867s</i>
Equipment Title	<i>Slops Pumps</i>
Equipment Tag No's.	<i>G75-44-G-0138A/B, G75-45-G-0156A/B, G75-46-G-0149A/B G75-47-G-0164A/B, G75-49-G-0143A/B, G75-52-G-0133A/B</i>
Pump Serial Numbers	<i>016867A/B, 016867C/D, 016867E/F 016867Y/Z, 016867AA/AB, 016867AC/AD</i>
Purchase Order Number	<i>L&T Hydrocarbon Saudi/83000-00192/SD</i>

Sequence	Component	Description	Material Number	Heat Number	Certificate Number	Global number	RAM Build Number	File Reference
23	PLG15245	PLUG TOP RAM54/HCH	N06625	361187	169050/0	26242	017340B	26242
20	VSR15244	VALVE SEAT RING	N06625	606389	1118501	26242	017338B	26242
18	PLG15243	PLUG 1.1/4" 8SPP	N06625	351483	130991	26242	173378	26242
11	VVI15242	VALVE INLET RAM54/HCH	N06625	319615	177564/0	26242	173318	26242
9	VST15241	VALVE SEAT RAM54/HCH	CW6MC	C6132	3300	26385	173308	26385
7	VGD15236	VALVE GUIDE DICHARGE	N06625	606389	1118501	26242	017324B	26242
6	VVD15235	VALVE DISCHARGE RAM54/HCH	N06625	319615	177564/0	26242	017323B	26242
3	PLG15234	PLUG TOP RAM54/HCH	N06625	361187	169050/0	26242	173228	26242
2	VNT15233	VALVE NUT RAM54	N06625	WLH8282	403805V1	26242	173208	26242
1	FHD15215	FLUIDHEAD RAM54 HCH	CW6MC	P0812	M2025	26534	174738	26534
1	FHD15215	FLUIDHEAD RAM54 HCH	CW6MC	P0813	M2027	26534	174738	26534

1	2	3	4	5	6	7	8	9	10	11	12
IF IN DOUBT ASK		DO NOT SCALE	REMOVE ALL SHARP EDGES AND BURRS UNLESS OTHERWISE STATED						DO NOT ACCEPT HAND MARK-UPS UNLESS SIGNED AND STAMPED BY THE ENGINEERING DEPT OF RAM PUMPS LTD.		

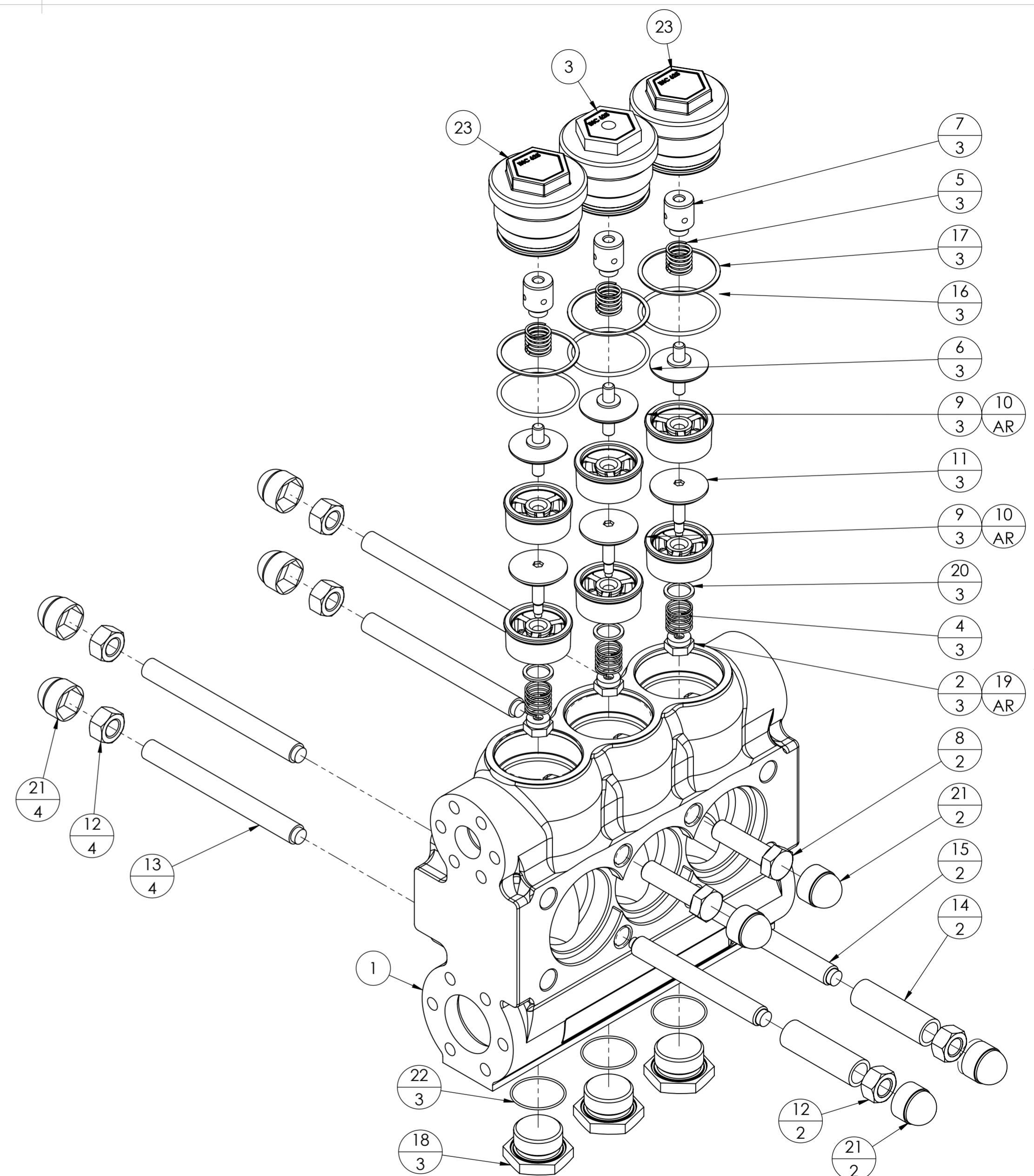
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	MATERIAL	/WETTED "W"
A 1	FHD15215	FLUIDHEAD RAM54 HCH - MACHINED	1	INCONEL 625	W
2	VNT15233	VALVE NUT RAM54 HCH	3	UNS N06625 (INCONEL 625)	W
3	PLG15234	PLUG TOP RAM54/HCH LIFTING	1	ASTM B446 UNS N06625 (INCONEL 625)	W
4	SVI11673	VALVE SPRING INLET RAM54	3	INCONEL GR.X750	W
5	SVD11674	VALVE SPRING DISCHARGE RAM54	3	INCONEL GR.X750	W
6	VVD15235	VAVLE DISCHARGE RAM54/HCH	3	ASTM B446 UNS N06625 (INCONEL 625)	W
7	VGD15236	VALVE GUIDE RAM54	3	ASTM B446 UNS N06625 (INCONEL 625)	W
8	BLT18A65C	HEX HEAD BOLT M18 X 65 GR.8.8 C-S	2	ISO 898-1 GR.8.8 C-S	
9	VST15241	VALVE SEAT RAM54 HCH	6	ASTM A494 GR. CW6MC	W
10	LOC7474	ADHESIVE - LOCTITE 641	1	METHACRYLATE	
11	VVI15242	VALVE INLET RAM54	3	ASTM B446 UNS N06625 (INCONEL 625)	W
12	NUT18LC	NUT M18 2H-C/S B18.2.4.2M STYLE 2	6	A194 GR.2H	
13	STD3399	STUD M18 X 185MM LG RAM40	4	BS 970 605M36T (EN16T)	
14	COL5390	SPACER	2	ST. STL. 431 S29	
15	STD3470	STUD M18 X 160MM LG RAM40	2	BS 970 605M36T (EN16T)	
16	ORG23075V	O-RING	3	ASTM D1418 FKM	W
17	AER230AE	BU230 SPIRAL PTFE-BACK UP RING	3	PTFE	W
C 18	PLG15243	PLUG 1 1/4" BSPP RAM54 HCH	3	ASTM B446 UNS N06625 (INCONEL 625)	W
19	LOC7475	ADHESIVE - LOCTITE 243	1	METHACRYLATE	
20	VSR15244	VALVE SEAT RING INLET RAM54 HCH	3	ASTM B446 UNS N06625 (INCONEL 625)	W
21	CAP4633	CAP NUT	8	POLYETHYLENE	
22	ORG03175V	O-RING	3	ASTM D1418 FKM	W
23	PLG15245	PLUG TOP RAM54/HCH	2	ASTM A494 CW6MC (Inconel 625)	W

NOTE:
ALL WETTED MATERIALS SUITABLE FOR NACE MR0175, ISO15156



SECTION ON Q

TORQUE SETTINGS	
ITEM No.	TORQUE Nm
2	20
8	200
12	200



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS TOLERANCES: LINEAR: 0 = +/- 0.5mm 0.0 = +/- 0.1mm 0.00 = +/- 0.04mm ANGULAR: +/- 0.5 DEGREES	MATERIAL: SEE PARTS LIST SEE BOM	THIS DRAWING IS CONFIDENTIAL AND MUST NOT BE COPIED LOANED OR TRANSFERRED WITHOUT PERMISSION OF: © 2015 RAM PUMPS LTD WORTHING SUSSEX
FOR EXPLANATION OF NOTES SYMBOLS ETC SEE B.S. 308	FINISH: N/A	TREATMENT: N/A
(N) INDICATES MODIFICATION ISSUE NUMBER	UNLESS OTHERWISE STATED	SHEET SIZE: A2
ISSUE: 02 DATE: 15/05/2019	MOD: BOM ADDED	ORIGINAL SCALE: 1:3
ISSUE: 01 DATE: 05/10/2016	DRAWN: SS	DATE: 05-10-2016
ISSUE: DATE:	APRVD: AP	APPROVED: AP
1st USED ON: 014574S		
RAM DWG NO. FH15156	SHT 1 OF 1	
FLUIDHEAD ASSEMBLY RAM54 HCH/SL/V		

CERTIFICATE OF CONFORMITY & TESTING

Certificate Number

M2027 REV. 1

William Cook Cast Products
 Parkway Avenue, Sheffield, S9 4UL England
 Phone +44 (0) 114 731252
 Fax +44(0) 114 275 2508
 Email castproducts@william-cook.co.uk
 Web www.william-cook.co.uk
 VAT Reg No GB 646 4752 15

Certified that the parts supplied have been manufactured, tested and inspected in accordance with our BS EN ISO 9001 System of Control and with the requirements of the Purchase Order and unless otherwise noted below, conform in all respects to the relevant specifications and drawings.

Customer	RAM Pumps Limited											
Part/Drawing	FHC15158				Rev	Job Number: P21760						
Description	FLUIDHEAD CASTING RAM54 HCH						Order Number: 033159PO/					
Specification	ASTM A494 CW6MC. NACE MR0175											
CHEMICAL ANALYSIS (Weight %)	Element	C	Si	Mn	S	P	Cr	Mo	Ni%	Nb	Fe	V
Identification	Minimum	0.00	0.00	0.00	0.000	0.000	20.00	8.00	0.00	3.15	0.00	0.00
	Maximum	0.06	1.00	1.00	0.015	0.015	23.00	10.00		4.50	5.00	
P0813	QTY 3	0.03	0.13	0.13	0.001	0.005	21.59	8.94	62.56	3.38	3.68	0.02
MECHANICAL PROPERTIES	Test	Rp 0.2		Rm		A	Hardness					
Identification	Units	N/mm ²		N/mm ²		%	HRBW					
	Minimum	275		485		25	0					
P0813		297		618		65	102					

Additional Remarks

CC 275B

According to BS EN 10204 3.1

H.F.Induction Melted.

Visual Inspection-MSS SP 55 Satisfactory

Heat Treatment-Solution Treated.

ALL PICKLED AND PASSIVATED.

Signed:



Date: 10/10/2019

Witnessed:

CERTIFICATE OF CONFORMITY & TESTING

Certificate Number
M2025

William Cook Cast Products
 Parkway Avenue, Sheffield, S9 4UL England
 Phone +44 (0) 114 731252
 Fax +44(0) 114 275 2508
 Email castproducts@william-cook.co.uk
 Web www.william-cook.co.uk
 VAT Reg No GB 646 4752 15

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Part/Drawing	FHC15158					Rev	Job Number: P21760					
Description	FLUIDHEAD CASTING RAM54 HCH						Order Number: 033159PO/					
Specification	ASTM A494 CW6MC. NACE MR0175											
CHEMICAL ANALYSIS (Weight %)	Element	C	Si	Mn	S	P	Cr	Mo	Ni%	Nb	Fe	V
Identification	Minimum	0.00	0.00	0.00	0.000	0.000	20.00	8.00	0.00	3.15	0.00	0.00
	Maximum	0.06	1.00	1.00	0.015	0.015	23.00	10.00		4.50	5.00	
P0812	QTY 3	0.03	0.16	0.15	0.001	0.005	21.15	8.56	63.09	3.35	4.10	0.01
MECHANICAL PROPERTIES	Test	Rp 0.2	Rm	A	Hardness							
Identification	Units	N/mm ²	N/mm ²	%	HRBW							
	Minimum	275	485	25	0							
P0812					102							
		300	613	59	89							

Additional Remarks

CC 275B

According to BS EN 10204 3.1

H.F. Induction Melted.

Visual Inspection-MSS SP 55 Satisfactory

Heat Treatment-Solution Treated.

All pickled and passivated.

Signed:



Date: 17/09/2019

Witnessed:

CERTIFICATE OF CONFORMITY & TESTING

Certificate Number

M2027 REV. 1

William Cook Cast Products
 Parkway Avenue, Sheffield, S9 4UL England
 Phone +44 (0) 114 731252
 Fax +44(0) 114 275 2508
 Email castproducts@william-cook.co.uk
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 VAT Reg No GB 646 4752 15

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Part/Drawing	FHC15158				Rev	Job Number: P21760						
Description	FLUIDHEAD CASTING RAM54 HCH						Order Number: 033159PO/					
Specification	ASTM A494 CW6MC. NACE MR0175											
CHEMICAL ANALYSIS (Weight %)	Element	C	Si	Mn	S	P	Cr	Mo	Ni%	Nb	Fe	V
Identification	Minimum	0.00	0.00	0.00	0.000	0.000	20.00	8.00	0.00	3.15	0.00	0.00
	Maximum	0.06	1.00	1.00	0.015	0.015	23.00	10.00		4.50	5.00	
P0813	QTY 3	0.03	0.13	0.13	0.001	0.005	21.59	8.94	62.56	3.38	3.68	0.02
MECHANICAL PROPERTIES	Test	Rp 0.2		Rm		A	Hardness					
Identification	Units	N/mm ²		N/mm ²		%	HRBW					
	Minimum	275		485		25	0					
P0813		297		618		65	102					

Additional Remarks

CC 275B

According to BS EN 10204 3.1

H.F.Induction Melted.

Visual Inspection-MSS SP 55 Satisfactory

Heat Treatment-Solution Treated.

ALL PICKLED AND PASSIVATED.

Signed:



Date: 10/10/2019

Witnessed:

CERTIFICATE OF CONFORMITY & TESTING

Certificate Number

M2025

William Cook Cast Products
 Parkway Avenue, Sheffield, S9 4UL England
 Phone +44 (0) 114 731252
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Customer	RAM Pumps Limited											
Part/Drawing	FHC15158				Rev	Job Number: P21760						
Description	FLUIDHEAD CASTING RAM54 HCH						Order Number: 033159PO/					
Specification	ASTM A494 CW6MC. NACE MR0175											
CHEMICAL ANALYSIS (Weight %)	Element	C	Si	Mn	S	P	Cr	Mo	Ni%	Nb	Fe	V
Identification	Minimum	0.00	0.00	0.00	0.000	0.000	20.00	8.00	0.00	3.15	0.00	0.00
	Maximum	0.06	1.00	1.00	0.015	0.015	23.00	10.00		4.50	5.00	
P0812	QTY 3	0.03	0.16	0.15	0.001	0.005	21.15	8.56	63.09	3.35	4.10	0.01
MECHANICAL PROPERTIES	Test	Rp 0.2		Rm		A	Hardness					
Identification	Units	N/mm ²		N/mm ²		%	HRBW					
	Minimum	275		485		25	0					
P0812		300		613		59	102					

Additional Remarks

CC 275B

According to BS EN 10204 3.1

H.F.Induction Melted.

Visual Inspection-MSS SP 55 Satisfactory

Heat Treatment-Solution Treated.

All pickled and passivated.

Signed:



Date: 17/09/2019

Witnessed:



ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U026

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

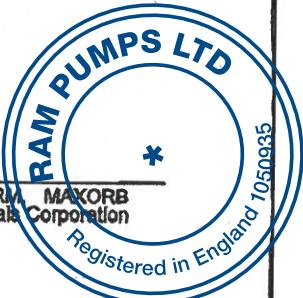
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





SPECIAL METALS WIGGIN LIMITED

Holme Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/AS/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS	
Al	pct	.4	B-01	0.23	PASS	
Co	pct	1	B-01	0.13	PASS	
			T-01	0.13	PASS	
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Cr	pct	20	23	B-01	21.64	PASS
				T-01	21.87	PASS
Fe	pct		5	B-01	4.02	PASS
				T-01	4.04	PASS
Mo	pct	8	10	B-01	8.71	PASS
				T-01	8.80	PASS
Nb	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS
Ni	pct	58		B-01	61.1	PASS
				T-01	60.7	PASS
Ti	pct			B-01	0.28	PASS
				T-01	0.28	PASS
Nb+Ta	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

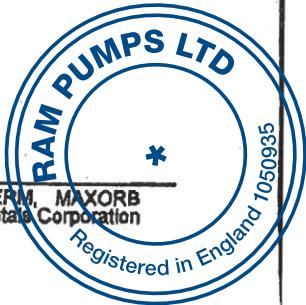
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mean)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
EN 10204:2004 - 3.1
ISO 9001
EN/AS/ISQ 9100
ISO/TS 16949 (by agreement)
TDV Approved to AD - Merkblatt WO/TRD 100
RRB000:6ABR Approved No. 1506
For tests performed by IncoTest :-
ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-EN ISO 6892-1:2016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTM E10-15A-(TYPE A):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

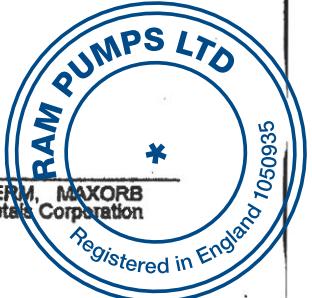
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTM E112 OCT 13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
-----------	-----	-----------	-----------	-----------	-------------	--------------





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO/TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

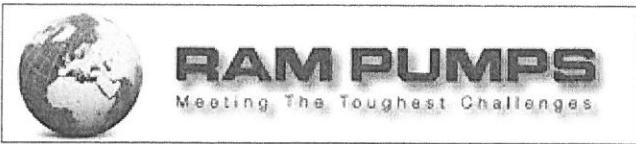
End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	

For and on behalf of SPECIAL METALS WIGGIN LIMITED
 Authorised Signatory
FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation

Registered in England 1050355



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test				Hardness Test					
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen				1 ASTM E10 - 17					
						2 ASTM E18 - 17e1					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC	
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60	1 258 surface
104864303	1-A1								2	23,5 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Q

E

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Page: 2 / 2
printed: 09. JAN 2019

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

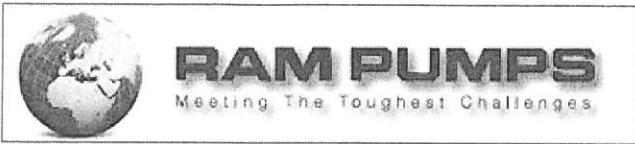
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



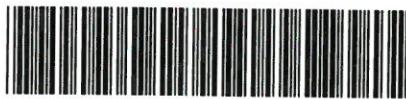


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

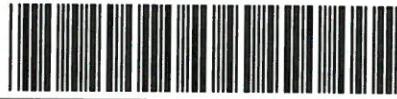
Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs

MANUFACTURED ON PRO: PRO0026549MK | SO #: SO0020479MK

S0091197-005-061 | QTY: 20 kg | PC: 1 | 3000.0 mm

HEAT: 606389 | MILL CERT: 001118501 | TRACER #: TRA0005770MK

ENGINE TYPE: | MILL SOURCE: Carpenter Technologies

SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME
SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE
S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED
2014/68/EU Recorded on Certs, SABRe Release, UNS N06625

| Country of Origin: United States of America

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

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Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals, BAE Systems BAE/AG/20203/MAA, BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

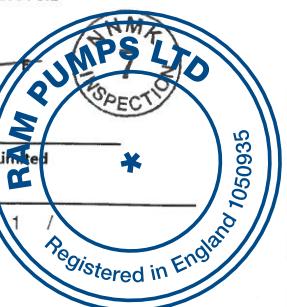
RELEASED IN ACCORDANCE WITH EN10204 2004 3.1

APPROVED CERTIFICATE

Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN (XRF)	SI (XRF)	P (OES)	S (COM)	CR (XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

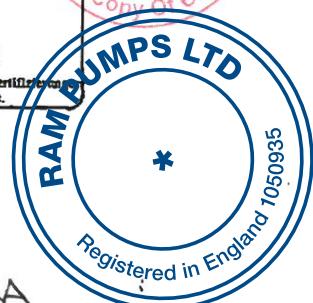
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

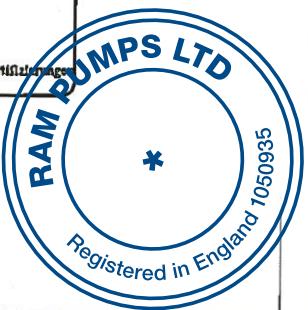
HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCl

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED  DATE 14/8/18
FOR AND ON BEHALF OF 

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

- THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
- THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

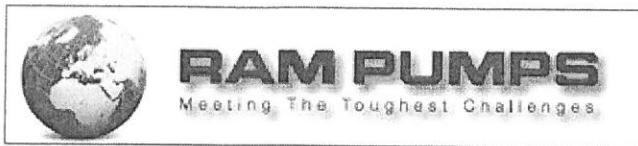
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

This certification is made to the customer printed on this form. Carpenter neither makes, nor assumes responsibility for, any representation or certification to other parties.
Die vorliegende Zertifizierung ist nur für den Kunden gemäß dem Formular gültig. Carpenter übernimmt keinerlei Haftung für die ausgewiesenen Daten oder Zertifizierungen.
Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S.Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test		
		1 ASTM E8/E8M - 16a / longitudinal specimen							1 ASTM E10 - 17		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	2 ASTM E18 - 17el		
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56	
104765347	1-A1								HBW 10/3000/A	HRC	
									1 254 surface	28,1 surface	

Sample Condition annealed		Notched Bar Impact Testing							Grain Size		
		1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10							1 ASTM E112 - 13		
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 No 7.5		
104765347	1-A1	1	-46	120	126	125					
104765347	1-A1										

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax _____
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection
Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :

Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl/ Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

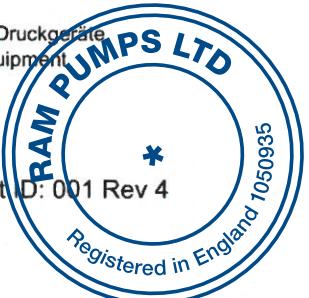
(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento		U.L. (mm) et Z.F. (mm)	Richtung (°) Direction (°) L'axe (°)	Sens., Längs, Long.	Temperatur (°C) Temperature (°C) Température (°C)	Streck- Dehnung (mm/mm) Tensile strain (mm/mm) Étirement (mm/mm)	0.2 N/mm²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min						
Mechaniical								415	830	30						
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>				1	2	3	20	477	923	48.0		HB				
333120	12.49 Ø			1	2	3	20	477	923	48.0		225				
361187	12.49 Ø			1	2	3	20	497	903	49		253				
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / PMI See manufactures certificate and Anlage 2 6 Hardness requirements 7 Customer Koso Kent Introl ltd O/N 104868																

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19

TÜV-UK DOC. No.:	FORM.: 0001	REV. No.:	2	DATE:	03.10.03
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TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Ausgabe

Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE							
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélevement Prelevamento															
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. Abmessung L = Length Z = Zähne Richtung Direzione Längs Lateral Dicke Spessore	Temperatur Temperature Température Temperatura	°C	Streckgrenze Yield Strength Tension de résistance Tensione di resistenza	0.2 N/mm²	Körperart Type of specimen Type d'éprouvette Tipo di provetta	RM	50mm A Lo=	Peripherie Periphery Perimètre Periferia	Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Bemerkung Remarks Remarques Osservazioni			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
<u>Req'ts / Anforderung</u>							min	min	min								
Mechanical			1	2	3	20	415	830	30								
Analysis % - Max unless Stated C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40,Ti 0.40, Fe 5.0																	
<u>Results</u>																	
XLH8874	12.49 Ø		1	2	3	20	422	873	50								
361776	12.51 Ø		1	2	3	20	553	900	46								
352975	12.48Ø		1	2	3	20	531	896	48								
WLH8121	12.47Ø		1	2	3	20	471	884	51								
361187	12.48Ø		1	2	3	20	479	882	48								
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																	
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																	

