



Bolt traceability register (To be updated for Manufacturing Data Book)


Item	Description	Purchase order item	Contract item	NOV Part no.	Part description	Batch id stamping	End fitting Id	Tension (kN)	Torque (Nm)	Lubricant
3a	Set of stud bolts and nuts as per rotative flange 4 1/16" API 17SV 5000 psi (for installation)	00070	00120							
3b	Set of stud bolts and nuts as per flange 4 1/16" API 17SS 5000 psi (for installation)	00090	00140							
3c	Set of stud bolts and nuts as per flange 4 1/16" API 17SS 5000 psi (for test and transportation)	00080	00130							

Anodes									
A-end					B-end				
Pipe	Item	Identification code	pcs/set	Total weight in kg per pipe end	Item	Identification code	pcs/set	Total weight in kg per pipe end	
15762NOV511	8a	B-171-80	3 Bracelets	240 kg	8b	R-450-46	2 Rings*	92 kg	

\*Each unit of ring anode consists of a pair of two symmetrical parts.


Rev. 02: This is the fifth issue of the document. Changes are in grey and clouds.

02	12-Sep-23	Issued for Construction	MASG	MAVB	MWLR	MWLR
01	12-May-23	Issued for Construction	CSLE	ALGS	MWLR	MWLR
00	6-Apr-23	Issued for Construction	CSLE	MAVB / ALGS	MWLR	MWLR
B	4-Aug-22	Issued for Review	CSLE	LBPA / RRAZ	MWLR	MWLR
A	28-Apr-22	Issued for Review	CSLE	NCH	MWLR	MWLR

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Client



Tag no.  
NOV-101-9101

Project  
15762 PB 4inch Service Flowline

Contract no. 4600635114  
RM-3534.00-1519-291-P29-010

Title  
15762 PB 4inch Service Flowline  
Composition Drawing  
Well: 4-RJS-377 4" Service Flowline

Purchase Order No.:  
4511717013

Sheet 3/3

Size  
A2

Drawing no.  
15762-DWG-COM-116-4-RJS-377-04

**15762 PB 4INCH SERVICE FLOWLINE**  
**CONTRACT NO 4600635114 / 5900.0117031.20.2**  
**5900.0117034.20.2 / 5900.0117035.20.2 /**

**4" FLOWLINES**

**GA DRAWING 4" END FITTING**  
**FLANGE: 4 1/16" API 17SS 5K PSI**  
**15163-NOV-9101-4\_5\_STD**



NOV Flexibles Doc. No.: 15762-DWG-EF-102  
Customer Doc. No.: N/A

A	Issued for Review	30-Jan-2023	MVSV	RRAZ	TVAL
Rev.	Purpose of Issue	Date	Originator	Checker	Approver
					Project Approver

15762 PB 4inch service flowline

Page 2 of 3

GA Drawing 4" End Fitting  
Flange: 4 1/16" API 17SS 5k psi  
15163-NOV-9101-4\_5\_STD

Doc. No.: 15762-DWG-EF-102

Rev.: A

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## REVISION HISTORY

Rev. no.	Description of changes
A	This is the first issue of this document

## LIST OF DRAWINGS

Drawing no.	Rev. no.	Drawing title
15163-NOV-9101-4_5_STD	00	GA Drawing 4" End Fitting Flange: 4 1/16" API 17SS 5k psi 15163-NOV-9101-4_5_STD

Purchase Order / Sales Order	15762-DWG-COM-	Well	End Fitting no.	End Fitting Design no.	Service
4511152635 4511150229 (RESALE)	109-MRL-231-04	MRL-231	15762NOV318A/B	#2	4" Gas Lift Service
4511448781	111-6-MRL-199-04	MRL-199	All	#2	4" Gas Lift Service
4511719888	113-7-MRL-145-04	MRL-145	All	#2	4" Gas Lift Service
4511719887	114-7-MRL-206-04	MRL-206	All	#2	4" Gas Lift Service
4511744986	115-7-VD-017H-04	7-VD-017H	All	#2	4" Gas Lift Service
4511717013	116-4-RJS-377-04	4-RJS-377	All	#2	4" Gas Lift Service
4511854373	117-P10-04	P-10	All	#2	4" Gas Lift Service

A

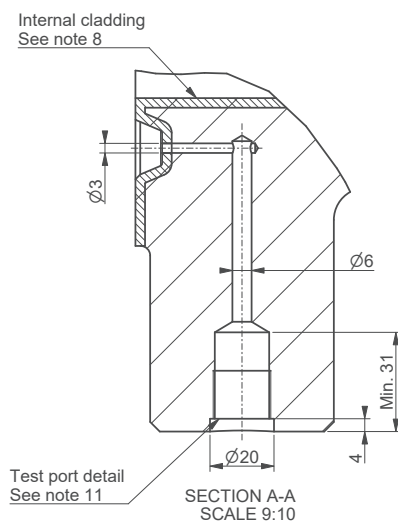
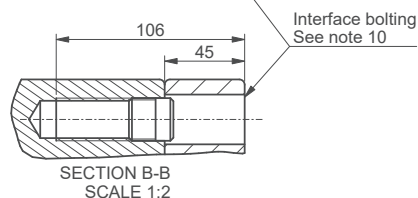
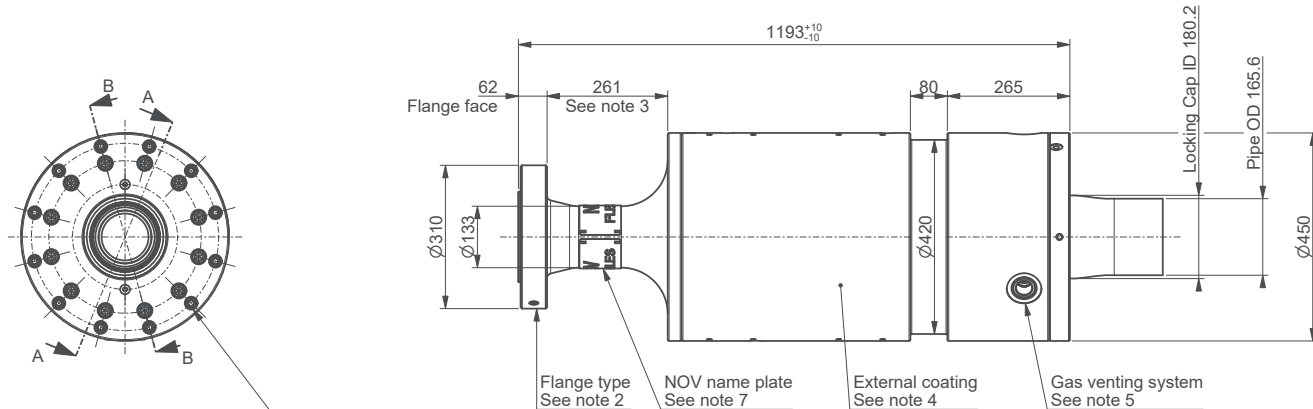
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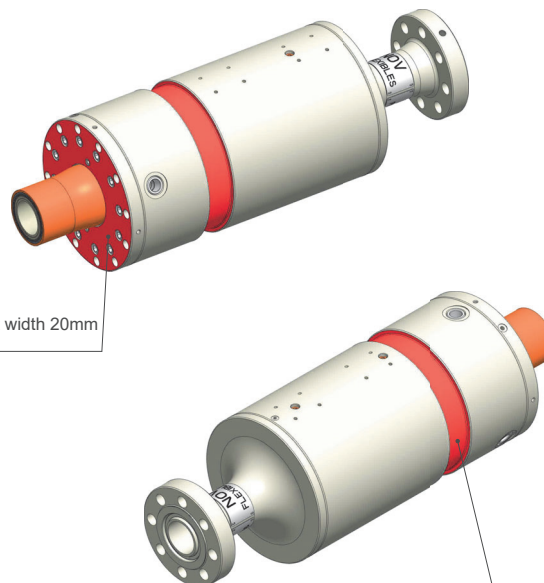
D

E

F



Face for support  
Minimum radial contact width 20mm  
See note 12



Face for support  
Minimum radial contact length 11.5 mm  
See note 12

## NOTES:

- All dimensions are in millimeters.  
Dimensions stated are as manufactured prior to application of surface treatment.
- Flange spec: 4 1/16" API 17SS Fixed  
Class : 5,000 psi  
Material : AISI 8630H  
Gasket : BX155, Inconel 625, max. 192 HB  
  
Bolts : 1 1/4" x 255 mm.  
: ASTM A320, grade L7  
8 pcs on a 241.3 BCD  
Residual bolt tension : 285 kN  
Applied bolt torque : 1068 Nm,  $\mu=0.1$   
Lubricant with friction coefficient of 0.1 to be used, eg. Molykote® G-Rapid Plus.  
Nuts : ASTM A194 Grade 7, Heavy Hex Nuts with Tommy bar holes  
Acc. with ASME B18.2.2  
Bolts & nuts are cadmium bicromatized.
- Flange bolt connection designed to be tensioned with hydraulic tensioner (Hydratight HL01).  
Please note that NOV does not recommend the use of torque, as the flange connection does not reach the desired pre-tension.
- External coating:  
NORSOK M501 system 7C:  
Jotun Marathon 550  
White approximate RAL 9002  
DFT min. 400 microns.  
DFT max. 1100 microns
- Gas venting system, installed before delivery:  
Type of connection: M24  
3 locations displaced by 120°  
  
Use Lubricant with friction coefficient of 0.1, eg. Molykote® G-Rapid Plus:  
3x M24 Drukun Gas Venting Valve, Applied torque: 10 Nm,  $\mu=0.1$
- Approx. weight of end fitting in air : 828 kg.  
Approx. weight in water : 720 kg.
- Identification acc. to API spec. 17J.
- Internal cladding: Ring groove, face and bore  
Min. 3 mm Inconel 625 alloy UNS N06625
- Pipe ID Ø101.6mm.
- Interface to Bending restrictor/Bending stiffener:  
M24, 12pcs. BCD 405 mm.  
Bend restrictor/bend stiffener bolt holes are plugged at delivery by NOV,  
if no accessory is mounted.
- Test ports : 1 pc.  
Type of connection : 3/8" NPT  
Testport system plugged at delivery with 3/8" NPT plug, width across flats 18mm.  
Material : AISI 316L
- Faces for support.  
The indicated surfaces can be used for support during installation.  
Please be aware of damaging the end fitting and outer sheath.  
Please use the locking cap ID as a minimum Insert ID.  
SWL: 400 Tonnes

00	30-JAN-2023	Issued for construction	MVSV	RRAZ	EMK	HAL
Rev.	Date	Description	By	Chk	Appr	Proj
<b>NOV Completion &amp; Production Solutions</b> This document contains confidential information. All rights are owned by National Oilwell Varco Denmark I/S. No use or disclosure is to be made without prior written permission of National Oilwell Varco Denmark I/S.			<b>Subsea Production Systems</b> Flexibles			
Customer: <b>BR PETROBRAS</b>			Projection method 1st Angle Standard Tolerance - Scale 13:100 Size A2 NOV Traceability No - Customer Doc No. N/A Drawing No. 15163-NOV-9101-4_5_STD			
Project: 15163 - Generic Drawing			PDM Ver. D: A.1 P: A.1 Released Sheet 1/1			
Title: GA Drawing 4" End Fitting Flange: 4 1/16" API 17SS 5k psi 15163-NOV-9101-4_5_STD			15163-NOV-9101-4_5_STD			

