



PURCHASE ORDER

ABN : 66 616 757 638

DATE: 29/06/2024
ORDER NO: TSS_00889-1

21 Pullman Place
Emu Plains, NSW 2750
Andrew@tssengineering.com.au
daniel.ha@tssengineering.com.au

BILL TO: ARL Laboratory Services
Unit 13&14.55-61 Pine Rd
Yennora, NSW 261

< Must comply with AS/NZS 1554.1-2014 SP >
< Must comply with RMS B201 >
< Technician need to provide work sheet copy after completion of inspection >
< Required Visual Inspection report as well >

DESCRIPTION	Unit	AMOUNT
< Job Number: > 23382-13 - CHB Screen & Guardrails BR19		
NDT Test / Percentage : AS/NZS 1554.1-2014 SP table 7.4 100 % VT, 100% MT of all products table 6.2.2 100% UT of all products		
Welding Code : AS/NZS1554.1-2014 SP		
Welding method : GMAW		
WPS/PQR No : 001-1 Single bevel butt with superimposed fillet 063 - fillet weld with equal leg size		
Welder ID / Name : TSS-027 , Yuzhen Piao TSS-004 , Seungho Shin TSS-022 , Sungbin Hong TSS-052 , Seung Hwangbo		
Drawing No. Provided		

TOTAL	\$	-
GST	\$	-
TOTAL (Inc GST)	\$	-

If you have any questions concerning this purchase order, contact Andrew Ha,
andrew@tssengineering.com.au or 0433 591 517

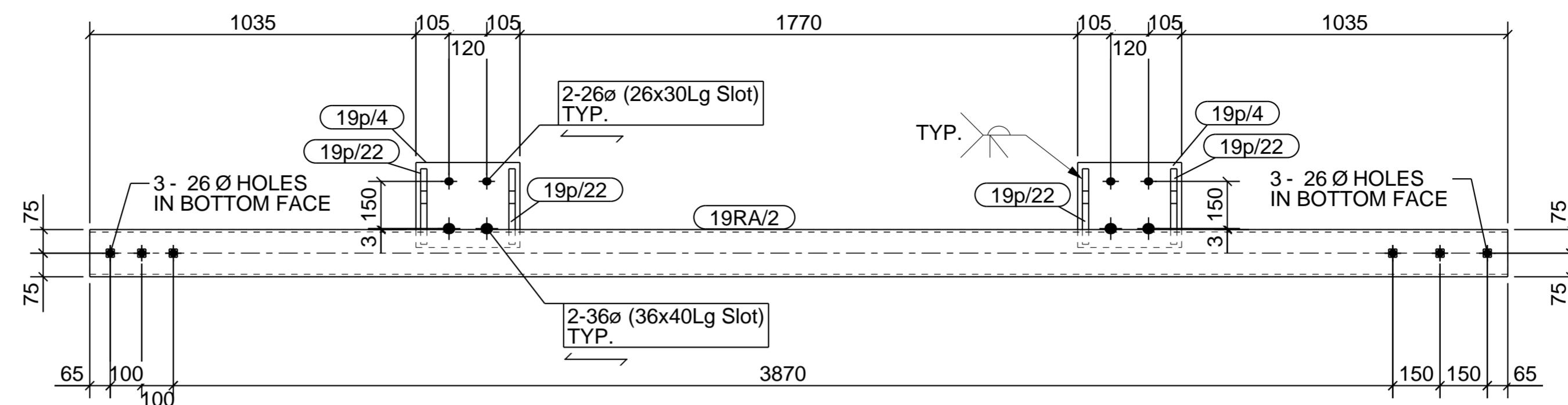
THANK YOU FOR YOUR BUSINESS!

Issued by Andrew Ha

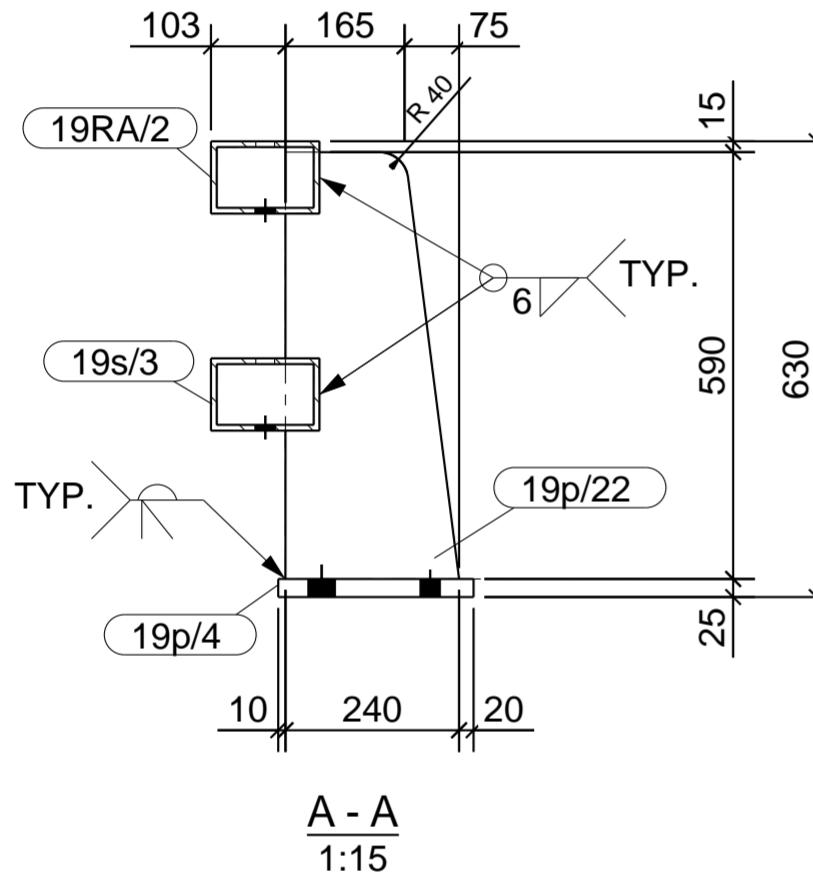
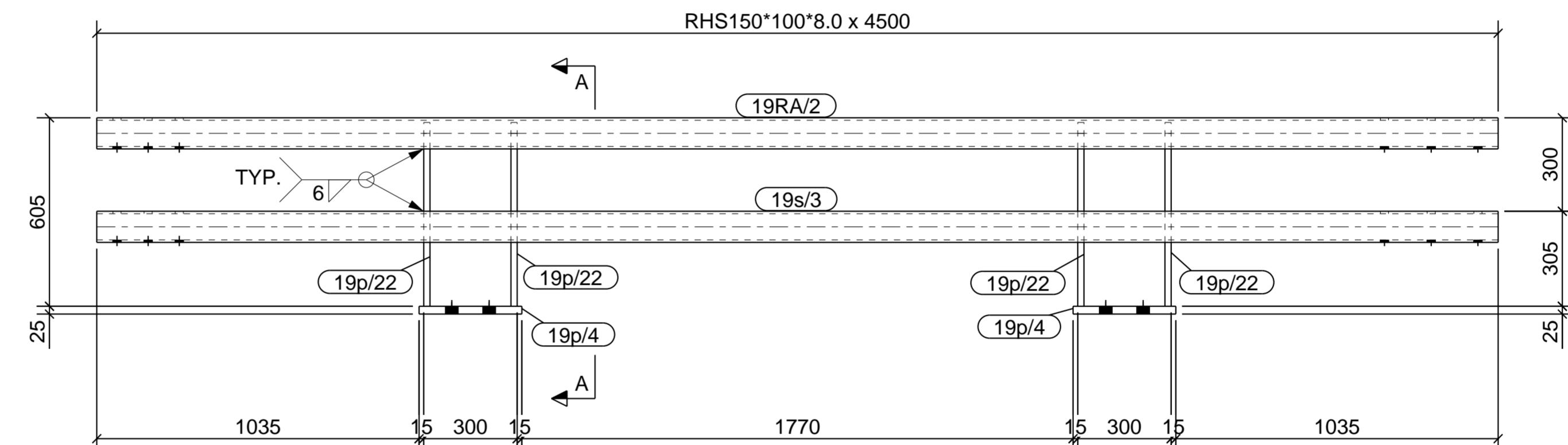
PHASE	QTY.
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GRID LOCATION	

19RA/2 BR19-B-B

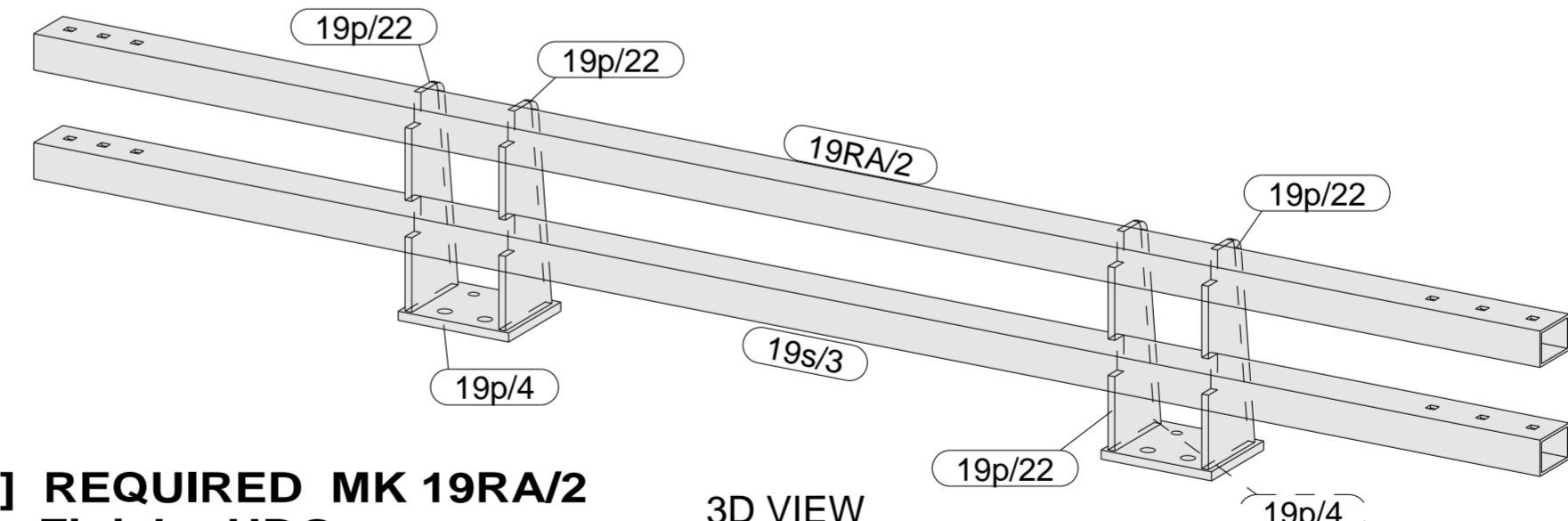
SUB-ASSEMBLY REF.
No. In Assembly.
1 ALONE



TOP VIEW
1:20

A - A
1:15

FRONT VIEW
1:20



1 RAIL[S] REQUIRED MK 19RA/2
Finish - HDG

3D VIEW

MATERIAL LIST					
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)
19RA/2	1	RHS150*100*8.0	4500	C450L0	124.3
19p/4	2	PLT25*270	330	250	35.0
19p/22	4	PLT20*240	590	250	69.4
19s/3	1	RHS150*100*8.0	4500	C450L0	124.3
		TOTAL:	353.1		5.6