Ort -Location -Lieu - Localita)

(Datum Date -Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

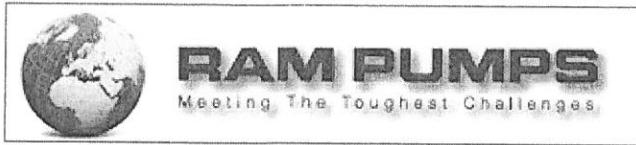
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U026

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	

+44 (0)1384 79924

enquiries@scantechinspection.com

www.scantechinspection.com

SBWCON 1" DA





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

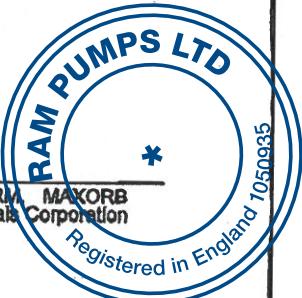
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holme Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS	
Al	pct	.4	B-01	0.23	PASS	
Co	pct	1	B-01	0.13	PASS	
			T-01	0.13	PASS	
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Cr	pct	20	23	B-01	21.64	PASS
				T-01	21.87	PASS
Fe	pct		5	B-01	4.02	PASS
				T-01	4.04	PASS
Mo	pct	8	10	B-01	8.71	PASS
				T-01	8.80	PASS
Nb	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS
Ni	pct	58		B-01	61.1	PASS
				T-01	60.7	PASS
Ti	pct			B-01	0.28	PASS
				T-01	0.28	PASS
Nb+Ta	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

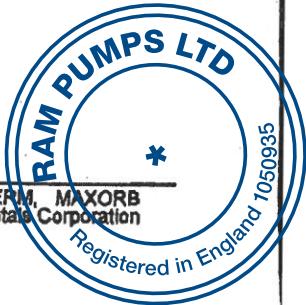
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mean)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
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SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/ISQ 9100
 ISO/TS 16949 (by agreement)
 TDV Approved to AD - Merkblatt WO/TRD 100
 RR8000:8ABR Approved No. 1506
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-ENISO6892-12016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTME10-15A-(TYPEA):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

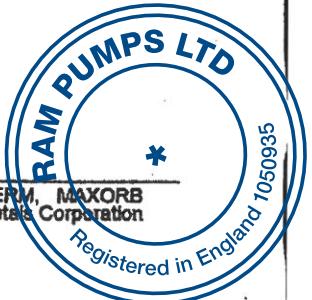
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTME112OCT13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
-----------	-----	-----------	-----------	-----------	-------------	--------------





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO/TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

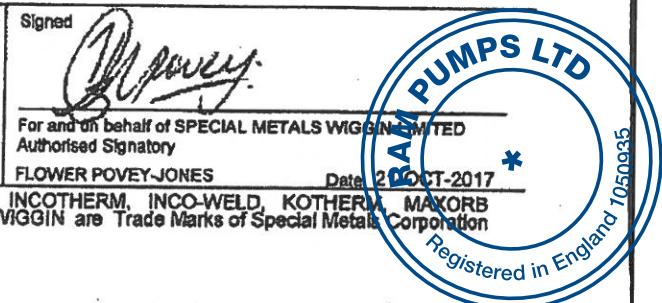
Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

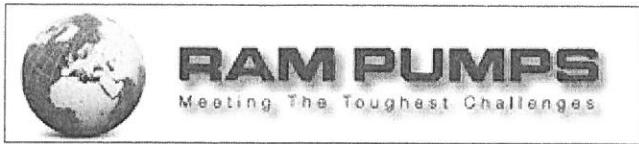
Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	For and on behalf of SPECIAL METALS WIGGIN LIMITED Authorised Signatory FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test				Hardness Test					
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen				1 ASTM E10 - 17					
						2 ASTM E18 - 17e1					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC	
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60	1 258 surface
104864303	1-A1								2	23,5 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Q

E

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

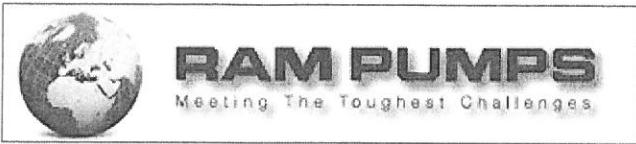
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



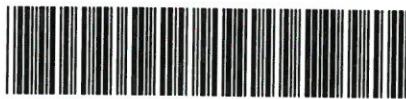


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs

MANUFACTURED ON PRO: PRO0026549MK | SO #: SO0020479MK

S0091197-005-061 | QTY: 20 kg | PC: 1 | 3000.0 mm

HEAT: 606389 | MILL CERT: 001118501 | TRACER #: TRA0005770MK

ENGINE TYPE: | MILL SOURCE: Carpenter Technologies

SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME
SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE
S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED
2014/68/EU Recorded on Certs, SABRe Release, UNS N06625

| Country of Origin: United States of America

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

All products sold by NeoNickel are subject to B.I.S. export administration regulations.
Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

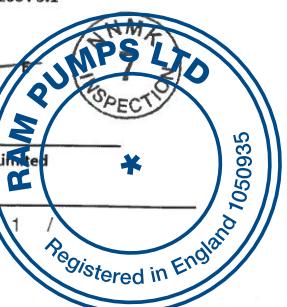
Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals, BAE Systems BAE/AG/20203/MAA, BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

RELEASED IN ACCORDANCE WITH EN10204 2004 3.1**APPROVED CERTIFICATE**Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN (XRF)	SI (XRF)	P (OES)	S (COM)	CR (XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

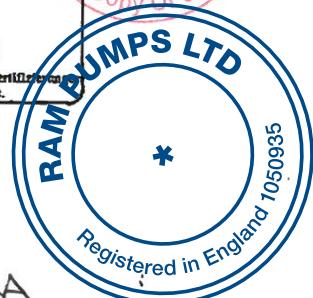
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE

**CARPENTER**Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

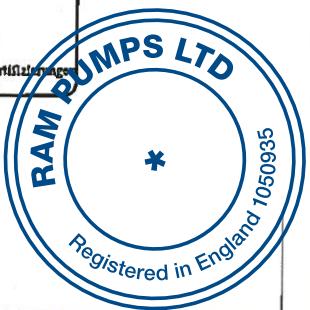
HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCl

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED  DATE 14/8/18
FOR AND ON BEHALF OF 

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

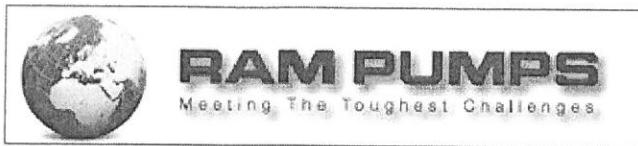
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

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RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856

Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test												
1 ASTM E8/E8M - 16a / longitudinal specimen																					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/A	HRC											
104765347	1-A1	RT	542		907	4D	46,5	5	45,3	56											
104765347	1-A1								1 254 surface	28,1 surface											

Sample Condition annealed		Notched Bar Impact Testing					Grain Size										
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10																	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]		1	No 7.5									
104765347	1-A1	-46	120	126	125												
104765347	1-A1																

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax _____
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E *

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VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item Lot		
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :

Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors

stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl/ Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

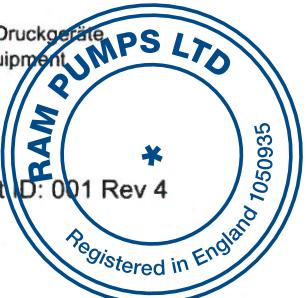
(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						Werte -Values- 1 2 3 Σ/n	
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento		U.L. Abstand entre face et face	Richtung Direction Direz. - Direzione	Sens., längs long. lungo	Temperatur Temperature Température Temperatura	Streck- Dehnungs- Tensile Strength Strength Forza Tensione	0.2 N/mm ²	N/mm ²	RM	50mm	A Lo=	Z %	Valeurs- Bemerkung Remarks Remarques Osservazioni		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min							
Mechaniical								415	830	30							
Analysis % - Max unless Stated C 0.10,Si 0.5,Mn 0.50,S 0.015,P 0.015,Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40,Ti 0.40, Fe 5.0																	
<u>Results</u>											HB						
333120	12.49 Ø		1	2	3	20	477	923	48.0		225						
361187	12.49 Ø		1	2	3	20	497	903	49		253						
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																	
<u>Notes</u>		Visual and dimensional checks- Satisfactory Chemical / PMI See manufactures certificate and Anlage 2 Hardness requirements Customer Koso Kent Introl ltd O/N 104868															
4																	
5																	
6																	
7																	

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19



TÜV UK Ltd
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Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:
various

ASTM B446

Latest Edition

Ausgabe Edition - Edizione:

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

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(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



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Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

N° di collaudo

Teil

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Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE										
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																		
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APPLIQUE L = Length Z = Zone Richtung Direzione Längs Lungo	Temperatur Temperature Température Temperatura	°C	Streckgrenze Yield Strength Tension de résistance Tensione di resistenza	0.2 N/mm²	Körperform Shape Form Forma	RM	50mm A Lo=	Werte Values- Valeurs- Valori	1	2	3	1	2	3	Σ/n	Bemerkung Remarks Remarques Osservazioni		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min										
Mechanical							415	830	30											
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																				
<u>Results</u>																				
XLH8874	12.49 Ø		1	2	3	20	422	873	50											
361776	12.51 Ø		1	2	3	20	553	900	46											
352975	12.48 Ø		1	2	3	20	531	896	48											
WLH8121	12.47 Ø		1	2	3	20	471	884	51											
361187	12.48 Ø		1	2	3	20	479	882	48											
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																				
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																				

Ort - Location - Lieu - Località

(Datum Date -Data)

LONDON

30/05/19

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Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

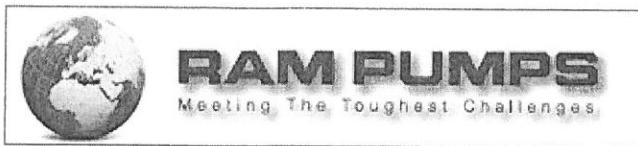
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

ULTRASONIC INSPECTION REPORT NUMBER	
U026	

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

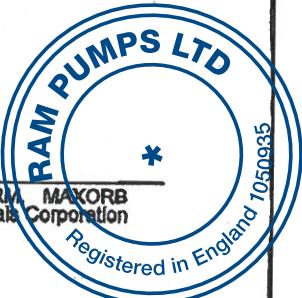
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017
	10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS
Al	pct	.4	B-01	0.23	PASS
Co	pct	1	B-01	0.13	PASS
			T-01	0.13	PASS
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result
Cr	pct	20	23	B-01	21.64
				T-01	21.87
Fe	pct		5	B-01	4.02
				T-01	4.04
Mo	pct	8	10	B-01	8.71
				T-01	8.80
Nb	pct	3.15	4.15	B-01	3.61
				T-01	3.64
Ni	pct	58		B-01	61.1
				T-01	60.7
Ti	pct			B-01	0.28
				T-01	0.28
Nb+Ta	pct	3.15	4.15	B-01	3.61
				T-01	3.64

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

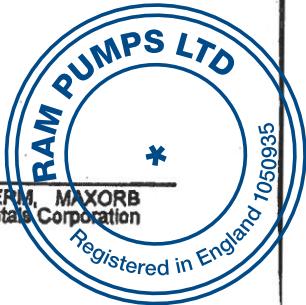
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mech)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/ISQ 9100
 ISO/TS 16949 (by agreement)
 TDV Approved to AD - Merkblatt WO/TRD 100
 RR8000:8ABR Approved No. 1506
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-ENISO6892-12016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTME10-15A-(TYPEA):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

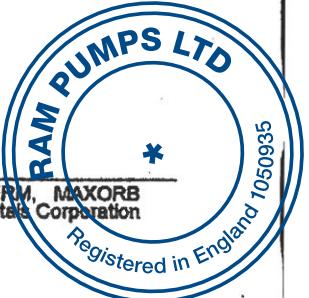
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTME112OCT13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
-----------	-----	-----------	-----------	-----------	-------------	--------------





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
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Quality System Compliance :-
 EN 10204:2004 - 3.1
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Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

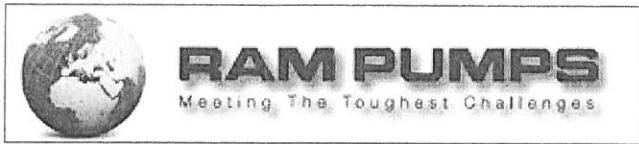
End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	

For and on behalf of SPECIAL METALS WIGGIN LIMITED
 Authorised Signatory
FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation

Registered in England 1050355



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test				Hardness Test					
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen				1 ASTM E10 - 17					
						2 ASTM E18 - 17e1					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC	
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60	1 258 surface
104864303	1-A1								2	23,5 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Date of release: 09.01.2019

E

Q

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries in this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

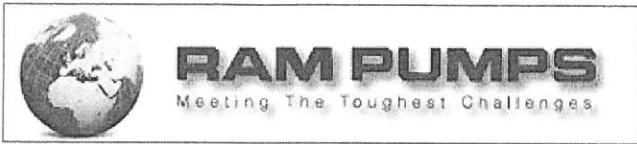
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



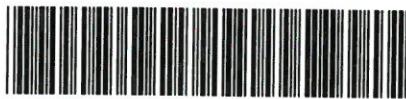


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

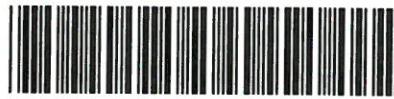
Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs
MANUFACTURED ON PRO: PRO0026549MK SO #: SO0020479MK			
S0091197-005-061 QTY: 20 kg PC: 1 3000.0 mm			
HEAT: 606389 MILL CERT: 001118501 TRACER #: TRA0005770MK			
ENGINE TYPE: MILL SOURCE: Carpenter Technologies			
SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED 2014/68/EU Recorded on Certs, SABRe Release, UNS N06625			

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

All products sold by NeoNickel are subject to B.I.S. export administration regulations.
Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals. BAE Systems BAE/AG/20203/MAA. BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

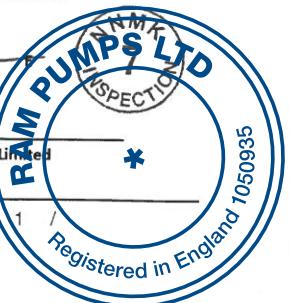
RELEASED IN ACCORDANCE WITH EN10204 2004 3.1

APPROVED CERTIFICATE

Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

- THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES EXCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN (XRF)	SI (XRF)	P (OES)	S (COM)	CR (XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

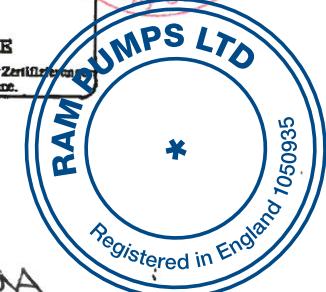
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCL

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED 
FOR AND ON BEHALF DATE 14/8/18
1604.C.L.

NAM
12

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

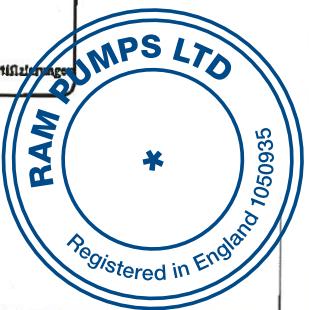
	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CONTINUED ON NEXT PAGE

FORM F2-566

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CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

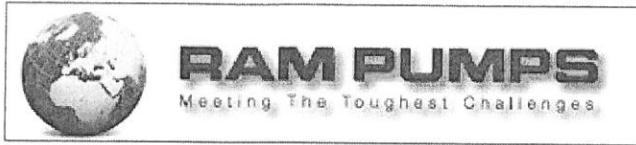
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

This certification is made to the customer printed on this form. Carpenter neither makes, nor assumes responsibility for, any representation or certification to other parties.
Die vorliegende Zertifizierung ist nur für den Kunden gemäß dem Formular gültig. Carpenter übernimmt keinerlei Haftung für die ausgewiesenen Daten oder Zertifizierungen.
Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test		
		1 ASTM E8/E8M - 16a / longitudinal specimen							1 ASTM E10 - 17		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	2 ASTM E18 - 17el		
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56	
104765347	1-A1								HBW 10/3000/A	HRC	
									1 254 surface	28,1 surface	

Sample Condition annealed		Notched Bar Impact Testing							Grain Size		
		1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10							1 ASTM E112 - 13		
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 No 7.5		
104765347	1-A1	1	-46	120	126	125					
104765347	1-A1										

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax _____
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:

various

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :
Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -
Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors
stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl/ Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevalimento		U.L. (mm) et Z.F. (mm)	Richtung (°) Direction (°) L'axe (°)	Sens., Längs, Long.	Temperatur (°C) Temperature (°C) Température (°C)	Streck- Dehnungsgrenze Yield strength Limite d'élasticité Limite di elasticità	0.2 N/mm²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min						
Mechaniical								415	830	30						
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>				1	2	3	20	477	923	48.0		HB				
333120	12.49 Ø			1	2	3	20	477	923	48.0		225				
361187	12.49 Ø			1	2	3	20	497	903	49		253				
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / PMI See manufactures certificate and Anlage 2 6 Hardness requirements 7 Customer Koso Kent Introl Ltd O/N 104868																
Ort -Location -Lieu - Localita)				(Datum Date -Data)				Prüfstelle für Druckgeräte - Notified Body for Pressure Equipment S Worrall								
LONDON				28/02/19												



TÜV UK Ltd
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Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:
NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend - according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:
various

ASTM B446

Latest Edition

Ausgabe Edition - Edizione:

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :
Material UNS NO6625
Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -
Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors
stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE										
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																	
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Thickness Epaisseur Spessore	Breite Ø Width Ø Largeur Ø Largh. Ø	U.L. - Abstand entre Zähne entre dents entre denti	Richtung Direz. test Längs - Länge Longitudinal Dirigente	Temperatur Température Temperatura	°C	Streckgrenze Tensile Strength Tensile Strength Tensione di rottura Tensione di rottura	0.2 N/mm²	A Lo=	50mm	%	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- 1 2 3 Σ/n	Valori 1 2 3 Σ/n				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
<u>Req'ts / Anforderung</u>							min	min	min										
Mechanical			1	2	3	20	415	830	30										
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																			
<u>Results</u>																			
XLH8874	12.49 Ø		1	2	3	20	422	873	50										
361776	12.51 Ø		1	2	3	20	553	900	46										
352975	12.48 Ø		1	2	3	20	531	896	48										
WLH8121	12.47 Ø		1	2	3	20	471	884	51										
361187	12.48 Ø		1	2	3	20	479	882	48										
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																			
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																			

Ort -Location -Lieu - Località)

(Datum Date -Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature

29/5/19

✓

✓

✓



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



1409

Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

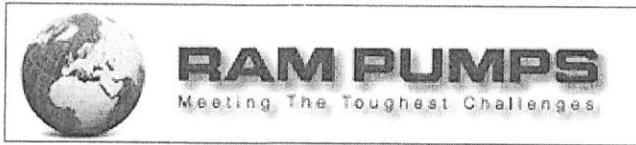
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U026

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030

Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 3.1

ISO 9001

EN/AS/JISQ 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RR9000:6ABR Approval No. 1606

For tests performed by IncoTest :-

(ISO/IEC 17025 — UKAS)

Certificate No.

403805 v 1

Date and Time 21-OCT-2017

10:10:37

Page

1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed

1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

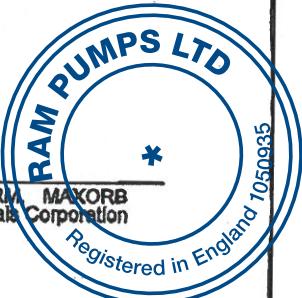
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C		ppt		.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si		ppt		.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn		ppt		.5	B-01	0.09	PASS
					T-01	0.09	PASS
P		ppt		.015	B-01	0.006	PASS
					T-01	0.005	PASS





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030
Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
EN 10204:2004 - 8.1
ISO 9001
EN/ASU/ISO 9100
ISO/TS 16949 (by agreement)
TÜV Approval to AD - Merkblatt WD/TRD 100
RRB000: SABR Approval No. 1506
For tests performed by IncoTest :-
ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS	
Al	pct	.4	B-01	0.23	PASS	
Co	pct	1	B-01	0.13	PASS	
			T-01	0.13	PASS	
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Cr	pct	20	23	B-01	21.64	PASS
				T-01	21.87	PASS
Fe	pct		5	B-01	4.02	PASS
				T-01	4.04	PASS
Mo	pct	8	10	B-01	8.71	PASS
				T-01	8.80	PASS
Nb	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS
Ni	pct	58		B-01	61.1	PASS
				T-01	60.7	PASS
Ti	pct			B-01	0.28	PASS
				T-01	0.28	PASS
Nb+Ta	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

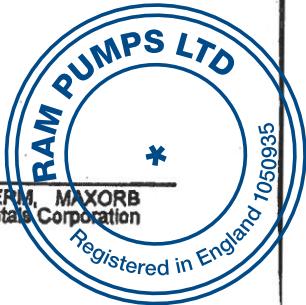
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mech)	mmpA			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





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Quality System Compliance :-
EN 10204:2004 - 3.1
ISO 9001
EN/AS/ISQ 9100
ISO/TS 16949 (by agreement)
TDV Approved to AD - Merkblatt WO/TRD 100
RRB000:6ABR Approved No. 1506
For tests performed by IncoTest :-
ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-EN ISO 6892-1:2016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTM E10-15A-(TYPE A):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTM E112 OCT 13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
-----------	-----	-----------	-----------	-----------	-------------	--------------





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO/TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

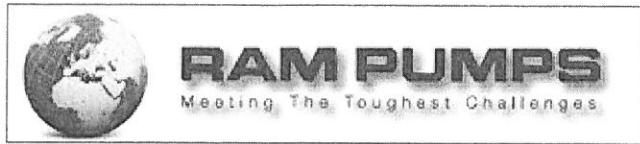
End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	

For and on behalf of SPECIAL METALS WIGGIN LIMITED
 Authorised Signatory
FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation

Registered in England 1050355



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test						Hardness Test		
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E10 - 17		
								2 ASTM E18 - 17e1		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60
104864303	1-A1								1 258 surface	23,5 surface

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Date of release: 09.01.2019

E

Q

* 1 7 7 5 6 4 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries in this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

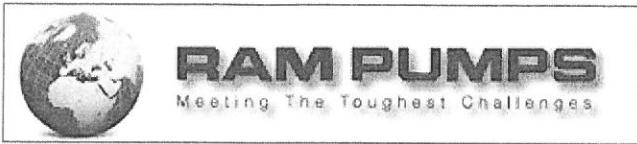
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



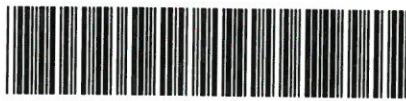


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs
MANUFACTURED ON PRO: PRO0026549MK SO #: SO0020479MK			
S0091197-005-061 QTY: 20 kg PC: 1 3000.0 mm			
HEAT: 606389 MILL CERT: 001118501 TRACER #: TRA0005770MK			
ENGINE TYPE: MILL SOURCE: Carpenter Technologies			
SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED 2014/68/EU Recorded on Certs, SABRe Release, UNS N06625			

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

All products sold by NeoNickel are subject to B.I.S. export administration regulations.
Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

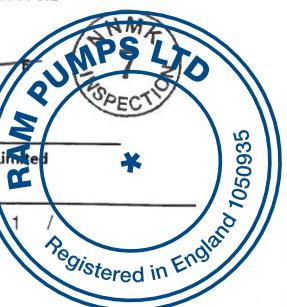
Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals, BAE Systems BAE/AG/20203/MAA, BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

RELEASED IN ACCORDANCE WITH EN10204 2004 3.1**APPROVED CERTIFICATE**Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

- THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES EXCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
- THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN(XRF)	SI(XRF)	P (OES)	S (COM)	CR(XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

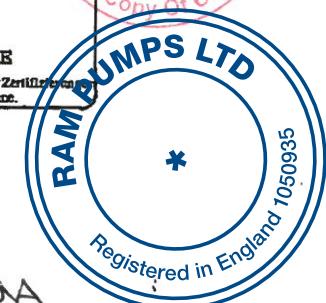
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.