**15762 PB 4INCH SERVICE FLOWLINE**  
**CONTRACT NO 4600635114 / 5900.0117031.20.2**  
**5900.0117034.20.2 / 5900.0117035.20.2**

**GA DRAWING**  
**ANCHORING COLLAR**  
**STD END FITTING OD 450**



NOV Flexibles Doc. No.: 15762-DWG-ANC-102  
Customer Doc. No.: N/A

A	Issued for Review	20-Mar-2023	THBL	RRAZ	MGMR
Rev.	Purpose of Issue	Date	Originator	Checker	Approver
					Project Approver

15762 PB 4inch SERVICE FLOWLINE

Page 2 of 3

GA Drawing Anchoring Collar Std End Fitting OD 450

Doc. No.: 15762-DWG-ANC-102

Rev.: A

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**Revision History**

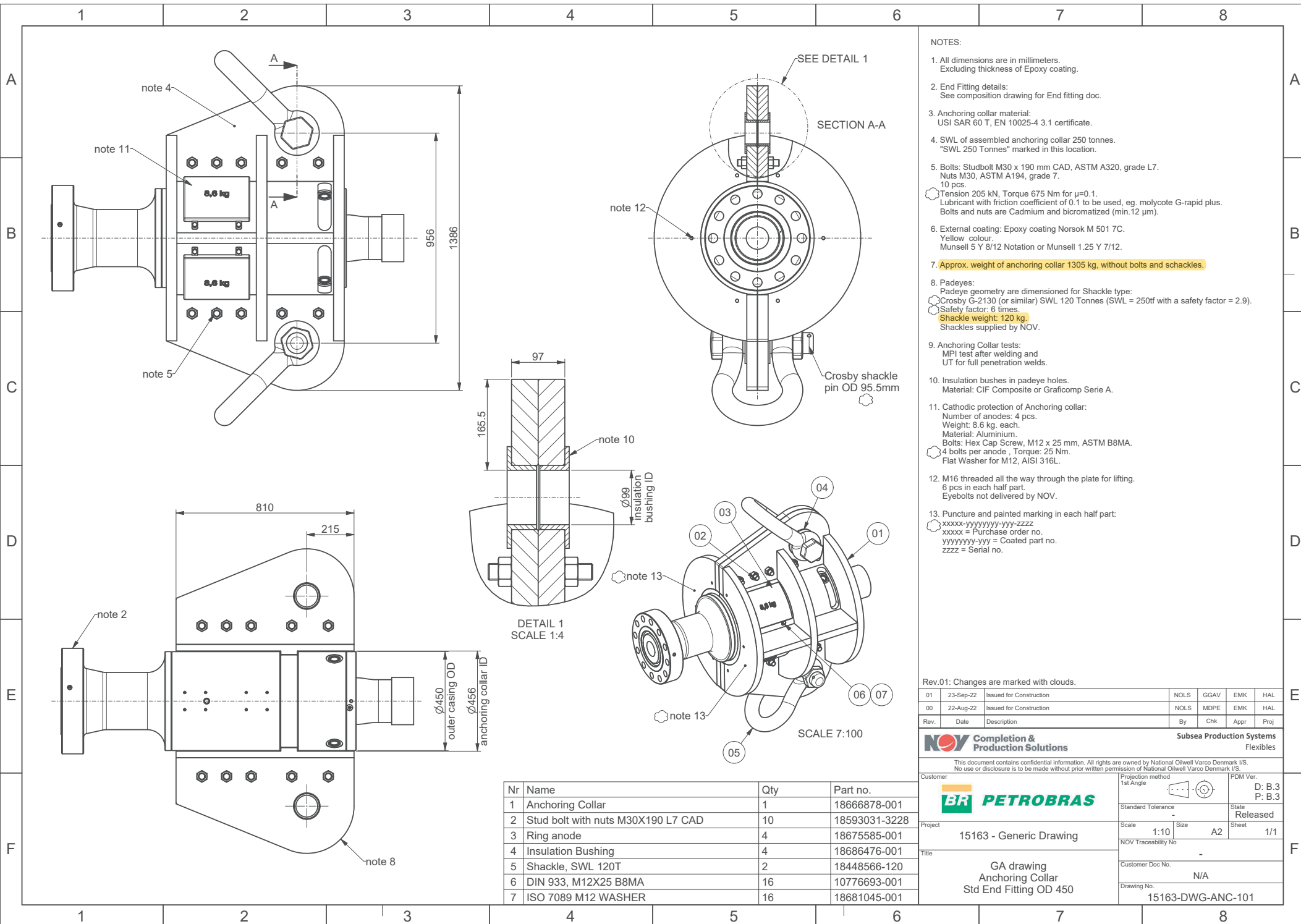
Rev. no.	Description of changes
A	This is the first issue of this document

**LIST OF DRAWINGS**

Drawing no.	Rev. no.	Drawing title
15163-DWG-ANC-101	01	GA Drawing Anchoring Collar Std End Fitting OD 450

Purchase Order / Sales Order	15762-DWG-COM-	Well	Service
4511448781	111-6-MRL-199-04	6-MRL-199	4" Gas Lift Service
4511719887	114-7-MRL-206-04	7-MRL-206HB	4" Gas Lift Service
4511744986	115-7-VD-017H-04	7-VD-017H	4" Gas Lift Service
4511717013	116-4-RJS-377-04	4-RJS-377	4" Gas Lift Service





15762 PB 4INCH SERVICE FLOWLINE  
CONTRACT NO. 4600635114

4" FLOWLINES

GA DRAWING, PIPE PROTECTION



NOV Flexibles Doc. No.: 15762-DWG-PP-100  
Customer Doc. No.: N/A

01	Issued for Construction	20-SEP-2022	BAL	DADD	AFBE	MWLR
00	Issued for Construction	19-AUG-2022	BAL	DADD	AFBE	MWLR
B	Issued for Review	09-AUG-2022	BAL	DADD	SDSI	MWLR
A	Issued for Review	30-MAY-2022	BAL	DADD	SDSI	MWLR
Rev.	Purpose of issue	Date	Originator	Checker	Approver	Project Approver

15/762 PB 4inch service flowline

Page 2 of 2

GA Drawing, Pipe Protection

Doc. No.: 15/762-DWG-PP-100

Rev.: 01

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## REVISION HISTORY

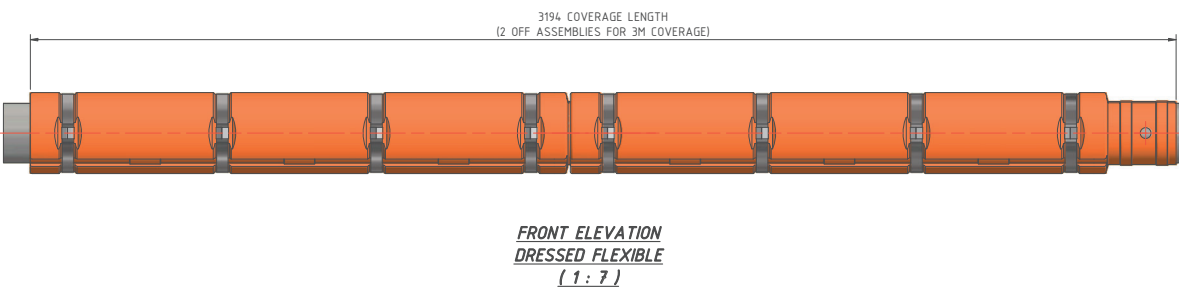
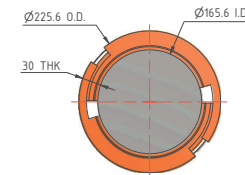
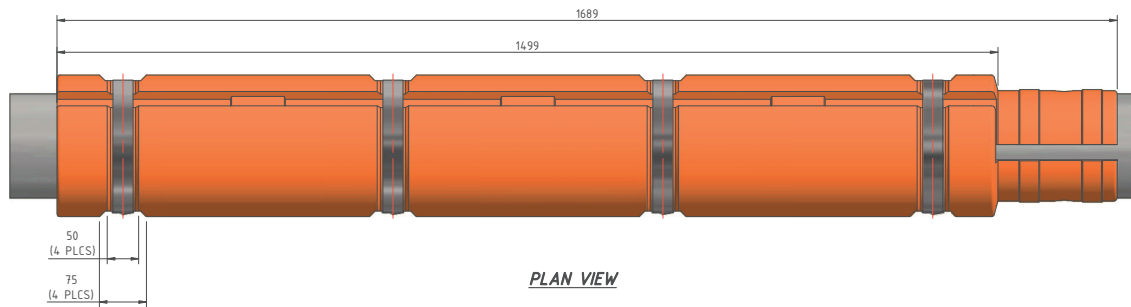
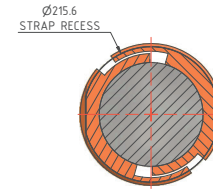
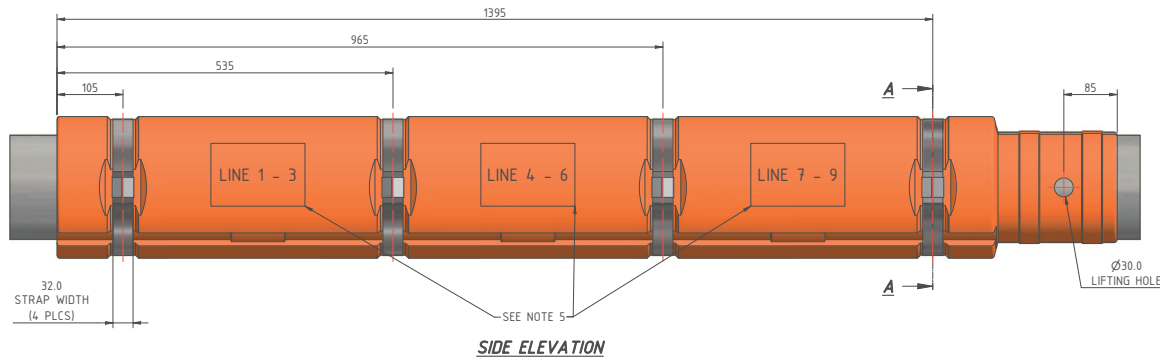
Rev. no.	Description of changes
A	This is the first issue of this document
B	This is the second issue of this document. Document revised by supplier.
00	This is the third issue of this document. Document approved by client.
01	This is the fourth issue of this document. Document updated by supplier to adjust the stencil marking text.