General Notes

REV NAME DATE DESCRIPTION

2	SSK	31/05/24	ISSUED FOR FABRICATION
1	KP	28/05/24	ISSUED FOR FABRICATION
0	KP	25/05/24	ISSUED FOR FABRICATION

TSS Engineering

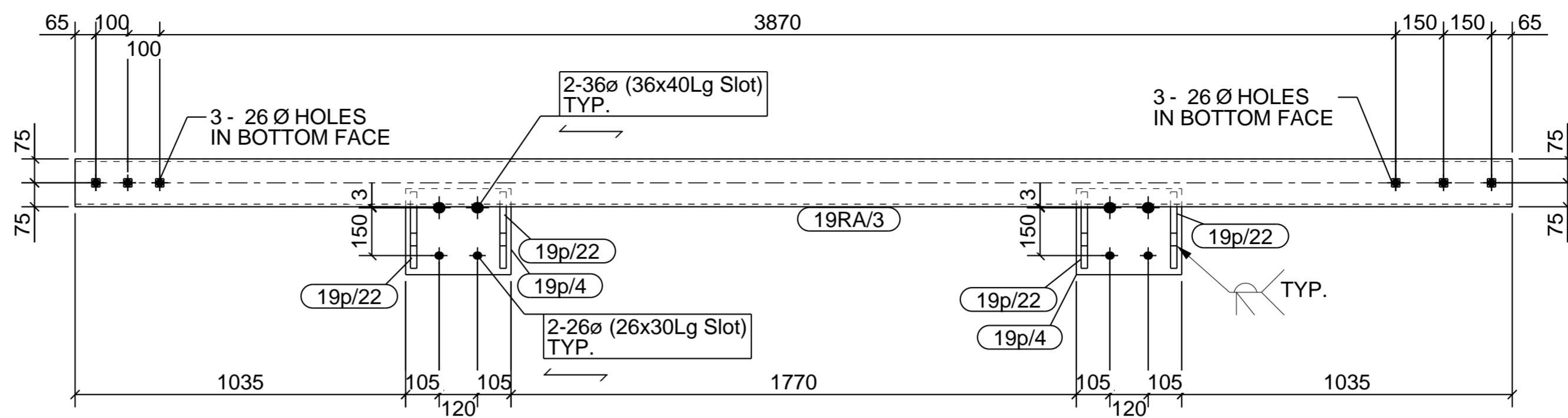
CHB TWIN RAIL&SCREEN

TSS
ENGINEERING

DRAWING TITLE: MID RAIL ASSEMBLY	ISSUE DATE: 27.06.2024	APPROVAL SENT: 31.05.2024
CONTRACT: CHB TWIN RAIL&SCREEN	CHECKED DATE: 31.05.2024	APPROVAL DATE: 31.05.2024
MODELED BY: SK	CREATED: 23.05.2024	CHECKED BY: GK
SCALE: 1:15	PROJECT No. 23382	APPROVED BY: NRG
ASSEMBLY No. 19RA/2	QUANTITY: SHEET No. 1	REV. 2

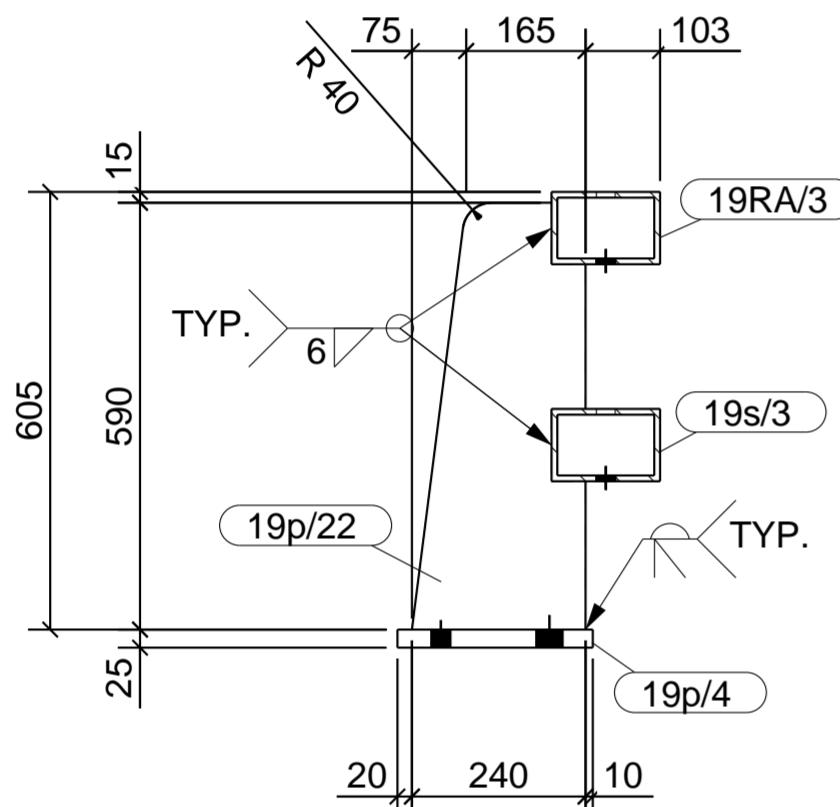
PHASE	QTY.
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GRID LOCATION	

SUB-ASSEMBLY REF.
No. In Assembly.
1 ALONE

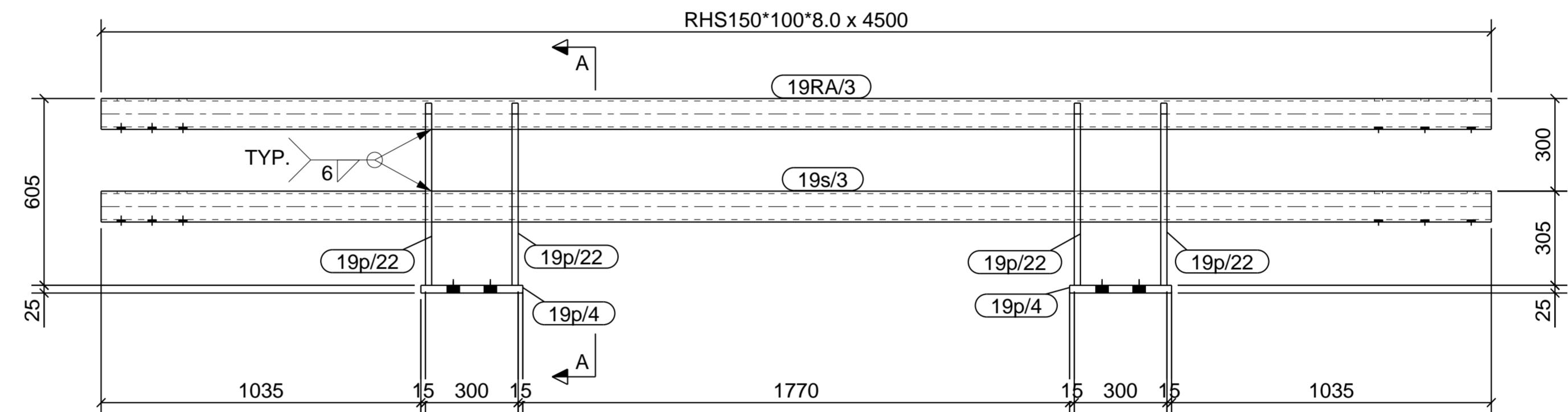


TOP VIEW

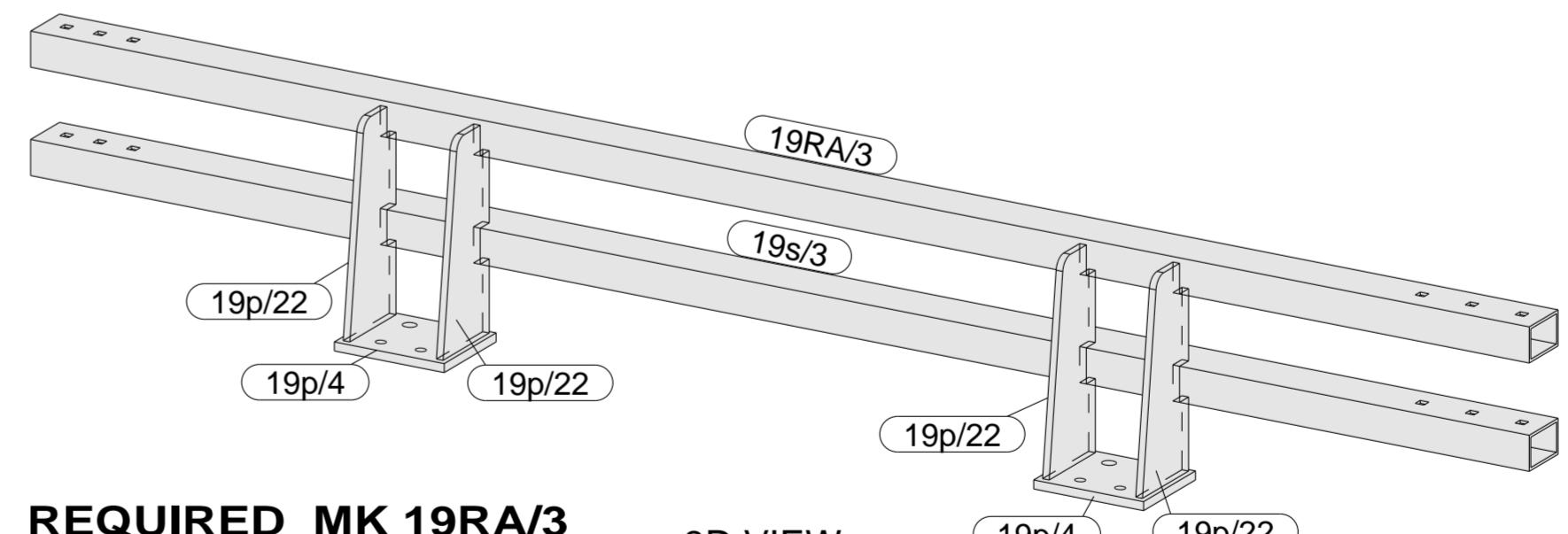
1:20



A - A
1:15



FRONT VIEW
1:20



1 RAIL[S] REQUIRED MK 19RA/3
Finish - HDG

3D VIEW

MATERIAL LIST					
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)
19RA/3	1	RHS150*100*8.0	4500	C450L0	124.3
19p/4	2	PLT25*270	330	250	35.0
19p/22	4	PLT20*240	590	250	69.4
19s/3	1	RHS150*100*8.0	4500	C450L0	124.3
TOTAL:			353.1		5.6