FORM E2-1466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

- THE RECORDING OF FALSE, FICTIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
- THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) RANSVERSE (L) ONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCL

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED _____ DATE 14/8/18
FOR AND ON BEHALF OF NEONICKEL

NAM
12

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CONTINUED ON NEXT PAGE

FORM F2-566

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Die vorliegende Zertifizierung ist nur für den in diesem Formular genannten Kunden gültig. Carpenter übernimmt gegenüber Dritten keinerlei Haftung für die ausgewiesenen Daten oder Zertifizierungen.
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CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

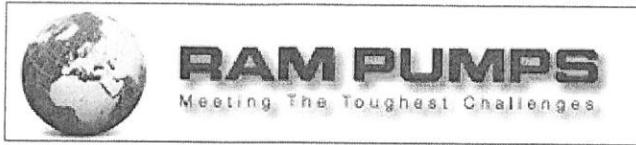
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

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RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test												
1 ASTM E8/E8M - 16a / longitudinal specimen																					
Lot	Sample No.	Temp. [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/A	HRC											
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56											
104765347	1-A1								1 254 surface	28,1 surface											

Sample Condition annealed		Notched Bar Impact Testing							Grain Size												
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10																					
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1	No 7.5											
104765347	1-A1	1	-46	120	126	125															
104765347	1-A1																				

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes A10A, A10B, A10C, A10D, A10F, A10G, A10H, A10I, A10J, A10K, A10L, A10M, A1XL / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:

various

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :
Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -
Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors
stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

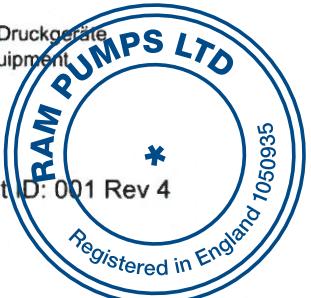
(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE							
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento	U.L. (mm) Larghezza (mm)	Richtung (°) Direction (°)	Länge (mm) Larghezza (mm)	Temperatur (°C) Temperature (°C)	Streck- Dehnungsgrenze Tensile strength limit Tension limite (Tensile strength limit)	N/mm² N/mm ²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni		
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. (mm) Larghezza (mm)	Richtung (°) Direction (°)	Temperatur (°C) Temperature (°C)	Streck- Dehnungsgrenze Tensile strength limit Tension limite (Tensile strength limit)	N/mm² N/mm ²	50mm	%								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>																
Mechaniical			1	2	3	20	415	830	30							
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>																
333120	12.49 Ø		1	2	3	20	477	923	48.0		HB					
361187	12.49 Ø		1	2	3	20	497	903	49		225					
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / PMI See manufactures certificate and Anlage 2 6 Hardness requirements 7 Customer Koso Kent Introl Ltd O/N 104868																
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:
various

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE												
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																			
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APPLIQUE Larg. - Largeur Richtung Directio Lage Positio Höhe Hauteur Prestige Prestige																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
<u>Req'ts / Anforderung</u>																					
Mechaniical			1	2	3	20	415	830	30												
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																					
<u>Results</u>																					
XLH8874	12.49 Ø		1	2	3	20	422	873	50												
361776	12.51 Ø		1	2	3	20	553	900	46												
352975	12.48Ø		1	2	3	20	531	896	48												
WLH8121	12.47Ø		1	2	3	20	471	884	51												
361187	12.48Ø		1	2	3	20	479	882	48												
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																					
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																					

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature

29/5/19

✓

✓

✓



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



RMR MATERIALS TESTING LTD

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Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards
(Quality Assurance Director)

TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26



VST15241

GN26385

173308

Polycast Limited



market leaders of specialist investment casting

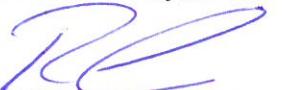
Clock Tower Buildings, Shore Road Warsash,
Southampton, SO31 9GQT +44 (0) 1489 885560 F +44 (0) 1489 885608
E wendy@polycast.ltd.uk W www.polycast.ltd.uk**CERTIFICATE OF CONFORMITY / DELIVERY NOTE No. 33679**

DELIVER TO: RAM PUMPS LTD
UNIT 14 HAZLEWOOD
TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP

DELIVERY NO :	No. 33679
SHIP VIA :	
DATE SENT :	01/08/2019
NO. OF PAGES :	3

Quantity	Part No	Description	Drawing No.	Revision No	Your Order No	Works Order
148	R-11-008	VALVE SEAT CASTING RAM54	VSC15262		033121PO	26508/1

Courier 6 boxes 66kg
Each part engraved with the number 625 as instructed.
We hereby certify that the above detailed supplies have been manufactured, tested, inspected and unless stated conform to both order and drawing requirement

For and on behalf of Polycast Ltd.
Signed: 

Gw 26385



5-8-2019



**POLYCAST LIMITED
TERMS AND CONDITIONS OF SALE**

1. General

- 1.1 Unless agreed in writing, all goods and services supplied by us shall be subject to these terms and conditions (hereinafter called "the Conditions") to the exclusion of any other conditions issued by you and to the exclusion of any pre-contractual representations.
- 1.2 Any agreed written variation of these Conditions shall be peculiar to the circumstances stated or implied and shall not be regarded as a general variation.
- 1.3 No time or other indulgence granted shall prejudice our rights under the contract.
- 1.4 Save as otherwise provided in these Conditions and to the extent provided by law, other conditions and warranties are excluded.
- 1.5 No quotation by us shall constitute an offer and there shall be no contract to supply until we have accepted an order either in writing or orally whereupon these Conditions shall apply.

2. Prices

- 2.1 Our prices are those prevailing at the date of acknowledgement of order and apply to all goods and services covered by such order which are to be delivered to you within 3 months of the acknowledgement of order. Thereafter we reserve the right to raise prices to allow reasonably for any increases in the costs of materials, labour and services.
- 2.2 Any goods or services ordered but not called down within 6 months of our acknowledgement may be delivered and invoiced at any time thereafter.
- 2.3 Prices are quoted ex-works, exclusive of value-added tax and delivery costs unless otherwise stated.

3. Accounts

- 3.1 Each account is payable within 30 days from the date of invoice or, if sooner, immediately upon the commencement of any act or proceeding invoicing insolvency, or upon the happening of any event set out in clauses 11.1 and 11.2.
- 3.2 Postal delays are not allowable against late receipt of payments.
- 3.3 You may not withhold or set off payment for goods or services delivered against accounts on other contracts.
- 3.4 Payment can be recognised only if our relevant invoice number is quoted.
- 3.5 We may supply goods or services by more than one consignment and invoice each separately, in which case each such consignment shall be deemed to be a separate Contract subject to these Conditions and you shall pay us the amount payable under the invoice for each Consignment notwithstanding any rights which you claim against us in respect of any other consignment.
- 3.6 Interest may be added to overdue accounts at a rate of 1.5 percent per month from date of invoice. Any discounts granted shall be lost once payment is overdue.

4. Tools

- 4.1 Any special tools required for the manufacture of your products are quoted at 80% of our normal price and remain in our part ownership.
- 4.2 We shall use the tools as required for the manufacture of goods for you, and shall not use the tools for any other work.
- 4.3 We shall store tools ready for use and we shall insure the tools against fire, theft, storm and tempest.
- 4.4 We shall keep the tools in good repair.
- 4.5 Should you wish to remove any tool (provided by us) from our foundry, you may do so by giving a 30 day notice in writing and the payment of the outstanding 20% part ownership value of the tool referred to in 4.1.

5. Delivery and carriage

- 5.1 We shall make every effort to fulfil the contract by any stipulated dates but such dates are approximate only and no liability is accepted by us for failure to meet them. In particular, if events beyond our reasonable control prevent or hinder us, any delivery dates shall be extended by the period of delay.
- 5.2 If goods arrive damaged or short in number, written notification and evidence must be given to us within 7 days: otherwise we shall not be liable. Claims regarding non-delivery or transit damage can only be considered if made within the time limits imposed by the carriers.
- 5.3 Unless otherwise agreed in writing at the time of order, we reserve the right to deliver a batch of goods with between 90 and 110% of the number ordered, and to invoice you pro-rata.

6. Risk

- 6.1 Where goods are delivered by our carrier, the risk therein will pass to you immediately unloading commences, but where goods are delivered by your carrier, the risk therein will pass to you at the time of delivery to that carrier.

7. Defective and damaged goods

- 7.1 We will replace defective goods on condition that you notify us of the defects within 30 days of receiving the goods.
- 7.2 If we decide that the goods should be returned, they shall be packed safely and securely and returned to us in the same condition as received by you. An advice note must be enclosed in each package to identify the goods therein.
- 7.3 You must insure goods in transit when returning them.

8. Liability

- 8.1 Unless testing procedures are agreed in writing at the time of order, we shall not be liable for consequential costs or damages accrued by you or your customers as a result of any latent defects found by post-delivery machining or other operations.
- 8.2 You shall ensure that goods supplied by us will be used properly without risk to health or safety and shall be used only for the purpose for which they were supplied. You shall also indemnify us against all claims by third parties, and reimburse us all direct and indirect expenses (including loss of profits) arising out of any failure by you to comply with these obligations.
- 8.3 Nothing in these Conditions shall be construed as limiting our liability in negligence for the death or injury of any person caused as a direct result of the supply of goods or services by us.
- 8.4 Where you are not buying as a consumer within section 12(1) of the Unfair Contract Terms Act 1977, our goods are not supplied subject to any conditions of warranty, save those of section 12 of the Sale of Goods Act 1979.
- 8.5 Where you are dealing with us as a consumer within section 12(1) of the Unfair Contract Terms Act 1977, we supply the goods subject to the conditions of section 12 to 15 of the Sale of Goods Act 1979, and nothing contained in these Conditions shall affect your statutory rights under those sections.



Page 2 of 3

subject to any conditions of warranty, save those of section 12 of the Sale of Goods Act 1979.

8.5 Where you are dealing with us as a consumer within section 12(1) of the Unfair Contract Terms Act 1977, we supply the goods subject to the conditions of section 12 to 15 of the Sale of Goods Act 1979, and nothing contained in these Conditions shall affect your statutory rights under those sections.

9. Ownership of goods and reservation of title.

9.1 Subject as hereafter provided the legal title of and property in the goods shall remain vested in us until the price for them and every other sum due to us in respect of the contract in question has been paid. Until then you shall keep the goods as bailee and shall store them so that they are readily identifiable as our property. During such period any identification number, mark or batch number on the goods may not be removed.

9.2 We reserve the right to recover and dispose of our goods in satisfaction or part satisfaction of any sum overdue. We or our agents may enter your premises at all reasonable times to recover such goods (for which purpose you hereby irrevocably grant your consent and authority).

9.3 Any sale of goods by you in the ordinary course of your business shall be done by you as principal and not as our agent.

10. Events beyond our control

10.1 We shall not be under any liability for delays or other failures or omissions resulting from events beyond our reasonable control (which shall include but not be limited to labour disputes, lack of raw materials or components, machinery breakdown, fire, explosion, storm and flood).

10.2 We shall be relieved of liability under the contract to the extent that any obligation is prevented or rendered impracticable by war (whether declared or not) or any statute, rule, regulation, order or requisition made by any government department or local or other competent authority.

11. Termination and suspension

11.1 We may, without prejudice to our rights in any other clause of these Conditions, terminate the contract, wholly or in part, or suspend further deliveries under the contract at any time while:

- (a) Any debt by you to us remains overdue;
- (b) Otherwise than in accordance with your rights, you have failed to take delivery of any goods or services;
- (c) you are in breach of any part of the contract
- (d) any distress, execution or other legal process is levied against your assets;
- (e) you become insolvent or, being a company, have passed a resolution for winding-up (except where solely for the purpose of reconstruction) or have suffered a court order for winding-up or have had a receiver appointed or, being an individual or partnership, have proposed or entered into any composition or arrangement with your creditors or have had a receiving order in bankruptcy made against you.

11.2 In the event of any suspension we may demand payment in advance or security as a condition of resuming delivery under the contract.

12. Legal interpretation and jurisdiction

12.1 Any failure by us to exercise any rights under these Conditions shall not constitute a waiver or prevent the subsequent exercise of such rights.

12.2 Each Condition herein is deemed severable, and any unenforceability of any Condition shall not affect the remaining Conditions which shall be read as though the offending Condition has been expunged.

12.3 Any contract for the supply of goods or services or both between you and us shall be governed by English law, and you and we shall submit to the non-exclusive jurisdiction of the English Courts.



VST15241

GN26385

173308

Polycast Limited



market leaders of specialist investment casting

Clock Tower Buildings, Shore Road, Warsash
Southampton SO31 9GQ United Kingdom

T +44 (0) 1489 885560 F +44 (0) 1489 885608
W www.polycast.ltd.uk

Certificate of Material Conformance EN 10204 3.1 & NACE MR 0175

Serial No. 3300

Company
Ram Pumps Ltd
Unit 14 Hazlewood Trading Estate
Worthing
West Sussex
BN14 8NP

Metal Specification	Advice Note No.	Customer Order No.	Date
ASTM A494 CW6MC (Inconel 625)	33679	033121PO	01/08/2019

Chemical Analysis

	C %	Si %	Mn %	Cr %	Ni %	Mo %	S %	P %	Nb %	Fe %	Heat No.
Min				20.0		8.0			3.15		
Max	0.06	1.0	1.0	23.0		10.0	0.015	0.015	4.50	5.0	
Act	0.035	0.35	0.20	21.64	Bal	8.66	0.005	0.008	3.17	3.19	C6132

Mechanical Properties

	Yield Strength 0.2% MPa	Tensile Strength MPa	% Elongation	% Reduction In area	Heat No.
Min	275	485	25	25	
Max					
Act	331	513	45.5	52	C6132

Castings heat treated as follows:-

1175°C for 60 minutes

Gas fan quenched to ambient

Registered Office: Clock Tower Buildings, Shore Road, Warsash, Southampton. UK. SO31 9GQ

Registered in England No. 1851411 V.A.T. Registration No. 411 4167 93



VST15241

GN26385

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Form Of Supply

Cast, heat treated & shot blasted

Code No.	Description	Quantity
R-11-008	Valve Seat VSC15262	148

Signed : S. M. Hys
POL12

**For and on behalf of Polycast Limited
Quality Department**



VST15241

GN26385

173308

Release Note
~~Test Certificate~~
Approved Certificate
Certificate of Conformity



Unit 5d
Delta Drive Industrial Estate
Tewkesbury, GL20 8HB
Telephone: 01684 296601
Fax: 01684 274239
e-mail: admin@davis-scientific.co.uk
VAT Registration No. 419 1342 68

**Invoice &
Certificate No. 42552 Date: Jul 24, 2019**

Invoice To:
Polycast Ltd.
Clock Tower Buildings
Shore Road
Warsash
Southampton SO31 9GQ



Quantity (on this Inv)	Part No.	'r' denotes revision or issue. Description (for Reference only)	
149	HTR-11-008	PO#: 5539. Item#: 1. Total PO Qty: 149 impeller	<i>L 20054</i>
1	Test Bar	PO#: 5539. Item#: 2. Total PO Qty: 1 Test Bar	<i>L 20055</i>

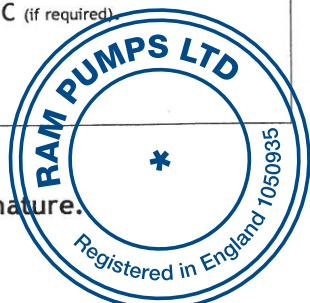
ProcessCode: DST1175 Inconel 625

Heat Treat for Inconel 625 (ASTM A 494/A494M)
1175 °C for 60 min.
GFC to ambient.

We certify that the work described in this document was performed in accordance with all the requirements of your Purchase Order, and as outlined in our Quality Assurance Manual. All records and certification are on file and are available for your inspection. Unless otherwise noted: all Hardness Testing (if required) is Vickers 10kg with conversion to Rockwell C (if required).

Davis Scientific Treatments Ltd.

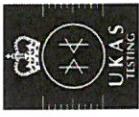
Authorised Signature



Test Certificate with goods to customer. No Test Certs or Parts are to leave DST without signature.

ROTECH Test Report

LABORATORIES



MOXLEY INDUSTRIAL CENTRE, WESTERN WAY,
WEDNESBURY, WEST MIDLANDS, WS10 7BG
TEL: 0121 505 4050, FAX: 0121 505 1115
www.rotechlabs.co.uk, info@rotechlabs.co.uk

Description	Test Sample
The test items were submitted to the laboratory for:	
Chemical Analysis	Mechanical - Tensile
Date Sample(s) Received:	25/07/2019
Date(s) tested:	31/07/2019

Chemical Analysis							Tested in accordance with: RP101 OES				
Sample ID	C [%]	Mn [%]	P [%]	Si [%]	Cr [%]	Ni [%]	Nb [%]	Ta [%]	Ti [%]	Al [%]	Co [%]
#1	0.035	0.20	0.008	0.005	0.35	21.64	62.45*	8.66	3.17	0.01	0.10
Rqmts	0.06 Max	1.00 Max	0.015 Max	0.015 Max	1.00 Max	20.0-23.0	Remainder	8.0-10.0	3.15-4.50	-	0.045
										-	0.07

Mechanical - Tensile							Tested in accordance with: ASTM A370 - 2017a				
Description: Longitudinal test piece			Test piece type: Round	Original gauge length [mm]: 4D							
Sample ID	Test piece size [mm]	Yield strength (0.2% offset) [MPa]	Tensile strength [MPa]	Elongation [%]	Reduction of area [%]						
#1	8.83Ø	331	513	45.5	52						
Rqmts	Min	275	485	25.0	25						

Pass

Sample meets chemical requirements.

*By diff.

Sample: 19-10109-001

Elongation method: Elongation at fracture

Description: Longitudinal test piece

Comments: All test results conform to specification



TESTS MARKED "NO UKAS ACCREDITED" IN THIS REPORT/CERTIFICATE ARE NOT INCLUDED IN THE UKAS ACCREDITATION SCHEDULE FOR OUR LABORATORY.
TESTS MARKED "SCA" HAVE BEEN SUBCONTRACTED. RESULTS IN THIS REPORT RELATE ONLY TO THE ITEMS TESTED.
OPINIONS AND INFERENCES EXPRESSED HEREIN ARE OUTSIDE THE SCOPE OF UKAS ACCREDITATION. THIS TEST REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL OF THE LABORATORY.
TESTING CONDUCTED IN ACCORDANCE WITH MANAGEMENT SYSTEM MANUAL ISSUE 14.

REPORT ISSUED AND
AUTHORISED BY

Chris Jones
Senior Technician

Registered in England 1050935



ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

ULTRASONIC INSPECTION REPORT NUMBER	U026
--	-------------

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030

Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 3.1

ISO 9001

EN/AS/JISQ 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RR9000:6ABR Approval No. 1606

For tests performed by IncoTest :-

(ISO/IEC 17025 — UKAS)

Certificate No.

403805 v 1

Date and Time 21-OCT-2017

10:10:37

Page

1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed

1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

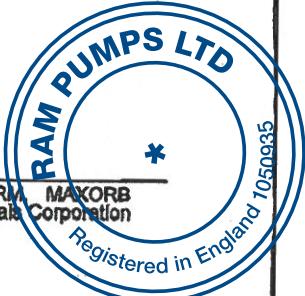
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS
Al	pct	.4	B-01	0.23	PASS
Co	pct	1	B-01	0.13	PASS
			T-01	0.13	PASS
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result
Cr	pct	20	23	B-01	21.64
				T-01	21.87
Fe	pct		5	B-01	4.02
				T-01	4.04
Mo	pct	8	10	B-01	8.71
				T-01	8.80
Nb	pct	3.15	4.15	B-01	3.61
				T-01	3.64
Ni	pct	58		B-01	61.1
				T-01	60.7
Ti	pct			B-01	0.28
				T-01	0.28
Nb+Ta	pct	3.15	4.15	B-01	3.61
				T-01	3.64

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

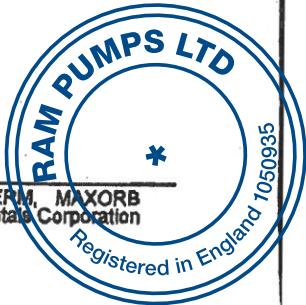
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mech)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030

Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/ISQ 9100
 ISO/TS 16949 (by agreement)
 TDV Approved to AD - Merkblatt WO/TRD 100
 RR8000:6ABR Approved No. 1506
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
Reduction of Area	pct	30	23104	55	PASS
LUTS	MPa	830	23105	55	PASS
LUTS	MPa	830	23104	60.8	PASS
LUTS	MPa	830	23105	62.6	PASS
LUTS	MPa	830	23104	905	PASS
LUTS	MPa	830	23105	903	PASS

Test Type 015:T20:12C008:BS-ENISO6892-12016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTME10-15A-(TYPEA):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTME112OCT13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
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INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
Reg. In England No. 36721

Quality System Compliance :-
EN 10204:2004 - 3.1
ISO 9001
EN/AS/JISQ 9100
ISO/TS 16949 (by agreement)
TOV Approval to AD - Merkblad WO/TRD 100
RR9000:8ABRe Approval No. 1606
For tests performed by IncoTest :-
ISO/IEC 17025 — UKAS

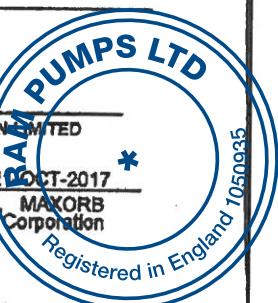
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Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

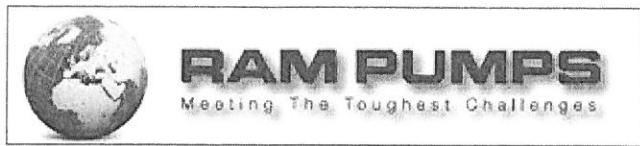
Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	For and on behalf of SPECIAL METALS WIGGIN LIMITED Authorised Signatory FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test						Hardness Test		
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E10 - 17		
								2 ASTM E18 - 17e1		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60
104864303	1-A1								1 258 surface	23,5 surface

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Q

E * 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Page: 2 / 2
printed: 09. JAN 2019

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₀ 450/10					Grain Size 1 ASTM E112 - 13			
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]					
104864303	1-A1	1	-46	144	143	143				
104864303	1-A1						1	No 9.5		
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition								
Lot	Sample No.	1 without objection : 0,90 mm/a								
104864303	1-A1									
104864303	1-A1									
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory								

Heat Treatment **Lot**

950°C/00:30h/Water 104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

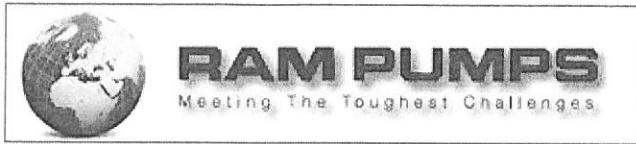
Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

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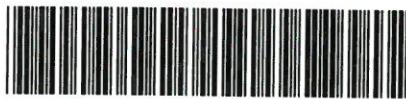


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs
MANUFACTURED ON PRO: PRO0026549MK SO #: SO0020479MK			
S0091197-005-061 QTY: 20 kg PC: 1 3000.0 mm			
HEAT: 606389 MILL CERT: 001118501 TRACER #: TRA0005770MK			
ENGINE TYPE: MILL SOURCE: Carpenter Technologies			
SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED 2014/68/EU Recorded on Certs, SABRe Release, UNS N06625			

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

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Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals. BAE Systems BAE/AG/20203/MAA. BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

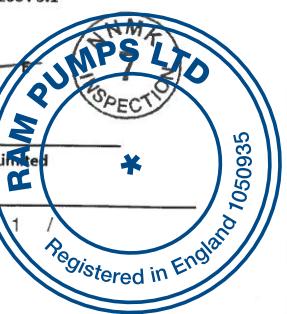
RELEASED IN ACCORDANCE WITH EN10204 2004 3.1

APPROVED CERTIFICATE

Conditions applicable: A B C D E

Signed: 
for and on behalf of Neo Nickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN (XRF)	SI (XRF)	P (OES)	S (COM)	CR (XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.