## LIST OF DOCUMENTS & DRAWINGS

Supplier document no.	Rev. no.	Supplier document title
14664-GA-01	04	Duraguard General Assembly

Purchase Order / Sales Order	16047-DWG-COM-	Well	Service
4511152688			
4511152690 (RESALE)	105-P9-04	P9	4" Gas Lift Service
4511150233			
4511150234 (RESALE)	107-P7-04	P7	4" Gas Lift Service
4511153346			
4511153347 (RESALE)	108-P8-04	P8	4" Gas Lift Service
4511137207			
4511131012 (RESALE)	110-MRL-210-04	MRL-210	4" Gas Lift Service
4511152635			
4511150229 (RESALE)	109-MRL-231-04	MRL-231	4" Gas Lift Service
45111516312			
	112-7-MRL-102H-04	MRL-102H	4" Gas Lift Service
4511448781			
	111-6-MRL-199-04	MRL-199	4" Gas Lift Service

14664-GA-01



ITEM	DESCRIPTION	MATERIAL	QTY	PART NUMBER
1	DURAGUARD ELEMENT DETAIL (150mm - 187mm)	BC-PU-140	2	DGM-1-00011
2	32mm WIDTH x 1080mm LENGTH - INCONEL SECURING STRAP	INCONEL ALLOY 625 (UNS N06625)	4	STP-1-00077
3	32mm WIDTH - INCONEL STRAP BUCKLE	INCONEL ALLOY 625 (UNS N06625)	4	STP-1-00078
4	4" SERVICE FLOWLINE REPRESENTATION	-	1	NON-DRAWN PART

#### GENERAL NOTES:

- MAXIMUM WEIGHT IN AIR PER ASSEMBLED MOULDING: 29 kg  
(WEIGHT IN AIR PER HALF MOULDING: 14 kg)
- MAXIMUM WEIGHT IN SEA WATER PER ASSEMBLED MOULDING: 3 kg  
(WEIGHT IN SEA WATER PER HALF MOULDING: 2 kg)  
(BASED ON A SEAWATER DENSITY OF 1025 kg/m<sup>3</sup>)
- FOR BANDING INSTALLATION TENSION AND TOOL PRESSURE SETTINGS REFER TO ASSEMBLY PROCEDURE: 14664-PD-006-001
- PART LIST ABOVE IS SUFFICIENT FOR 1 OFF ASSEMBLY
- DURAGUARD MOULDING WILL BE STENCILLED WITH THE FOLLOWING INFORMATION (5mm MINIMUM LETTER HEIGHT):

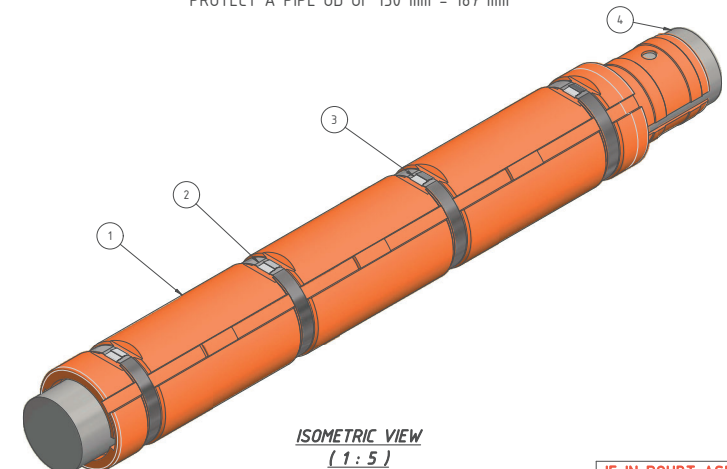
BALMORAL  
NOV PRJ NUMBER: 15762  
PRJ NAME: 4IN SERVICE FL

PIPE ID: 4" SERV FL  
PIPE OD: 165.64 MM  
DGM-1-00011-xxx

NOV ID: 18595706-001  
WIA PER HALF: 14 KG  
WIA PER FULL ASM: 29 kg

(WHERE xxx IS A SEQUENTIAL NUMBER STARTING AT 001)

- DESIGN UTILISES A BALMORAL STANDARD MOULD SUITABLE TO PROTECT A PIPE OD OF 150 mm - 187 mm



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Global HQ  
Balmoral Park, Linton, Aberdeen AB12 3DZ  
Tel +44 (0)1224 859000 Fax +44 (0)1224 859009  
Email group@balmoral.co.uk www.balmoral-group.com

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ALL DIMENSIONS ARE IN MILLIMETRES

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DIMENSIONS IN BRACKETS ARE REFERENCE ONLY

CLIENT NATIONAL OILWELL VARCO BRAZIL	PROJECT 4IN SERVICE FLOWLINE	PROJECT No. 14664	REVISION No. 04
DRAWING TITLE DURAGUARD GENERAL ASSEMBLY - 4" SERVICE FLOWLINE	DRAWN BY Samuel Huntington	CHECKED BY William Poxon	APPROVED BY Craig Sharp
1st ANGLE PROJECTION	SCALE 1 : 4	SHEET SIZE A1	SHEET OF 1
			DATE 25/08/2022

IF IN DOUBT ASK!

15762 PB 4INCH SERVICE FLOWLINE  
CONTRACT/PURCHASE ORDER NO. 4600635114

4" FLOWLINES

GA DRAWING BEND RESTRICTORS - 4" - EPOXY COATED END FITTING  
INTERFACE



NOV Flexibles Doc. No.: 15762-DWG-BR-102  
Customer Doc. No.: N/A

04	Issued for Construction	02-JUN-2023	EXSTO	DADD	SDSI	MWLR
03	Issued for Construction	03-FEV-2023	EXSTO	DADD	AFBE	MWLR
02	Issued for Construction	20-JAN-2023	EXSTO	DADD	AFBE	MWLR
01	Issued for Construction	27-SEP-2022	EXSTO	DADD	AFBE	MWLR
00	Issued for Construction	19-AUG-2022	EXSTO	DADD	AFBE	MWLR
B	Issued for Review	09-AUG-2022	EXSTO	DADD	AFBE	MWLR
Rev.	Purpose of issue	Date	Originator	Checker	Approver	Project Approver

15762 PB 4inch service flowline

Page 2 of 2

GA Drawing Bend Restrictors - 4" - Epoxy Coated End Fitting Interface      Doc. No.: 15762-DWG-BR-102      Rev.: 03

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REVISION HISTORY

Rev. no.	Description of changes
A	This is the first issue of this document
B	This is the second issue of this document. Document revised by supplier to include lubricant name and adjust the marking text.
00	This is the third issue of this document. Document approved by client.
01	This is the fourth issue of this document. Document revised to update correspondence table.
02	This is the fifth issue of this document. Document revised to add new purchase orders from supplier.
03	This is the sixth issue of this document. Document revised to add new purchase orders from client.
04	This is the seventh issue of this document. Cover page updated to include end-fitting information.

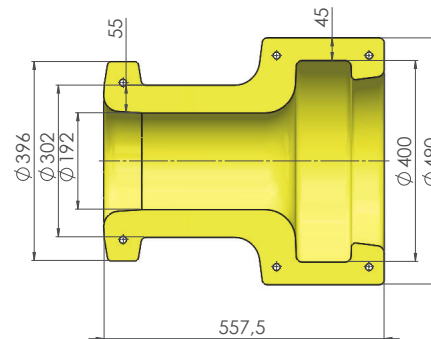
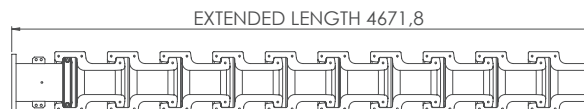
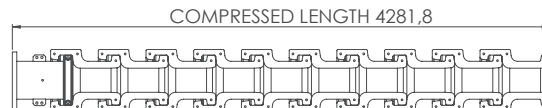
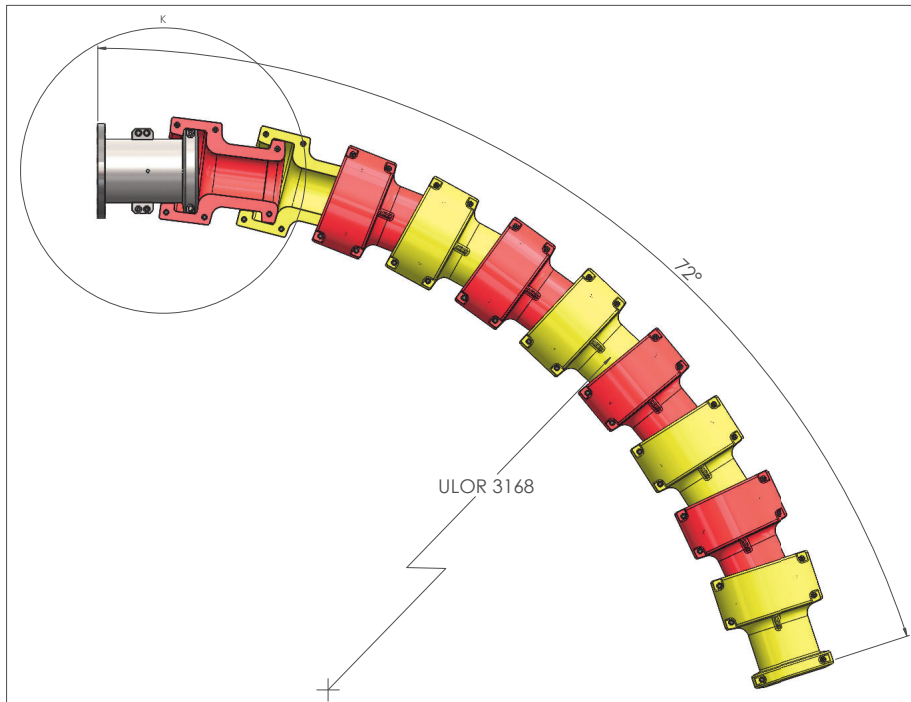
LIST OF DOCUMENTS & DRAWINGS

Supplier document no.	Rev. no.	Supplier document title
224254-12427	05	General Arrangement Drawing 4" - 1 type II

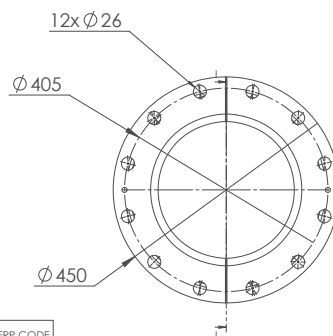
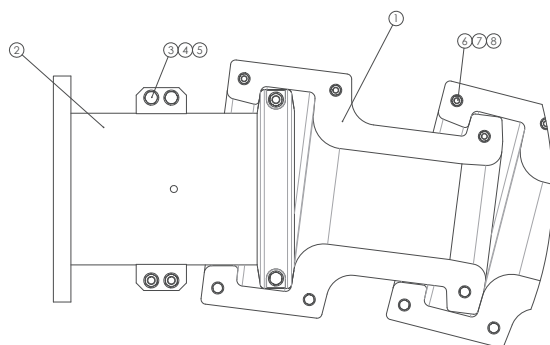
Purchase Order / Sales Order	15762-DWG-COM-	Well	Service
4511152635 4511150229 (RESALE)	109-MRL-231-04	MRL-231	4" Gas Lift Service
4511448781	111-6-MRL-199-04	MRL-199	4" Gas Lift Service
4511719888	113-7-MRL-145-04	MRL-145	4" Gas Lift Service
4511719887	114-7-MRL-206-04	MRL-206HB	4" Gas Lift Service
4511744986	115-7-VD-017H-04	VD-017H	4" Gas Lift Service
4511717013	116-4-RJS-377-04	RJS-377	4" Gas Lift Service
4511854373	117-P10-04	P10	4" Gas Lift Service

ADDITIONAL INFORMATION

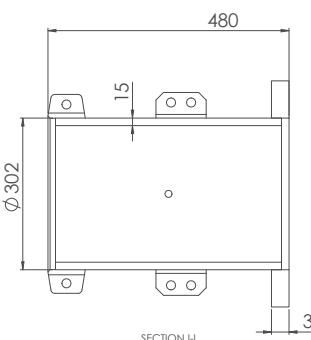
The bend restrictor 15762-DWG-BR-102 is applicable to the end-fitting 15762-DWG-EF-102, according to the composition drawing.