General Notes

REV NAME DATE DESCRIPTION

2 SSK 31/05/24 ISSUED FOR FABRICATION

1 KP 28/05/24 ISSUED FOR FABRICATION

TSS Engineering

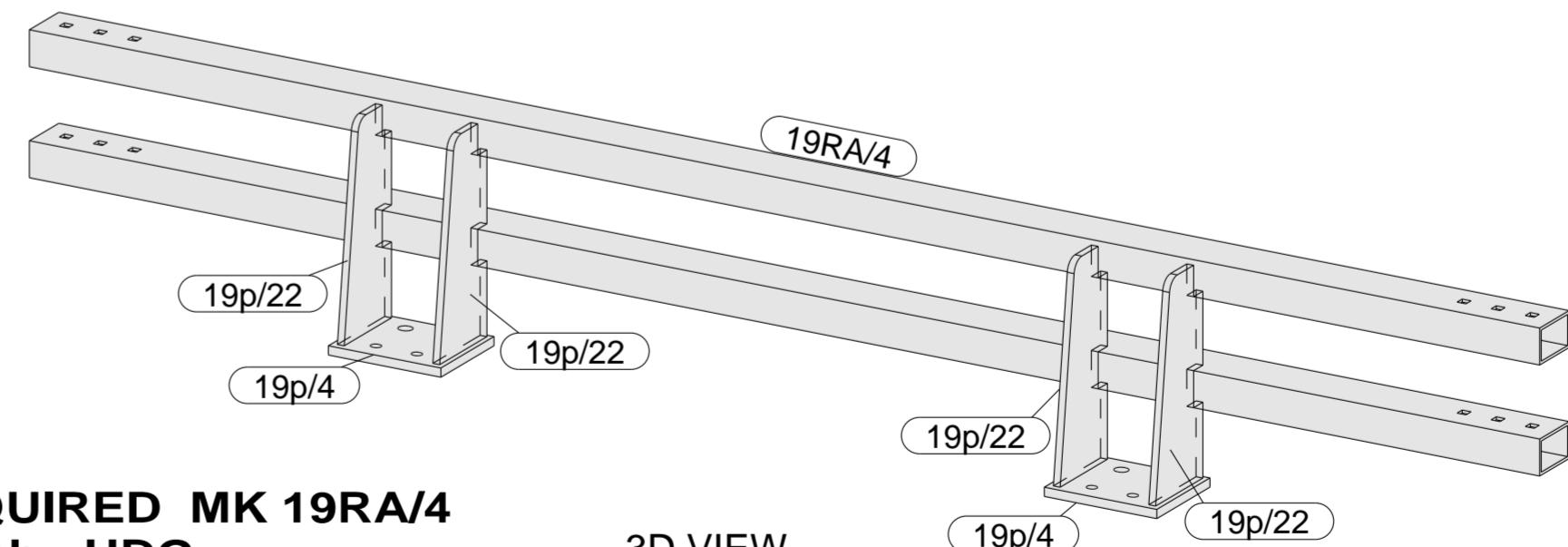
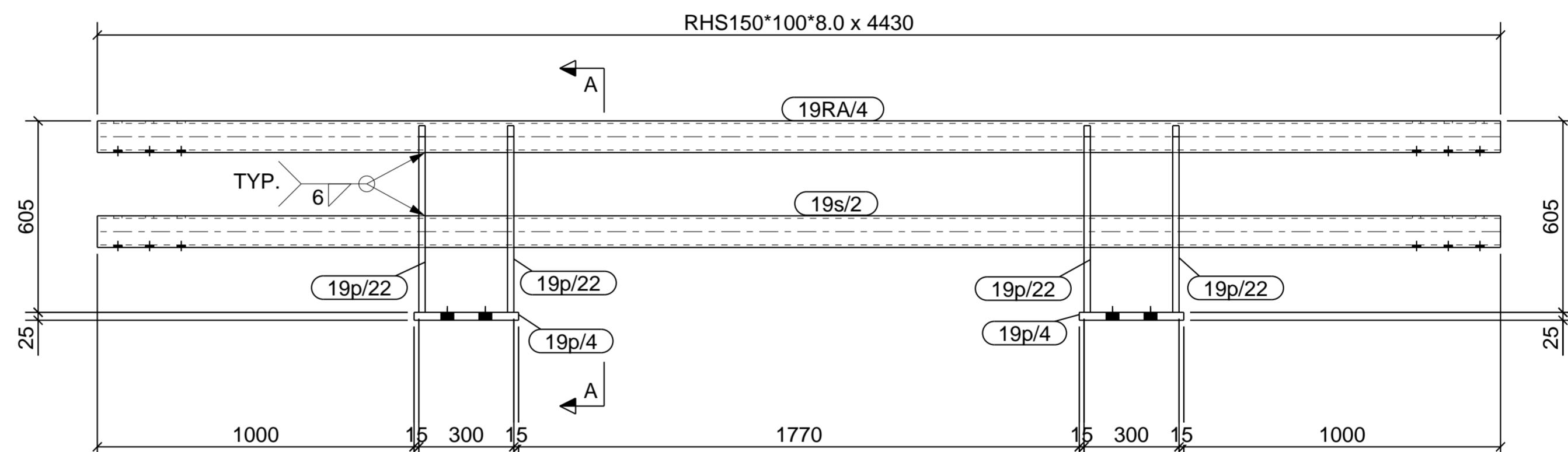
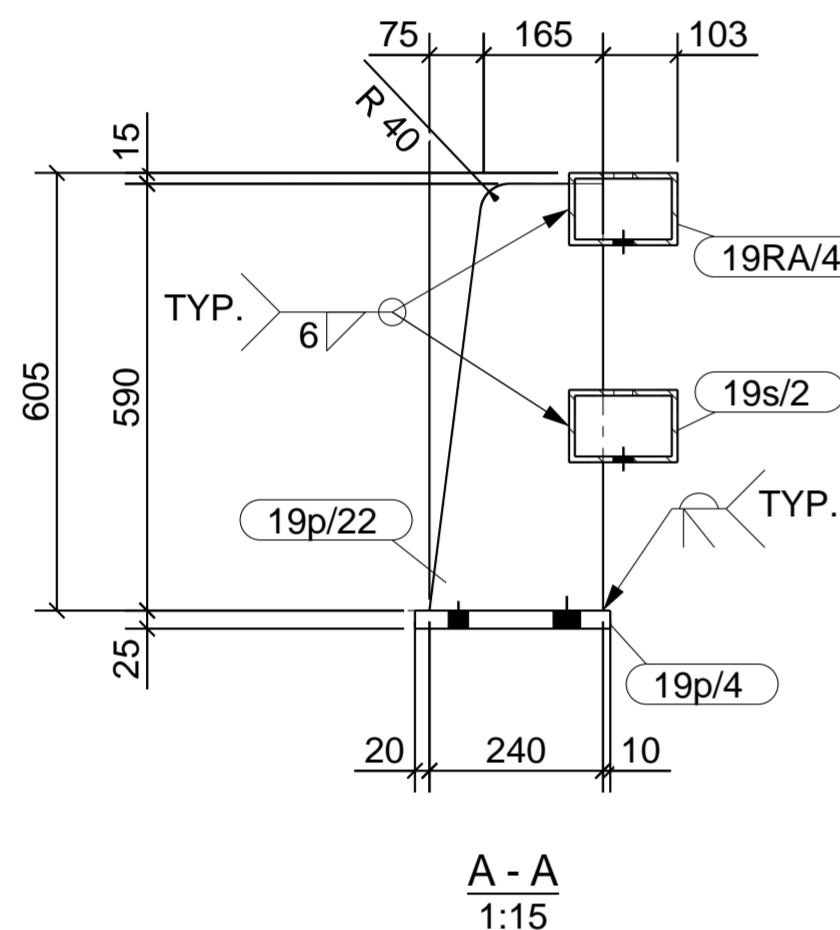
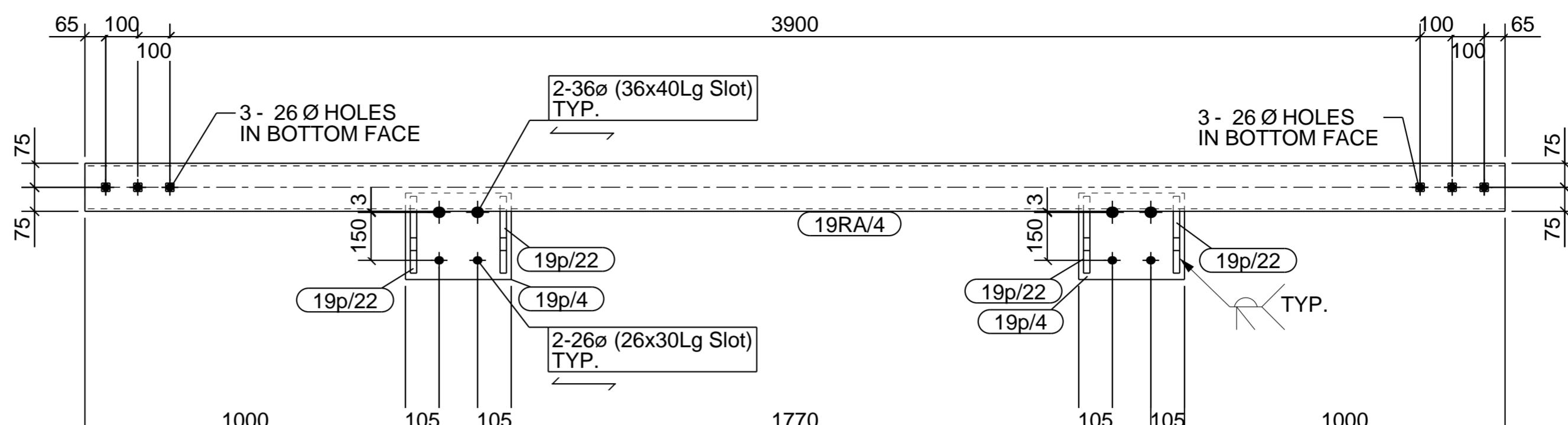
CHB TWIN RAIL&SCREEN

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ENGINEERING

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CONTRACT: CHB TWIN RAIL&SCREEN	CHECKED DATE: 31.05.2024	APPROVAL DATE: 31.05.2024
MODELED BY: SK	CREATED: 29.05.2024	CHECKED BY: GK
SCALE: 1:15	PROJECT No. 23382	APPROVED BY: NRG
ASSEMBLY No. 19RA/3	QUANTITY: SHEET No. 1	REV. 2

PHASE	QTY.
5	5
GRID LOCATION	
19RA/4 BR19-C-B	
19RA/4 BR19-E-B	
19RA/4 BR19-F-B	
19RA/4 BR19-G>/	

SUB-ASSEMBLY REF.
No. In Assembly.
5 ALONE



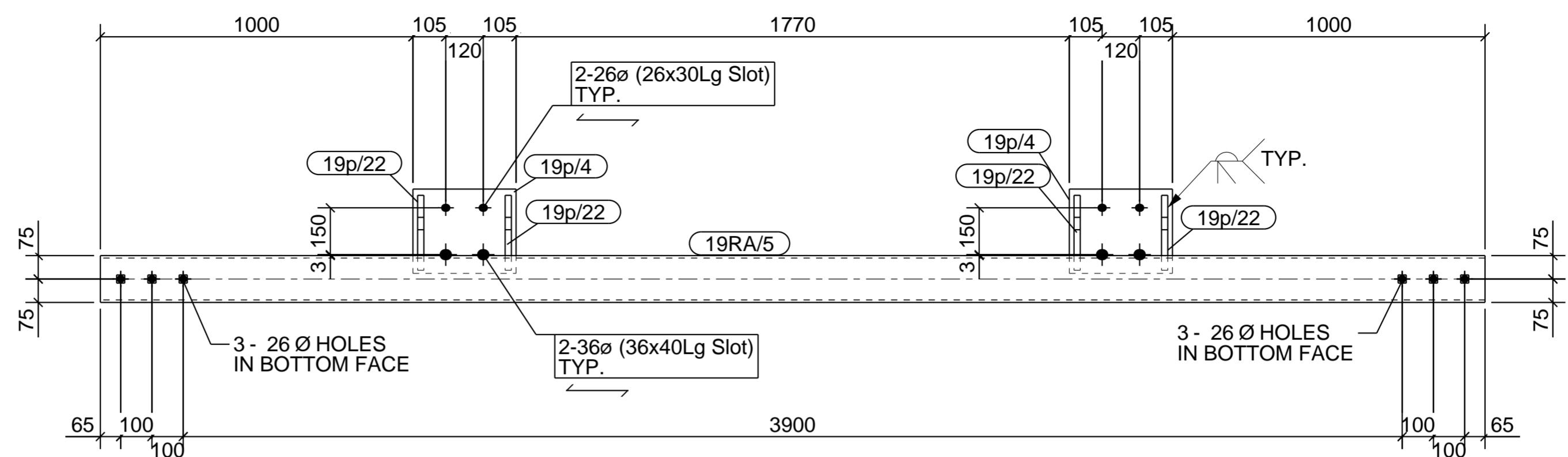
5 RAIL[S] REQUIRED MK 19RA/4
Finish - HDG

MATERIAL LIST					
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)
19RA/4	5	RHS150*100*8.0	4430	C450L0	612.0
19p/4	10	PLT25*270	330	250	174.9
19p/22	20	PLT20*240	590	250	347.0
19s/2	5	RHS150*100*8.0	4430	C450L0	612.0
		TOTAL:	1746.0		27.8

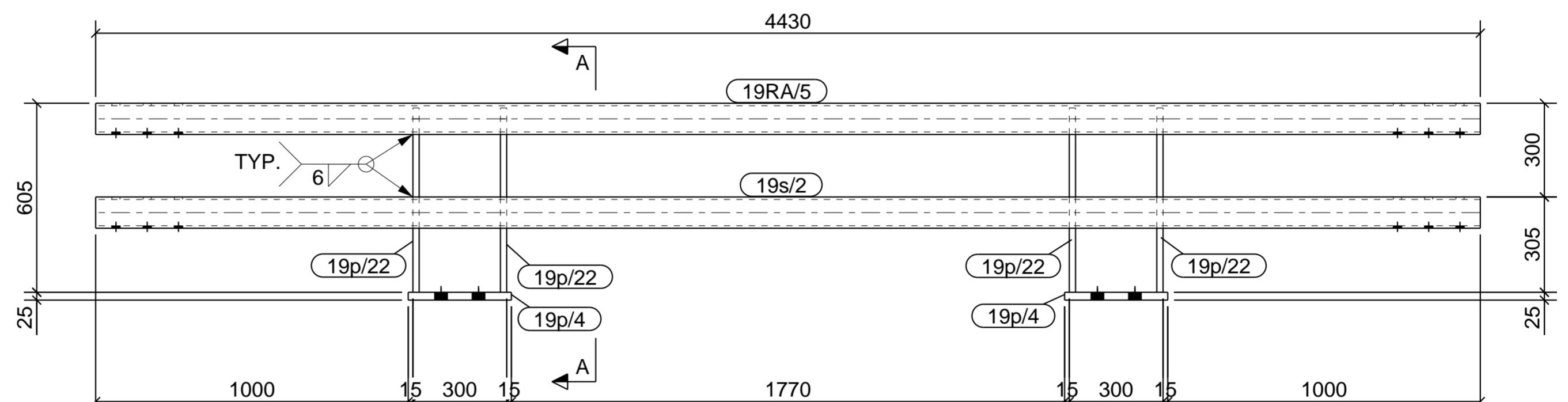
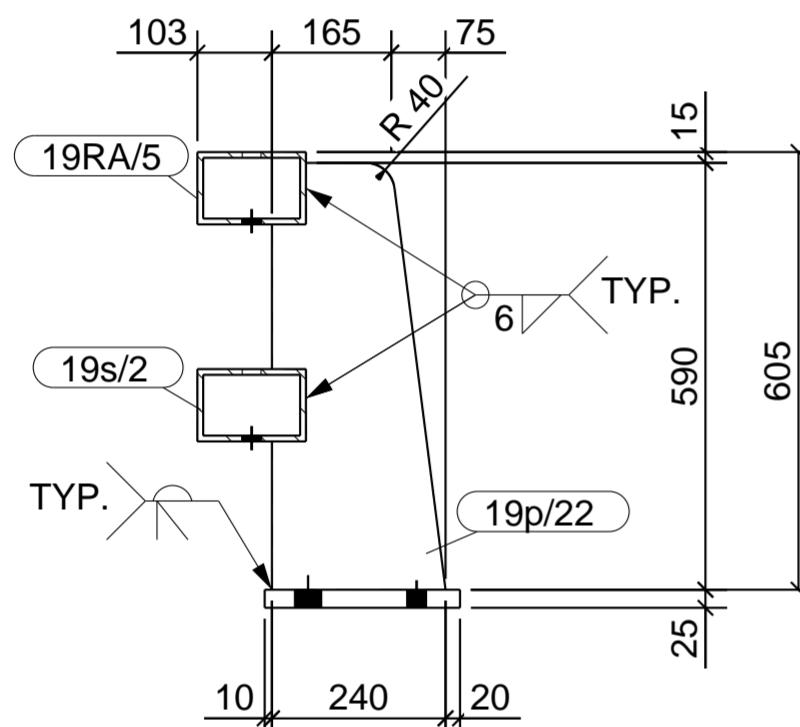
General Notes				REV	NAME	DATE	DESCRIPTION	TSS Engineering	
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				1	KP	28/05/24	ISSUED FOR FABRICATION		
CHB TWIN RAIL&SCREEN									
				DRAWING TITLE: MID RAIL ASSEMBLY		ISSUE DATE: 27.06.2024		APPROVAL SENT: 31.05.2024	
				CONTRACT: CHB TWIN RAIL&SCREEN		CHECKED DATE: 31.05.2024		APPROVAL DATE: 31.05.2024	
				MODELED BY: SK CREATED: 29.05.2024		CHECKED BY: GK		APPROVED BY: NRG	
				SCALE:	PROJECT No.	ASSEMBLY No.		QUANTITY: SHEET No.	REV.
				1:15	23382	- 19RA/4		5	2