FORM E2-5466

Heat #

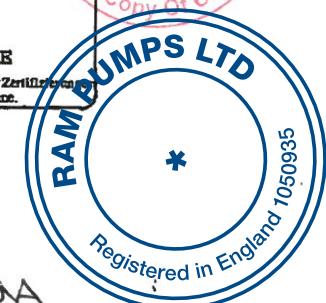
606389

Tracer #

TRA0005770MK



SBWCONCL# 1.25" DA



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE

**CARPENTER**Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCL

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED 
FOR AND ON BEHALF OF 

DATE 14/8/18

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

- THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
- THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

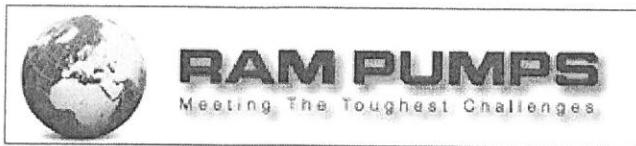
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

This certification is made to the customer printed on this form. Carpenter neither makes, nor assumes responsibility for, any representation or certification to other parties.
Die vorliegende Zertifizierung ist nur für den Kunden gemäß auf diesem Formular genannten Kundennamen gültig. Carpenter übernimmt keinerlei Haftung für die ausgewiesenen Daten oder Zertifizierungen.
Ce certificat est uniquement valable pour le client dont le nom est indiqué sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S.Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test												
1 ASTM E8/E8M - 16a / longitudinal specimen																					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/A	HRC											
104765347	1-A1	1 RT	542		907	4D	46,5	5	45,3	56											
104765347	1-A1								1 254 surface	28,1 surface											

Sample Condition annealed		Notched Bar Impact Testing					Grain Size										
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10																	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]		1	No 7.5									
104765347	1-A1	1 -46	120	126	125												
104765347	1-A1																

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E-

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item Lot		
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :

Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors

stamp Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento		U.L. (mm) et Z.F. (mm)	Richtung (°) Direction (°) L'axe (°)	Sens., Längs, Long.	Temperatur (°C) Temperature (°C) Température (°C)	Streck- Dehnungs- Spannungs- Kurve Tension- deformations- kurve Courbe de tension- de déformation	0.2 N/mm²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min						
Mechaniical								415	830	30						
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>				1	2	3	20	477	923	48.0		HB				
333120	12.49 Ø			1	2	3	20	477	923	48.0		225				
361187	12.49 Ø			1	2	3	20	497	903	49		253				
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / PMI See manufactures certificate and Anlage 2 6 Hardness requirements 7 Customer Koso Kent Introl Ltd O/N 104868																
Ort -Location -Lieu - Localita)				(Datum Date -Data)				Prüfstelle für Druckgeräte - Notified Body for Pressure Equipment S Worrall								
LONDON				28/02/19												



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Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Werks-Nr

- Works No. - No usine - Commissa No.:
various

ASTM B446

Latest Edition

Ausgabe

Edition - Edizione:

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS N06625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE								
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APPLIQUE Larg. - Largeur Richtung Directio Lage Positio Punkte Points																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
<u>Req'ts / Anforderung</u>																		
Mechaniical			1	2	3	20	415	830	30									
Analysis % - Max unless Stated		C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>																		
XLH8874	12.49 Ø		1	2	3	20	422	873	50									
361776	12.51 Ø		1	2	3	20	553	900	46									
352975	12.48 Ø		1	2	3	20	531	896	48									
WLH8121	12.47 Ø		1	2	3	20	471	884	51									
361187	12.48 Ø		1	2	3	20	479	882	48									
Notes			1	From Bar end 2 L=Longitudinal 3 Mid thickness section														
4	Visual and dimensional checks- Satisfactory																	
5	Chemical / See manufactures certificate and Anlage 2																	

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

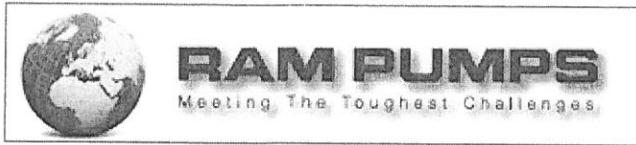
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

ULTRASONIC INSPECTION REPORT NUMBER	
U026	

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

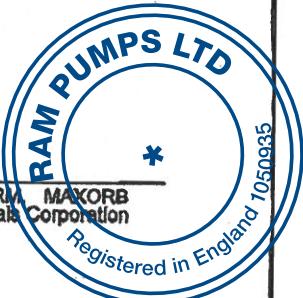
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





SPECIAL METALS WIGGIN LIMITED

Holme Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000; SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS	
Al	pct	.4	B-01	0.23	PASS	
Co	pct	1	B-01	0.13	PASS	
			T-01	0.13	PASS	
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Cr	pct	20	23	B-01	21.64	PASS
				T-01	21.87	PASS
Fe	pct		5	B-01	4.02	PASS
				T-01	4.04	PASS
Mo	pct	8	10	B-01	8.71	PASS
				T-01	8.80	PASS
Nb	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS
Ni	pct	58		B-01	61.1	PASS
				T-01	60.7	PASS
Ti	pct			B-01	0.28	PASS
				T-01	0.28	PASS
Nb+Ta	pct	3.15	4.15	B-01	3.61	PASS
				T-01	3.64	PASS

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

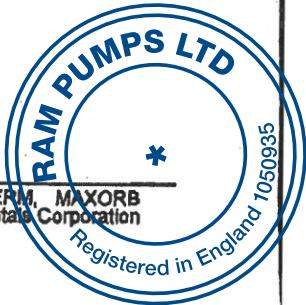
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mean)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name UOM Min Limit Max Limit Sample ID Test Result Test Verdict





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030

Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/ISQ 9100
 ISO/TS 16949 (by agreement)
 TDV Approved to AD - Merkblatt WO/TRD 100
 RR8000:6ABR Approved No. 1506
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	3 of 4

0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
Reduction of Area	pct	30	23104	55	PASS
LUTS	MPa	830	23105	55	PASS
LUTS	MPa	830	23104	60.8	PASS
LUTS	MPa	830	23105	62.6	PASS
LUTS	MPa	830	23104	905	PASS
LUTS	MPa	830	23105	903	PASS

Test Type 015:T20:12C008:BS-ENISO6892-12016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTME10-15A-(TYPEA):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

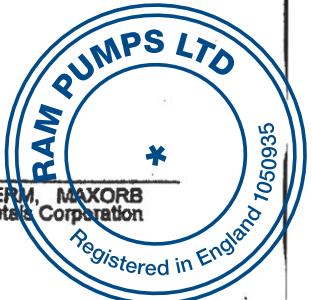
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTME112OCT13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
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INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO/TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

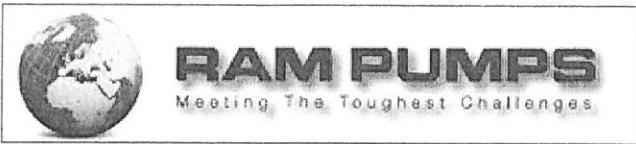
End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	

For and on behalf of SPECIAL METALS WIGGIN LIMITED
 Authorised Signatory
FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation

Registered in England 1050355



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test						Hardness Test		
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E10 - 17		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60
104864303	1-A1								1 258 surface	23,5 surface

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

U. Ucuncu

Fax

EMail ueanal.uecuencue@vdm-metals.com

Unal Ucuncu, authorized inspection representative

Date of release: 09.01.2019

Mark of the Inspector

Q

E

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries in this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR IN CONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Page: 2 / 2
printed: 09. JAN 2019

Sample Condition annealed		Notched Bar Impact Testing 1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₀ 450/10					Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]			
104864303	1-A1	1	-46	144	143	143		
104864303	1-A1						1	No 9.5
Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition						
Lot	Sample No.	1 without objection : 0,90 mm/a						
104864303	1-A1							
104864303	1-A1							
Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory						
7	104864303							

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

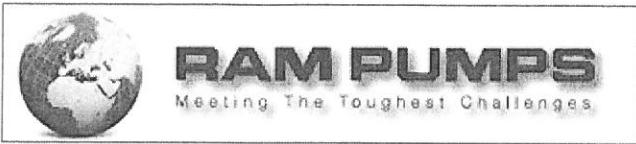
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



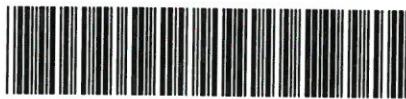


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs

MANUFACTURED ON PRO: PRO0026549MK | SO #: SO0020479MK

S0091197-005-061 | QTY: 20 kg | PC: 1 | 3000.0 mm

HEAT: 606389 | MILL CERT: 001118501 | TRACER #: TRA0005770MK

ENGINE TYPE: | MILL SOURCE: Carpenter Technologies

SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME
SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE
S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED
2014/68/EU Recorded on Certs, SABRe Release, UNS N06625

| Country of Origin: United States of America

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

All products sold by NeoNickel are subject to B.I.S. export administration regulations.
Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals, BAE Systems BAE/AG/20203/MAA, BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

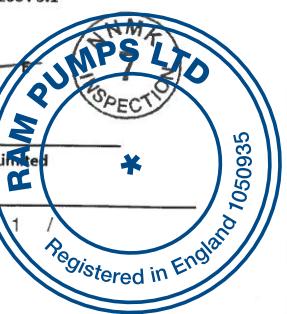
RELEASED IN ACCORDANCE WITH EN10204 2004 3.1

APPROVED CERTIFICATE

Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN(XRF)	SI(XRF)	P (OES)	S (COM)	CR(XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

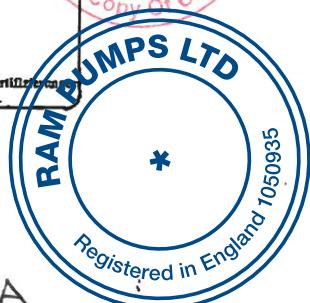
CONTINUED ON NEXT PAGE

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FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCl

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED 
FOR AND ON BEHALF OF 

DATE 14/8/18

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

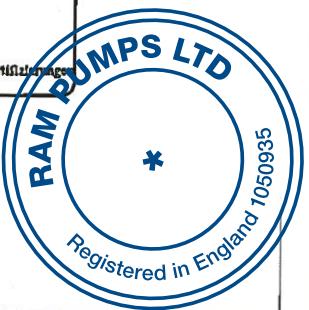
	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CONTINUED ON NEXT PAGE

FORM F2-566

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CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

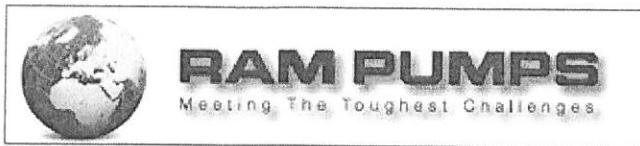
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

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RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S.Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test												
1 ASTM E8/E8M - 16a / longitudinal specimen																					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/A	HRC											
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56											
104765347	1-A1								1 254 surface	28,1 surface											

Sample Condition annealed		Notched Bar Impact Testing					Grain Size										
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10																	
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]		1	No 7.5									
104765347	1-A1	1	-46	120	126	125											
104765347	1-A1																

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

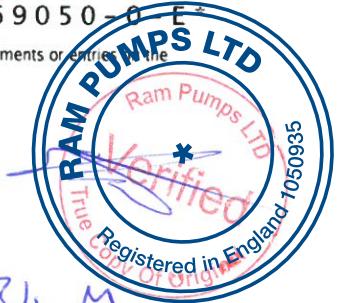
Q

* 169050-0-E-

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VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	

Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :
Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -
Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors
stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

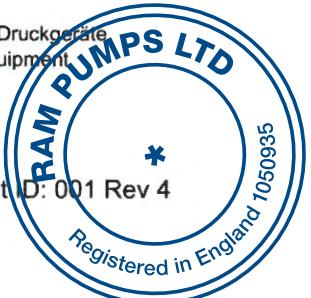
(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

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Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE							
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento	U.L. (mm) Larghezza (mm)	Richtung (2) Direction (2)	Länge (mm) Larghezza (mm)	Temperatur (°C) Temperature (°C)	Streck- Dehnungs- Spannungs- Kriech- Zeit- Spannung Tensile- strain- stress- creep- time- stress	0.2 N/mm²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>																
Mechaniical			1	2	3	20	415	830	30							
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>										HB						
333120	12.49 Ø		1	2	3	20	477	923	48.0		225					
361187	12.49 Ø		1	2	3	20	497	903	49		253					
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																
<u>Notes</u>			Visual and dimensional checks- Satisfactory Chemical / PMI See manufactures certificate and Anlage 2 Hardness requirements Customer Koso Kent Introl Ltd O/N 104868													
4																
5																
6																
7																

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19

TÜV-UK DOC. No.:	FORM.: 0001	REV. No.:	2	DATE:	03.10.03
------------------	-------------	-----------	---	-------	----------



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



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Croydon CR9 1XZ
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Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

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Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE											
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																		
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APALON Larg. - Zähne Richtung Direzione Länge Lunghezza	Temperatur Température Temperatura	Streckgrenze Tensile Strength Tension de résistance Tensione di resistenza	°C	0.2 N/mm²	RM	50mm	A Lo=	Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Bemerkung Remarks Remarques Osservazioni							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
<u>Req'ts / Anforderung</u>							min	min	min											
Mechanical			1	2	3	20	415	830	30											
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																				
<u>Results</u>																				
XLH8874	12.49 Ø		1	2	3	20	422	873	50											
361776	12.51 Ø		1	2	3	20	553	900	46											
352975	12.48Ø		1	2	3	20	531	896	48											
WLH8121	12.47Ø		1	2	3	20	471	884	51											
361187	12.48Ø		1	2	3	20	479	882	48											
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																				
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																				

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

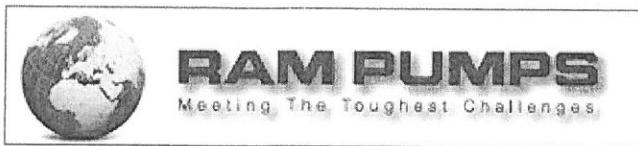
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

**ULTRASONIC INSPECTION
REPORT NUMBER**

U026

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	

+44 (0)1384 79924

enquiries@scantechinspection.com

www.scantechinspection.com

SBWCON 1" DA





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

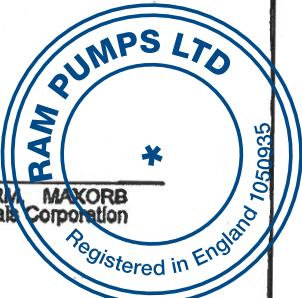
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL

Tel: +44 (0)1432 382200 Fax +44 (0)1432 264030

Reg. In England No. 36721

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
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Page	2 of 4

S	pct	.015	B-01	<0.001	PASS
Al	pct	.4	B-01	0.23	PASS
Co	pct	1	B-01	0.13	PASS
			T-01	0.13	PASS
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result
Cr	pct	20	23	B-01	21.64
				T-01	21.87
Fe	pct		5	B-01	4.02
				T-01	4.04
Mo	pct	8	10	B-01	8.71
				T-01	8.80
Nb	pct	3.15	4.15	B-01	3.61
				T-01	3.64
Ni	pct	58		B-01	61.1
				T-01	60.7
Ti	pct			B-01	0.28
				T-01	0.28
Nb+Ta	pct	3.15	4.15	B-01	3.61
				T-01	3.64

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mech)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
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INSPECTION CERTIFICATE

Quality System Compliance :-
EN 10204:2004 - 3.1
ISO 9001
EN/AS/ISQ 9100
ISO/TS 16949 (by agreement)
TDV Approved to AD - Merkblatt WO/TRD 100
RRB000:6ABR Approved No. 1506
For tests performed by IncoTest :-
ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
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0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-EN ISO 6892-1:2016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTM E10-15A-(TYPE A):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

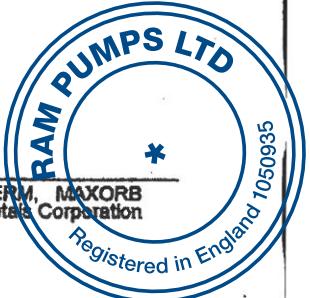
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTM E112 OCT 13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
-----------	-----	-----------	-----------	-----------	-------------	--------------





INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
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Quality System Compliance :-
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 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

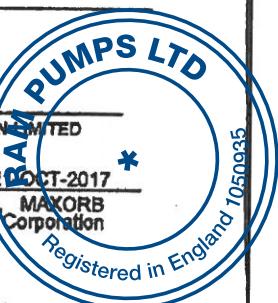
Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

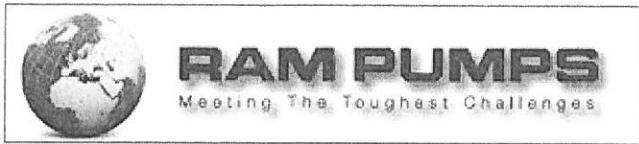
Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	For and on behalf of SPECIAL METALS WIGGIN LIMITED Authorised Signatory FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB, MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test				Hardness Test					
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen				1 ASTM E10 - 17					
						2 ASTM E18 - 17e1					
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC	
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60	1 258 surface
104864303	1-A1								2	23,5 surface	

We herewith certify, that the material is in conformance with the above mentioned specifications

Tel. +49 2392 552186

Mark of the Inspector

E

U. Ucuncu

Unal Ucuncu, authorized inspection representative

Date of release: 09.01.2019

Q

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries in this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SUSINCONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

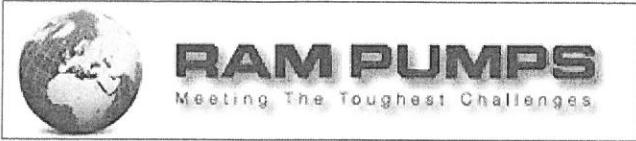
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



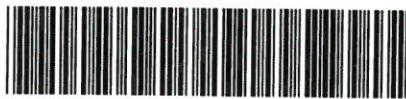


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

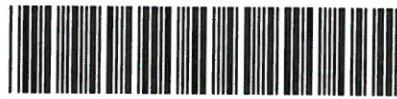
Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs

MANUFACTURED ON PRO: PRO0026549MK | SO #: SO0020479MK

S0091197-005-061 | QTY: 20 kg | PC: 1 | 3000.0 mm

HEAT: 606389 | MILL CERT: 001118501 | TRACER #: TRA0005770MK

ENGINE TYPE: | MILL SOURCE: Carpenter Technologies

SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME
SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE
S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED
2014/68/EU Recorded on Certs, SABRe Release, UNS N06625

| Country of Origin: United States of America

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

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Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

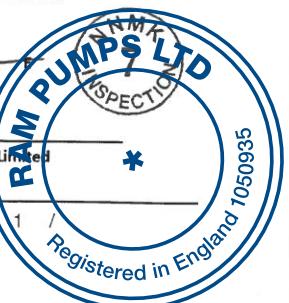
Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals, BAE Systems BAE/AG/20203/MAA, BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

RELEASED IN ACCORDANCE WITH EN10204 2004 3.1**APPROVED CERTIFICATE**Conditions applicable: A B C D E

Signed:
for and on behalf of NeoNickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN (XRF)	SI (XRF)	P (OES)	S (COM)	CR (XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

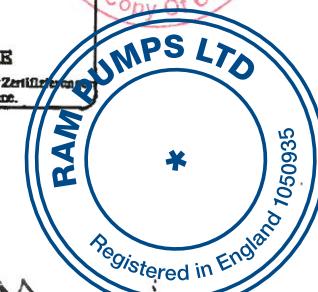
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER/SCHMELZE-NR./N° DE COULEE:

606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) TRANSVERSE (L) LONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCl

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED _____ DATE 14/8/18
FOR AND ON BEHALF OF NEONICKEL

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CONTINUED ON NEXT PAGE

FORM F2-566

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CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

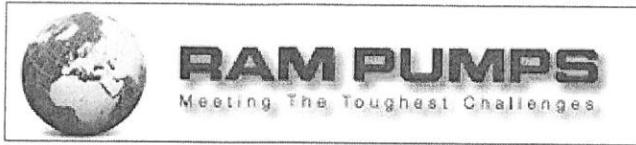
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

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RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S .Talbot

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VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test		
		1 ASTM E8/E8M - 16a / longitudinal specimen							1 ASTM E10 - 17		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	2 ASTM E18 - 17el		
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56	
104765347	1-A1								HBW 10/3000/A	HRC	
									1 254 surface	28,1 surface	

Sample Condition annealed		Notched Bar Impact Testing							Grain Size		
		1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10							1 ASTM E112 - 13		
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 No 7.5		
104765347	1-A1	1	-46	120	126	125					
104765347	1-A1										

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax _____
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

Q

* 169050-0-E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Ausgabe Edition - Edizione:

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :

Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors

stamp Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl/ Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento		U.L. (mm) Larghezza (mm) Thickness (mm)	Richtung (°) Direction (°) L'axe (°)	Sens., Längs, Long.	Temperatur (°C) Temperature (°C)	Streck- Dehnungsgrenze Tensile strength limit Limit d'élasticité Limite di elasticità	0.2 N/mm²	RM N/mm²	A 50mm % Z %	Bruchdehnung Elongation at break Élongation à la cassure Elongazione alla rottura	1 = [J] Schlagarbeit - Energy of impact 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Werte -Values- 1 2 3 Σ/n Valeurs- 1 2 3 Valori 1 2 3 Bemerkung Remarks Remarques Osservazioni		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>																
Mechaniical			1	2	3	20	415	830	30							
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>										HB						
333120	12.49 Ø		1	2	3	20	477	923	48.0		225					
361187	12.49 Ø		1	2	3	20	497	903	49		253					
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																
Notes				Visual and dimensional checks- Satisfactory Chemical / PMI See manufactures certificate and Anlage 2 Hardness requirements Customer Koso Kent Introl ltd O/N 104868												
4																
5																
6																
7																

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19

TÜV-UK DOC. No.:	FORM.: 0001	REV. No.:	2	DATE:	03.10.03
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TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Werks-Nr

- Works No. - No usine - Commissa No.:
various

ASTM B446

Latest Edition

Ausgabe

Edition - Edizione:

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE									
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite Ø Thickness Width Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APPLIQUE Larg. - Largeur Richtung Directio Lage Positio Höhe Hauteur	Temperatur Température Temperatura	Streckgrenze Tensile Strength Tension de résistance Tensione di resistenza	°C	0.2 N/mm²	RM	50mm	A Lo=	Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Bemerkung Remarks Remarques Osservazioni					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
<u>Req'ts / Anforderung</u>							min	min	min									
Mechanical			1	2	3	20	415	830	30									
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																		
<u>Results</u>																		
XLH8874	12.49 Ø		1	2	3	20	422	873	50									
361776	12.51 Ø		1	2	3	20	553	900	46									
352975	12.48 Ø		1	2	3	20	531	896	48									
WLH8121	12.47 Ø		1	2	3	20	471	884	51									
361187	12.48 Ø		1	2	3	20	479	882	48									
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / See manufactures certificate and Anlage 2																		
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																		

Ort - Location - Lieu - Località

(Datum Date - Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature

29/5/19

JM

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*

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - rmmaterialtesting@gmail.com



Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

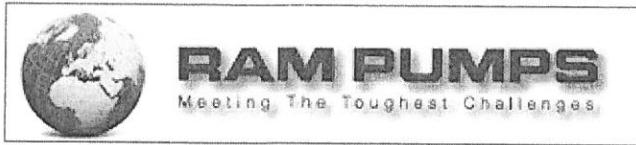
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





ScanTech Inspection Services
Unit 13, The Wallows Industrial Estate
Fenspool Avenue, Brierley Hill
West Midlands, DY5 1QA

ULTRASONIC INSPECTION REPORT NUMBER	
U026	

Customer	<i>NEO NICKEL LTD</i>	Date	<i>12/09/2017</i>
Item	<i>AS LISTED</i>		
Order number	<i>P00019170KW</i>	Job reference	<i>N/A.</i>

Drawing number	<i>N/A.</i>	Material	<i>UNS N06625</i>
Weld process	<i>N/A.</i>	Thickness	<i>AS LISTED</i>
Surface condition	<i>GOOD</i>	Stress relief	<i>N/A.</i>

Procedure number	<i>DEF STAN 02-729 PART 5 ISS 3 ASTM A388</i>	Couplant	<i>OIL.</i>
Equipment	<i>USM 36 (14077642)</i>	Attenuation	<i>0dB</i>
Sensitivity for DAC	<i>1.5mm F.B.H. & 2.5mm F.B.H</i>	Cal. Block	<i>AS PROC.</i>
Acceptance criteria	<i>DEF STAN 02-862 PART 3 ISS 3</i>		

UT EXAMINATION WAS CARRIED OUT ON THE ITEMS LISTED BELOW.

QTY	DESCRIPTION	HEAT NO	TRACER
53 LENGTHS (215.18M)	1" DIA BAR	606266	23714
8 LENGTHS (39.78M)	1" DIA BAR	WLH8282	22264
4 LENGTHS (20.01M)	35MM DIA BAR	WLH7753	20897



THE ITEMS LISTED ABOVE WERE FOUND TO BE ACCEPTABLE TO SPECIFICATION.

Client / Inspection authority	Scantech Inspection Services		
Name		Operator's Name	<i>D. HARRIS</i>
Date		Qualification	<i>PCN II (314980)</i>
Signature		Signature	





WLH8282-05

Tracer #
22264

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 284030
 Reg. In England No. 36721

JL.