BEND RESTRICTOR DIMENSIONS  
WEIGHT = 23.68kg  
SCALE 1:5



STEEL BRC  
SCALE 1:5  
WEIGHT = 96.65kg



SECTION H-H  
SCALE 1:5

ITEM	PART NUMBER	DESCRIPTION	CERTIFICATE	QTY	ERP CODE
1	PU BEND RESTRICTOR HALF ELEMENT	SEE SHEET 2 / PU E82HT - 23.68KG- SEE NOTE 12	CERTIFICATE OF CONFORMITY	20	PI-7699
2	END TERMINATION ASSY	SEE SHEET 3	CERTIFICATE OF CONFORMITY	1	7706
3	M16 HX BOLT 80 LNG - ISO 4014	ASTM A320 GRADE L7 BICHROMATE TE CADMIUM - SEE NOTE 11	MAT. CERTIF. TYPE 3.1 EN10204:2004	6	573
4	M16 HX NUT - ISO 4032	ASTM A194 GRADE 7 BICHROMATE TE CADMIUM - SEE NOTE 11	MAT. CERTIF. TYPE 3.1 EN10204:2004	6	574
5	M16 PLAIN WASHER - ISO 7089	BICHROMATE TE CADMIUM	CERTIFICATE OF CONFORMITY	12	572
6	M12 HX BOLT 160 LNG - ISO 4014	UNS S32760	MAT. CERTIF. TYPE 3.1 EN10204:2004	60	576
7	M12 HX NUT - ISO 4032	UNS S32760	MAT. CERTIF. TYPE 3.1 EN10204:2004	60	577
8	M12 PLAIN WASHER - ISO 7089	UNS S32760	MAT. CERTIF. TYPE 3.1 EN10204:2004	120	575

#### NOTES :

- BEND RESTRICTOR FOR 4" - OD MAX 172.8mm
- DESIGN ULOR (FREE LOCKING RADIUS) = 3168 mm
- LOADED LOCKING RADIUS = 2692mm
- CLIENT MBR = 2640 mm  
COVERAGE = 72°
- AT END TERMINATION LOCATION
  - MAX BENDING MOMENT = 50kN.m
  - MAX SHEAR FORCE = 50kN
- FOR PU BR ELEMENT
  - MAX BENDING MOMENT = 30kN.m
  - MAX SHEAR FORCE = 30kN
- DESIGN LIFE = 25 YEARS
- TOTAL ASSY WEIGHT IN AIR / WATER = 582kg / 156kg  
PU ASSY WEIGHT WITHOUT END TERMINATION IN SEAWATER = 72kg
- ASSY TORQUES :
  - M16 END TERMINATION BOLT TORQUE = 65N.m,  $\mu=0.1$  (LUBRICATED WITH MOLYKOTE G-RAPID PLUS)
  - M12 BEND RESTRICTOR BOLT TORQUE = 25N.m (NOT GREASED)
  - M24 FLANGE BOLT TORQUE = 415N.m,  $\mu=0.1$  (LUBRICATED WITH MOLYKOTE G-RAPID PLUS)
- Bichromate cadmium, according to ASTM B766, Class 12, Type II and BOLT ACCORDING TO NOV SPEC SP-BRAS-8660010
- ADJACENT PU BEND RESTRICTOR ELEMENTS ARE SUPPLIED IN ALTERNATE COLOUR SCHEME:
  - PU ELEMENT NEXT TO REACTION FLANGE IS RED.
  - FOLLOWING PU ELEMENTS ALTERNATE BETWEEN YELLOW AND RED
- M16 HOLES FOR EYEBOLTS. EYEBOLTS FOR HANDLING WILL NOT BE PROVIDED
- MARKING : AS PER SP-ENG-BR-200

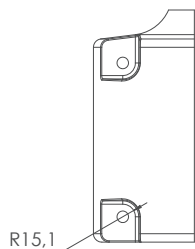
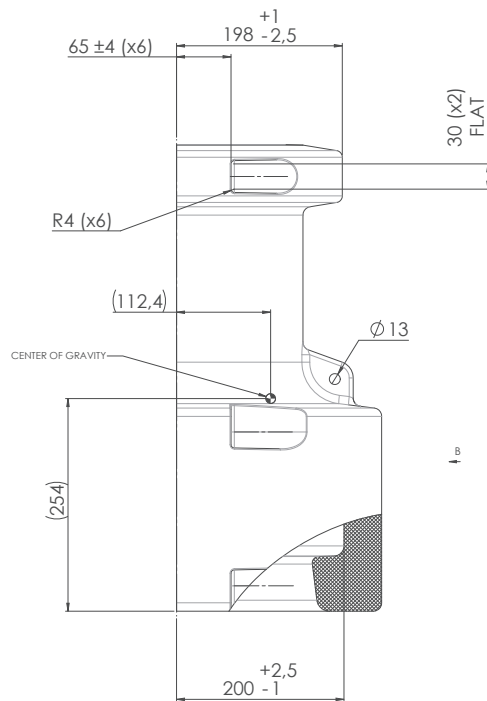
PART	EXSTO PART NUMBER	SERIAL N°	N° LINE SHIPMENT	NOV ID N°
POLIMER	FC-7707	*	**	18645352-001
SRF	PA-7708	*	**	18645298-001

\*AS PER CURRENT TRANSMITTAL SHEET

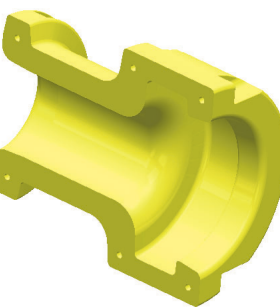
\*\*AS PER CURRENT TRANSMITTAL SHEET

REV.	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED
05	18/01/2022	ISSUED FOR CONSTRUCTION	GBA	DLA	DLA
04	21/09/2022	ISSUED FOR CONSTRUCTION	DLA	GBA	DLA
03	03/08/2022	ISSUED FOR CONSTRUCTION	TBA	TBA	TBA
02	28/07/2022	ISSUED FOR CONSTRUCTION	DLA	PVN	PVN
01	18/05/2022	ISSUED FOR CONSTRUCTION	AAD	TBA	TBA

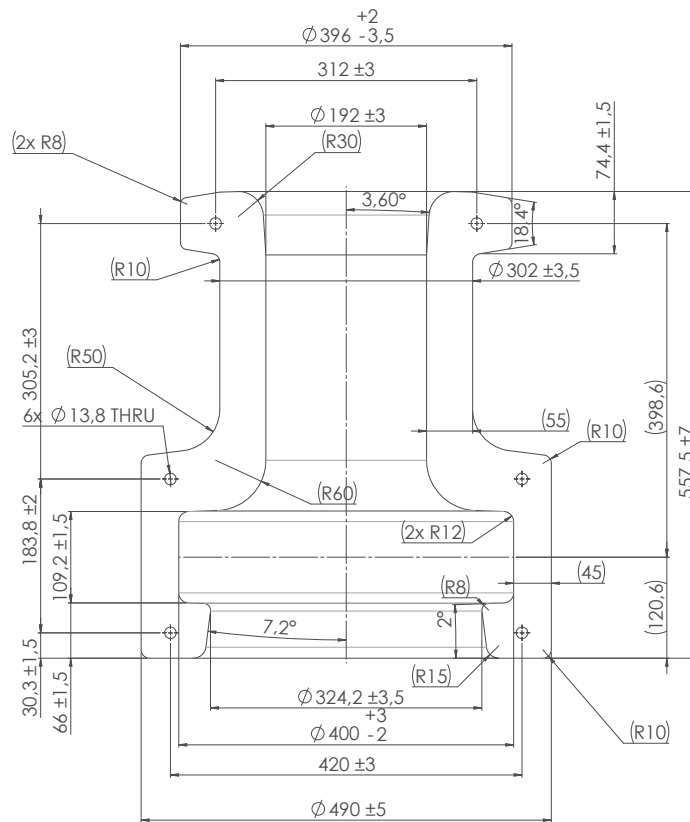
		CLIENT NAME	NOV	
		PROJECT NAME	15762	
<b>EXSTO</b> Perfecting Performance		DRAWING TITLE	GENERAL ARRANGEMENT DRAWING 4" - I type II	
SCALE AT A1		DRAWING NO.	224254-12427	05 / 1/5
SCALE 1:10	CONTR. NO.	AREA	SYSTEM	EXSTO DRAWING NUMBER
				REV. SHEET



VUE B



SCALE 1 : 5




- NOTES :
1. REMOVE ALL BURPS & SHARP EDGES
  2. MATERIAL : PU ELADEEP E82HT - COLOR RED AND YELLOW
  3. PART NON DIMENSIONAL ACCEPTANCE CRITERIA TO DOCUMENT PCS- CPU-003
  4. OVERALL PART QUALITY CONTROL TO DOCUMENT GCP-CPU-003
  5. MARKING :  
"EXSTO - 24kg - ##"  
NOV ID = %%"  
(WHERE ## = SERIAL NUMBER and %% = NOV ID N°)

WEIGHT IN AIR (kg)	23.68
WEIGHT IN WATER (kg)	3.11

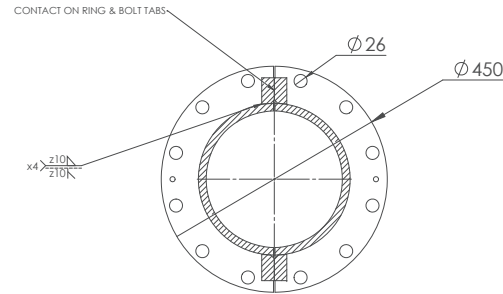
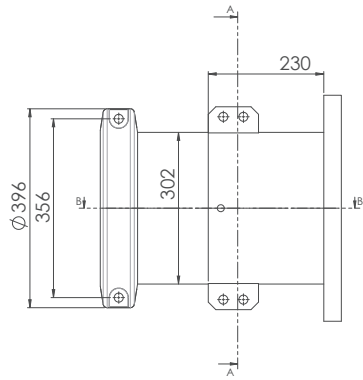
UNLESS STATED OTHERWISE:  
JS js 15