PHASE	QTY.
5	5
GRID LOCATION	
19RA/5 BR19-C-B	
19RA/5 BR19-E-B	
19RA/5 BR19-F-B	
19RA/5 BR19-G>/	

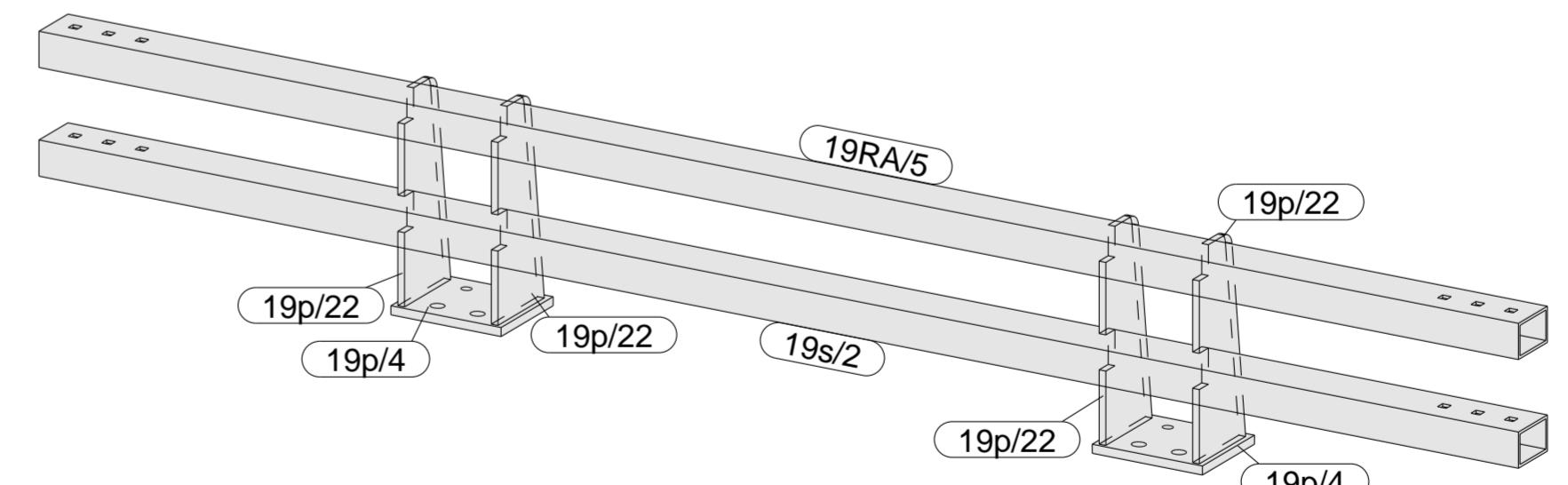
SUB-ASSEMBLY REF.	
No.	In Assembly.
5	ALONE



TOP VIEW
1:20



FRONT VIEW
1:20



5 RAIL[S] REQUIRED MK 19RA/5
Finish - HDG

3D VIEW

MATERIAL LIST					
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)
19RA/5	5	RHS150*100*8.0	4430	C450L0	612.0
19p/4	10	PLT25*270	330	250	174.9
19p/22	20	PLT20*240	590	250	347.0
19s/2	5	RHS150*100*8.0	4430	C450L0	612.0
		TOTAL:	1746.0		27.8

General Notes

REV NAME DATE DESCRIPTION

2 SSK 31/05/24 ISSUED FOR FABRICATION
1 KP 28/05/24 ISSUED FOR FABRICATION
0 KP 25/05/24 ISSUED FOR FABRICATION

TSS Engineering

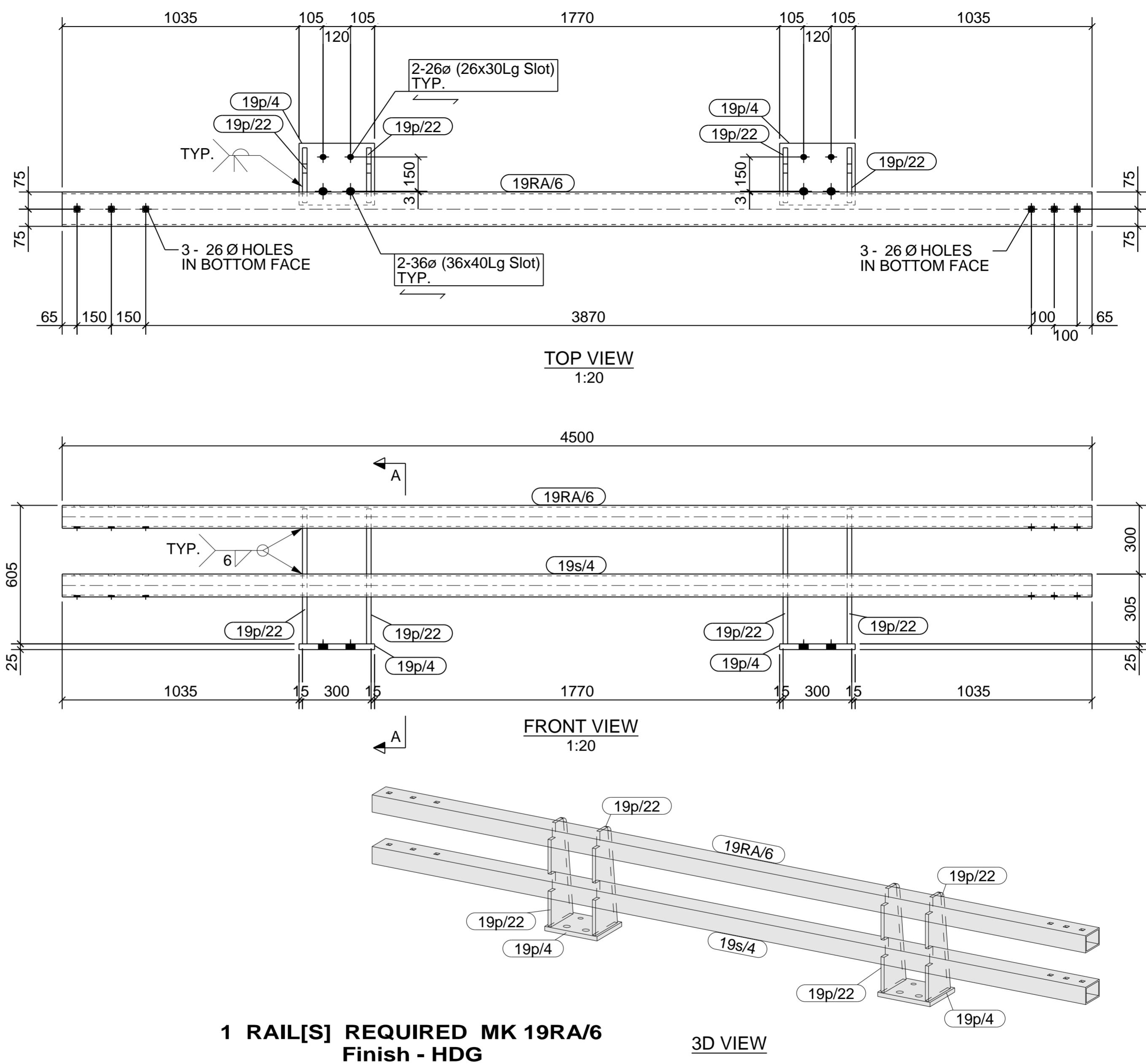
CHB TWIN RAIL&SCREEN

TSS
ENGINEERING

DRAWING TITLE: MID RAIL ASSEMBLY ISSUE DATE: 27.06.2024 APPROVAL SENT: 31.05.2024
CONTRACT: CHB TWIN RAIL&SCREEN CHECKED DATE: 31.05.2024 APPROVAL DATE: 31.05.2024
MODELED BY: SK CREATED: 23.05.2024 CHECKED BY: GK APPROVED BY: NRG
SCALE: PROJECT No. ASSEMBLY No. QUANTITY: SHEET No. REV.
1:15 23382 - 19RA/5 5 2