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WD/TRD 100
 RR9000:6ABR Approval No. 1606
 For tests performed by IncoTest :-
 (ISO/IEC 17025 — UKAS)

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	1 of 4

Customer :

NEONICKEL KINGSWINFORD
 THE PENSNETT ESTATE
 KINGSWINFORD
 WM
 GREAT BRITAIN
 DY6 7TG

Consignee :

NEONICKEL LTD
 BUILDING 8 FIRST AVENUE
 KINGSWINFORD
 WM.
 GREAT BRITAIN
 DY6 7TG

Customer's Order No. / Contract No. : PO0017330KW

SMW Sales Order - Item No. : 511907 - 10

SMW Batch No. : WLH8282-05

Cast No. : WLH8282

Product Description and Dimensions :

INCONEL alloy 625. Hot Finished Round.Ground.Annealed
 1 DIA IN RANDOM

Advice Note No. - Item
80795098 - 10Quantity / Unit
544 Kg

Piece Identities

Specification(s)

This material complies with the following specification(s)

ASTM/ASME B446/SB446 UNS N06625

BRITISH STANDARDS 3076 NA21

SAE AMS 5666 J UNS N06625

ASTM/ASME B564/SB564 UNS N06625

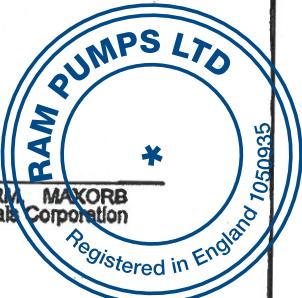
NACE MR 0175 ISO 15156 UNS N06625

NACE MR0103-2012 UNS N06625

Heat Chemistry Results:

Chemical Composition

Test Type	PALM CHEMISTRY						
	Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
C	pct		.1	.1	B-01	0.03	PASS
					T-01	0.03	PASS
Si	pct		.5	.5	B-01	0.13	PASS
					T-01	0.14	PASS
Mn	pct		.5	.5	B-01	0.09	PASS
					T-01	0.09	PASS
P	pct		.015	.015	B-01	0.006	PASS
					T-01	0.005	PASS





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Holmer Road, Hereford, England HR4 9SL

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Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-

EN 10204:2004 - 8.1

ISO 9001

EN/ASU/ISO 9100

ISO/TS 16949 (by agreement)

TÜV Approval to AD - Merkblatt WD/TRD 100

RRB000: SABR Approval No. 1506

For tests performed by IncoTest :-

ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017
	10:10:37
Page	2 of 4

S	pct	.015	B-01	<0.001	PASS
Al	pct	.4	B-01	0.23	PASS
Co	pct	1	B-01	0.13	PASS
			T-01	0.13	PASS
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result
Cr	pct	20	23	B-01	21.64
				T-01	21.87
Fe	pct		5	B-01	4.02
				T-01	4.04
Mo	pct	8	10	B-01	8.71
				T-01	8.80
Nb	pct	3.15	4.15	B-01	3.61
				T-01	3.64
Ni	pct	58		B-01	61.1
				T-01	60.7
Ti	pct			B-01	0.28
				T-01	0.28
Nb+Ta	pct	3.15	4.15	B-01	3.61
				T-01	3.64

Mechanical Test Results

Mechanical Tests

Test Type 011-99A015:ASTMG28NOV15MA

Test Method ASTM G28 NOV 15 METHOD A

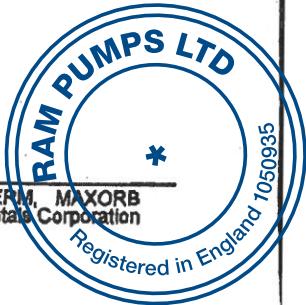
Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Corrosion (mech)	mmPa			23109	4.12	PASS
				23110	3.52	PASS

Test Type 015:T20:10B001:ASTME8/E8M-16A-(.5/-5.0):DLO

Test Method ASTM E8/E8M-16A (0.5/ 5.0)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict





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 Reg. In England No. 36721

INSPECTION CERTIFICATE

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/ISQ 9100
 ISO/TS 16949 (by agreement)
 TDV Approved to AD - Merkblatt WO/TRD 100
 RR8000:8ABR Approved No. 1506
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
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0.2Proof stress	MPa	415	23104	484	PASS
EL 4D	pct	35	23105	463	PASS
EL 5.65/A	pct	30	23104	58	PASS
Reduction of Area	pct	35	23105	58	PASS
LUTS	MPa	830	23104	55	PASS
			23105	55	PASS
			23104	60.8	PASS
			23105	62.8	PASS
			23104	905	PASS
			23105	903	PASS

Test Type 015:T20:12C008:BS-ENISO6892-12016-(A2.2.4)

Test Method BS EN ISO 6892-1:2016 (A2.2.4)

Test Temperature 20 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
0.2Proof stress	MPa	415		23107	485	PASS
EL 5.65/A	pct	30		23107	55	PASS
Reduction of Area	pct	35		23107	59.5	PASS
LUTS	MPa	830		23107	913	PASS

Test Type 016:01H001:ASTME10-15A-(TYPEA):H-BRINELL

Test Method ASTM E10-15A (TYPE A)

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Hardness (Brinell)	HB		287	23103	222	PASS

Test Type 027-T-046:28A005

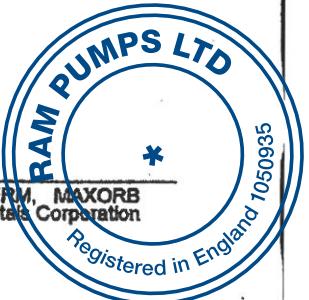
Test Temperature 46 degC

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
Charpy	joul	27		23112	148	PASS
				28308	148	PASS
				28307	152	PASS

Test Type 049:02G001:ASTME112OCT13

Test Method ASTM E112 OCT 13

Test Name	UOM	Min Limit	Max Limit	Sample ID	Test Result	Test Verdict
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INSPECTION CERTIFICATE

SPECIAL METALS WIGGIN LIMITED

Holmer Road, Hereford, England HR4 9SL
 Tel: +44 (0)1432 382200 Fax: +44 (0)1432 264030
 Reg. In England No. 36721

Quality System Compliance :-
 EN 10204:2004 - 3.1
 ISO 9001
 EN/AS/JISQ 9100
 ISO/TS 16949 (by agreement)
 TÜV Approval to AD - Merkblatt WO/TRD 100
 RR9000:8ABRe Approval No. 1606
 For tests performed by IncoTest :-
 ISO/IEC 17025 — UKAS

Certificate No.	403805 v 1
Date and Time	21-OCT-2017 10:10:37
Page	4 of 4

Grain size average	ASTM	23111	9.5	PASS
Additional Remarks :	1. Supplies furnished under this contract do not contain any functional mercury, have not been contaminated by mercury or mercury compounds, and have not come in contact with mercury or mercury compounds 2. Radiation Levels Exhibited By This Material Do Not Exceed Background Levels. 3. Country of melt and manufacture: United Kingdom. 4. Method of Melt: VIM + ESR 5. UNS N06625 GRADE 1 6. W.NR. 2.4856 7. 100% Positive material identification test satisfactory. 8. Visual and dimensional examination satisfactory 9. U.S.T. Satisfactory to API 6A 10. Heat treatment: Batch: Annealed, 32 minutes, at 930C, A/C.			
Release Statements :	Certified that, unless otherwise stated above, the whole of the above-mentioned materials have been manufactured, tested and inspected in accordance with the terms of the contract/order applicable thereto and conform fully to the standards/specification quoted hereon and the requirements of: 1. BS EN ISO 9001 2. EN 9100 3. GEAE S1000, GEAE S400 4. PED 2014/68/EU Annex 1			

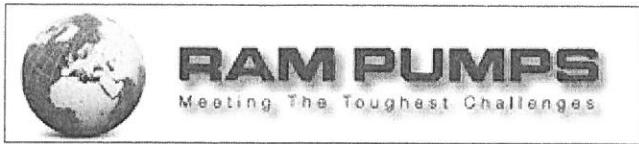
End of Certificate

This material manufacturer's certificate has been issued by Special Metals Wiggin Limited to, and may only be relied on, its customer:	Signed
NEONICKEL KINGSWINFORD	
It is a condition of issue that any copy made is a true and complete copy of the original, with an optional endorsement certifying it as such.	

For and on behalf of SPECIAL METALS WIGGIN LIMITED
 Authorised Signatory
FLOWER POVEY-JONES Date 21-OCT-2017 *

BRIGHTRAY, CORRONEL, FERRY, INCOCLAD, INCOLOY, INCONEL, INCOTHERM, INCO-WELD, KOTHERM, MAXORB
 MONEL, NILO, NILOMAG, NIMONIC, NIOTHERM, NI-SPAN, UDIMET & WIGGIN are Trade Marks of Special Metals Corporation

Registered in England 1050355



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 11:16
Duration	11.98
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.13
SAMPLE	SBINCONEL#1
HEAT	WLH8282-05
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.705	+/-	0.291
W	0.000	+/-	0.072
Cu	0.000	+/-	0.198
Ni	61.716	+/-	0.788
Co	0.142	+/-	0.111
Fe	4.241	+/-	0.203
Mn	0.000	+/-	0.195
Cr	21.302	+/-	0.413
V	0.000	+/-	0.192

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. JAN 2019

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

NeoNickel Ltd.
First Avenue
GB - DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, hot rolled, annealed, machined

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89
NACE MR0175 / ISO 15156-3 2015
NACE MR0103-2012
US-test acc. to API 6A PSL3 (7.4.2.3.15)
add. customer requirement: impact test

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

Analysis (weight %)

LE=combustion analysis
RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
319615	VIM/ESR	top	0,02	<0,001	22,19	R59,82	0,04	0,06	9,17	0,31	3,46	4,57
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
319615	VIM/ESR	top	0,24	0,02	0,01
		Meth	RF	RF	RF

Sample Condition		Tensile Test						Hardness Test		
annealed		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E10 - 17		
								2 ASTM E18 - 17e1		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	HBW 10/3000/ A	HRC
104864303	1-A1	1 RT	478		915	4D	51,9	5	49,3	60
104864303	1-A1								1 258 surface	23,5 surface

We herewith certify, that the material is in conformance with the above mentioned specifications
Tel. +49 2392 552186
Fax
EMail ueenal.uecuencue@vdm-metals.com
Unal Ucuncu , authorized inspection representative

Mark of the Inspector

Q

E

* 177564 - 0 - E *

This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on this certificate may be punished as a felony under federal law.

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



SR INCONEL # 2" DA

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 177564/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
528182 PO0018424KW / LB 11547

Page: 2 / 2
printed: 09. JAN 2019

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Notched Bar Impact Testing
1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV₀ 450/10

Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]
------------	--------	-------------------------	-------------------

1 -46	144	143	143
-------	-----	-----	-----

Grain Size
1 ASTM E112 - 13

1	No 9.5
---	--------

Sample Condition annealed	
Lot	Sample No.
104864303	1-A1
104864303	1-A1

Corrosion Test
1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition

1 without objection : 0,90 mm/a

Item	Lot	Ultrasonic Examination acc. to API Spec. 6A Twentieth Ed.2010 - PSL3 Test on 100% of surface: satisfactory
7	104864303	

Heat Treatment	Lot
950°C/00:30h/Water	104864303

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

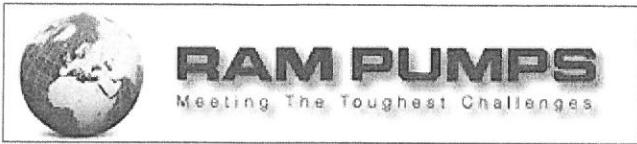
GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals International GmbH has complied with all producer requirements of AS6279 and has instructed and received confirmation by its outsourced toll manufacturer VDM Metals GmbH accordingly.





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	7
Mode	General Metals
Time	2019-06-24 11:18
Duration	10.48
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.08
SAMPLE	SBINCONEL#2
HEAT	319615
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.179	+/-	0.287
W	0.000	+/-	0.086
Cu	0.000	+/-	0.152
Ni	61.555	+/-	0.726
Co	0.000	+/-	0.146
Fe	4.749	+/-	0.232
Mn	0.302	+/-	0.199
Cr	20.628	+/-	0.426
V	0.000	+/-	0.060

Supervised By: S .Talbot

26



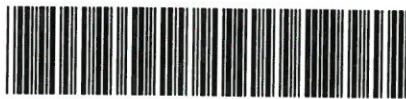


QA REVIEW

NeoNickel Milton Keynes

1 Java Park, Bradbourne Drive,
Tilbrook, Milton Keynes,
MK7 8AT
United Kingdom

Tel: +44 (0) 1908 275 700
Fax: +44 (0) 1908 275 701

CERTIFICATE OF CONFORMITY**APPROVED CERTIFICATE****NUMBER** SHP0019580MK

CUST NUMBER: CU0000859MK

REQ. DATE: 17/06/2019

Sold To:

NEONICKEL KINGSWINFORD
BUILDING 8 FIRST AVENUE
THE PENSNETT ESTATE
KINGSWINFORD
WEST MIDLANDS
DY6 7TG
United Kingdom

Delivery To:

ram pumps
UNIT 14
HAZELWOOD TRADING ESTATE
WORTHING
WEST SUSSEX
BN14 8NP
United Kingdom

SALESPERSON: AMANDA FINN

VIA: Default

CUST ORD NO.: PO0020284KW



Line #	Product Description	Dimensions	Ship Qty
1	625 - Round Bar - 1 1/4"	3000.0 mm	1.00 pcs
MANUFACTURED ON PRO: PRO0026549MK SO #: SO0020479MK			
S0091197-005-061 QTY: 20 kg PC: 1 3000.0 mm			
HEAT: 606389 MILL CERT: 001118501 TRACER #: TRA0005770MK			
ENGINE TYPE: MILL SOURCE: Carpenter Technologies			
SPEC: 2.4856, AMS 5666, AMS-STD-2154 Class A, ASME SB446, ASTM B446, ASTM G28 Method A, EN10204 3.1, GEAE S400/S1000, ISO 15156 - 2015, NACE MR0175, NADCAP, PED 2014/68/EU Recorded on Certs, SABRe Release, UNS N06625			
Country of Origin: United States of America			

Comments: ASME SB446 - ASTM B446 - Grade 1 - UNS N06625

All products sold by Neo Nickel are subject to B.I.S. export administration regulations.
Prior Government approval may be required before acceptance of an order, sales and shipment, and export and/or re-export by the buyer.
Diversion contrary to US, UK or EU law is prohibited.

Certified that the whole of the materials detailed hereon confirm in all respects to the standards/specifications and requirements of the order applicable thereto and with the conditions as follows:

- a) Our own inspection procedures to conform to AS 9100 & AS 9120: Lloyds Refs 0043859 & 0043860.
- b) Safran Messier Dowty.
- c) Our own inspection organisation as authorised by Rolls Royce under the terms of their Quality Control requirements for supplied to Rolls Royce (RR9000:SABRe) Approval No. 89730.
- d) British Aerospace Approvals. BAE Systems BAE/AG/20203/MAA. BAE Regional Aircraft RALOA/00318/2.
- e) Leonardo QRSO1 (AgustaWestland SQA50), Approval No AW/0095.

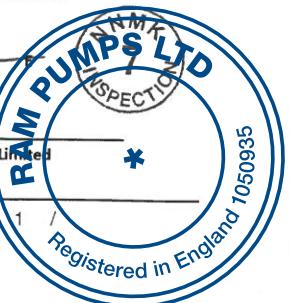
RELEASED IN ACCORDANCE WITH EN10204 2004 3.1

APPROVED CERTIFICATE

Conditions applicable: (A) B C D E

Signed:
for and on behalf of Neo Nickel (Blackburn) Limited

Page



CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

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07/24/18

PAGE 1 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

PRODUCT DESCRIPTION: PYROMET 625 HI TEMP ALLOY ANNEALED GROUND
COMMODITY CODE: 7505.12.0000
PART NUMBER: 625 31.75MMSPECIFICATION: AMS 5666 REV J (11/ /16)
ASTM-B446-03 GRADE 1 REAPPROVED 2014
ANSI/NACE MR0175 ISO 15156-3:2015
ASTM-G28-02(2015) METHOD A
GE S-400 (06/03/16)
GE S-1000 S-SPEC-1 (05/23/17)
ROLLS ROYCE SABRE EDITION 2 REV 1 (07/01/12)
AS 9100 REV D (09/ /16)
AMS-STD-2154 TYPE I - CLASS A REV C (06/01/17)
EN 10204 3.1 (10/01/04)
ASME-SB446 GRADE 1 2017
2014/68/EU UNS N06625 (05/15/14)

SIZE 1.250000 IN. (31.75 MM) RD BAR

HEAT CHEMISTRY(WT%): (TEST METHOD IS SHOWN IN PARENTHESIS)

C (COM)	MN(XRF)	SI(XRF)	P (OES)	S (COM)	CR(XRF)
0.04	0.10	0.08	0.005	LT .001	22.40
NI (XRF)	MO (XRF)	CU (XRF)	CO (XRF)	AL (XRF)	N (FUS)
60.44	8.77	0.06	0.10	0.15	0.0111
TI (XRF)	CB (XRF)	TA (OES)	ZR (XRF)	MG (OES)	O (FUS)
0.29	3.53	0.01	LT .005	0.0076	LT .0010
B (OES)	CB+TA	CA (OES)	FE (XRF)		
0.0017	3.54	LT .0010	3.78		

GEAG SUPPLIER CODE - 21100/CARPENTER

MATERIAL MELTED AND MANUFACTURED IN THE U.S.A.

CORROSION TESTED PER ASTM-G28, METHOD A. ACCEPTABLE 16.4 MPY

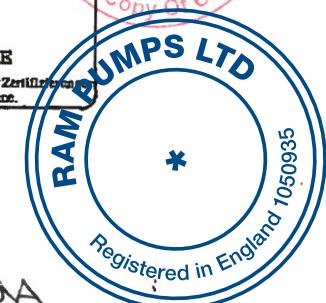
MATERIAL MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH SABRE EDITION 2 REV 1 REQUIREMENTS

THE SUPPLIES DETAILED HAVE BEEN MANUFACTURED/INSPECTED/TESTED AND UNLESS OTHERWISE STATED, CONFORM IN ALL RESPECTS TO THE RELEVANT SPECIFICATIONS, DRAWINGS AND PURCHASE ORDER REQUIREMENTS.

CONTINUED ON NEXT PAGE

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Die vorliegende Zertifizierung ist nur für den in diesem Formular genannten Kunden gültig. Carpenter übernimmt gegenüber Dritten keinerlei Haftung für die ausgewiesenen Daten oder Zertifizierungen.
Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.

FORM E2-5466

Heat #
606389Tracer #
TRA0005770MK

SBWCONCL# 1.25" DA

CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

- THE RECORDING OF FALSE, FICTIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47.
- THE VALUES AND OTHER TECHNICAL DATA REPRESENT THE RESULTS OF ANALYSES AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT. ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
- THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

07/24/18

PAGE 2 OF 3

CUSTOMER/BESTELLER/CLIENT

SELLER/VERKAUFER/VENDEUR

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLANDCARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIB, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

ULTRASONIC INSPECTION PER AMS-STD-2154, MIL-STD-2154 CLASS A SATISFACTORY
PER CARPENTER PROCEDURE: B-UT-I-604 REV 5, TECHNICAL ADDENDUM 5, REV 2.

INSPECTION CERTIFICATE 3.1 IN ACCORDANCE WITH EN 10204 AND DIN 50049

THIS MATERIAL HAS BEEN SAMPLED, TESTED, AND INSPECTED IN ACCORDANCE WITH THE
SPECIFICATION AND MEETS ALL SPECIFICATION REQUIREMENTS.WITH CONSENT OF TUV RHEINLAND GROUP CERTIFICATE NOS: AD/WO 01 202 USA/Q-03
8928 DATED 5 JULY 2012 AND PED 01 202 USA/Q-03 8928 DATED 21 AUGUST, 2012
WHICH IS IN COMPLIANCE WITH 3.1 INSPECTION CERTIFICATE AND FOUND TO COMPLY
WITH PARAGRAPH 4.3 OF THE PED ANNEX I.

THIS HEAT MELTED BY THE VIM + ESR PROCESSES

HARDNESS AS SHIPPED, HBW 231 (MIDRADIUS)
THE INDENTATION MEASURING DEVICE WAS A TYPE A.(T) RANSVERSE (L) ONGITUDINAL
YIELD STRENGTH, (0.20 %) KSI (MPA) L 66.5 (459)
TENSILE STRENGTH, KSI (MPA) 135.0 (931)
ELONGATION IN 2.00", % 49.0GRAIN SIZE PER ASTM E112: 10
5 ML H202 (30%), 100 ML HCL

NEONICKEL - MILTON KEYNES
THIS IS A TRUE COPY
OF THE ORIGINAL MILL
TEST CERTIFICATE

SIGNED _____ DATE 14/8/18
FOR AND ON BEHALF OF CARPENTER

CHEMISTRY CHECK (WT%) AT SIZE 8.000 IN.

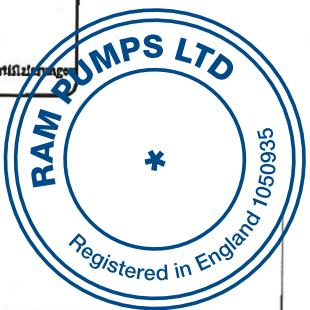
	C	MN	SI	P	S	CR
5X (BOTTOM)	0.05	0.10	0.10	0.005	LT .001	22.4
	NI	MO	AL	TI	CB	FE
5X (BOTTOM)	60.66	8.8	0.18	0.21	3.54	3.8

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING
COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING
COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND
252.225-7009.

CONTINUED ON NEXT PAGE

FORM F2-566

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CERTIFICATE OF TESTS
CERT SERIAL# 001118501

ABNAHMEPRUEFZEUGNIS CERTIFICAT DE CONTROLE



CARPENTER

Carpenter Technology Corporation
101 West Bern Street, Reading, Pa. 19601

07/24/18

CUSTOMER/BESTELLER/CLIENT

NEONICKEL MILTON KEYNES
1 JAVA PARK, BRADBourNE DRIVE
TILBROOK,
MILTON KEYNES
MK7 8AT , ENGLAND

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- MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM, ALPHA AND GAMMA SOURCE CONTAMINATION.
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PAGE 3 OF 3

SELLER/VERKAUFER/VENDEUR

CARPENTER TECHNOLOGY EUROPE
RUE EDOUARD BELIN 11

1435 MT ST GUIL, BELGIUM

CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE	CARPENTER NO./WERKS-NR./ N° DE REFERENCE INTERNE	DATE/DATUM/DATE	WEIGHT/GEWICHT/POIDS
3514MK-1	W69802	07/24/18	2122.00

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 606389

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH & TESTING - ASTM A604/E381, 21) PITTING CORROSION - ASTM A923, 22) Crevice Corrosion-ASTM G48, 23) Hardness Conversions - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OES - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 35 DATED 11/07/16.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

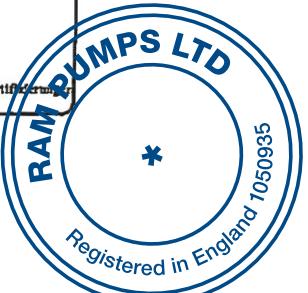
TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

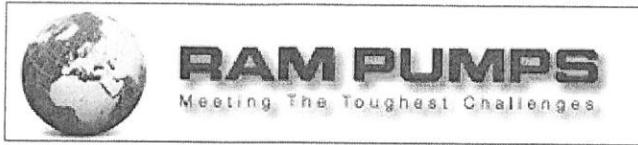
ADDRESS OF SATELLITE TESTING LOCATIONS:

ATHENS - 22110 THOMAS L HAMMONDS RD, TANNER, AL 35671
SHALMET - 116 PINEDALE INDUSTRIAL RD, ORWIGSBURG, PA 17961

DANIELLE A MURPHY
ADMINISTRATOR - QUALITY
CARPENTER TECHNOLOGY CORPORATION

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RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	16
Mode	General Metals
Time	2019-06-24 11:28
Duration	11.80
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 0.15
SAMPLE	SBINCONEL#1.25
HEAT	606389
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	8.855	+/-	0.311
W	0.000	+/-	0.076
Cu	0.000	+/-	0.147
Ni	61.917	+/-	0.835
Co	0.000	+/-	0.174
Fe	3.918	+/-	0.200
Mn	0.000	+/-	0.298
Cr	21.574	+/-	0.442
V	0.000	+/-	0.291

Supervised By: S .Talbot

26



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 1 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

NeoNickel Ltd.

First Avenue
GB -DY6 7TG Kingswinford

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

ASTM B 446-03 (reapproved 14)
ASME BPVC.II.B-2017 SB-446
AMS 5666 J
ASTM B 564-17a applicable for forgings
ASME BPVC.II.B-2017 SB 564 applicable for forgings
BS 3076-89

Material

UNS N06625
UNS N06625
UNS N06625
UNS N06625
UNS N06625
NA 21

NACE MR0175 / ISO 15156-3 2015

NACE MR0103-2012

Item	Pcs	Wht [kg]	Dimension [mm]	Cast	Lot
40	2	552	88,90 Ø x 3000-6000	361187	104765347 3 1/2"

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

ASTM B 446-03 (reapproved 14); ASME BPVC.II.B-2017 SB-446; AMS 5666 J; ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; BS 3076-89

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Fe	P
361187	VIM/ESR	top	0,02	<0,001	22,27	R59,58	0,07	0,16	9,15	0,34	3,42	4,62
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	Al	Co	Ta	Nb+Ta
361187	VIM/ESR	top	0,25	0,02	<0,01
		Meth	RF	RF	RF

Sample Condition annealed		Tensile Test							Hardness Test		
		1 ASTM E8/E8M - 16a / longitudinal specimen							1 ASTM E10 - 17		
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	2 ASTM E18 - 17el		
104765347	1-A1	1	RT	542	907	4D	46,5	5	45,3	56	
104765347	1-A1								HBW 10/3000/A	HRC	
									1 254 surface	28,1 surface	

Sample Condition annealed		Notched Bar Impact Testing							Grain Size		
		1 ASTM E23 - 12cCharpy-V sample / longitudinal (L-R) / KV ₆ 450/10							1 ASTM E112 - 13		
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Exp. [mm]				1 No 7.5		
104765347	1-A1	1	-46	120	126	125					
104765347	1-A1										

We herewith certify, that the material is in conformance with the above mentioned specifications

 Tel. +49 2303 6733850
 Fax
 EMail daniel-nikola.schindler@vdm-metals.com
 Daniel Schindler , authorized inspection representative

Mark of the Inspector

E

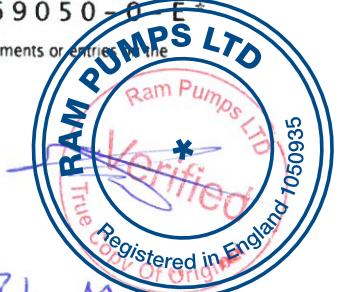
Q

* 169050-0-E *

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VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephon: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl



PLG15234.M

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169050/0
DIN EN 10204/01.05 3.1

Page: 2 / 2
printed: 09. MAY 2018

Order No. Delivery No. Purchase Order No.
524076 14092 PO0018163KW / LB 11422

Sample Condition		Corrosion Test
annealed		1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition
Lot	Sample No.	
104765347	1-A1	1 without objection : 0,46 mm/a
104765347	1-A1	
Item	Lot	
40	104765347	Ultrasonic Examination acc. to API Specification 6A / ISO 10423:2010 API 6A PSL3 Clause 7.4.2.3.15, 100% Scan: satisfactory Ultrasonic Examination acc. to AMS-STD-2154 RevA; CIA phase array tr.t. MIL-STD 2154 Class A: satisfactory

Heat Treatment	Lot
920°C/0:45h/Water	104765347

Spectrographic analytical mixup test/PMI check: without objection
Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

Grade 1

Certified acc. to Pressure Equipment Directive (2014/68/EU) by TÜV-Systems-Certification body for pressure equipment of the TÜV NORD GROUP: notified body, reg-no. 0045.