ALL DIMENIONS ARE IN MILLIMETERS

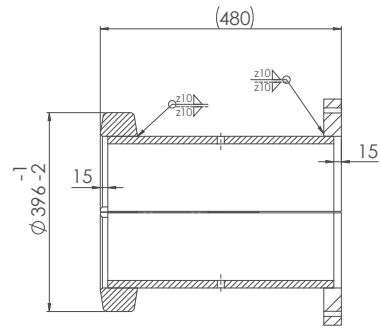
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05	18/01/2022	ISSUED FOR CONSTRUCTION	GBA	DLA	DLA
04	21/09/2022	ISSUED FOR CONSTRUCTION	DLA	GBA	DLA
03	03/08/2022	ISSUED FOR CONSTRUCTION	TBA	TBA	TBA
02	28/07/2022	ISSUED FOR CONSTRUCTION	DLA	PVN	PVN
01	18/05/2022	ISSUED FOR CONSTRUCTION	AAD	TBA	TBA

 <p>EXSTO Perfecting Performance</p>		CLIENT NAME		NOV	
		PROJECT NAME		15762	
SCALE AT A1		DRAWING TITLE		PU BEND RESTRICTOR DRAWING 4" - 1 type II	
SCALE 1:3		DRAWING NO.		224254-12427	
CONTR. NO.		EXSTO DRAWING NUMBER		REV. 05	
AREA		SYSTEM		SHEET 2/5	

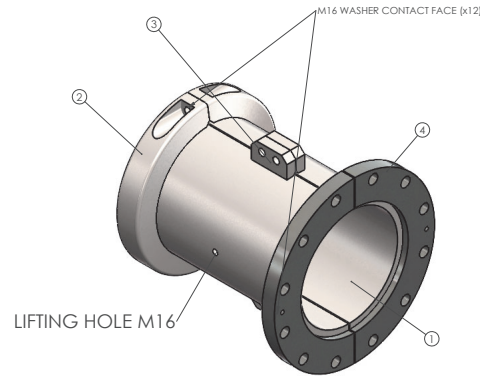




SECTION A-A



SECTION B-B



LIFTING HOLE M16

NOTES:

1. ALL DIMENSIONS BEFORE COATING
2. GENERAL TOLERANCES  $\pm 0.5$
3. REMOVE ALL BURRS AND SHARP EDGES, CHAMF 1x45° TYP
4. WELDING ACTIVITIES IN COMPLIANCE WITH APPLICABLE PARTS OF AWS D1.1 SUBMISSION WPS, WPQR & WQ
5. WELDING NDT EXAMINATION TO CARRIED OUT PRIOR TO COATING ACCORDING TO AWS D1.1
6. ALL FILLET & BEVEL WELDS MUST BE FULLY SEALED (SEA WATER INGRESS TO BACK OF WELDS NOT PERMISSIBLE)
7. ITEMS TO BE MANUFACTURED IN MATCHED PAIRS
8. ASSY TREATED & COATED ACCORDING TO NORSOK M-501 SYSTEM 7C, COLOUR YELLOW MUNSELL 5Y8/12n
9. ALL HOLES (THREADED AND UNTHREADED) TO BE CLEAR OF SWarf, PAINT & DEBRIS. ALL WASHER CONTACT FACE TO BE CLEAR OF PAINT
10. CATHODIC PROTECTION MADE BY CUSTOMER ANODE



ASSY WEIGHT IN AIR 96.65 KG

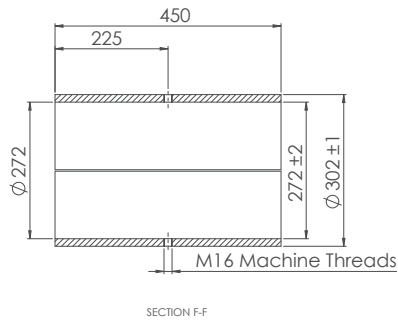
UNLESS STATED OTHERWISE:  
 $\pm 0.5$   
ISO 2768m FOR MACHINING

ALL DIMENSIONS ARE IN MILLIMETERS

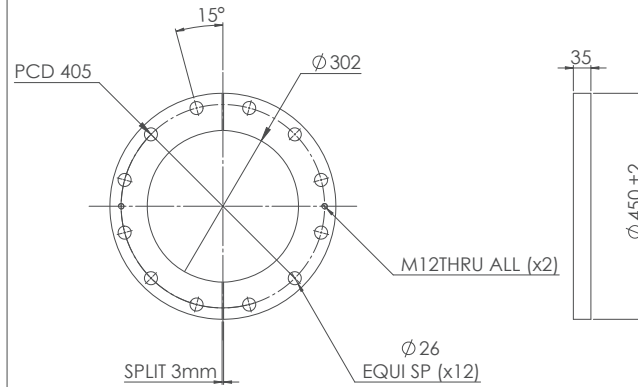
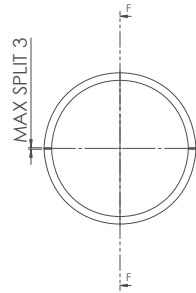
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04	21/09/2022	ISSUED FOR CONSTRUCTION		DLA	GBA
03	03/08/2022	ISSUED FOR CONSTRUCTION		TBA	TBA
02	28/07/2022	ISSUED FOR CONSTRUCTION		DLA	PVN
01	18/05/2022	ISSUED FOR CONSTRUCTION		AAD	TBA

		CLIENT NAME: NOV	
		PROJECT NAME: 15762	
		DRAWING TITLE: BRI DRAWING 4" - I type II	
		DRAWING NO: 224254-12427	
SCALE AT A1	-	-	-
SCALE	1:5	CONTR. NO	AREA
EXSTO DRAWING NUMBER		REV.	SHEET

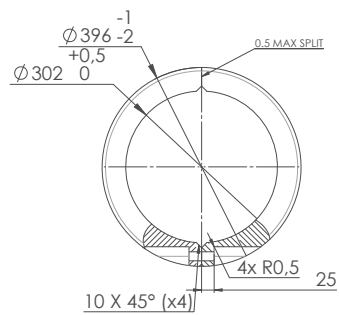
ITEM	PART NUMBER	DESCRIPTION	CERTIFICATE	QTY
1	END TERMINATION TUBE	FOLDED AND MACHINED S355 J2+N	MAT. CERTIF. TYPE 3.1 EN10204:2004	1
2	END TERMINATION RING	MACHINED S355 J2+N	MAT. CERTIF. TYPE 3.1 EN10204:2004	1
3	END TERMINATION BOLT TAB	PROFIED & MACHINED S355 J2+N	MAT. CERTIF. TYPE 3.1 EN10204:2004	4
4	END TERMINATION FLANGE	PROFIED & MACHINED S355 J2+N	MAT. CERTIF. TYPE 3.1 EN10204:2004	1



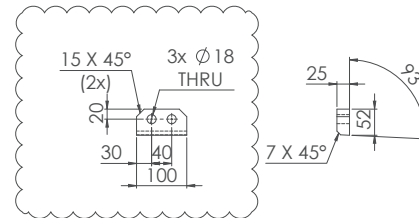
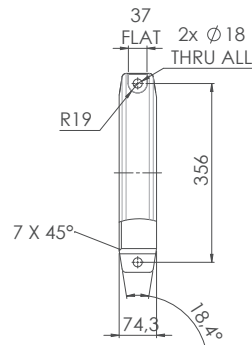
TUBE  
MATERIAL : FOLDED AND MACHINED S355  
J2+N (WITH STRESS RELEASE HEAT TREATMENT)  
OR  
VMEC 134AP with CVN at -20degC = 27J



FLANGE  
MATERIAL : S355 J2+N



RING  
MATERIAL : S355 J2+N



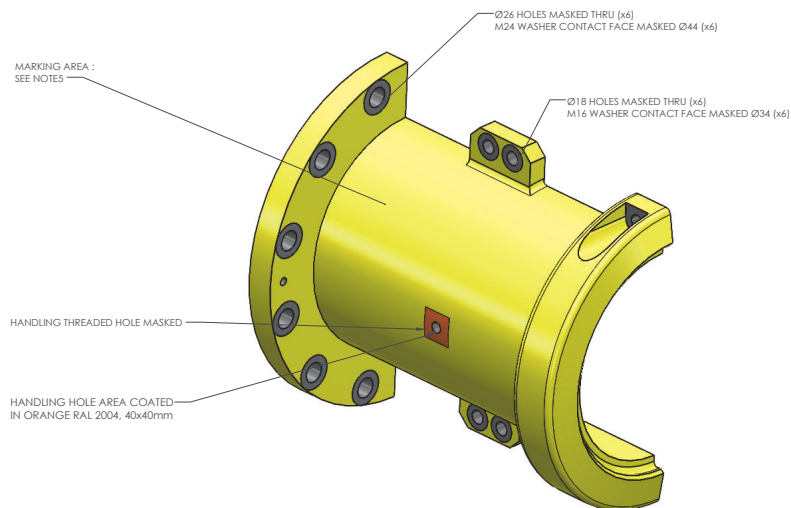
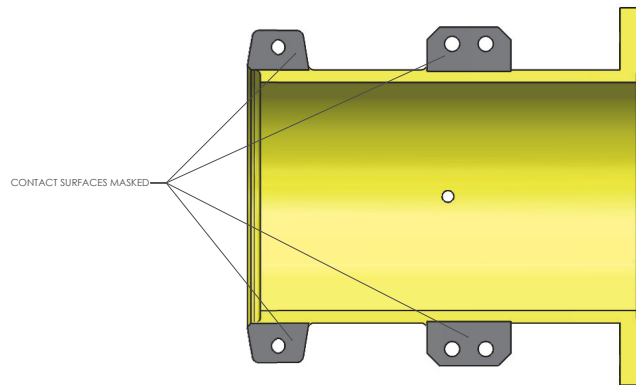
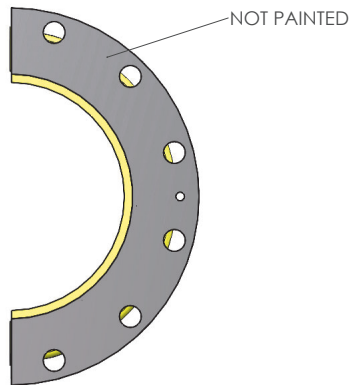
BOLT TAB  
MATERIAL : S355 J2+N

ALL ITEMS : REMOVE ALL BURRS & SHARP EDGES  
UNLESS STATED OTHERWISE:  
±0.5  
ISO 2768m FOR MACHINING

ALL DIMENSIONS ARE IN MILLIMETERS


REV.	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED
05	18/01/2022	ISSUED FOR CONSTRUCTION	GBA	DLA	DLA
04	21/09/2022	ISSUED FOR CONSTRUCTION	DLA	GBA	DLA
03	03/08/2022	ISSUED FOR CONSTRUCTION	TBA	TBA	TBA
02	28/07/2022	ISSUED FOR CONSTRUCTION	DLA	PVN	PVN
01	18/05/2022	ISSUED FOR CONSTRUCTION	AAD	TBA	TBA

		CLIENT NAME	NOV		
		PROJECT NAME	15762		
		DRAWING TITLE	BRI COMPONENTS DRAWING 4" - I type II		
SCALE AT A1		DRAWING NO.	224254-12427		
SCALE	1:5	CONTR. NO.	AREA	SYSTEM	EXSTO DRAWING NUMBER
					REV. 05 SHEET 4/5