PHASE	QTY.
5	1
GRID LOCATION	

SUB-ASSEMBLY REF.
No. In Assembly.
1 ALONE



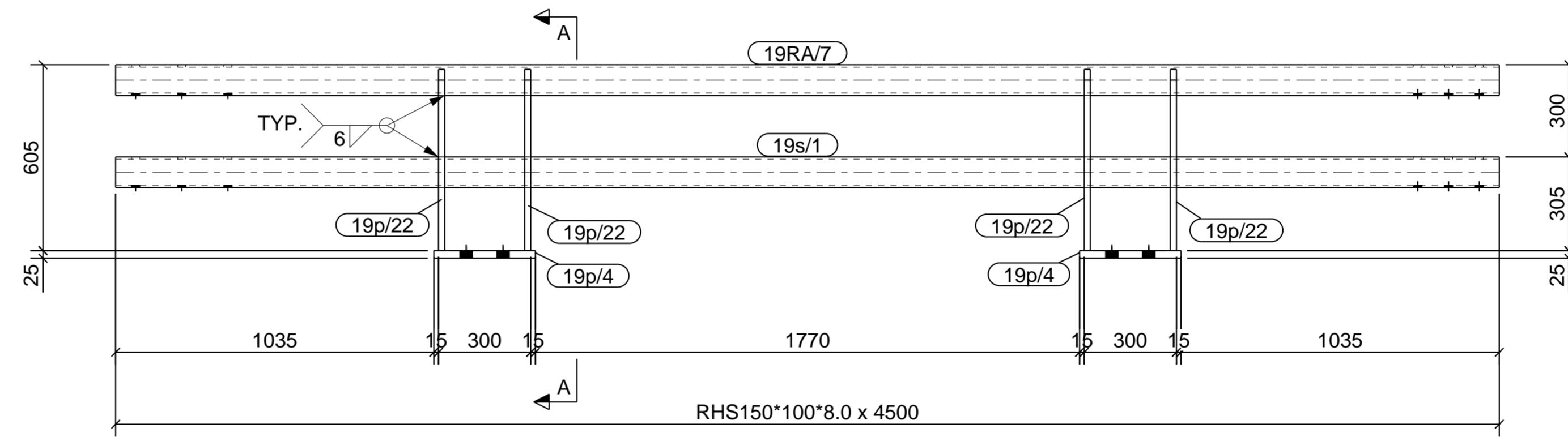
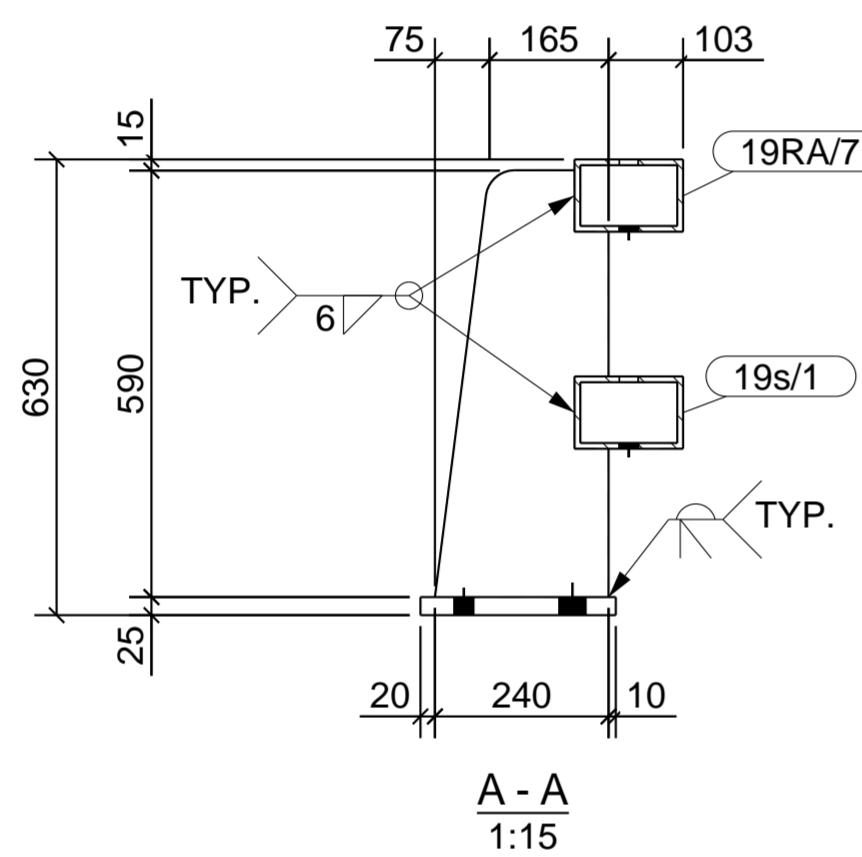
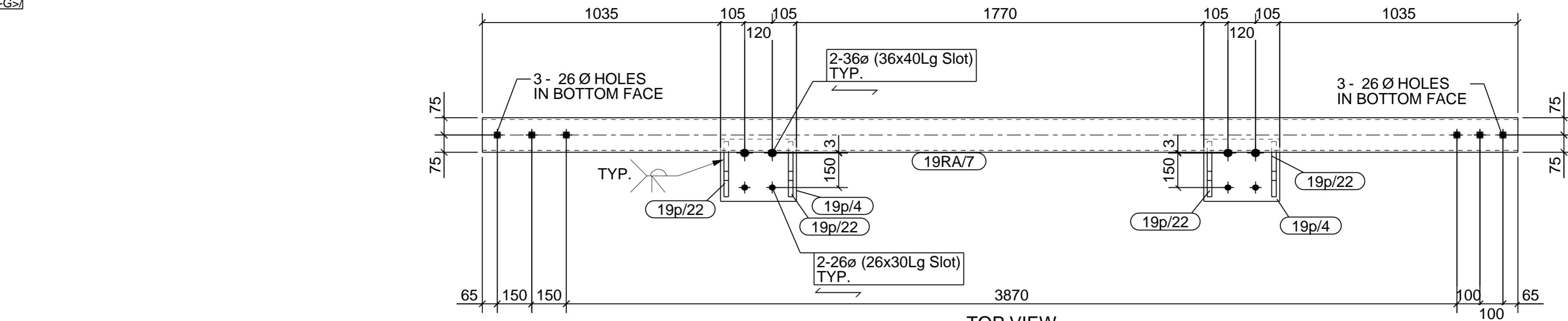
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)	AREA(m²)
19RA/6	1	RHS150*100*8.0	4500	C450L0	124.3	2.1
19p/4	2	PLT25*270	330	250	35.0	0.4
19p/22	4	PLT20*240	590	250	69.4	1.0
19s/4	1	RHS150*100*8.0	4500	C450L0	124.3	2.1
		TOTAL:	353.1		5.6	

MATERIAL LIST

General Notes				REV	NAME	DATE	DESCRIPTION	TSS Engineering		
2	SSK	31/05/24	ISSUED FOR FABRICATION					CHB TWIN RAIL&SCREEN		
1	KP	28/05/24	ISSUED FOR FABRICATION							
0	KP	25/05/24	ISSUED FOR FABRICATION							
DRAWING TITLE: MID RAIL ASSEMBLY ISSUE DATE: 27.06.2024 APPROVAL SENT: 31.05.2024 CONTRACT: CHB TWIN RAIL&SCREEN CHECKED DATE: 31.05.2024 APPROVAL DATE: 31.05.2024 MODELLED BY: SK CREATED: 24.05.2024 CHECKED BY: GK APPROVED BY: NRG SCALE: 1:15 PROJECT No. 23382 ASSEMBLY No. - 19RA/6 QUANTITY: SHEET No. 1 REV. 2										

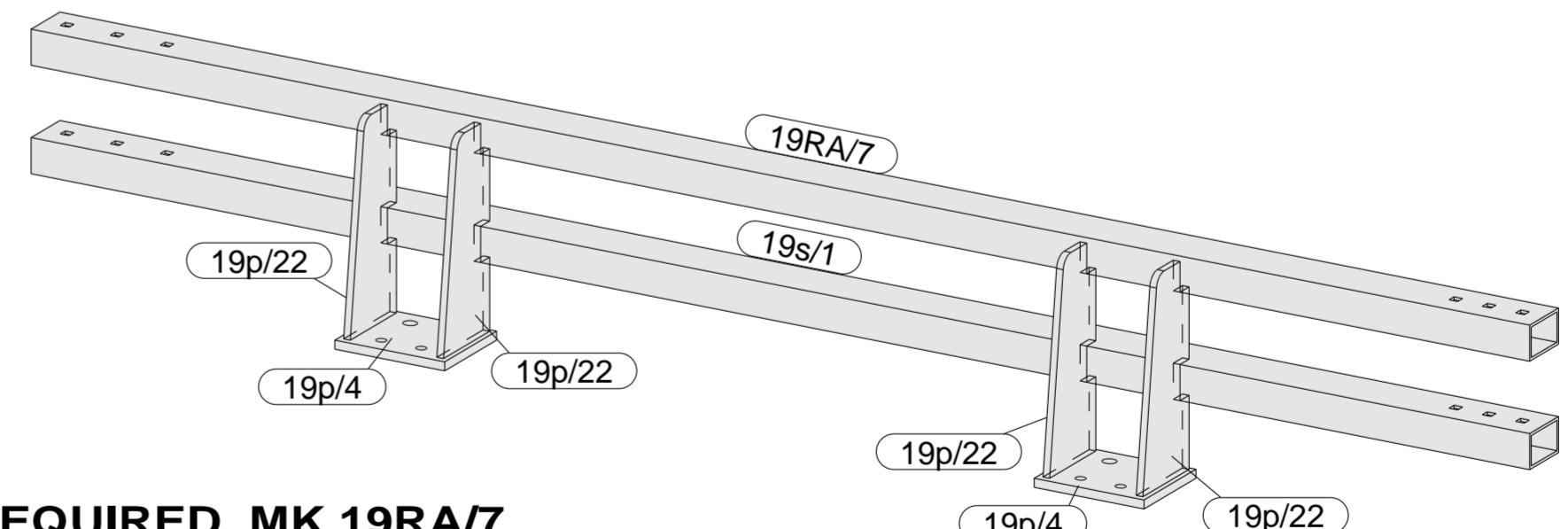
PHASE	QTY.
5	1
GRID LOCATION	

SUB-ASSEMBLY REF.
No. In Assembly.
1 ALONE



1 RAIL[S] REQUIRED MK 19RA/7
Finish - HDG

3D VIEW



MATERIAL LIST					
ITEM	No.OFF	SECTION	LENGTH	GRADE	WEIGHT(kg)
19RA/7	1	RHS150*100*8.0	4500	C450L0	124.3
19p/4	2	PLT25*270	330	250	35.0
19p/22	4	PLT20*240	590	250	69.4
19s/1	1	RHS150*100*8.0	4500	C450L0	124.3
TOTAL:			353.1		5.6

General Notes

REV NAME DATE DESCRIPTION

2 SSK 31/05/24 ISSUED FOR FABRICATION
1 KP 28/05/24 ISSUED FOR FABRICATION
0 KP 25/05/24 ISSUED FOR FABRICATION

TSS Engineering

CHB TWIN RAIL&SCREEN

TSS
ENGINEERING

DRAWING TITLE: MID RAIL ASSEMBLY	ISSUE DATE: 27.06.2024	APPROVAL SENT: 31.05.2024
CONTRACT: CHB TWIN RAIL&SCREEN	CHECKED DATE: 31.05.2024	APPROVAL DATE: 31.05.2024
MODELED BY: SK	CREATED: 24.05.2024	CHECKED BY: GK
SCALE: 1:15	PROJECT No. 23382	ASSEMBLY No. - 19RA/7
QUANTITY: 1	SHEET No. 1	REV. 2



This WPS and supporting PQR test packs were independently reviewed and approved by

Name	Qualification	Signature	Dated
Sameer Sameem	AU/ IWI S/0476		22/05/2024
Anu Mathew	AU/ IWI S/0358		22/05/2024

2024

TSS ENGINEERING Pty. Ltd.

Welding Procedure Specification





Mechanical Test Report

ARL Report No.

MTSS-319-150-11-M

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: WPS Requalification Test to PQR No. 001, WPS No. 001-01
Welding Process/es: GMAW (MAG) -135 Welding Position: 2G-PC / 2F-PB
Base Material: AS/NZS 3678 Grade 350 (Nominal Thickness: 12mm)
Welder ID: Yuzhen Piao (TSS-027)
Order No.: TSS_813
Work Voucher No.: D2459
Tested By: S. Sameem/ K. Hadley/ A. Hao
Test Date: 13-July-2023

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Table 6.2.2) and AS/NZS ISO 9606.1:2017 Clause 7
Item/s Tested: 300x12mm thick double-sided fillet test plate as supplied.
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: N/A
Weld Finish: As Welded – SP1
Time of Test: N/A

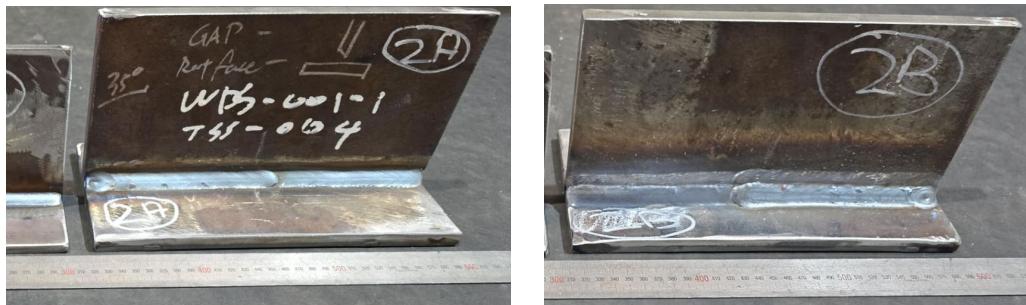


Figure 1. Photos of the test sample as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611

Accredited for compliance with ISO/IEC 17025 – Testing.

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 13-July-2023



Mechanical Test Report

ARL Report No.

MTSS-319-150-11-M

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Clause 4.7.4)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital

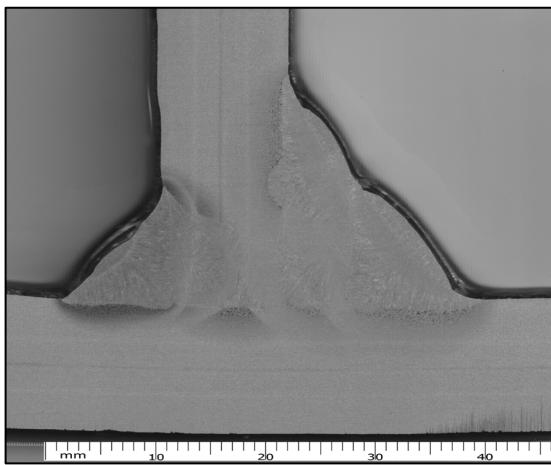


Figure 2. Etched Macro Section. Magnification at 5X approx.

Test Result: The macro complied as a Single Bevel Full Penetration T Joint butt weld with superimposed 8mm and 16mm fillet welds.

===== End of Report =====



This WPS and supporting PQR test packs were independently reviewed and approved by

Name	Qualification	Signature	Dated
Sameer Sameem	AU/IWI S/0476		22/05/2024
Anu Mathew	AU/IWI S/0358		22/05/2024

TSS ENGINEERING Pty. Ltd.