Conform to RR SABRE Ed. 2

GE S-400 AE Supplier Code: T9085 / S-400 Codes AI0A, AI0B, AI0C, AI0D, AI0F, AI0G, AI0H, AI0I, AI0J, AI0K, AI0L, AI0M, AI0L / Expiration Date: Sep-30-2020

GE S-1000 approved, Expiration Date Nov-30-2018

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

VDM Metals GmbH has complied with all producer requirements of AS6279

Country of Origin and Melt: Germany

TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

Inspection Certificate Intent EN10204:2004- 3.2
Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

Besteller - Customer - Acheteur - Committente:

NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:

VDM Metals GmbH
Postfach 12.51,58742 Altene

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

See Below

Werkstoff - Material - Matière - Materiale

entsprechend - according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:

various

UNS N06625
Grade 1

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking -Marquage - Punzonature :
Material UNS N06625
Cast Nr – 333120,361187

Herstellerzeichen -Brand of the manufacturer -
Marque du fabricant - Marchio del produttore : VDM

Stempel des Sachverständigen - Inspectors
stamp
Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl/ Number of Quota Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di produotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	45.0 mm Ø Bar x 430 mm	333120	333120
02	1	3.50" Ø Bar x 130 mm	361187	361187

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Localita)

LONDON

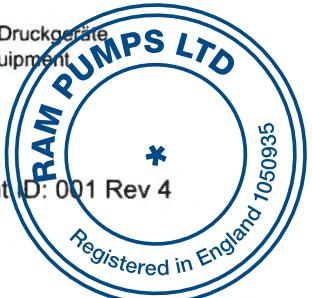
(Datum - Date - Data)

28/02/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



TÜV NORD
TÜV UK Limited

Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19086-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova: Probenart - Specimen size Type de l'éprouvette Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:				TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE						
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento		U.L. Abstand entre face et face	Richtung Direction Direz. Direzione	Sens. Sens. Sensore Sense	Temperatur Temperature Température Temperatura	Streck- Dehnungsgrenze Tensile strength Tensile Strength Tensione di flessione	0.2 N/mm ²	RM	50mm	A Lo=	Z %	Werte -Values- 1 2 3 Σ/n	Valeurs- Bemerkung Remarks Remarques Osservazioni	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<u>Req'ts / Anforderung</u>				1	2	3	20	min	min	min						
Mechaniical								415	830	30						
Analysis % - Max unless Stated C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0 (min), Al 0.40, Ti 0.40, Fe 5.0																
<u>Results</u>				1	2	3	20	477	923	48.0		HB				
333120	12.49 Ø			1	2	3	20	477	923	48.0		225				
361187	12.49 Ø			1	2	3	20	497	903	49		253				
1 From Bar end 2 L=Longitudinal 3 Mid thickness section																
Notes 4 Visual and dimensional checks- Satisfactory 5 Chemical / PMI See manufactures certificate and Anlage 2 6 Hardness requirements 7 Customer Koso Kent Introl Ltd O/N 104868																

Ort -Location -Lieu - Localita)

(Datum Date -Data)

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall

LONDON

28/02/19



TÜV UK Ltd
Suite 27-29 ,5th floor
Croydon CR0 2LX
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Abnahmeprüfzeugnis

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Certificat de Réception EN 10204:1991- 3.1.C
Certificato Collaudo Materiali

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NeoNickel
Building 8 First Avenue
Pensnett Trading Estate
Kingswinford
DY6 7TG

Hersteller - Manufacturer - Fabricant - Produttore:
Various

Prüfgegenstand - Article - Produit - Prodotto : Round Bar

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécifications techniques/Exigences - Norma di controllo/Requisiti :

Werkstoff - Material - Matière - Materiale

UNS N06625
Grade 1

See Below

entsprechend

- according to suivant- secondo

Werks-Nr - Works No. - No usine - Commissa No.:
various

Ausgabe Edition - Edizione:

ASTM B446

Latest Edition

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: Annealed

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione : Vacuum

Kennzeichnung - Marking - Marquage - Punzonature :

Material UNS NO6625

Cast Nr – XLH8874,361776,352975,361187,WLH8121

Herstellerzeichen - Brand of the manufacturer -

Marque du fabricant - Marchio del produttore : VDM SMW

Stempel des Sachverständigen - Inspectors

stamp

Poinçon de l'expert - Punzone dell'ispettore.



Pos.-Nr/Item No. Poste-No No.pos	Stückzahl Number of Quote Numero pezzi	Gegenstand - Article Désignation du produit - Tipo di prodotto	Schmelze-Nr. Heat No. No Coulée No Colata	Probe-Nr. Test No. No d'épreuve No di prova
01	1	3.50" Ø Bar x 3570 mm	XLH8874	XLH8874
02	1	3.50" Ø Bar x 3265 mm	361776	361776
03	1	3.50" Ø Bar x 3435 mm	352975	352975
04	1	3.50" Ø Bar x 4744 mm	361187	361187
05	1	3.50" Ø Bar x 3883 mm	WLH8121	WLH8121

Zusätzliche Angaben - Additional remarks -Autres remarques - Osservazione:

Die gestellten Anforderungen sind lt. Anlagen erfüllt.

The requirements are fulfilled as per annex
Les conditions imposées sont satisfaites suivant annexes -
I risultati sono conformi ai requisiti richiesti come da allegati

(Ort - Location - Lieu - Località)

LONDON

(Datum - Date - Data)

30/05/19

Prüfstelle für Druckgeräte
Notified Body for Pressure Equipment

S Worrall

Document ID: 001 Rev 4



TÜV UK Ltd
Surrey House, Surrey Street
Croydon CR9 1XZ
Tel. +44-(0)20-8680 7711
Fax. +44-(0)20-8680 4035



Ergebnis der Prüfungen
Test Results
Résultats des Essais
Risultati delle Probe

Prüf-Nr. 19308-01(SW)

Inspection No.

Certificat N°.

Nº di collaudo

Teil

Part

Partie

Parte

Anlage - Annex - Annexe - Allegato: 1

Blatt-Nr. 1 of 1

Sheet-No.

Page N°.

Pag N°

Mechanische Prüfungen - Mechanical tests - Essais mécaniques - Prove meccaniche

Prüfart - Test type - Type d'essai - Tipo di prova:			TENSILE TEST / ZUGVERSUCH						HARDNESS/HÄRTE																					
Probenart - Specimen size Type de l'éprouvette																														
Tipo di provetta: Probenzustand - Specimen condition - Etat d'éprouvette - Stato delle provette:																														
Probe-Nr. Test No. Nº d'éprouvette Nº di prova.	Probenabmessung Dim. of specimen Dim. de l'éprouvette Dim. della provetta	Probenentnahme Specimen Prélèvement Prelevamento																												
Schmelze-Nr. Heat No. Nº Coulée Colata Nº	Dicke Breite, Ø Thickness Width, Ø Epaisseur Largeur Ø Spessore Largh. Ø	U.L. APALON Larg. - Zähne Richtung Direzione Länge Lunghezza	Temperatur Température Temperatura	Streckgrenze Tensile Strength Tension de résistance Tensione di resistenza	°C	0.2 N/mm²	RM	50mm A Lo=	Z %	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	1 = [J] Schlagarbeit - Energy of impact Energie de rupture - Energia di rotura 2 = [J/cm²] Kerbschlagzähigkeit - Impact Strength Résilience - Resilienza 3 = [%] Krist.Bruchanteil - Cryst. proportion Partie cristalline - Proporzione cristallina 4 = [mm10⁻³] Breitung - Expansion 5 = [%] Elargissement - Espansione 6 = Härte (Einheiten) - Hardness - Dureté - Durezza	Werte -Values- Valeurs- Valori 1 2 3 Σ/n	Bemerkung Remarks Remarques Osservazioni																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17														
<u>Req'ts / Anforderung</u>																														
Mechanical			1	2	3	20	415	830	30																					
Analysis % - Max unless Stated			C 0.10, Si 0.5, Mn 0.50, S 0.015, P 0.015, Cr 20.0-23.0, Mo 8.0-10.0, Nb+Ta 3.15-4.15, Co 1.0, Ni 58.0, Al 0.40, Ti 0.40, Fe 5.0																											
<u>Results</u>																														
XLH8874	12.49 Ø		1	2	3	20	422	873	50																					
361776	12.51 Ø		1	2	3	20	553	900	46																					
352975	12.48 Ø		1	2	3	20	531	896	48																					
WLH8121	12.47 Ø		1	2	3	20	471	884	51																					
361187	12.48 Ø		1	2	3	20	479	882	48																					
Notes			1 From Bar end 2 L=Longitudinal 3 Mid thickness section																											
4	Visual and dimensional checks- Satisfactory																													
5	Chemical / See manufactures certificate and Anlage 2																													

Ort -Location -Lieu - Località

(Datum Date -Data)

LONDON

30/05/19

Prüfstelle für Druckgeräte -
Notified Body for Pressure Equipment
S Worrall





RMR MATERIALS TESTING LTD

MECHANICAL TESTING - PROOF LOAD TESTING - CHEMICAL ANALYSIS
WELDER & WELD PROCEDURE QUALIFICATIONS

Tel: 01384 234515 - mmrmaterialtesting@gmail.com



1409

NeoNickel Limited
Building 8 First Avenue
The Pensnett Estate
Kingswinford
DY6 7TG

Sovereign works
Deepdale Lane
Lower Gornal
Dudley
West Midlands
DY3 2AF

TEST CERTIFICATE

Test Certificate No.	0519 / 9450 - 9454	O/No.	PO0020153KW	Date Received	15.05.2019
				Tested/Reported	29.05.2019

Page 1 of 2

Item

3½" Round bar -

- | | |
|---------------------|---------------------|
| 1) Cast No: XLH8874 | 4) Cast No: WLH8121 |
| 2) Cast No: 361776 | 5) Cast No: 361187 |
| 3) Cast No: 352975 | |

Specification for Test

ASME SB446 (ASTM B446 -03 - 2008) UNS N06625 Grade 1

Tensile Test ASTM A370 : 2018 / E8 : 2016a Method C

Test piece orientation dimensions mm /	Area mm ²	Yield (.2%Rp) N/mm ²	Tensile Strength N/mm ²	% Elong. after fracture on 4D	% Red. in Area
1) L 12.49 Ø	122.5	422	873	50	55
2) L 12.51 Ø	122.9	553	900	46	57
3) L 12.48 Ø	122.3	531	896	48	58
4) L 12.47 Ø	122.1	471	884	51	55
5) L 12.48 Ø	122.3	479	882	48	57
Specification < 102mm Ø		415 min	830 min	30 min	-

Hardness Test ASTM E10 : 2017

Brinell 10/3000kgs 1) 226 HBW 2) 238 HBW 3) 237 HBW 4) 218 HBW 5) 219 HBW

TÜV UK LTD

Witnessed ✓

Reviewed ✓

Signature

29/5/19

✓

✓

✓



The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budget, details available upon request.



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Test Certificate No. 0519 / 9450 - 9454

Page 2 of 2

Chemical Analysis [%] (Documented in-house method- Spectrographic)*

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Fe	Nb	Ta	Ti
1)	.031	.31	.12	.005	<.003	21.47	9.08	60.7	.28	.089	3.81	3.74	.003	.21
2)	.032	.095	.084	.004	<.003	21.21	9.25	60.5	.31	.062	4.62	3.51	.003	.26
3)	.031	.094	.082	.004	<.003	21.54	9.02	60.3	.31	.058	4.69	3.46	.003	.26
4)	.033	.11	.10	.004	<.003	20.90	8.76	61.4	.26	.17	3.99	3.84	.003	.27
5)	.030	.15	.086	.005	<.003	21.50	9.10	60.1	.31	.066	4.73	3.51	.003	.26
min	-	-	-	-	-	20.0	8.0	58.0	-	-	-	3.15	-	-
max	.10	.50	.50	.015	.015	23.0	10.0	-	.40	1.0	5.0	4.15	-	.40

nd = none detected

TEST RESULTS ACCEPTABLE TO SPECIFICATION REQUIREMENTS

For and on behalf of RMR Materials Testing Co. Ltd

Martin C. Richards

(Quality Assurance Director)

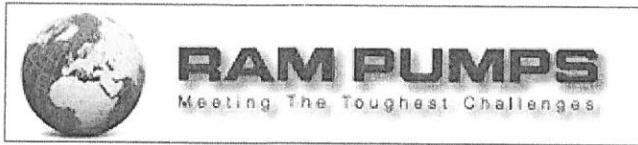
TUV 19308

* Not currently UKAS accredited for this material type

The contents of this report are governed by the terms and conditions overleaf.
All results are subject to uncertainty of measurement budgets. Details available upon request.

TÜV UK LTD
Witnessed✓ Date 29/5/19
Reviewed✓ Date
Signature





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	22
Mode	General Metals
Time	2019-06-24 11:32
Duration	10.82
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : 1.14
SAMPLE	PLG15234.M
HEAT	361187
LOT	
BATCH	GN26242
MISC	
NOTE	

	%	+/-	Error
Mo	9.363	+/-	0.349
W	0.000	+/-	0.099
Ni	60.934	+/-	0.891
Co	0.000	+/-	0.116
Fe	5.035	+/-	0.232
Mn	0.000	+/-	0.276
Cr	21.057	+/-	0.448
V	0.000	+/-	0.200
Re	0.000	+/-	0.071
Ta	0.094	+/-	0.079
Hf	0.000	+/-	0.098

Supervised By: S .Talbot

26





RAM PUMPS
Meeting The Toughest Challenges

RAM Pumps Ltd
Unit 14 Hazelwood
Trading Estate
Worthing
West Sussex
BN14 8NP

Tel: +44 (0) 1903 206622
Fax: +44 (0) 1903 205511

OPERATING & MAINTENANCE MANUAL / OPERATION & MAINTENANCE DATABOOK INDEX

Client	<i>L&T Hydrocarbon Saudi</i>
Project Title	<i>Marjan Increment Program – Offshore Oil Facilities</i>
Ram Project Reference	<i>016867s</i>
Equipment Title	<i>Slops Pumps</i>
Equipment Tag No's.	<i>G75-44-G-0138A/B, G75-45-G-0156A/B, G75-46-G-0149A/B G75-47-G-0164A/B, G75-49-G-0143A/B, G75-52-G-0133A/B</i>
Pump Serial Numbers	<i>016867A/B, 016867C/D, 016867E/F 016867Y/Z, 016867AA/AB, 016867AC/AD</i>
Purchase Order Number	<i>L&T Hydrocarbon Saudi/83000-00192/SD</i>

Sequence	Component	Description	Material Number	Heat Number	Certificate Number	Global number	RAM Build Number	File Reference
4	TIR15824	THRUST RING RAM54R055	N06625	342920	173503/0	26197	017345B	26197
3	RAM15823	RAM54R055 HCH	N06625	44789	250235	26387	017343B	26387
2	NPA3418.4	NUT PACKING ADJUSTER-55MM	CA104/CW307GEA5805		298710	26241	173428	26241
1	SLH15822	SEAL HOUSING RAM54R055	N06625	361508	169371/0	26208	017341B	26208

**RAM
PUMPS**

1

2

3

4

5

6

7

8

IF IN DOUBT ASK



DO NOT SCALE

REMOVE ALL SHARP EDGES AND BURRS
UNLESS OTHERWISE STATED

DO NOT ACCEPT HAND MARK-UPS UNLESS SIGNED AND STAMPED BY THE ENGINEERING DEPT OF RAM PUMPS LTD.

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	MATERIAL	/WETTED "W"
1	SLH15822	SEAL HOUSING RAM54R055 HCH	1	ASTM A494 CW6MC (INCONEL 625)	W
2	NPA3418	NUT PACKING ADJUSTER-55MM RAM	1	BS 2874 CA104	W
3	RAM15823	RAM54R055 HCH	1	ASTM B446 UNS N06625 (INCONEL 625)	W
4	TTR15824	THRUST RING RAM54R055 HCH	1	ASTM B446 UNS N06625 (INCONEL 625)	W
5	PKB15558	BRAIDED PACKING 6.5mm UTEX 217	4	UTEX 217	W
6	ORG15075V	O-RING	1	ASTM D1418 FKM	W
7	AER150AE	BU150 SPIRAL PTFE-BACK UP RING	1	PTFE	W
8	ORG22975V	O-RING	1	ASTM D1418 FKM	W
9	HDR15563	HEAD RING 55.0 X 6 X 3 PEEK	1	UNFILLED PEEK	W
10	AER15562	ANTI EXTRUSION RING 55.0 X 6 X 3 CP	2	CARBON FILLED PTFE	W
11	PKR15561	PACKING RETAINER 55.0 X 6 X 3 PEEK	3	UNFILLED PEEK	W

B

B

C

C

D

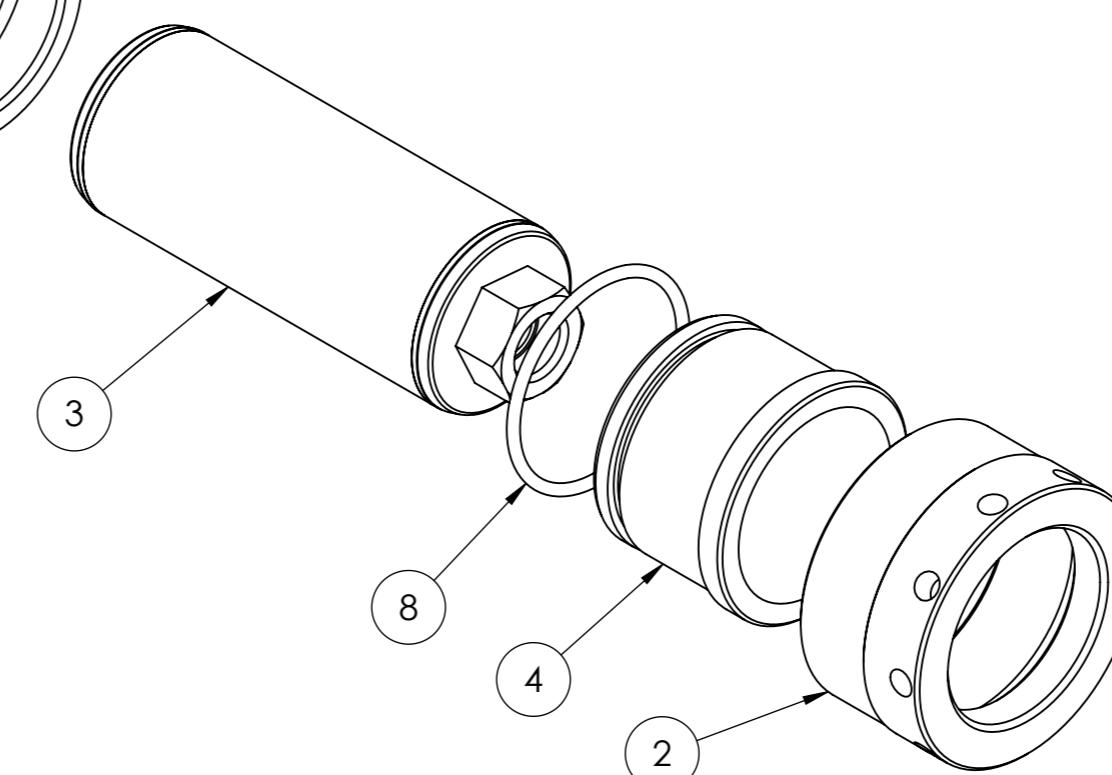
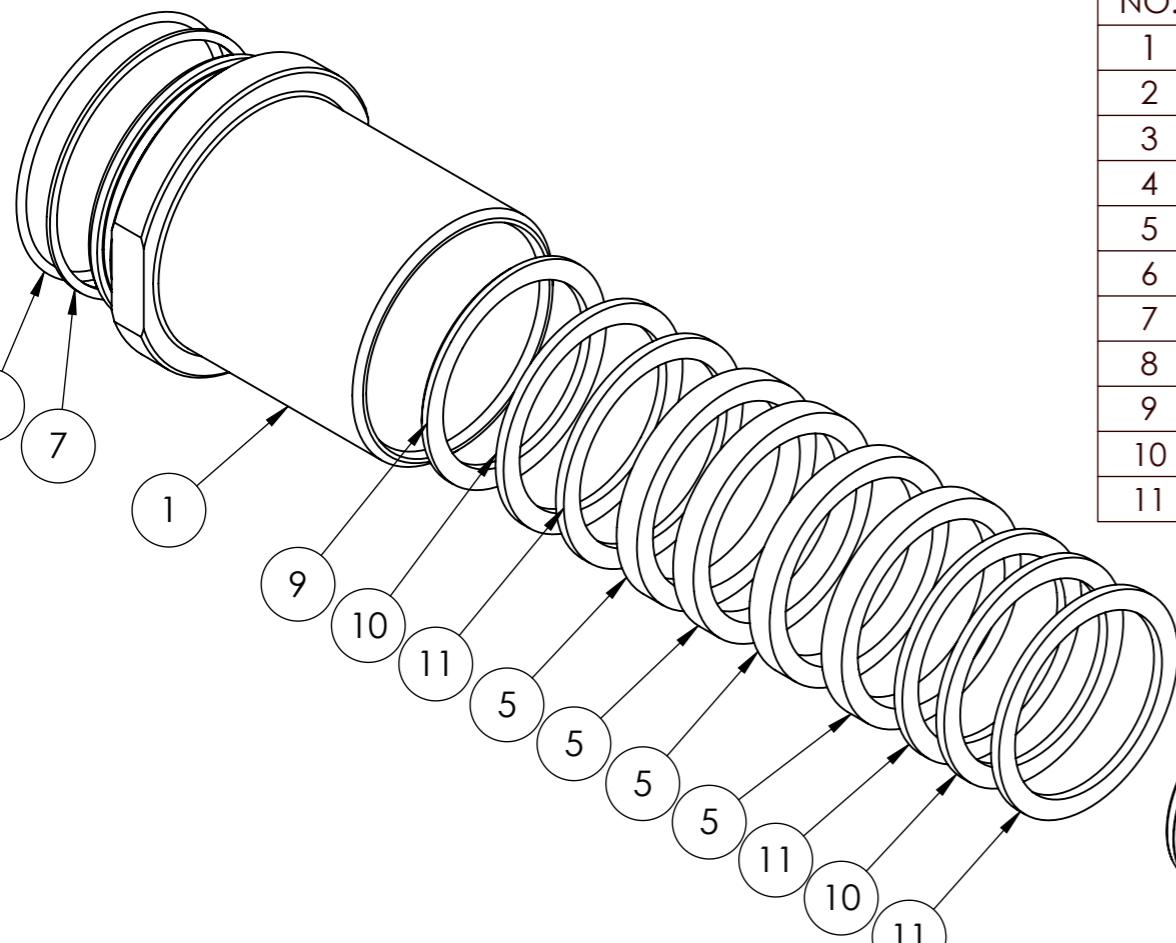
D

E

E

F

F

SECTION ON C
SCALE 1 : 1.5

TORQUE SETTINGS	
ITEM No.	TORQUE Nm
3	35

					UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS TOLERANCES: LINEAR: 0 = +/- 0.5mm 0.0 = +/- 0.1mm 0.00 = +/- 0.04mm ANGULAR: +/- 0.5 DEGREES	MATERIAL: N/A	THIS DRAWING IS CONFIDENTIAL AND MUST NOT BE COPIED LOANED OR TRANSFERRED WITHOUT PERMISSION OF: © 2018 RAM PUMPS LTD WORTHING SUSSEX	
02	15/05/2019	BOM ADDED	SS	SS	FOR EXPLANATION OF NOTES SYMBOLS ETC SEE B.S. 308	FINISH: N/A	TREATMENT: NONE	DRAWN (1st): SS APPROVED (1st): SS
01	30/01/2018	INITIAL RELEASE	SS	SS	INDICATES MODIFICATION ISSUE NUMBER	SHEET SIZE: A3	ORIGINAL SCALE: 1:2	DATE (1st): 30/01/2018 1st USED ON: 015527s
ISSUE	DATE	MOD	DRAWN	APRVD	TITLE: SEAL HOUSING ASSEMBLY RAM54R055 HCH/V	RAM DWG NO. SH15821	SHT 1 OF 1	

RAM PUMPS
Meeting The Toughest Challenges

SLH15822

GN26208

017341B

GN 26208



Continental Works
Bessemer Road
Sheffield
England
S9 3XN

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f: +44 (0) 114 2441199
enquiries@specialqualityalloys.com
www.specialqualityalloys.com

Certificate of Compliance

Report No:	148133	Rev:	00	Date:	12/06/19	Page 1 of 2
Customer				Delivery Address		
Ram Pumps Limited Unit 14 Hazelwood Trading Estate Worthing West Sussex BN14 8NP.				Ram Pumps Limited Unit 14 Hazelwood Trading Estate Worthing West Sussex BN14 8NP.		
Our Order No.	069986	Item No.	002			
Customer Order No.	033203PO	Item No.	002			
Despatch Note No.	138918					
Specification	UNS N06625 TO ASTM B446-03 (2014) GRADE 1					

HEAT NO.