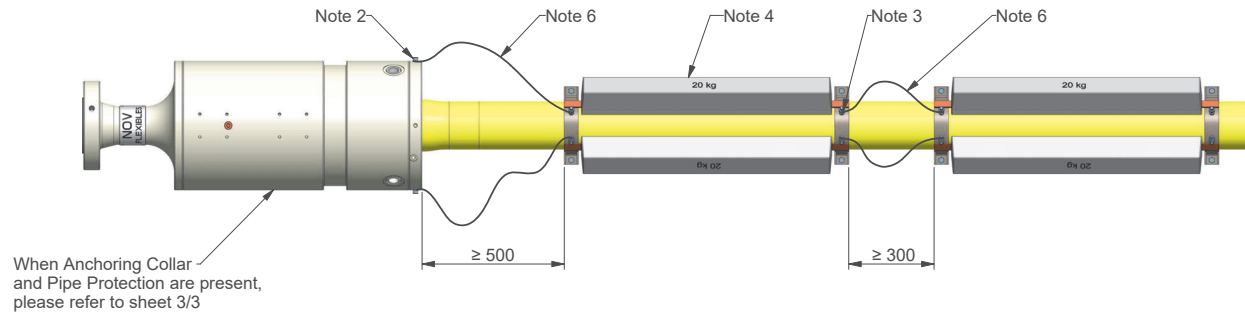


- NOTES :
1. REMOVE ALL BURRS AND SHARP EDGES
  2. COATING ACCORDING TO NORSOK M501 SYSTEM 7C  
COLOUR YELLOW MUNSELL 5Y8/12n
  3. THE FOLLOWING SHALL NOT BE COATED : RING AND BOLT TABS  
MATING SURFACES, BOLT HOLES, THREADS, WASHER CONTACT FACES
  4. FLUSH MOUNTED ANODE SHALL BE COATED ON SURFACE FACING THE END TERMINATION ACCORDING TO NORSOK M503
  5. MARKING :  
"EXSTO  
NOV - 15762 4inch service  
4" GLF / FLR = 3.16m  
SERIAL NO. ##  
NOV ID = %%  
WIA = 48kg"  
(WHERE ## = SERIAL NUMBER and %% = NOV ID N°)
- PER HALF
- COATED SURFACE = 0.58m<sup>2</sup>
  - NO COATED SURFACE = 0.08 m<sup>2</sup>

05	18/01/2022	ISSUED FOR CONSTRUCTION	GBA	DLA	DLA
04	21/09/2022	ISSUED FOR CONSTRUCTION	DLA	GBA	TBA
03	03/08/2022	ISSUED FOR CONSTRUCTION	TBA	TBA	TBA
02	28/07/2022	ISSUED FOR CONSTRUCTION	DLA	PVNN	PVNN
01	18/05/2022	ISSUED FOR CONSTRUCTION	AAD	TBA	TBA
REV.	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED

 <b>EXSTO</b> Perfecting Performance	CLIENT NAME:		NOV		
	PROJECT NAME:		15762		
	DRAWING TITLE:		COATING DRAWING 4" - I type II		
	DRAWING NO.:		224254-12427		
SCALE AT A1	-	-	-	05	5/5
SCALE	1:3	CONTR. NO.	AREA	SYSTEM	EXSTO DRAWING NUMBER
					REV. SHEET

## Anode installation scheme, bracelets:

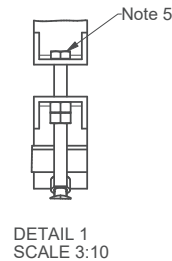
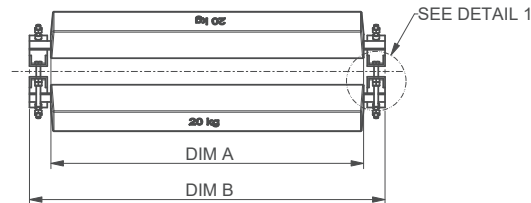
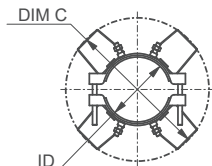


### NOTES:

1. All dimensions are in millimeters.
2. Continuity cable connection in EF:  
3 pcs. DIN 912, M12 x 16 ASTM A193 B8MA, torque 25 Nm.  
Observation: There are 4 M12 threaded connections in EF Locking Cap. Only 3 connections shall be used for continuity and the remaining threads must remain plugged.
3. Continuity cable connection in Bracelet:  
4 pcs. (per side) DIN 933, M12 x 30 screws ASTM A193 B7M, welded on steel armour.  
4 pcs. (per side) DIN 934, M12 nuts ASTM A194 8MA, torque 25 Nm  
Observation: There are 4 connections at each bracelet side, only 3 connections shall be used.
4. Bracelet anode:  
Quantity supplied for each pipe end: see Composition Drawing.  
Material: Aluminium.  
Protection rubber (neoprene), 5 mm thick, glued inside of each bracelet. Dimensions on drawing include protection rubber.
5. Bolting of bracelet halves (per bracelet):  
4 pcs. M12 x 120mm, DIN 912, B8MA  
8 pcs. M12, DIN 934, 8MA, 2 nuts per bolt. Torque: 25Nm.
6. Continuity cables:  
RV-K Powerflex with double insulation (PVC), 1 x 16mm<sup>2</sup> core.  
Cable shoes for M12 screws soldered to each end.  
Cable has heat-shrink tubes from the cable shoes until 10-15 cm along the cable.  
Length of cable between EF and first bracelet: See Packing List.  
Length of cable between adjacent bracelets: 500 mm.  
3 cables per connection.
7. Continuity check shall be performed between End Fitting and bracelet anodes.  
Continuity between the bracelet halves shall also be checked.  
Acceptance criteria: electrical resistance max. 0.1 ohm.

## Dimensions of bracelets:

Drawing for Bracelet with 4 bars



Bracelet Model	Number of bars	Net weight of each bar	Total net weight of bracelet	ID	DIM A	DIM B	DIM C
B-171-80	4	20 kg	80 kg	171 mm	880 mm	1010 mm	394 mm

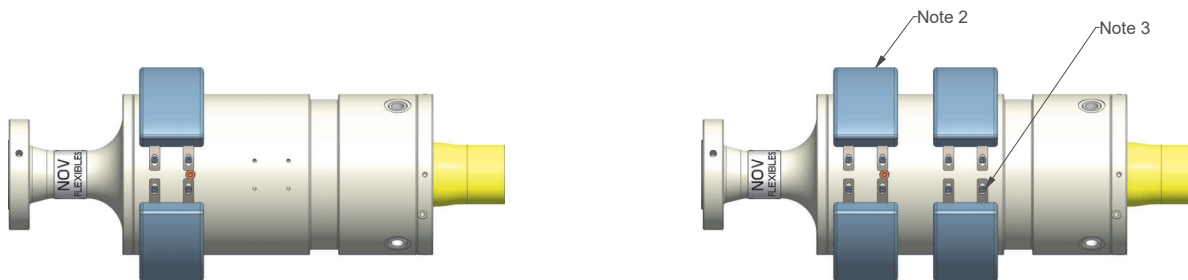
A	08-Mar-23	Issued for Review	PAVN	RRAZ	TVAL	MWLR
Rev.	Date	Description	By	Chk	Appr	Proj

**NOV Completion & Production Solutions** Subsea Production Systems Flexibles

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Customer	Projection method 1st Angle	PDM Ver.
<b>BR PETROBRAS</b>		D: A.1 P: A.1
Project	Standard Tolerance	State
15762 PB 4inch SERVICE FLOWLINE	-	Released
Title	Scale 2:25	Size A2
GA Drawing Cathodic Protection (Anodes #2) 4"	NOV Traceability No	Sheet 1/3
	Customer Doc No.	
	Drawing No.	
	15762-DWG-CP-102	

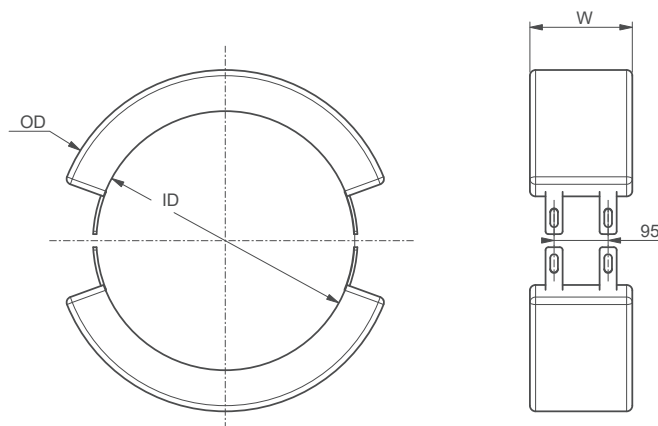
## Anode installation scheme, rings:



Installation with 1 ring anode

Installation with 2 ring anodes



## Dimensions of Rings:



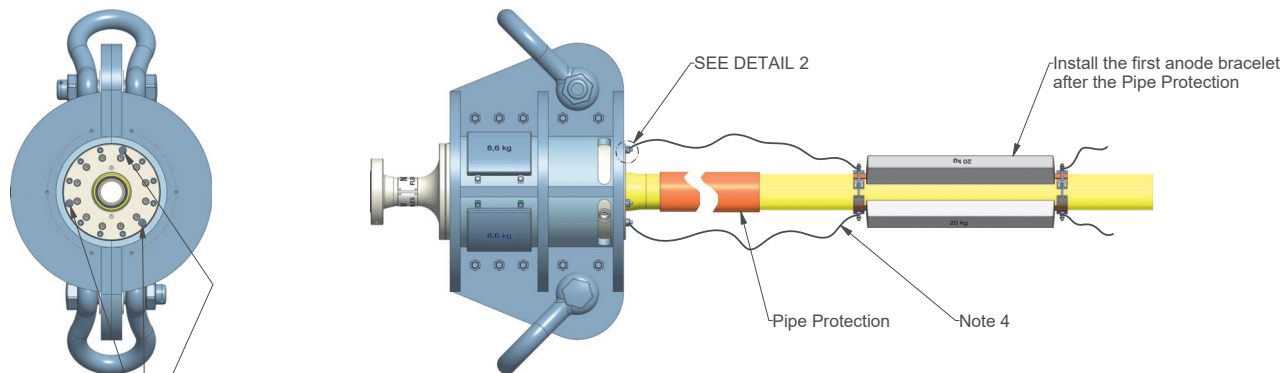
Ring model	Net weight	ID	OD	W
R-450-46	46 kg	455 mm	600 mm	180 mm

### NOTES:

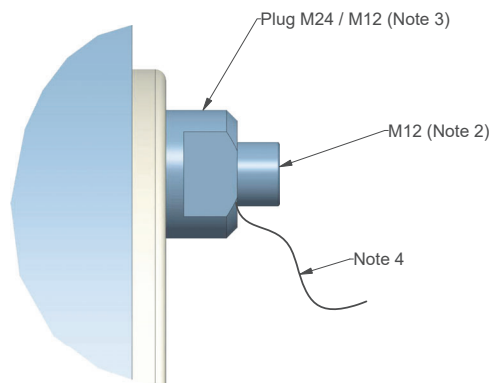
1. All dimensions are in millimeters.
2. Ring Anodes:  
Quantity supplied for each pipe end: see Composition Drawing.  
Material: Aluminium.
3. Bolting of ring anodes:  
4 pcs. per part: M12 x 20 mm, DIN 912, B8MA. Bolt torque 25 Nm.
4. Continuity check shall be performed between End Fitting and ring anodes.  
Acceptance criteria: electrical resistance max. 0.1 ohm.