Welding Procedure Specification



Project: Standard Procedure				PQR No.001			WPS No.001					
Welding Code		AS/NZS 1554.1-2014 SP				Material Grade qualified			AS/NZS 3678 GRADE350 300,250,200			
Welding Process		GMAW				Material Thickness qualified			6mm-24mm			
Welding Position		1G, 2G				Material Type No. W Group No.			TYPE 4,3,2,1 W GROUP 5,4,3,2,1			
Joint Type		Single bevel butt weld, (Prequalified Joint T-C4A) with superimposed fillet										
Joint Preparation						Pass Sequence						
Joint Tolerances			Diameter – Thickness				Thermal Treatment					
Bevel Angle	45-60°		Pipe Diameter			N/A		Preheat °C	Ambient temp (note2)			
Root Gap	2.5mm - 4 mm							Inter-pass °C	MAX.300 °C			
Root Face	0mm – 1.5 mm							P.W.H.T.	N/A			
Consumable Details and Welding Parameters												
Consumable Classification			AS/NZS14341: B G 49A 3U C1/ M21 /M24/ S6 or equivalent			Technique		Semi-Automatic Push, Stringer				
Trade Name			Any			Electrode Stick-out		8-12mm				
						Welding Transfer mode		SPRAY				
Shielding Gas			ISO 14175 M24 (Note 3)			Inter-run Cleaning		GRINDING & STEEL BRUSH				
Flow Rate			18-25 L/MIN			Back Gouging		GRINDING				
Run No.	Side	Pos.	Electrode/Wire		Shielding Gas	Amps	Volts	Polarity	Travel speed mm/min	Interpass Tem. °C	Heat Input Kj	
1.	A	2G	Size	Filler Material	ISO 14175 M24	261-319	26-30	DCEP	380-514	Maximum Inter-pass Temp. 300 °C	0.79-1.5	
2.	A	2G	1.2mm	LW1-6		270-330	27-31	DCEP	216-292		1.49-2.8	
3.	A	2G	1.2mm	LW1-6		264-323	28-32	DCEP	263-356		1.24-2.35	
4.	A	2G	1.2mm	LW1-6		250-304	28-32	DCEP	310-420		1-1.88	
5.	B	2G	1.2mm	LW1-6		257-314	28-33	DCEP	301-407		1.02-2.06	
Notes and Approvals										Reviewed & Approved		
Note 1. AS/NZS 1554.1 - 2014 TABLE E1 – Other qualified joint : B-C 4a and C-C 4a . AS/NZS 1554.1 - CL4.1.2 (b) – prequalified butt-welded joint listed in Table E1 shall qualify all other welding position listed for that joint and angle of preparation used without further testing												
Note 2. AS/NZS 1554.1-2014 CL 5.3 – Preheat shall be calculate on combined joint thickness and applied before weld. Note 3. Core Has 5/2 SG or any equivalent with addition to the requirement of Table 4.11D AS/NZS 1554.1:2014												
Prepared By: Juwon Ha (Supervisor)			Date	07/07/2023	 Weld Australia Certified Senior Welding Inspector (CSWI) (Formerly known as WTIA CSWI) YASHPAL SINGH KANDA Registration No: YK880147-01-Rev.0 Expiry Date: 09/09/2025 Signature : Date: 05/04/2022			INTERNATIONAL WELDING INSPECTOR(BASIC)				
Approved for Construction: Yashpal Singh Kanda						SUNGMOOK PARK						





This WPS and supporting PQR test packs were independently reviewed and approved by

Name	Qualification	Signature	Dated
Sameer Sameem	AU/IWI S/0476		22/05/2024
Anu Mathew	AU/IWI S/0358		22/05/2024

TSS ENGINEERING Pty. Ltd.

Procedure Qualification Record



Page 1 of 1				PQR No. 001							
Welding Code	AS/NZS 1554.1-2014 SP			Material Grade	AS/NZS 3678 GRADE 350						
Welding Process	GMAW			Thickness	12mm						
Position	2G			Material Type No.	STEEL TYPE 4						
Joint Type	Single bevel butt weld with superimposed fillet, (Prequalified Joint T-C4A)			W Group No.	W GROUP 5						
Joint Preparation				Pass Sequence							
Joint Tolerances		Diameter – Thickness			Thermal treatment						
Bevel Angle	50°	Pipe Diameter	N/A		Preheat Temp. °C	27 °C					
Root Gap	4mm	Plate Thickness	12mm		Inter-pass Temp. °C	MAX 98 °C					
Root Face	1.5mm	Combined Thickness	36mm		P.W.H.T.	N/A					
Consumable Details and Welding Parameters											
Consumable Classification			AS/NZS14341: B G 49A 3U C1/ M21 /M24/ S6		Welding Technique		Semi-Automatic Push, Stringer				
Trade Name/Product			CIGWELD/ Autocraft LW1-6		Electrode Stick-out		10mm				
Batch No.			2001264		Welding Transfer mode		SPRAY				
Shielding Gas			COREGAS 5/2 SG		Inter-run Cleaning		GRINDING & STEEL BRUSH				
Flow Rate			20 L/MIN		Back Gouging		GRINDING				
Run No.	Side	Pos.	Electrode/Wire		Shielding Gas	Amps	Volts	Polarity	Travel Speed mm/min	Interpass Tem. °C	Heat Input Kj
			Size	Filler Material							
1.	A	2G	1.2mm	LW1-6	ISO 14175 M24	290	28	DCEP	447	27°C	1.09
2.	A	2G	1.2mm	LW1-6		300	29	DCEP	254	81°C	2.05
3.	A	2G	1.2mm	LW1-6		294	30	DCEP	310	98°C	1.70
4.	A	2G	1.2mm	LW1-6		277	30.7	DCEP	365	70°C	1.39
5.	B	2G	1.2mm	LW1-6		286	30.5	DCEP	354	71°C	1.47
Notes, Testing Requirements and Approvals											
1. Visual inspection of welded coupons carried out at workshop and samples complied with AS/NZS1554.1-2014 SP Table 6.2.2 (in house)										Reviewed & Approved	
2. Back gouging has been carried out until sound weld meal achieve from side b and grinded surface visually inspected.										 YASHPAL SINGH KANDA Registration No: YK880147-01-Rev.0 Expiry Date: 09/09/2025	
NDT			Mechanical Testing								
V	VISUAL-MTSS-319-145 M		V	Macro-MTSS-319-145 M							
V	UT-TSS-117-212-01 UT										
Welder Name / ID: Sung Bin Hong/ TSS-022							Date	07/07/2023			
Prepared By: Juwon Ha (Supervisor)							Witnesses By	S. PARK(IWIB)			
Manufacturer Approval: Yashpal Singh Kanda							 YASHPAL SINGH KANDA Registration No: YK880147-01-Rev.0 Expiry date: 09/09/2025 Signature:				



Customer:	INFRABUILD STEEL CENTRE ELECTRONIC TRADING WETHERILL PARK N S W 2164	Supplier:	BLUESCOPE STEEL (AIS) PTY LTD PORT KEMBLA, N.S.W., AUSTRALIA. A.B.N. 19 000 019 625
Cust Order No:	7506348320	Sales Order No:	H0500
		Printed At:	Supplier MWS on: 29/01/2020



Accredited for compliance with ISO/IEC 17025 - Testing.

I certify that the original records of the company show that the item(s) referred to on this certificate conform to the specification as stated.

R.MATHIESSEN - BLUESCOPE STEEL APPROVED SIGNATORY
Mechanical LAB 0631
M.GATRICK - BLUESCOPE STEEL APPROVED SIGNATORY
Chemical LAB 0632

STEELMAKING: Basic Oxygen - Slab Cast

INSPECTION: Supplier

SPECIFICATION: AS/NZS 3678-350

CERTIFICATION: EN10204 3.1

PRODUCT: XLERPLATE

CHEMICAL ANALYSIS

Percentage of element by mass (L=Cast, P=Product, -S=Soluble, -T=Total, CF=Chemical Formula, n=Min, x=Max)

Item No	Heat / Unit No	NATA Lab	L/P	C	P	Mn	Si	S	Ni	Cr	Mo	Cu	Al-T
0092C	6690199	0632	L	.153	.025	1.20	.30	.015	.017	.040	.004	.051	.025

Item No	Heat / Unit No	NATA Lab	L/P	Ti	B-T	Nb	V	CF1	CF2	CF3
0092C	6690199	0632	L	.016	.0004	.001	<.003	.37	.11	.02

CF1=C+ (MN/6) + ((CR+MO+V)/5) + ((CU+NI)/15) CF2=NI + CR + CU + MO CF3=NB + TI + V

MECHANICAL TESTING**Tensile AS 1391**

Item No	Heat No	Tested Unit	NATA Lab	Cat	Loc	THICK mm	ReH MPa	Rm MPa	Lo	ELONGN %
0092C	6690199	MH289	0631	P	TQM	12.00	385	510	A	30
0092C	6690199	MH290	0631	P	TQM	12.00	395	510	A	34

ITEMS COVERED BY THIS CERTIFICATE

Item No	Heat No	Ordered Dimensions (mm)	No of Units	Mass (Tonnes)	Unit Identities
0092C	6690199	2400.0X12.00X9600	4	8.680	MH289C1 MH290A1 MH290B1 MH290C1

COMMENTS

This test certificate is issued subject to the Uncertainty of Results statement set out on BlueScope Steel's Website www.bluescopesteelconnect.com. In order to rely upon this certificate, you must read the Uncertainty of Results statement.

THIS PRODUCT IS SUPPLIED IN ACCORDANCE WITH THE REQUIREMENTS OF AS/NZS 3678:2016. SAMPLING AND CHEMICAL ANALYSIS ARE PERFORMED IN ACCORDANCE WITH BLUESCOPE STEEL PROCEDURE DH-LABS-QS-00 S05.07C. MECHANICAL TESTING HAS BEEN PERFORMED ON SAMPLES SUPPLIED BY THE RELEVANT PRODUCTION DEPARTMENTS. HEAT TREATMENT - PRODUCT AS ROLLED. Quality management system conforms to AS/NZS ISO 9001 as assessed by BSI (Certificate Number FS 594448).

MECHANICAL COMMENTS

TEST PIECE LOCATION (LOC) TQM=Transverse Quarter Middle

TEST CATEGORY (CAT) P=Pattern

GAUGE LENGTH (Lo) A=5.65 * square root of the original cross-sectional area of the test piece.

Product Information

Product / Tradename	Autocraft LW1-6	Certificate No.	13031
Standard / Classification	AS/NZS 14341: B G 49A 3U C1/M21/M24 S6 AWS/ASME-SFA A5.18: ER70S-6	Date	27/04/21
		Batch No.	2001264
		Part Number	720096
		Consumable Type	Solid Mig Wire
Size	1.2 mm	Country of Origin	China

[2.2] - Typical Chemical Analysis

Typical Data: Acc To En 10204 2.2

C	Mn	Si	P	S	Ni	Cr	Mo	V	Cu	Nb	Ti	Al	B	Zr
0.07	1.44	0.85	0.014	0.008	0.02	0.04	0.02		0.14					

Notes

[2.2] - Typical Mechanical Properties

Typical Data: Acc To En 10204 2.2

Tensile Properties

Condition	Shielding	ISO 14175: M21	
Test Temp	R _p 0.2% Yield	R _m UTS	A ₅ Elongation
Ambient	440 MPa	552 MPa	27%

Impact Properties

Typical Data: Acc To En 10204 2.2

Temp	Impact Value	Lateral Expansion
-30°C	80 J avg.	

Other Mechanical Properties - Typical Avg.

Hardness	
----------	--

Other Properties / Information

Diffusible Hydrogen (typical) ml H/100g weld metal	Radiographic Soundness	
---	------------------------	--

Compliance

Cigweld Pty. Ltd. certifies that the material listed in the certificate conforms to the listed specifications and this product is supplied under a QA Program fulfilling the EN ISO 9001 standard

This certificate is produced electronically and is valid without signature.

Issued by

Vida Mokhtar
Quality Manager

Reviewed by

Damian Bibby
Senior Brand Manager - Consumables

Company Details

Cigweld Pty Ltd
71 Gower Street, Preston
Victoria, Australia, 3072
Tel: (03) 94747400
Fax: (03) 94747391

CERTIFICATE OF CONFORMANCE

COREGAS 5/2 SG Product Code: 271150

This is to certify that quality verification tests have been performed on representative samples of Coregas 5/2 from Coregas' approved production plants and the results of the tests comply with the requirements of the Coregas 5/2 specification.