361508

Qty	Weight (kg)	Part No.	Part Rev	Batch No
60	6.5	Each	SLH15822.M	7441/1806

Description

PEELED BAR APPROX SUPPLY SIZE:

3.750" OD X 105mm LONG

CERTIFICATION TO BS.EN10204:2004 3.1

*NACE MR-01-75 2015

Analysis 361508	C .03	Si .12	Mn .06	S <.001	P .007	Ni 59.59	Cr 22.34	Mo 9.13	Ti .32	Nb 3.41
	Al .24	Cu .02	Fe 4.64	Co .02	Ta <.01	NT <3.42				

Melting Practice	VIM/ESR
Reduction Ratio	18.35:1

SLH15822.M



SLH15822

GN26208

017341B

Report No: 148133	Rev: 00	Date: 12/06/19	Page 2 of 2
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Heat Treatment Detail

Heat Treatment Lot No.					
Furnace Calibration					
Heat Treatment Comment					
Type	Temp(°C)	Thermocouple	Soak HH:MM	Quench/Cooling	Quench Temp (°C) Start Finish
Test Piece Coupon Type			Test Piece size		

Test No: SEE ATTACHED MILL CERT**Hardness on Component**

Location	Type of Check	Requirement	Results

Additional information

MECHANICAL TEST ACC ASTM A370.

MATERIAL ACC NACE MR-0175/ISO 15156:2015

SEE ATTACHED MILL CERT NO 169371/0 AND ASSOCIATED DOCUMENTS FOR ALL RELEVANT DETAILS.

Signature	R. mcdonald	Position: R.McDonald Certification Officer
------------------	-------------	--

* L = Longitudinal; T = Transverse; Q=Tangential; A=Axial

NT= Nb + Ta / Cb +Ta

No welding, material free from contamination with mercury or radioactive materials.

ISO9001 Quality Management and ISO14001 Environmental Management certified by BSI under certificate numbers Q06199 and EMS62069

Reporting of false, fictitious, or fraudulent statements or entries may have serious consequences and may be punishable by UK civil and criminal law.

Any act of tampering, modification, alteration, counterfeiting and/or any actions which modifies the contents of this certificate of conformity may constitute a violation of applicable UK civil and criminal law.



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169371/0
DIN EN 10204/01.05 3.1

Order No. 522850 Delivery No. 15279 Purchase Order No. 010361 (LB 11380)

Page: 1 / 2
printed: 22. MAY 2018

Special Quality Alloys Ltd
Bessemer Road
GB - S9 3XN Sheffield

Trademark
VDM® Alloy 625
NICROFER 6020 HMO
2.4856
Product
Bar, round, forged, annealed, machined

EN ISO 9001, AS 9100
LRQA Approval
KLN 4000941/E

Specification

SQA MPS 0530.R Rev.2 20/10/2010

ASTM B 446-03 (reapproved 14)

Grade 1

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB-446

ASME BPVC.II.B-2017 SB 564 applicable for forgings

NACE MR0175 / ISO 15156-3 2015

AMS 5666 J

Material

UNS N06625

Item Pcs Wht [kg]

Dimension [mm]

Cast

Lot

2	6	1727	95,25 Ø x 4000-8000	361508	104788338	3.75" dia.
---	---	------	---------------------	--------	-----------	------------

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SQA MPS 0530.R Rev.2 20/10/2010; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB 564 applicable for forgings; AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Cu	Fe
361508	VIM/ESR	top	0,03	<0,001	22,34	R59,59	0,06	0,12	9,13	0,32	3,41	0,02
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	RF

Cast	Melting Pr.	P	Al	Co	Ta	Nb+Ta
361508	VIM/ESR	top	0,007	0,24	0,02	<0,01
		Meth	RF	RF	RF	<3,42

Sample Condition annealed		Tensile Test						Hardness Test				
		1 ASTM E8/E8M - 16a / longitudinal specimen						1 ASTM E18 - 17e1				
Lot	Sample No.	Temp [°C]	Yield0.2% [MPa]	Yield1.0% [MPa]	Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	2 ASTM E10 - 17			
104788338	1-A1	1	RT	537		896	4D	50,2	HRC			
104788338	1-A1							58	HBW 10/3000/ A			

Sample Condition annealed		Grain Size		Corrosion Test					
Lot	Sample No.	1	No 8.5	1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition					
104788338	1-A1			1 without objection: 0,30 mm/a					
104788338	1-A1								

We herewith certify, that the material is in conformance with the above mentioned specifications

S. Frensemeier-Chacha
Susanne Frensemeier-Chacha, authorized inspection representative

Tel. +49 2392 552816

Fax +49 2392 552827

Email susanne.frensemeier-chacha@vdm-metals.com

Date of release: 22.05.2018

Mark of the Inspector

Q

E

Enclosures: 5

* 169371 - D-F *

Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller
Andrea Bauer, Rolf Schencking
Commercial register: Iserlohn local court, #5327
Company domicile: Werdohl

VDM Metals GmbH
Division Bar and Forgings
Plettenberger Straße 2, D-58791 Werdohl
Postbox 1820, D-58778 Werdohl
Telephone: 02392 55-0, Fax: 02392 55-2217
Internet: www.vdm-metals.com



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 169371/0
DIN EN 10204/01.05 3.1

Order No. Delivery No. Purchase Order No.
522850 15279 010361 (LB 11380)

Page: 2 / 2
printed: 22. MAY 2018

Item	Lot
2	104788338 Ultrasonic Examination: see enclosure

Heat Treatment	Lot
920°C/00:45h/Water	104788338

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

The quench bath water temperature was at start of quench 31,3°C and 33,5°C at completion of quench.

Hot forming: Reduction ratio: 18,35:1

For dimensions greater 16mmØ, we use samples for notched-bar impact testing, which are standard ASTM specimens with 10 mm x 10 mm square, taken from a prolongation of the bars.

MACROETCHING: conducted as per ASTM A 604, etchant 'Aqua Regia', sample taken from top and bottom of ingot after hot forming.

Rating: better or equal class A, in all 4 classes.

The material fulfills the requirements of the NACE MR 0175/ISO 15156-3,

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

Heat treatment location: VDM Metals GmbH, Kleffstr. 23, D-58762 Altena / Germany

Grade 1

Forging process was done by forging press (Unna), rotary forge (DEW)

Temperature controlled / monitored by heat sink.

VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Enclosure for Inspection certificate 169371/0
DIN EN 10204/01.05 3.1
Order No. Delivery No. Purchase Order No.
522850 15279 010361 (LB 11380)

Enclosure: 1
Page: 1 / 1
printed: 22. MAY 2018

Notched Bar Impact Testing

annealed

ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_B 450/10

Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104788338	1-A1	-110	123	121	118	1,47 1,49 1,32 70 70 70



VDM Metals GmbH



VDM Metals

ULTRASCHALL-PRÜFPROTOKOLL / ultrasonic-examination record

BESTELLER: customer:			Special Quality Alloys Ltd			PROTOKOLL-NR.: record-no.:			
KUNDENAUFTRAGS NR.: / Position: customer order no. / position:			7600 522850 2			BLATT sheet 1			
FAUF: order no.:	AVO-Nr.: 104788338	Anwendung: 1210	Soll-Abmessung: dimension:	95,3	x	0	x	4000 [mm]	
PRÜFUNG NACH: SQA MPS 0530.R Rev.3 & API Spec. 6A Twentieth examination acc.to: Ed.2010 - PSL3			Ist-ABMESSUNG: dimension:	95,3	x	4780	x	4930 [mm]	
WERKSTOFF: material: VDM® Alloy 625			SCHMELZE - (Chg.-)NR.: heat - no.: 361508	MB-Nr.: NCR-No.:					
PRÜFUNG NACH/VOR DER WÄRMEBEHANDLUNG examination after/before heat treatment			PRÜFFLÄCHENZUSTAND: condition of exam surface: geschält/peeled						
PRÜFGERÄT: examination equipment:	1. 1090 21300	2.	Oberflächenrauheit surface roughnes						
Justerbereich [SB]: equipment calibration:	1. 110	2.	PRÜFKÖPFE: 1. SEB 2 search units: 57467/03082	2.					
GRUNDVERSTÄRKUNG: base amplitude:	1. 55,0	2.	ANKOPPLUNGSMITTEL: couplant: Wasser/Water						
REGISTRIERGRENZE: recording level:	1. 2,26	2.	JUSTIERKÖRPER: FBE X calibration block: [mm]	Nut [mm]	Querbohrung [mm]	Kante [mm]			
RG-ZUSATZVERSTÄRKUNG ΔV add. recording level amplitude:	1. 10,0	2.	SCHALLWEGE: 1. sound distance: 95,25	2. [mm]					
Registrierverstärkung examination amplitude:	1. 65,0	2.	Bewertungsverfahren: assessment procedures:	AVG	Bezugshöhe	Bezugslinie	Vergleichsl.	Testk. 26	
Zulässigkeitsgrenze permissible limit	1. 3,00	2.	SPURABSTAND: [mm] index: 20% überlappend	Prüfgeschw. [mm/s]	<150				
SCHALLWEG/øFBB-ZUSATZVERST. add. sound path amplitude:	1.	2.	RÜCKWANDECHOVERLUST: loss of back reflection: [%]						
Blende gate:	1.	2.							
SCHALLSCHWÄCHUNG dB: sound attenuation:	1.	2.							
KONTROLLE - GERÄTEJUSTIERUNG: control - equipment calibration		Kontrolle ~ alle h: control ~ after h:			Kontrolle nach erfolgter Prüfung: control after examination:				
BEMERKUNG:									
remarks:									
Anzahl geprüften Stücke i.o.: Number of tested pieces ok:		6		Anzahl geprüfter Stücke n.i.o.: Number of tested pieces not ok:		0		0	
DATUM / ORT: PRÜFER: examiner:	04.05.2018 Gugsch, Thomas ASNT/DIN EN ISO 9712/Level II	Altena	date/place: PRÜFAUFSICHT: exam. super visor:	18.05.2018 Böning, Tobias DIN EN ISO 9712 Level III	Altena	<input checked="" type="checkbox"/> Frei / accepted	<input type="checkbox"/> Frei: zulässige Befunde / acceptable indications		
						<input type="checkbox"/> Gesperrt: unzulässige Befunde / Hold: unacceptable indications			

ohne Genehmigung der Ultraschallaufsicht Level III darf dieser Bericht auch nicht auszugsweise vervielfältigt werden





DEUTSCHE
GESELLSCHAFT FÜR
ZERSTÖRUNGSFREIE
PRÜFUNG E.V.

PERSONALZERTIFIZIERUNGSSTELLE (DPZ)

Akkreditierte Zertifizierungsstelle nach DIN EN ISO/IEC 17024
Accredited certifying body pursuant to DIN EN ISO/IEC 17024
Organisme de certification accrédité selon DIN EN ISO/IEC 17024
DAkkS-Reg.-Nr. D-ZP-19000-01-00

Anerkannte unabhängige Prüfstelle nach Artikel 20 der Richtlinie 2014/68/EU
Recognized third-party organisation according to article 20 of Directive 2014/68/EU
Entité tierce partie reconnue selon l'article 20 de la Directive 2014/68/UE
Reg.-Nr. ZLS-NB-0229

Certificate

Zertifikat

Certificat

Nr. | No. | N°
23718-UT 2

Hiermit zertifizieren wir, dass
We hereby certify that | Nous certifions que

Thomas Gugsch

(Signature of Thomas Gugsch)
Titel, Vorname, Name | Title, first name, surname | Titre, prénom, nom

Geburtsdatum | Date of birth | Date de naissance

Geburtsort | Place of birth | Lieu de naissance

nach DIN EN ISO 9712 kompetent ist für die
is competent according to DIN EN ISO 9712 for | est compétent selon DIN EN ISO 9712 pour

Ultraschallprüfung Stufe 2 (UT)

Ultrasonic testing Level 2 (UT)
Ultrasons Niveau 2 (UT)

Prüfverfahren, Stufe | NDT method, level | Méthode d'essai, niveau

Sektor / Sector / Secteur: Is

03.03.2017

Datum der Zertifizierung
Date of certification
Date de certification

(Signature of Thomas Gugsch)

Unterschrift des Zertifikatinhabers
Signature of certified person
Signature de la personne de certifiée



02.03.2022

Ablaufdatum
Expiry date
Date de fin de validité

(Signature of Leiter der Zertifizierungsstelle)
Leiter der Zertifizierungsstelle
Head of certifying body
Chef d'organisme de certification

Erläuterungen auf der Rückseite | Explanations overleaf | Explication au verso

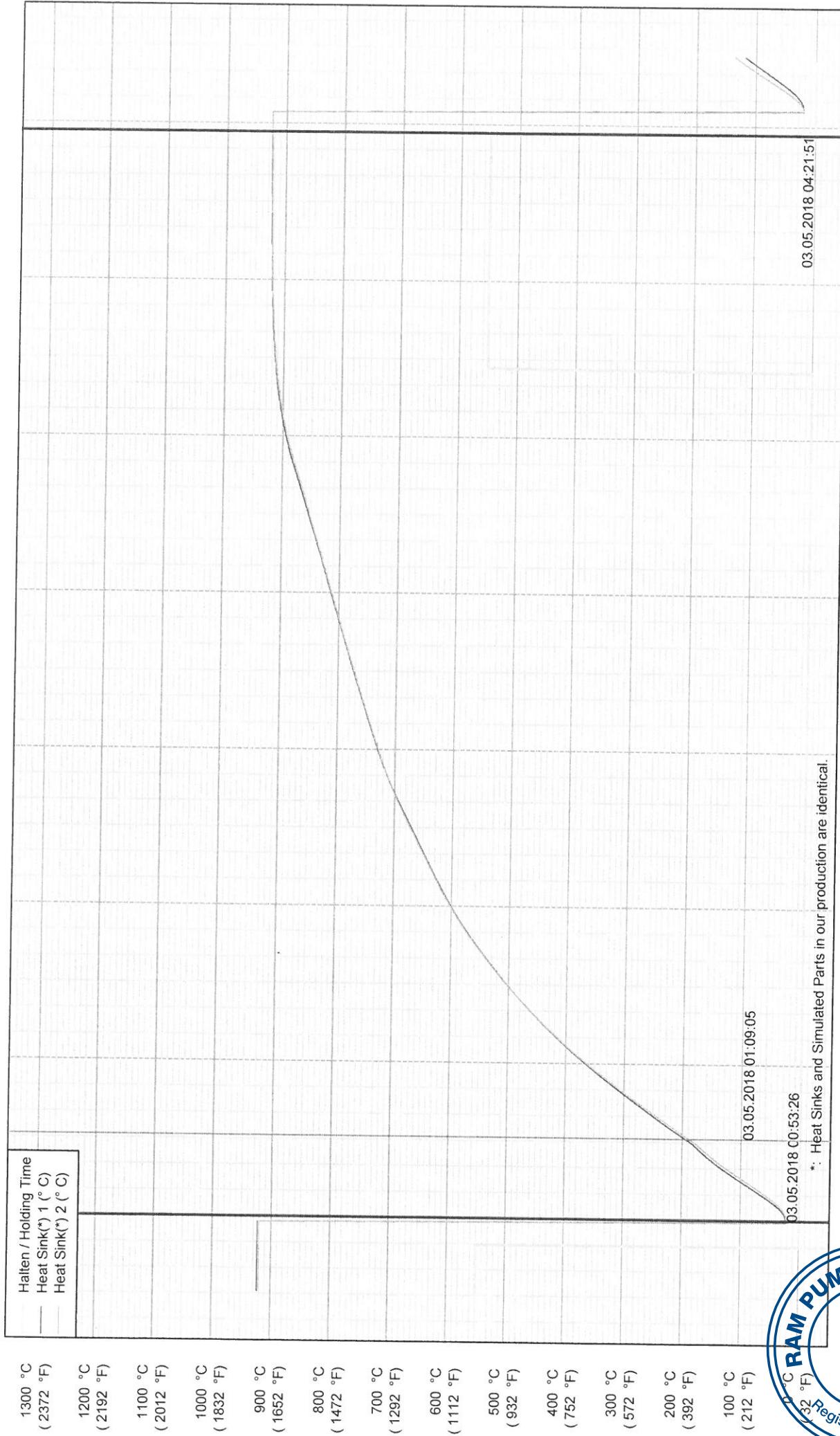
Das Zertifikat bleibt Eigentum der DPZ und kann entzogen werden, wenn es irreführend zitiert oder missbräuchlich verwendet wird.
The certificate remains the property of DPZ and may be revoked, if it is misleadingly quoted or misused.
Le certificat reste la propriété de DPZ, il peut être retiré au cas où il serait cité de manière mensongère ou utilisé de manière abusive.



SLH15822

GN26208

017341B

Inspection Certificate No. 169371
Enclosure 3 / Page 1 of 1**Herdwagenofen / Furnace : 4 – Gluehlos / Batch : 408731**

00:00

00:30

01:00

01:30

02:00

02:30

03:00

03:30

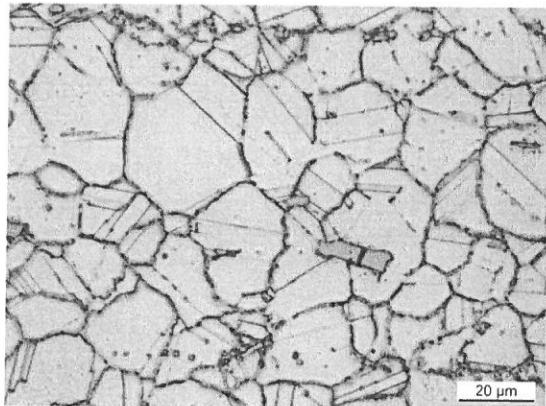
Zeit [hh:mm]

VDM Metals GmbH

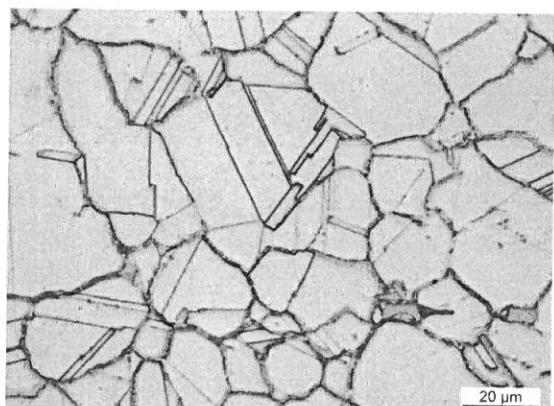
VDM Metals

Microstructure Examination

Metallography Job No.: 159103
Lot No.: 104788338
Heat: 361508

Inspection Certificate No.: 169371**Enclosure:** 4
Page: 1 of 1

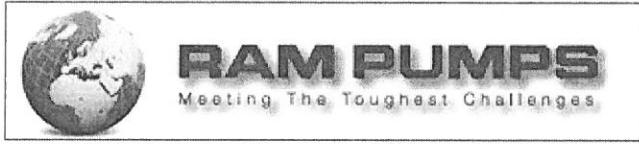
500:1VDM® Alloy 625 / Nicrofer 6020 hMo SMT
Salz Salpeter 6:1 08.05.2018 11:19:58
1A1 1/4 thickness



500:1VDM® Alloy 625 / Nicrofer 6020 hMo SMT
Salz Salpeter 6:1 08.05.2018 11:19:59
1A1 1/4 thickness

Address: VDM Metals GmbH, Kleffstrasse 23, D-58762 Altena, P.O. Box 12 51, D-58742 Altena
Telephone: +49 2392 55-0 Fax: +49 2392 55-2217 Internet: www.vdm-metals.com
Chairman of the Supervisory Board: Dr. Thomas Ludwig
Management Board: Dr. Niclas Müller, Chairman; Andrea Bauer, Rolf Schencking
Company domicile: Werdohl Commercial register: Iserlohn local court, HRB 5327





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No 22
Mode General Metals
Time 2019-06-14 08:39
Duration 11.49
Units %
Sigma Value 2
Sequence Final
Alloy1 Alloy 625 : 0.66
SAMPLE SLH15822.M
HEAT
LOT
BATCH
MISC
NOTE

	%	+/-	Error
Mo	9.214	+/-	0.240
W	0.000	+/-	0.073
Cu	0.000	+/-	0.140
Ni	61.181	+/-	0.606
Co	0.000	+/-	0.109
Fe	4.971	+/-	0.220
Mn	0.000	+/-	0.284
Cr	21.182	+/-	0.406
V	0.000	+/-	0.253

Supervised By: S.Talbot



Test and analysis certificate

Certificate of Conformity

Invoice To:
 RAM PUMPS LTD
 UNIT 14
 HAZELWOOD TRADING ESTATE
 WORTHING
 WEST SUSSEX
 BN14 8NP

Deliver To:
 RAM PUMPS LTD
 UNIT 14
 HAZELWOOD TRADING ESTATE
 WORTHING
 WEST SUSSEX
 BN14 8NP

Our Order No M194333 Order Date 11/06/19 Despatch Date 18/06/19 Despatch Note 298710
 Account 103845 Your Order No. 033194PO/ Despatch Details CLARKE TRANSPORT NEXT DAY
 Page 2

Product Specification

K2-3.500-SOLID BS2874 CA104/BS B23 1991/CW307G R680 Diameter 80 and above

Cast Number	Heat Number	GI No	Despatch Qty
EA5805		076398	20 200MM LONG

Chemical Analysis

Cu	Sn	Pb	Ni	Zn	Si	Mn	Al	Fe	Im
80.469	0.014	0.000	4.780	0.020	0.000	0.000	10.126	4.591	0.000

Mechanical Analysis

Tensile Strength	.2% Proof Stress	Elongation	Hardness
727.0 N/mm ²	355.0 N/mm ²	26.0 Elong	180.0 HB

Remarks

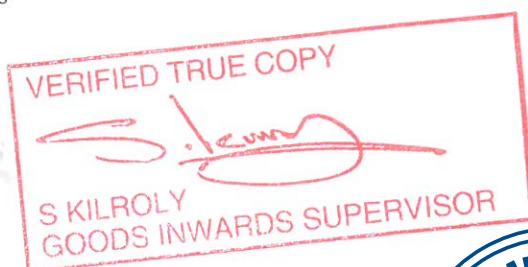
Material triple released to:

BS2874:1986 CA104

BS 2B 23A:2009

EN12163:2011 CW307G R680

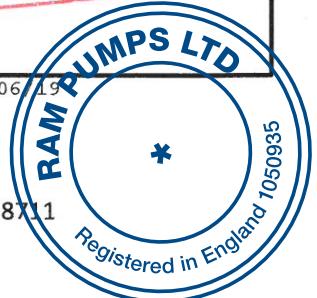
This certificate complies with BS EN 10204 : 2004 - 3.1.
 It is certified that the whole of the materials and/or parts
 hereon conform to the full requirements of your order or
 drawing/specification relative thereto.