A	08-Mar-23	Issued for Review	PAVN	RRAZ	TVAL	MWLR
Rev.	Date	Description	By	Chk	Appr	Proj
 <b>Completion &amp; Production Solutions</b>			<b>Subsea Production Systems</b> Flexibles			
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Customer		Projection method 1st Angle		PDM Ver. D: A.1 P: A.1		
 <b>PETROBRAS</b>		Standard Tolerance -		State Released		
Project		Scale 2:25		Size A2		Sheet 2/3
15762 PB 4inch SERVICE FLOWLINE		NOV Traceability No -				
Title		Customer Doc No. -				
GA Drawing Cathodic Protection (Anodes #2) 4"		Drawing No.		15762-DWG-CP-102		

## Anode installation scheme when Anchoring Collar is present






Remove 3 Outer Casing POM Plugs and then install 3 M24 / M12 plug in the M24 threads (see Note 3)



DETAIL 2  
SCALE 1:1

### NOTES:

- All dimensions are in millimeters.
- Continuity cable connection in EF:  
3 pcs. DIN 912, M12 x 16 ASTM A193 B8MA, torque 25 Nm.
- Plug M24 / M12 (three pcs. supplied)  
Distance between flat faces: 27 mm  
Length: 75 mm  
Torque for installation: 100 Nm
- Continuity cables:  
RV-K Powerflex with double insulation (PVC), 1 x 16mm<sup>2</sup> core.  
Cable shoes for M12 screws soldered to each end.  
Cable has heat-shrink tubes from the cable shoes until 10-15 cm along the cable.  
Length: See Packing List.  
3 cables per connection.
- Continuity check shall be performed between End Fitting and bracelet anodes.  
Continuity between the bracelet halves shall also be checked.  
Acceptance criteria: electrical resistance max. 0.1 ohm.

A	08-Mar-23	Issued for Review	PAVN	RRAZ	TVAL	MWLR
Rev.	Date	Description	By	Chk	Appr	Proj
<div><div></div><div><div>Completion &amp; Production Solutions</div></div></div>			<div>Subsea Production Systems</div> <div>Flexibles</div>			
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Customer	<div><div></div><div><div>PETROBRAS</div></div></div>		<div>Projection method 1st Angle</div> <div></div>		<div>PDM Ver.</div> <div>D: A: P: A:</div>	
Project	15762 PB 4inch SERVICE FLOWLINE		<div>Standard Tolerance</div> <div>-</div>		<div>State</div> <div>Released</div>	
			<div>Scale</div> <div>3:50</div>	<div>Size</div> <div>A2</div>	<div>Sheet</div> <div>3/3</div>	
Title	<div>GA Drawing</div> <div>Cathodic Protection (Anodes #2)</div> <div>4"</div>		<div>NOV Traceability No</div> <div>-</div>			
			<div>Customer Doc No.</div> <div>-</div>			
			<div>Drawing No.</div> <div>15762-DWG-CP-102</div>			

**15762 PB 4INCH SERVICE FLOWLINE**  
**CONTRACT NO 4600635114 / 5900.0117031.20.2**  
**5900.0117034.20.2 / 5900.0117035.20.2 /**

**4" FLOWLINES**

**GA DRAWING, HANDLING HEAD**  
**4 1/16" API 17SS - 5000 PSI, SWL 55T**



**PETROBRAS**

NOV Flexibles Doc. No.: 15762-DWG-HH-101  
Customer Doc. No.: N/A

00	Issued for Construction	21-DEC-2022	PAVN	RRAZ	MGMR	MWLR
A	Issued for Review	26-AUG-2022	PAVN	RRAZ	MGMR	MWLR
Rev.	Purpose of issue	Date	Originator	Checker	Approver	Project Approver

15762 PB 4inch service flowline

Page 2 of 4

GA Drawing, Handling Head  
4 1/16" API 17SS - 5000 psi, SWL 55T

Doc. No.: 15762-DWG-HH-101

Rev.: 00

THIS DOCUMENT IS ELECTRONICALLY GENERATED. THE DOCUMENT IS CHECKED AND APPROVED ACCORDING TO INTERNAL PROCEDURES IN FLEXIBLES BUSINESS MANAGEMENT SYSTEM THAT ARE PART OF THE OVERALL QUALITY SYSTEM.  
THE SIGNED DOCUMENT IS ELECTRONICALLY FILED AT FLEXIBLES AND IS AVAILABLE UPON REQUEST.

## REVISION HISTORY

Rev. no.	Description of changes
A	This is the first issue of this document
00	The document has been issued for construction, following customer's approval. No changes have been made

## LIST OF DOCUMENTS & DRAWINGS

Drawing no.	Rev. no.	Drawing title
15163-DWG-HH-101	00	GA Drawing Handling Head - 55T 4 1/16" API 17SS 5000 psi

Purchase Order / Sales Order	15762-DWG-COM-	Well	Service
4511134320	101-MRL-150-04	MRL-150	4" Gas Lift Service
4511134323 (RESALE)			
4511134318	102-MRL-156-04	MRL-156	4" Gas Lift Service
4511134319 (RESALE)			
4511149988	103-MRL-223-04	MRL-223	4" Gas Lift Service
4511149992 (RESALE)			
4511131429	104-MRL-103-04	MRL-103	4" Gas Lift Service
4511131431 (RESALE)			
4511152688	105-P9-04	P9	4" Gas Lift Service
4511152690 (RESALE)			
4511137201	106-MRL-167-04	MRL-167	4" Gas Lift Service
4511137206 (RESALE)			
4511150233	107-P7-04	P7	4" Gas Lift Service
4511150234 (RESALE)			
4511153346	108-P8-04	P8	4" Gas Lift Service
4511153347 (RESALE)			
4511137207	110-MRL-210-04	MRL-210	4" Gas Lift Service
4511131012 (RESALE)			
4511152635	109-MRL-231-04	MRL-231	4" Gas Lift Service
4511150229 (RESALE)			
45111516312	112-7-MRL-102H-04	MRL-102H	4" Gas Lift Service
4511448781	111-6-MRL-199-04	MRL-199	4" Gas Lift Service



15762 PB 4inch service flowline

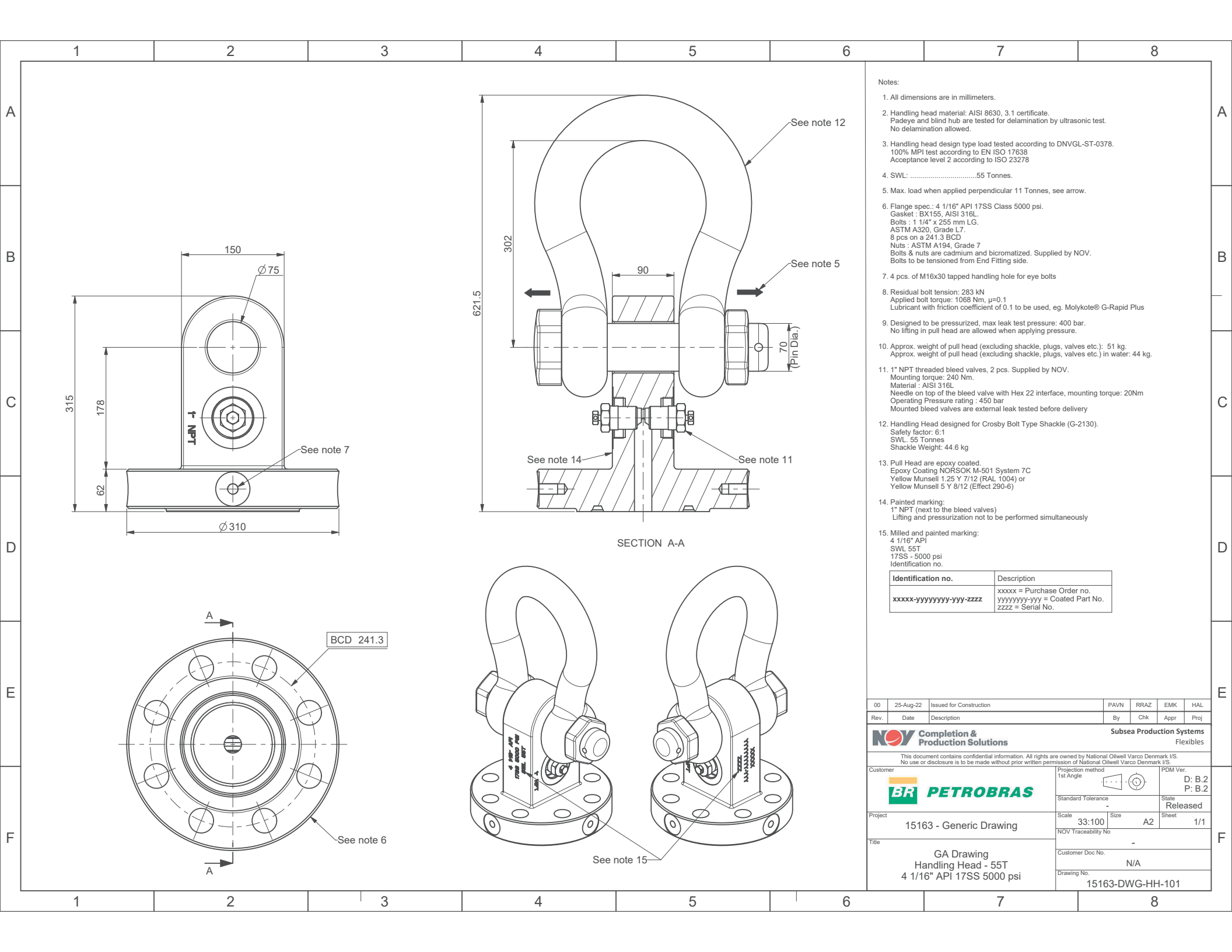
Page 3 of 4

GA Drawing, Handling Head  
4 1/16" API 17SS - 5000 psi, SWL 55T

Doc. No.: 15762-DWG-HH-101

Rev.: 00

4511719888	113-7-MRL-145-04	MRL-145	4" Gas Lift Service
4511719887	114-7-MRL-206-04	MRL-206	4" Gas Lift Service
4511744986	115-7-VD-017H-04	7-VD-017H	4" Gas Lift Service
4511717013	116-4-RJS-377-04	4-RJS-377	4" Gas Lift Service
4511854373	117-P10-04	P-10	4" Gas Lift Service



**15762 PB 4INCH SERVICE FLOWLINE**  
**CONTRACT NO 4600635114 / 5900.0117031.20.2**  
**5900.0117034.20.2 / 5900.0117035.20.2 /**

**4" FLOWLINES**

**GA DRAWING, PULL HEAD**  
**4 1/16" API 17SS - 5000 PSI, SWL 200T**



**PETROBRAS**

NOV Flexibles Doc. No.: 15762-DWG-PH-100  
Customer Doc. No.: N/A

00	Issued for Construction	21-DEC-2022	PAVN	RRAZ	MGMR	MWLR
A	Issued for Review	26-AUG-2022	PAVN	RRAZ	MGMR	MWLR
Rev.	Purpose of issue	Date	Originator	Checker	Approver	Project Approver

15762 PB 4inch service flowline

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GA Drawing, Pull Head  
4 1/16" API 17SS - 5000 PSI, SWL 200T

Doc. No.: 15762-DWG-PH-100

Rev.: 00

THIS DOCUMENT IS ELECTRONICALLY GENERATED. THE DOCUMENT IS CHECKED AND APPROVED ACCORDING TO INTERNAL PROCEDURES IN FLEXIBLES BUSINESS MANAGEMENT SYSTEM THAT ARE PART OF THE OVERALL QUALITY SYSTEM.  
THE SIGNED DOCUMENT IS ELECTRONICALLY FILED AT FLEXIBLES AND IS AVAILABLE UPON REQUEST.