Component	Chemical Formula	Specification	Unit
Argon	Ar	Balance	
Carbon dioxide	CO ₂	5	%
Oxygen	O ₂	2	%

Cylinder connection as per AS2473

Type 10

Cylinder pressure at 15°C

20,000 kPa

Package content at 15°C, 101 kPa

10.6 m³

Remarks:

-

Approved by:



National Quality and Compliance Manager

Date of issue:

1 September 2018



Complies with requirements
of ISO 9001

ISO 9001



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

Ultrasonic Test Report

Unit 13 & 14, 55-61 Pine Road

Yennora NSW 2161

Phone (02) 9681 1316

Fax (02) 9681 6375

Report No.	TSS-117-212-01 UT	Date of test	05-Jul-23	to	05-Jul-23	Page	1	of	1		
Client	TSS Engineering Pty Ltd				ARL Job No. TSS-117	Work Voucher No.	D2432				
Client Address	21 Pullman Place, Emu Plains, NSW 2750				Order No.	TSS_00811					
Project	PQR/WPS testing as below				Client Job No.	TSS_00811					
Items Tested	300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld				Client Request No.	TSS_00811					
Test Location	21 Pullman Place, Emu Plains, NSW 2750				Drawing No.	Photo shown					
Acceptance	AS/NZS 1554.1 - 2014 SP Table 6.2.1 / ASNZS ISO 9606.1 - 2017 Clause 7				Flaw Detector	Epoch IV -					
Method	AS 2207-2007				Material	AS/NZS 3678 Grade 350			Serial No. 18050011		
Technique	Pulsed Echo				Surface Condition	As Welded			Calibration Block V2-7032		
Sizing Method	6 dB Drop				Weld Finish	SP1-Undressed			Sensitivity Block 1003070		
ARL Procedure	QTP-121 Rev. 2				Time of Test	Post weld			Tool Kit No. Epoch IV		
Technicians	Rizwan Ali				Heat Treatment	N/A			Couplant Polycell Paste		
Restrictions	Nil				Weld Process	GMAW-135					
<u>Test Method Designation</u>						Probe	Angle	Type	Size	MHz	Serial No
UMA	UMB	UMC	UMF	UMG		MSEB-4	0°	Dual	3.5X10	4	24094
						MWB70-4E	70°	Single	8x9	4	41678
Double Prep.	Single Prep.	T-Butt	Set Through	Set On		MWB60-4E	60°	Single	8x9	4	36965
						N/A	N/A	N/A	N/A	N/A	N/A
Date	Item	Welder ID	Weld No	Test Length	Test Method	Wall Thickness (mm)	Interpretation (mm)		Result		
05-Jul-23	Weld Procedure/ Welder Performance Qualification Test to PQR No. 001, Pos: 2G/2F Single Bevel Butt Weld T-Joint Welder: Sung Bin Hong	TSS- 022	W1	250mm	UMC	12mm	NRD		C		

===== End of Report =====

ARL Laboratory Services - Abbreviations						NATA Accredited Laboratory No. 12611			
C	Complies	IL	Linear Inclusion	IN	Inclusions				
DNC	Does Not Comply	PI	Point Indication's	KT	Transverse Crack	Accredited for compliance with ISO/IEC 17025 - Testing.			
NRD	No Recordable Discontinuities	KL	Longitudinal Crack	SXP	Excess Penetration				
LP	Lack of Penetration								
LF	Lack of Fusion								
LR	Lack Of Root Fusion								
SUC	Undercut								

ARL Signatory :

Rizwan Ali

Signature :

Date : 05-Jul-23



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-145-M

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Weld Procedure/ Welder Performance Qualification Test to PQR No. 001
Process: GMAW (MAG) -135, Pos: 2G-PC / 2F-PB
Base Material: AS/NZS 3678 Grade 350 (Thickness: 12mm, Heat No.: 6690199)
Welder ID: SUNG BIN HONG (TSS-022)
Order No.: TSS_811
Work Voucher No.: D2432
Tested By: S. Sameem/ K. Hadley/ A. Hao
Test Date: 06-July-2023

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Table 6.2.2) and AS/NZS ISO 9606.1:2017 Clause 7
Item/s Tested: 300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld.
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: N/A
Weld Finish: As Welded – SP1
Time of Test: N/A



Figure 1. Photos of the test sample as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611

Accredited for compliance with ISO/IEC 17025 – Testing.

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 06-July-2023



Mechanical Test Report

ARL Report No.

MTSS-319-145-M

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital

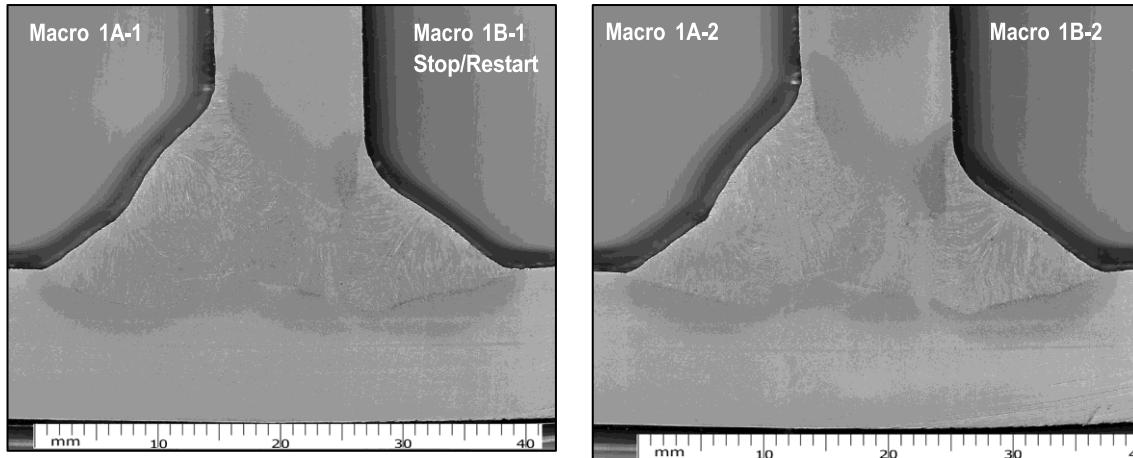


Figure 2. Etched Macro Sections. Magnification at 5X approx.

Test Result: The macros complied as Single Bevel Butt Welds T-Joints with superimposed 8mm Single Run Fillet welds on the root side.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE

Designation: AS/NZS ISO 9606.1/135/P/BW.FW/FM1/S/12t/12D/PB.PC/ml



TOTAL STEEL SOLUTIONS

Welder name:	Seungho Shin	
Identification Number:	TSS-004	
PQR No:	PQR-001	
WPS No:	WPS-001	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1 :2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

Variable:	Test Piece	Range of Qualification	References
referenced Standard(s):	AS/NZS ISO 9606.1: 2017	AS/NZS ISO 9606.1 : 2017	AS/NZS ISO 9606.1 : 2017
welding Process (es):	GMAW(135)	GMAW(135)	Clause 4.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	N/A
Test Plate Type:	Plate	Plate & Pipe (Fixed ≥500mm OD) Rotating Pipe With ≥75mm OD	Table 10
Type of Weld:	Single bevel butt weld T joint, Welded both side	Fillet weld in combination with a butt weld	Clause 5.4 (b)
Parent Metal and Group:	AS/NZS 3678 Grade 350 (Group 1)	Steel Group 1	Clause 5.5.1 and ISO/TR 15608 Cluse 10 (Non-essential variable)
Filler material group	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid wire electrode, rod (S) Metal cored electrode, Rod (M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	N/A
Electrode current and polarity:	DCEP	DCEP	Clause 10
Material Thickness:	12mm	3mm-Unlimited	Table 8
Outside Diameter (mm):	N/A	N/A	N/A
Welding Position:	PB,PC	PA,PB,PC	Table 9
Weld details:	Welding from both sides (bs)	Material backing (ss,mb) Welding from both sides (bs)	Table 11
Multi-layer/Single layer:	Multi-Layer	Signle & Multi-Layer	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-187-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Ultrasonic Testing	Complied	TSS-117-285-UT	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-187-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Name	Signature	Position or Title	Date	Name	Position or Title
22/02/2024	Juwon Ha		WELDING SUPERVISOR		Juwon Ha	

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS ISO 9606.1:2017 Sec 9.2)

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
22/02/2024	Juwon Ha		WELDING SUPERVISOR				

The statements in this record are true and correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-187-VM

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welder Performance Qualification Test to WPS No. 001
Welding Process/es: GMAW - 135 Welding Position/s: 2G-PC
Base Material/s: AS/NZS 3678 Grade 350 (Thickness: 12mm)
Welder ID: Seungho Shin (TSS-004)
Order No.: TSS_00859 **Work Voucher No.:** D3113
Tested By: S. Sameem/ K. Hadley/ A. Hao **Test Date/s:** 22-Feb-2024

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Table 6.2.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested: 300 x 12mm thick T-joint butt weld with 8mm fillet superimposed, as supplied
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: External weld surfaces only
Weld Finish: As Welded – SP1
Time of Test: Final weld inspection
Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 22-Feb-2024



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

Ultrasonic Test Report

Unit 13 & 14, 55-61 Pine Road
Yennora NSW 2161
Phone (02) 9681 1316
Fax (02) 9681 6375

Report No.	TSS-117-285 UT	Date of test	22-Feb-24	to	22-Feb-24	Page	1	of	1				
Client	TSS Engineering Pty Ltd	ARL Job No. TSS-117			Work Voucher No. D3113								
Client Address	21 Pullman Place, Emu Plains, NSW 2750					Order No. TSS_00859							
Project	PQR/WPS testing as below					Client Job No. TSS_00859							
Items Tested	300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld					Client Request No. TSS_00859							
Test Location	21 Pullman Place, Emu Plains, NSW 2750					Drawing No. Photo shown							
Acceptance	AS/NZS 1554.1 - 2014 SP Table 6.2.1 / ASNZS ISO 9606.1 - 2017 Clause 7					Flaw Detector Epoch IV -							
Method	AS 2207-2007		Material AS/NZS 3678 Grade 350		Serial No. 18050011								
Technique	Pulsed Echo		Surface Condition As Welded		Calibration Block V2-7032								
Sizing Method	6 dB Drop		Weld Finish SP1-Undressed		Sensitivity Block 1003070								
ARL Procedure	QTP-121 Rev. 2		Time of Test Post weld		Tool Kit No. Epoch IV								
Technicians	Jinwoo Ahn		Heat Treatment N/A		Couplant Polycell Paste								
Restrictions	Nil		Weld Process GMAW-135										

==== End of Report =====

<u>ARL Laboratory Services - Abbreviations</u>		
C	Complies	
DNC	Does Not Comply	IL Linear Inclusion
NRD	No Recordable Discontinuities	IN Inclusion's
LP	Lack of Penetration	PI Point Indication's
LF	Lack of Fusion	KT Transverse Crack
LR	Lack Of Root Fusion	KL Longitudinal Crack
SUC	Undercut	SXP Excess Penetration



NATA
WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory No. 12611

Accredited for compliance with ISO/IEC 17025 - Testing.

ARL Signatory: [Rizwan Ali](#)

Signature : R. D.

Date : 22-Feb-24



Mechanical Test Report

ARL Report No.

MTSS-319-187-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) & AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital Solutions (A.1) – Swab Method

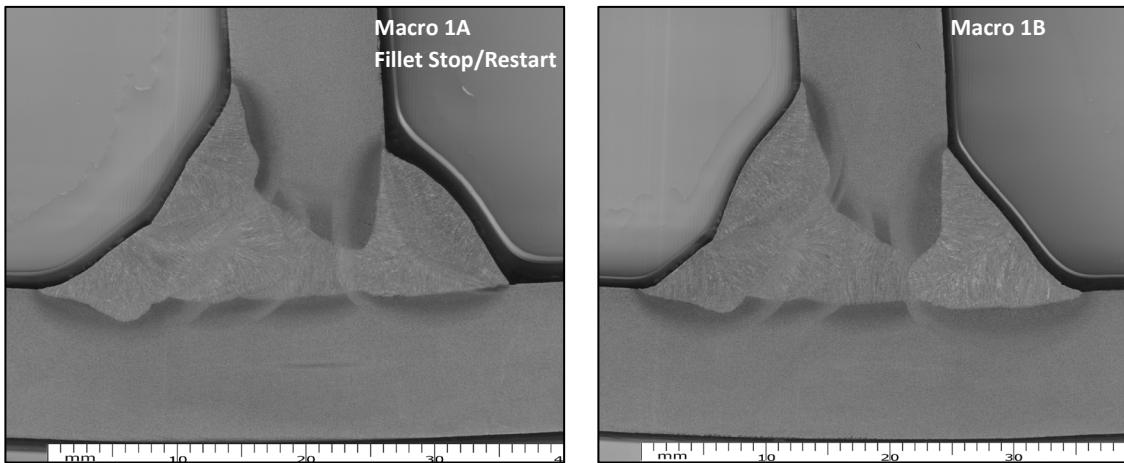


Figure 1. Etched macro sections. Magnification at 5X Approx.

Test Result: The macros complied as Single Bevel Full Penetration T-Joint Butt Weld, with superimposed 8mm Fillet Welds.