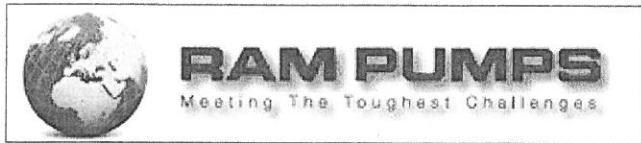


Signature

Print Name

Date 18/06/19





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	3
Mode	General Metals
Time	2019-06-24 08:52
Duration	10.55
Units	%
Sigma Value	2
Sequence	Final
Alloy1	C630/955AlBz : 1.69
SAMPLE	NPA3418.M
HEAT	EA5805
LOT	
BATCH	GN26241
MISC	
NOTE	

	%	+/-	Error
Mo	0.000	+/-	0.104
W	0.000	+/-	0.062
Cu	81.175	+/-	0.422
Ni	4.856	+/-	0.215
Co	0.000	+/-	0.065
Fe	4.576	+/-	0.176
Mn	0.094	+/-	0.046
Cr	0.000	+/-	0.202
V	0.000	+/-	0.004
LEC	10.250	+/-	0.011

Supervised By: S .Talbot

26



VOESTALPINE BÖHLERVoestalpine BÖHLER Edelstahl GmbH & Co. KG
Mariazellerstrasse 25 / 8605 Kapfenberg / AUSTRIAQUALITY MANAGEMENT SYSTEM
ISO 9001:2015 certification
EN ISO 14001:2015 certificationINSPECTION CERTIFICATE
EN 10204-1Nr. / No.: 250235 / 2018.12.17
Seite / Page: 1 / 7

Besteller/Purchaser/Acheteur:

Empfänger/Consignee/Destinataire:

Bestell-Nr./Purchaser order No./No. de commande:

4502754848 / 2018.07.24

Empfänger ref.-Nr./Receiver reference-No./Référence destinataire:

Werksauftrags-Nr./Works order-No./No. de la commande de l'usine:

2183907 / 2018.07.24

Lieferschein-Nr./Delivery note-No./Avis d'exécution du client:

51586473 / 2018.12.07

Prüfgegenstand/Object of test/Object d'examen:

BÖHLER L625

Bars, rolled, annealed

IBO ECOMAX ISO 286/2 ITk12

Anforderungen/Requirements/Exigence:

AMS-5666J

ASTM B446-03 (2014)

ANSI/NACE MR0175/ISO 15156-3:2015

ANSI/NACE MR0103/ISO 17495-1:2016

FMC M40400 Rev.1

Norsok Standard M-630 Edition 6, October 2013

Norsok MDS N01 Rev.5

UNS N06625, Grade 1, 2.4856

Pressure equipment directive PED 2014/68/EU

Volume of delivery

Pos/Lot	Dimensions	Length	No. of Pieces	Weight/kg	Matl.ID	Test.No.	Heat No.
30/1	RD 57,15 MM	3.000 - 4.000 MM	-	1453,0	2ES5	1702398-1	D44789

Ingot size = rd. 425 mm

Reduction ratio = 50.2 : 1

Quality heat treatment

Temperature monitoring = Heat sink thermocouples

	Temperature	Soak Time	Cooling
Annealed	1706°F (930°C)	1 h M	Water

M...Holding time at nominal temperature after center of material has reached the tolerance limit.

Pyrometry according to AMS 2750E as required by SAE - AMS -H-6875 B



RAM15823



QUALITY MANAGEMENT SYSTEM
ISO 9001:2015 certification
EN ISO 14001:2015 certification

ABNAHMEPRÜFZEUGNIS
INSPECTION CERTIFICATE
EN 10204-3.1

voestalpine BÖHLER Edelstahl GmbH & Co KG
Mariazellerstrasse 25 / 8605 Kapfenberg / AUSTRIA

Nr. / No.: 250235 / 2018.12.17
Seite / Page: 2 / 7

Chemical Composition (%)

Chemical Composition Steelmaking Process: VIM+ESR											Heat No.
C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Co		
0,012	0,09	0,09	0,005	0,0004	21,48	8,12	63,4	0,04	<0,05	D44789	
Ti	Al	Nb	Fe	Ta							D44789
0,05	0,15	3,25	3,18	<0,020							

Metallographic examination

Macro etch examination

Testing standard = ASTM A 604/A 604M - 07 (reapproved 2017)

Etch media = 1/3 H₂O₂ + 2/3 HCl

Class 1 Severity A

Class 2 Severity A

Class 3 Severity A

Class 4 Severity A

The macroetch examination is performed on full transverse cross-section slices representative of the top and bottom section of the remelted ingot.

Grain size evaluation, Microstructure

Testing standard = ASTM E112-13

Etch media = H₂O 10-40ml, HCl 40ml, H₂O₂ 1-15ml

Magnification = 50:1, 100:1, 500:1

Structur	Orientation	Rim	1/2 Radius (1/4T)	Center
Uniform	longitudinal	ASTM No.12	ASTM No.12	ASTM No.12

The microstructure is free from continuous networks of secondary phases, and other unusual features.

Photomicrographs



Location = longitudinal, 1/2 Radius (1/4T)

Magnification = 500:1

Location = longitudinal, Center

Magnification = 500:1



BÖHLER

QUALITY MANAGEMENT SYSTEM
ISO 9001:2015 certification
EN ISO 14001:2015 certification

ABNAHMEPRÜFZEUGNIS
INSPECTION CERTIFICATE
EN 10204-3.1

voestalp. BÖHLER Edelstahl GmbH & Co KG
Mariazellerstrasse 25 / 8605 Kapfenberg / AUSTRIA

Nr. / No.: 250235 / 2018.12.17
Seite / Page: 3 / 7

Mechanical Properties

The QTC is a prolongation of the final heat treated bar.
The test specimen and the test method is in accordance with ASTM A 370 - 17a.

Tensile test properties

Orientation = longitudinal

Location = 1/2 Radius (1/4T)

Tensile test in delivery condition

*Key
H = hardest
W = softest
S = Top
M = Middle
B = Bottom

Test no.	Place no.	Testing standard	Location	Temp. grd C	Yield Strength	Ultimate Tensile Strength	Elongation	Reduction of Area
					YS0.2 MPa	UTS MPa	%	%
1702398-1	1S4	ASTM E 8/E8M-16a	L2	-23	574 >=415	979 >=830	49 >=30	63 >=45

Impact test properties

Orientation = longitudinal

Location = 1/2 Radius (1/4T)

Impact test in delivery condition

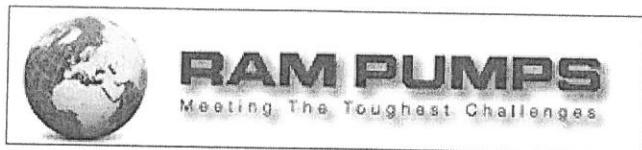
*Key
H = hardest
W = softest
S = Top
M = Middle
B = Bottom

Test no.	Place no.	Testing standard	Location	Temp. grd C	Impact energy	Lateral expansion	Shear area
					Charpy V J	mm	%
1702398-1	1S4	ASTM E 23-16b	L2	-110	133 137 128 >=27	1,30 1,39 1,37 Info	100 100 100 Info

Hardness test in delivery condition

Test no.	Place no.	Testing standard	Location	HBW10/3000	HRC
1702398-1	-	ASTM E10-17	Bars	174 - 287	<=35
1702398-1	1	ASTM E18-17 01.07.2017	Rim	236-238	<20
1702398-1	1	ASTM E18-17 01.07.2017	Rim		<20
1702398-1	1	ASTM E18-17 01.07.2017	Rim		<20





RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No 9
Mode General Metals
Time 2019-08-06 08:09
Duration 11.13
Units %
Sigma Value 2
Sequence Final
Alloy1 Alloy 625 : 0.68
SAMPLE RAM15823
HEAT
LOT
BATCH
MISC
NOTE

	%	+/-	Error
Mo	8.158	+/-	0.179
W	0.149	+/-	0.105
Cu	0.000	+/-	0.150
Ni	64.088	+/-	0.475
Co	0.000	+/-	0.165
Fe	3.161	+/-	0.188
Mn	0.000	+/-	0.231
Cr	20.958	+/-	0.423
V	0.000	+/-	0.472

Supervised By: S .Talbot



TIR15824

GN26197

017345B

GIN 26197


**SPECIAL
QUALITY
ALLOYS Ltd**

Continental Works
Bessemer Road
Sheffield
England
S9 3XN

t: +44 (0) 114 2434366
f: +44 (0) 114 2441199
enquiries@specialqualityalloys.com
www.specialqualityalloys.com

Certificate of Compliance

Report No:	148055	Rev:	00	Date:	10/06/19	Page 1 of 2
Customer				Delivery Address		
Ram Pumps Limited Unit 14 Hazelwood Trading Estate Worthing West Sussex BN14 8NP.				Ram Pumps Limited Unit 14 Hazelwood Trading Estate Worthing West Sussex BN14 8NP.		
Our Order No.	069986	Item No.	001			
Customer Order No.	033203PO	Item No.	001			
Despatch Note No.	138840					
Specification	UNS N06625 TO ASTM B446-03 (2014) GRADE 1					
HEAT NO.	342920					

Qty	Weight (kg)	Part No.	Part Rev	Batch No
4	38.0	Each	SBINCONEL#3	7832/1809

Description

PEELED BAR APPROX SUPPLY SIZE:

3" OD X 1 METRE

CERTIFICATION TO BS.EN10204:2004 3.1

*NACE MR-01-75 2015

Analysis	C	Si	Mn	S	P	Ni	Cr	Mo	Ti	Nb
342920	.02	.13	.05	<.001	.005	59.73	22.24	9.10	.33	3.38
	AI	Cu	Fe	Co	Ta	NT				
	.24	.02	4.65	.03	<.01	3.39				
Melting Practice	VIM/ESR									
Reduction Ratio	27.25:1									

SBINCONEL#3"dia



VDM Metals GmbH
on behalf of VDM Metals International GmbH

VDM Metals

Inspection certificate 173503/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
526137 010429 (LB 11485)

Page: 1 / 2
printed: 12. SEP 2018

Special Quality Alloys Ltd	Trademark VDM® Alloy 625 NICROFER 6020 HMO 2.4856	EN ISO 9001, AS 9100 LRQA Approval KLN 4000941/E
Bessemer Road GB - S9 3XN Sheffield	Product Bar, round, forged, annealed, machined	

Specification

SQA MPS 0530.R Rev.2 20/10/2010

ASTM B 446-03 (reapproved 14)

Grade 1

ASTM B 564-17a applicable for forgings

ASME BPVC.II.B-2017 SB-446

ASME BPVC.II.B-2017 SB 564 applicable for forgings

NACE MR0175 / ISO 15156-3 2015

AMS 5666 J

Material

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

UNS N06625

Item Pcs Wht [kg]

Dimension [mm]

Cast

Lot

Delivery No.

4	6	1168	76,20 Ø x 4000-8000	342920	104807664	8681929062	3.00" dia.
---	---	------	---------------------	--------	-----------	------------	------------

Analysis (weight %)

LE=combustion analysis

RF=X-ray fluorescence spectroscopy

Nb+Ta =

SQA MPS 0530.R Rev.2 20/10/2010; ASTM B 446-03 (reapproved 14); ASTM B 564-17a applicable for forgings; ASME BPVC.II.B-2017 SB-446; ASME BPVC.II.B-2017 SB 564 applicable for forgings; AMS 5666 J

Cast	Melting Pr.	C	S	Cr	Ni	Mn	Si	Mo	Ti	Nb	Cu	Fe
342920	VIM/ESR	top	0,02	<0,001	22,24	R59,73	0,05	0,13	9,10	0,33	3,38	0,02
		Meth	LE	LE	RF		RF	RF	RF	RF	RF	4,65

Cast	Melting Pr.	P	Al	Co	Ta	Nb+Ta
342920	VIM/ESR	top	0,005	0,24	0,03	<0,01
		Meth	RF	RF	RF	3,39

Sample Condition annealed		Tensile Test 1 ASTM E8/E8M - 16a / longitudinal specimen						Grain Size 1 ASTM E112 - 13	
Lot	Sample No.	Temp [°C]	Yield [MPa]	0.2% Yield [MPa]	1.0% Tensile [MPa]	Elongation A [%]	A [%]	RoA [%]	1 No 8.5
104807664	1-A1	1 RT	643		970	4D	43,3	57	

Sample Condition annealed		Corrosion Test 1 ASTM G 28-02 (Reapproved 2015) Method A - delivery condition					
Lot	Sample No.	1 without objection: 0,71 mm/anno					
104807664	1-A1						

Item	Lot	Ultrasonic Examination: see enclosure		
4	104807664			

Heat Treatment	Lot
920°C/00:45h/Water	104807664

We herewith certify, that the material is in conformance with the above mentioned specifications
 Tel. +49 2392 552816
 Fax +49 2392 552827
 EMail susanne.frensemeier-chacha@vdm-metals.com
 Susanne Frensemeier-Chacha , authorized inspection representative Date of release: 12.09.2018

E

Enclosures: 5

* 173503-0-E *



This certified test report shall not be reproduced except in full, without the written approval of VDM Metals. The recording of false, fictitious or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

VDM Metals GmbH
on behalf of VDM Metals International GmbH

Inspection certificate 173503/0
DIN EN 10204/01.05 3.1

Order No. Purchase Order No.
526137 010429 (LB 11485)

VDM Metals

Page: 2 / 2
printed: 12. SEP 2018

Spectrographic analytical mixup test/PMI check: without objection

Dimensional and visual inspection performed: without objection

No mercury contamination; no Radium, Luminous or Alpha source materials were used in the manufacture or testing of the items furnished.

No weld repairs performed.

The quench bath water temperature was at start of quench 31,2°C and 32,8°C at completion of quench.

Hot forming: Reduction ratio: 27,25:1

For dimensions greater 16mmØ, we use samples for notched-bar impact testing, which are standard ASTM specimens with 10 mm x 10 mm square, taken from a prolongation of the bars.

MACROETCHING: conducted as per ASTM A 604, etchant 'Aqua Regia', sample taken from top and bottom of ingot after hot forming.

Rating: better or equal class A, in all 4 classes.

The material fulfills the requirements of the NACE MR 0175/ISO 15156-3,

VDM Metals is PRI / NADCAP accredited in accordance with AMS 2750 which is also referenced in AMS-H-6875 and which is a worldwide acceptance standard for qualification of heat treatment.

Heat treatment location: VDM Metals GmbH, Kleffstr. 23, D-58762 Altena / Germany

Grade 1

Forging process was done by forging press (Unna), rotary forge (DEW)

Temperature controlled / monitored by heat sink.

VDM Metals GmbH has complied with all producer requirements of AS6279

Subcontractor:

Hot forming: DEW, Witten (forging)



Inspection Certificate-No. 173503 / Enclosure: 2 / page 1 of 1

VDM Metals GmbH

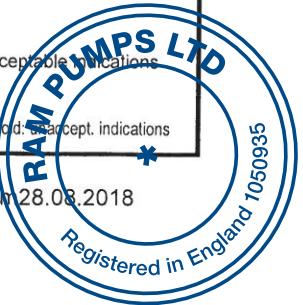


VDM Metals

ULTRASCHALL-PRÜFPROTOKOLL / ultrasonic-examination record

BESTELLER: customer:			Special Quality Alloys Ltd			PROTOKOLL-NR.: record-no.:		
KUNDENAUFTRAGS NR.: / Position: customer order no. / position:			7600 526137 4			BLATT sheet 1		
FAUF: order no.:	AVO-Nr.: 104807664	Anwendung: 1400	Soll-Abmessung: dimension:	76,2	x	0	x	4000 [mm]
PRÜFUNG NACH: API Spec. 6A Twentieth Ed.2010 - PSL3 examination acc.to:			Ist-ABMESSUNG: dimension:	76,2	x	5035	x	5155 [mm]
WERKSTOFF: material:	VDM® Alloy 625		SCHMELZE - (Chg.-)NR.: heat - no.:	342920	MB-Nr.: NCR-No.:			
PRÜFUNG NACH/VOR DER WÄRMEBEHANDLUNG examination after/before heattreatment			PRÜFFLÄCHENZUSTAND: condition of exam surface: peeled					
PRÜFGERÄT: examination equipment:	1. 1090 21300	2.	Oberflächenrauheit surface roughnes					
Justierbereich [SB]: equipment calibration:	1. 100	2.	PRÜFKÖPFE: 1. SEB4 search units: 57469/7674	2.				
GRUNDVERSTÄRKUNG: base amplitude:	1. 58,0	2.	ANKOPPLUNGSMITTEL: couplant: Wasser					
REGISTRIERGRENZE: recording level:	1. 2,26	2.	JUSTIERKÖRPER: FBE 3,2 Nut calibration block: [mm] [mm]	Querbohrung		Kante		
RG-ZUSATZVERSTÄRKUNG ΔV add. recording level amplitude:	1. 6,0	2.	SCHALLWEGE: 1. sound distance: 76,2	2. [mm]				
Registrierverstärkung examination amplitude:	1. 64,0	2.	Bewertungsverfahren: assessment procedures:	AVG	AVG	Testk.	12	
Zulässigkeitsgrenze permissible limit	1. 3,20	2.	SPURABSTAND: [mm] index: 15% überl.	Prüfgeschw. scanning speed: <150 [mm/s]				
SCHALLWEG/ØFBB-ZUSATZVERST. add. sound path amplitude:	1.	2.	RÜCKWANDECHOVERLUST: loss of back reflection:	[%]				
Blende gate:	1.	2.						
SCHALLSCHWÄCHUNG dB: sound attenuation:	1.	2.						
KONTROLLE - GERÄTEJUSTIERUNG: control - equipment calibration	Kontrolle ~ alle h: control ~ after h:		Kontrolle nach erfolgter Prüfung: control after examination:					
BEMERKUNG: remarks:								
Anzahl geprüften Stücke i.o.:		6	Anzahl geprüfter Stücke n.i.o.:		0			
Number of tested pieces ok:		6	Number of tested pieces not ok:		0			
DATUM / ORT: PRÜFER: examiner: DIN EN ISO 9712/DIN EN 4179 Level II	27.08.2018 Altena		date/place: PRÜFAUFSICHT: exam. super visor: ASNT/DIN EN ISO 9712/DIN EN 4179 Level II	28.08.2018 Altena		<input checked="" type="checkbox"/> Frei / accepted <input type="checkbox"/> Frei: zulässige Befunde / acceptable indications <input type="checkbox"/> Gesperrt: unzulässige Befunde / Hold: unacceptable indications		

ohne Genehmigung der Ultraschallaufsicht Level III darf dieser Bericht auch nicht auszugsweise vervielfältigt werden



TIR15824

GN26197

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Heat Treatment Detail

Heat Treatment Lot No.

Furnace Calibration

Heat Treatment Comment

Type	Temp(°C)	Thermocouple	Soak HH:MM	Quench/Cooling	Quench Temp (°C) Start	Quench Temp (°C) Finish
Test Piece Coupon Type			Test Piece size			

Test No: SEE ATTACHED MILL CERT**Hardness on Component**

Location	Type of Check	Requirement	Results

Additional information

MECHANICAL TEST ACC ASTM A370.

MATERIAL ACC NACE MR-0175/ISO 15156:2015

SEE ATTACHED MILL CERT NO 173503/0 AND ASSOCIATED DOCUMENTS FOR ALL RELEVANT DETAILS.

Signature	M Chapman	Position: M Chapman: Certification Supervisor
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* L = Longitudinal; T = Transverse; Q=Tangential; A=Axial

NT= Nb + Ta / Cb +Ta

No welding, material free from contamination with mercury or radioactive materials.

ISO9001 Quality Management and ISO14001 Environmental Management certified by BSI under certificate numbers Q06199 and EMS62069

Reporting of false, fictitious, or fraudulent statements or entries may have serious consequences and may be punishable by UK civil and criminal law.

Any act of tampering, modification, alteration, counterfeiting and/or any actions which modifies the contents of this certificate of conformity may constitute a violation of applicable UK civil and criminal law.



VDM Metals GmbH

on behalf of VDM Metals International GmbH

VDM Metals

Enclosure for inspection certificate 173503/0

DIN EN 10204/01.05

3.1

Order No. 526137

Delivery No.

Purchase Order No.
010429 (LB 11485)Enclosure: 1
Page: 1 / 1
printed: 12. SEP 2018

Hardness Test

annealed ASTM E10 - 17

Lot	Sample No.	Location	Method	Values		
104807664	1-A1	1/2 radius	HBW 10/3000/ A	262	259	260
<hr/>						
annealed			ASTM E18 - 17e1			
Lot	Sample No.	Location	Method	Values		
104807664	1-A1	1/2 radius	HRC	21,5	22,1	24,7

Notched Bar Impact Testing

annealed ASTM E23 - 12c Charpy-V sample / longitudinal (L-R) / KV_a 450/10

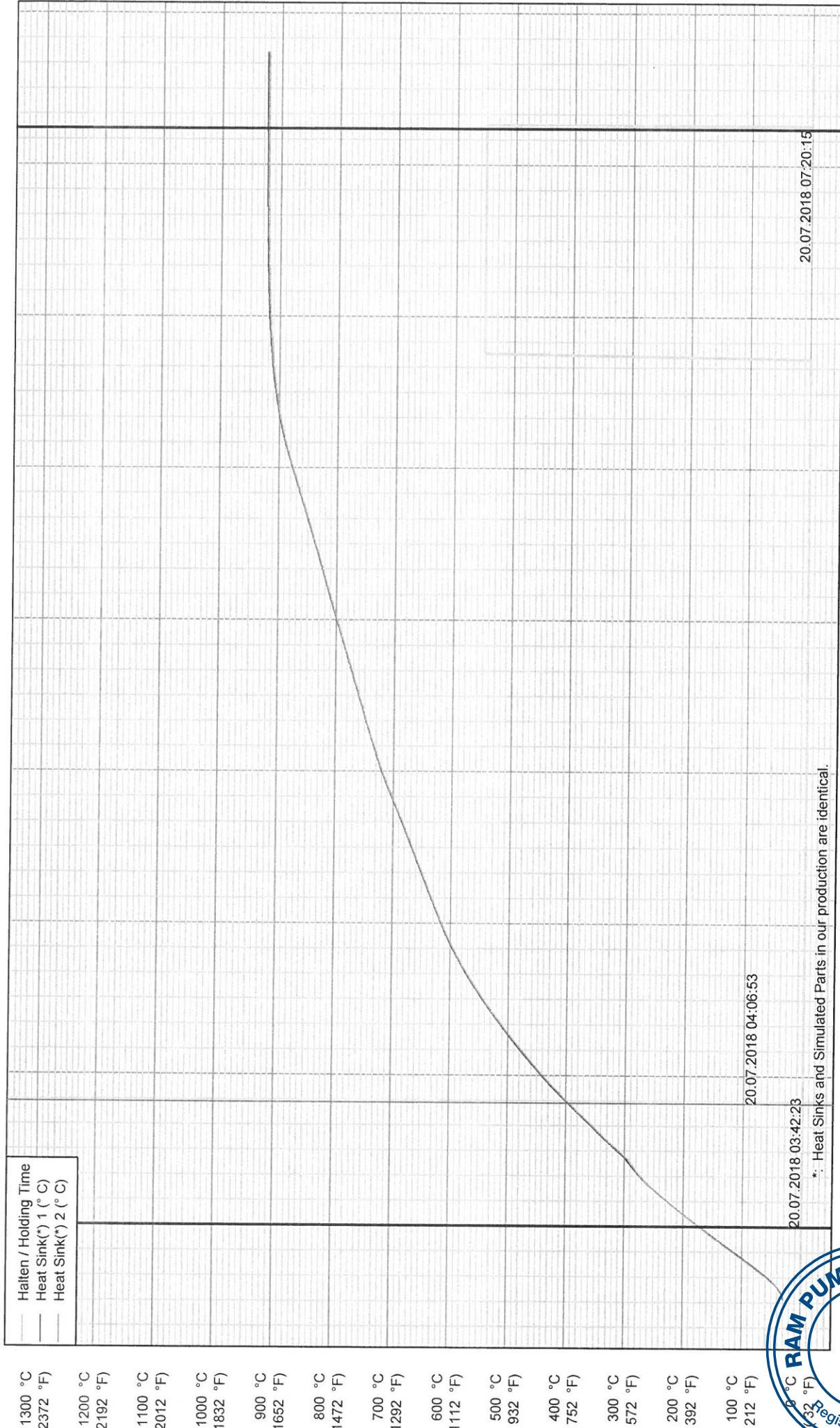
Lot	Sample No.	Temp. [°C]	KV [J]	aK [J/cm ²]	Lateral Expansion [mm]	Shear Fracture [%]
104807664	1-A1	-110	109	112	112	1,05 1,08 1,18 70 70 70

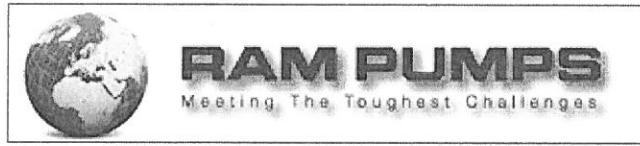


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Inspection Certificate No. 173503
Enclosure 4 / Page 1 of 1**Herdwagenofen / Furnace : 4 – Gluehlos / Batch : 408960**



RAM PUMPS LTD
UNIT 14 HAZELWOOD TRADING ESTATE
WORTHING BN14 8 NP

Certificate of Verification

XL2-93882

Reading No	6
Mode	General Metals
Time	2019-06-12 07:46
Duration	11.24
Units	%
Sigma Value	2
Sequence	Final
Alloy1	Alloy 625 : *1.96
SAMPLE	SBINCONEL#3DIA
HEAT	
LOT	
BATCH	
MISC	
NOTE	

	%	+/-	Error
Mo	9.340	+/-	0.197
W	0.000	+/-	0.085
Cu	0.000	+/-	0.154
Ni	60.698	+/-	0.487
Co	0.000	+/-	0.174
Fe	*5.457	+/-	0.232
Mn	0.000	+/-	0.270
Cr	21.007	+/-	0.395
V	0.000	+/-	0.201

Supervised By: S .Talbot