## REVISION HISTORY

Rev. no.	Description of changes
A	This is the first issue of this document
00	The document has been issued for construction, following customer's approval. No changes have been made

## LIST OF DOCUMENTS & DRAWINGS

Drawing no.	Rev. no.	Drawing title
15163-DWG-PH-101	00	GA Drawing Pull Head - 200T 4 1/16" API 17SS 5000 psi

Purchase Order / Sales Order	15762-DWG-COM-	Well	Service
4511134320			
4511134323 (RESALE)	101-MRL-150-04	MRL-150	4" Gas Lift Service
4511134318			
4511134319 (RESALE)	102-MRL-156-04	MRL-156	4" Gas Lift Service
4511149988			
4511149992 (RESALE)	103-MRL-223-04	MRL-223	4" Gas Lift Service
4511131429			
4511131431 (RESALE)	104-MRL-103-04	MRL-103	4" Gas Lift Service
4511152688			
4511152690 (RESALE)	105-P9-04	P9	4" Gas Lift Service
4511137201			
4511137206 (RESALE)	106-MRL-167-04	MRL-167	4" Gas Lift Service
4511150233			
4511150234 (RESALE)	107-P7-04	P7	4" Gas Lift Service
4511153346			
4511153347 (RESALE)	108-P8-04	P8	4" Gas Lift Service
4511137207			
4511131012 (RESALE)	110-MRL-210-04	MRL-210	4" Gas Lift Service
4511152635			
4511150229 (RESALE)	109-MRL-231-04	MRL-231	4" Gas Lift Service
45111516312			
	112-7-MRL-102H-04	MRL-102H	4" Gas Lift Service
4511448781			
	111-6-MRL-199-04	MRL-199	4" Gas Lift Service

15762 PB 4inch service flowline

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GA Drawing, Pull Head  
4 1/16" API 17SS - 5000 PSI, SWL 200T

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4511719888	113-7-MRL-145-04	MRL-145	4" Gas Lift Service
4511719887	114-7-MRL-206-04	MRL-206	4" Gas Lift Service
4511744986	115-7-VD-017H-04	7-VD-017H	4" Gas Lift Service
4511717013	116-4-RJS-377-04	4-RJS-377	4" Gas Lift Service
4511854373	117-P10-04	P-10	4" Gas Lift Service

A

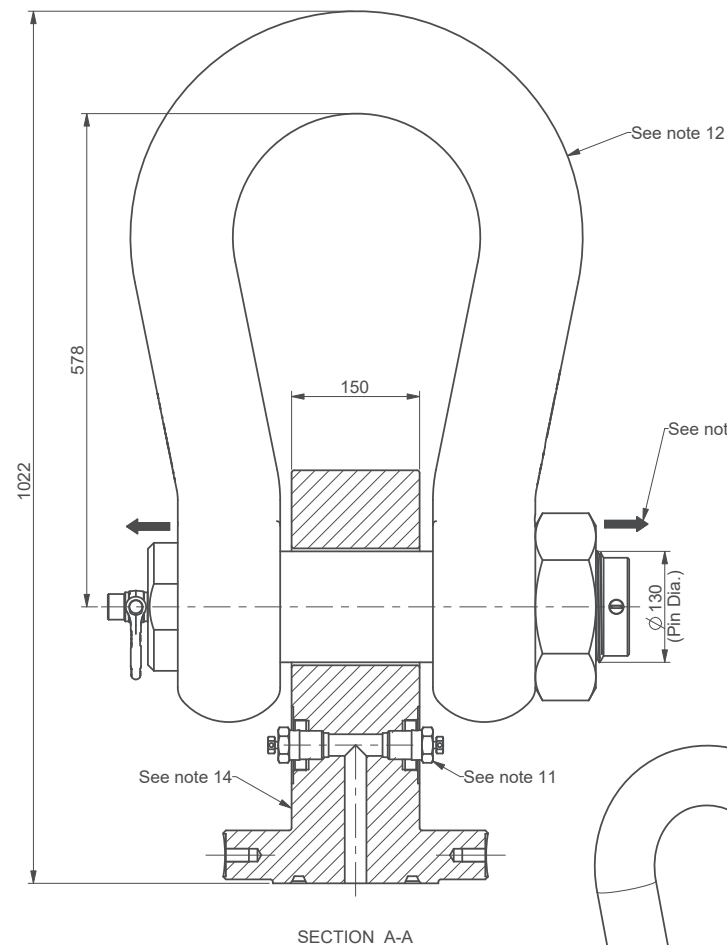
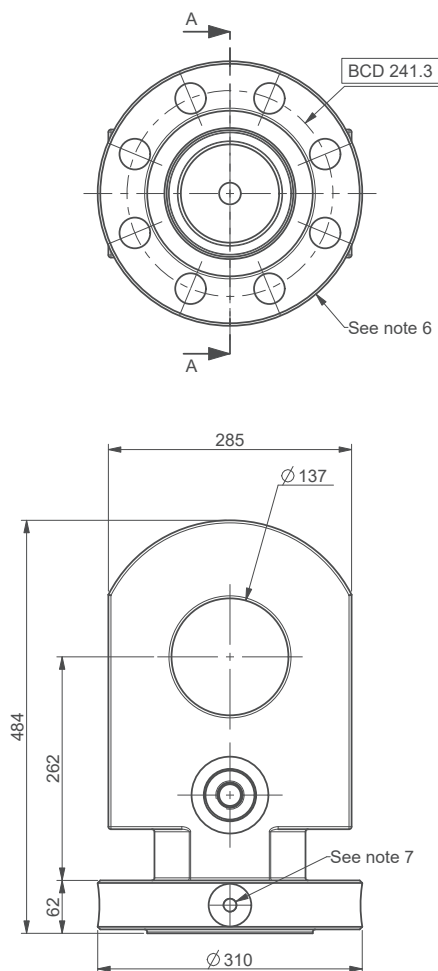
B

C

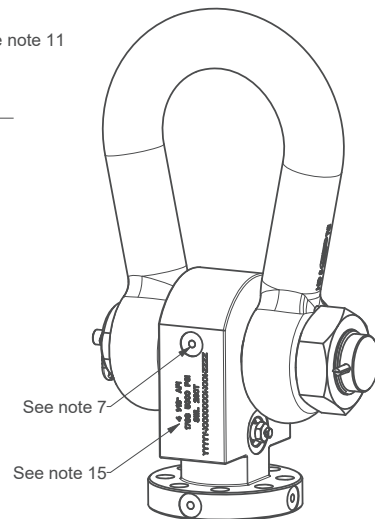
D

E

F






SECTION A-A



## Notes:

- All dimensions are in millimeters.
- Pull head material: AISI 8630, 3.1 certificate.  
Padeye and blind hub are tested for delamination by ultrasonic test.  
No delamination allowed.
- Pull head design type load tested according to DNVGL-ST-0378.  
100% MPI test according to EN ISO 17638  
Acceptance level 2 according to ISO 23278
- SWL: .....200 Tonnes.
- Max. load when applied perpendicular 17 Tonnes, see arrow.
- Flange spec.: 4 1/16" API 17SS Class 5000 psi.  
Gasket : BX155, AISI 316L.  
Bolts : 1 1/4" x 255 mm LG.  
ASTM A320, Grade L7.  
8 pcs on a 241.3 BCD  
Nuts : ASTM A194, Grade 7  
Bolts & nuts are cadmium and bicromatized. Supplied by NOV.  
Bolts to be tensioned from End Fitting side.
- 6 pcs. of M16x30 tapped handling hole for eye bolts
- Residual bolt tension: 283 kN  
Applied bolt torque: 1068 Nm,  $\mu=0.1$   
Lubricant with friction coefficient of 0.1 to be used, eg. Molykote® G-Rapid Plus
- Designed to be pressurized, max leak test pressure: 400 bar.  
No lifting in pull head are allowed when applying pressure.
- Approx. weight of pull head (excluding shackle, plugs, valves etc.): 135 kg.  
Approx. weight of pull head (excluding shackle, plugs, valves etc.) in water: 117 kg.
- 1" NPT threaded bleed valves, 2 pcs. Supplied by NOV.  
Mounting torque: 240 Nm.  
Material : AISI 316L  
Needle on top of the bleed valve with Hex 22 interface, mounting torque: 20Nm  
Operating Pressure rating : 450 bar  
Mounted bleed valves are external leak tested before delivery
- Pull Head designed for Green Pin Shackle with safety bolt (P-6036).  
Safety factor: 5:1  
SWL: 200 Tonnes  
Shackle Weight: 235 kg
- Pull Head are epoxy coated.  
Epoxy Coating NORSOK M-501 System 7C  
Yellow Munsell 1.25 Y 7/12 (RAL 1004) or  
Yellow Munsell 5 Y 8/12 (Effect 290-6)
- Painted marking:  
1" NPT (next to the bleed valves)  
Lifting and pressurization not to be performed simultaneously
- Milled and painted marking:  
4 1/16" API  
SWL 200T  
17SS - 5000 psi  
Identification no.

Identification no.	Description
xxxxx-yyyyyyyy-yyy-zzzz	xxxxx = Purchase Order no. yyyyyyyy-yyy = Coated Part No. zzzz = Serial No.

00	25-Aug-22	Issued for Construction	PAVN	RRAZ	EMK	HAL
Rev.	Date	Description	By	Chk	Appr	Proj
<div><div></div><div><div>Completion &amp; Production Solutions</div></div></div>			<div>Subsea Production Systems</div> <div>Flexibles</div>			
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Customer	<div><div></div><div><div>PETROBRAS</div></div></div>		Projection method 1st Angle		<div><div></div><div>PDM Ver. D: B. P: B.</div></div>	
			Standard Tolerance -		State Released	
Project			15163 - Generic Drawing		Scale 6:25	Size A2
Title	GA Drawing Pull Head - 200T 4 1/16" API 17SS 5000 psi		NOV Traceability No -			
Customer Doc No. N/A						
Drawing No. 15163-DWG-PH-101						