Note Weld, welder and materials details supplied by the client.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE



TOTAL STEEL SOLUTIONS

Designation: AS/NZS ISO 9606.1/135/P/BW/FM1/S/12t/12D/PB,PC/ml

Welder name:	Sungbin Hong	
Identification Number:	TSS-022	
PQR No:	PQR-001	
WPS No:	WPS-001	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1 :2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

Variable:	Test Piece	Range of Qualification	References
Preferred Standard(s):	AS/NZS ISO 9606.1: 2017	AS/NZS ISO 9606.1 : 2017	AS/NZS ISO 9606.1 : 2017
Welding Process (es):	GMAW(135)	GMAW(135)	Clause 4.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	N/A
Test Plate Type:	Plate	Plate	Table 10
Type of Weld:	Single bevel butt weld T joint, Welded both side	Fillet weld in combination with a butt weld	Clause 5.4 (b)
Parent Metal and Group:	Steel Group 1	Steel Group 1	Clause 5.5.1 (ISO/TR15608 2017 Table 1)
Filler material group	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid wire electrode, rod (S) Metal cored electrode, Rod (M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	N/A
Type of current and polarity:	DCEP	DCEP	Clause 10
Material Thickness:	12mm	3mm-Unlimited	Table 8
Pipe Outside Diameter (mm):	N/A	N/A	N/A
Welding Position:	PB,PC	PA,PB,PC	Table 9
Weld details:	Single bevel butt weld T joint, Welded both side	Material backing (ss,mb) Welding from both sides (bs)	Table 11
Multi-layer/Single layer:	Multi-Layer	Signle & Multi-Layer	Table 12

Type of Test	Results	Test report		Examiner/Examining body
Visual Testing	Complied	MTSS-319-145-M		ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Ultrasonic	Complied	TSS-117-212-01 UT		ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-145-M		ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
07/07/2023	Juwon Ha		WELDING SUPERVISOR				

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS ISO 9606.1:2017 Sec 9.2)

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
07/07/2023	Juwon Ha		WELDING SUPERVISOR				
07/01/2024	Juwon Ha		WELDING SUPERVISOR				

The statements in this record are true and correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

Ultrasonic Test Report

Unit 13 & 14, 55-61 Pine Road

Yennora NSW 2161

Phone (02) 9681 1316

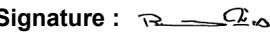
Fax (02) 9681 6375

Report No.	TSS-117-212-01 UT	Date of test	05-Jul-23	to	05-Jul-23	Page	1	of	1
Client	TSS Engineering Pty Ltd				ARL Job No. TSS-117	Work Voucher No. D2432			
Client Address	21 Pullman Place, Emu Plains, NSW 2750				Order No. TSS_00811				
Project	PQR/WPS testing as below				Client Job No. TSS_00811				
Items Tested	300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld				Client Request No. TSS_00811				
Test Location	21 Pullman Place, Emu Plains, NSW 2750				Drawing No. Photo shown				
Acceptance	AS/NZS 1554.1 - 2014 SP Table 6.2.1 / ASNZS ISO 9606.1 - 2017 Clause 7				Flaw Detector Epoch IV -				
Method	AS 2207-2007				Material AS/NZS 3678 Grade 350	Serial No. 18050011			
Technique	Pulsed Echo				Surface Condition As Welded	Calibration Block V2-7032			
Sizing Method	6 dB Drop				Weld Finish SP1-Undressed	Sensitivity Block 1003070			
ARL Procedure	QTP-121 Rev. 2				Time of Test Post weld	Tool Kit No. Epoch IV			
Technicians	Rizwan Ali				Heat Treatment N/A	Couplant Polycell Paste			
Restrictions	Nil				Weld Process GMAW-135				

Test Method Designation						Probe	Angle	Type	Size	MHz	Serial No
UMA	UMB	UMC	UMF	UMG		MSEB-4	0°	Dual	3.5X10	4	24094
Double Prep.	Single Prep.	T-Butt	Set Through	Set On		MWB70-4E	70°	Single	8x9	4	41678
						MWB60-4E	60°	Single	8x9	4	36965
						N/A	N/A	N/A	N/A	N/A	N/A
Date	Item	Welder ID	Weld No	Test Length	Test Method	Wall Thickness (mm)	Interpretation (mm)			Result	
05-Jul-23	Weld Procedure/ Welder Performance Qualification Test to PQR No. 001, Pos: 2G/2F Single Bevel Butt Weld T-Joint Welder: Sung Bin Hong	TSS- 022	W1	250mm	UMC	12mm	NRD			C	

===== End of Report =====

ARL Laboratory Services - Abbreviations						 NATA Accredited Laboratory No. 12611 Accredited for compliance with ISO/IEC 17025 - Testing.
C	Complies	IL	Linear Inclusion			
DNC	Does Not Comply	IN	Inclusion's			
NRD	No Recordable Discontinuities	PI	Point Indication's			
LP	Lack of Penetration	KT	Transverse Crack			
LF	Lack of Fusion	KL	Longitudinal Crack			
LR	Lack Of Root Fusion	SXP	Excess Penetration			
SUC	Undercut					

ARL Signatory : Rizwan Ali Signature :  Date : 05-Jul-23



Mechanical Test Report

ARL Report No.

MTSS-319-145-M

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Weld Procedure/ Welder Performance Qualification Test to PQR No. 001
Process: GMAW (MAG) -135, Pos: 2G-PC / 2F-PB
Base Material: AS/NZS 3678 Grade 350 (Thickness: 12mm, Heat No.: 6690199)
Welder ID: SUNG BIN HONG (TSS-022)
Order No.: TSS_811
Work Voucher No.: D2432
Tested By: S. Sameem/ K. Hadley/ A. Hao
Test Date: 06-July-2023

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Table 6.2.2) and AS/NZS ISO 9606.1:2017 Clause 7
Item/s Tested: 300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld.
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: N/A
Weld Finish: As Welded – SP1
Time of Test: N/A



Figure 1. Photos of the test sample as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611

Accredited for compliance with ISO/IEC 17025 – Testing.

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 06-July-2023



Mechanical Test Report

ARL Report No.

MTSS-319-145-M

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital

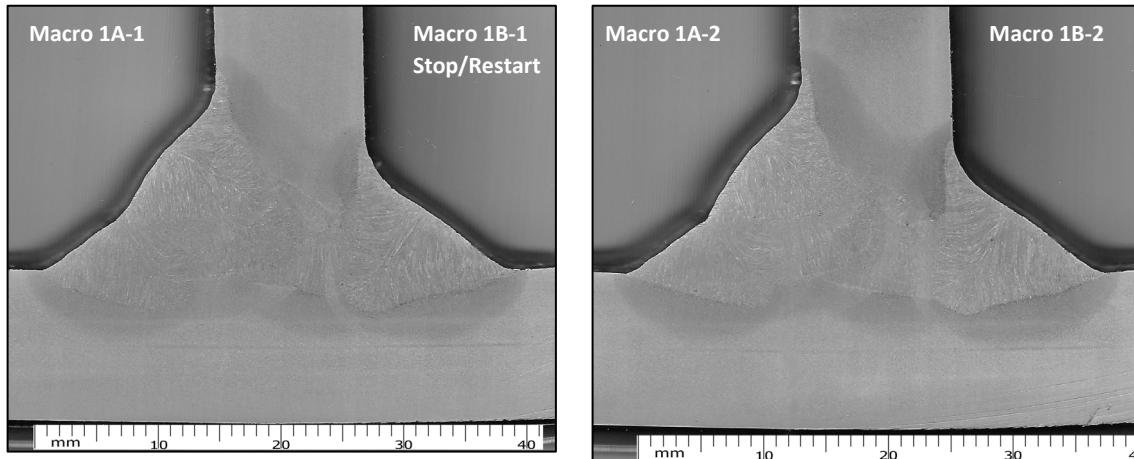


Figure 2. Etched Macro Sections. Magnification at 5X approx.

Test Result: The macros complied as Single Bevel Butt Welds T-Joints with superimposed 8mm Single Run Fillet welds on the root side.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE



Designation: AS/NZS ISO 9606.1/135/P/BW/FM1/S/12t/12D/PB,PC/ml

Welder name:	Yuzhen Piao	
Identification Number:	TSS-022	
PQR No:	PQR-001	
WPS No:	WPS-001	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1 :2017	
Job Knowledge:	Acceptable <input type="checkbox"/>	Not Tested <input checked="" type="checkbox"/>



Variable:	Test Piece	Range of Qualification	References
Preferred Standard(s):	AS/NZS ISO 9606.1: 2017	AS/NZS ISO 9606.1 : 2017	AS/NZS ISO 9606.1 : 2017
Welding Process (es):	GMAW(135)	GMAW(135)	Clause 4.2
Transfer mode:	Spray/Short Arc	Spray/Short Arc	N/A
Test Plate Type:	Plate	Plate	Table 10
Type of Weld:	Single bevel butt weld T joint, Welded both side	Fillet weld in combination with a butt weld	Clause 5.4 (b)
Parent Metal and Group:	Steel Group 1	Steel Group 1	Clause 5.5.1 (ISO/TR15608 2017 Table 1)
Filler material group	FM1	FM1,FM2	Table 2,3
Filler Material and Group/Type:	ER70S-6 Solid wire(S)	Solid wire electrode, rod (S) Metal cored electrode, Rod (M)	Table 5
Shielding Gas:	Argon/CO ₂ 5%/2%	N/A	N/A
Type of current and polarity:	DCEP	DCEP	Clause 10
Material Thickness:	12mm	3mm-Unlimited	Table 8
Pipe Outside Diameter (mm):	N/A	N/A	N/A
Welding Position:	PB,PC	PA,PB,PC	Table 9
Weld details:	Single bevel butt weld T joint, Welded both side	Material backing (ss,mb) Welding from both sides (bs)	Table 11
Multi-layer/Single layer:	Multi-Layer	Single & Multi-Layer	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-146-M	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-146-M	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Ultrasonic Testing	Complied	TSS-117-212-02 UT	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following **3 years** (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
07/07/2023	Juwon Ha		WELDING SUPERVISOR				

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following **6 months** (AS/NZS ISO 9606.1:2017 Sec 9.2)

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
07/07/2023	Juwon Ha		WELDING SUPERVISOR				
07/01/2024	Juwon Ha		WELDING SUPERVISOR				

The statements in this record are true and correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

Ultrasonic Test Report

Unit 13 & 14, 55-61 Pine Road

Yennora NSW 2161

Phone (02) 9681 1316

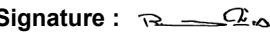
Fax (02) 9681 6375

Report No.	TSS-117-212-02 UT	Date of test	05-Jul-23	to	05-Jul-23	Page	1	of	1
Client	TSS Engineering Pty Ltd				ARL Job No. TSS-117	Work Voucher No.	D2432		
Client Address	21 Pullman Place, Emu Plains, NSW 2750					Order No.	TSS_00811		
Project	WPS testing as below					Client Job No.	TSS_00811		
Items Tested	300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld					Client Request No.	TSS_00811		
Test Location	21 Pullman Place, Emu Plains, NSW 2750					Drawing No.	Photo shown		
Acceptance	AS/NZS 1554.1 - 2014 SP Table 6.2.1 / ASNZS ISO 9606.1 - 2017 Clause 7					Flaw Detector	Epoch IV -		
Method	AS 2207-2007					Material	AS/NZS 3678 Grade 350		
Technique	Pulsed Echo					Surface Condition	As Welded		
Sizing Method	6 dB Drop					Weld Finish	SP1-Undressed		
ARL Procedure	QTP-121 Rev. 2					Time of Test	Post weld		
Technicians	Rizwan Ali					Heat Treatment	N/A		
Restrictions	Nil					Weld Process	GMAW-135		

Test Method Designation						Probe	Angle	Type	Size	MHz	Serial No
UMA	UMB	UMC	UMF	UMG		MSEB-4	0°	Dual	3.5X10	4	24094
Double Prep.	Single Prep.	T-Butt	Set Through	Set On		MWB70-4E	70°	Single	8x9	4	41678
						MWB60-4E	60°	Single	8x9	4	36965
						N/A	N/A	N/A	N/A	N/A	N/A
Date	Item	Welder ID	Weld No	Test Length	Test Method	Wall Thickness (mm)	Interpretation (mm)			Result	
05-Jul-23	Welder Performance Qualification Test to WPS No. 001, Pos: 2G/2F Single Bevel Butt Weld T-Joint Welder: Yuzhen Piao	TSS- 027	W2	250mm	UMC	12mm	NRD			C	

===== End of Report =====

ARL Laboratory Services - Abbreviations						 <p>NATA Accredited Laboratory No. 12611 Accredited for compliance with ISO/IEC 17025 - Testing.</p>
C	Complies	IL	Linear Inclusion			
DNC	Does Not Comply	IN	Inclusion's			
NRD	No Recordable Discontinuities	PI	Point Indication's			
LP	Lack of Penetration	KT	Transverse Crack			
LF	Lack of Fusion	KL	Longitudinal Crack			
LR	Lack Of Root Fusion	SXP	Excess Penetration			
SUC	Undercut					

ARL Signatory :	Rizwan Ali	Signature : 	Date :	05-Jul-23
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ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-146-M

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welder Performance Qualification Test to WPS No. 001
Process: GMAW (MAG) -135, Pos: 2G-PC / 2F-PB
Base Material: AS/NZS 3678 Grade 350 (Thickness: 12mm, Heat No.: 6690199)
Welder ID: YUZHENG PIAO (TSS-027)
Order No.: TSS_811
Work Voucher No.: D2432
Tested By: S. Sameem/ K. Hadley/ A. Hao
Test Date: 06-July-2023

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Table 6.2.2) and AS/NZS ISO 9606.1:2017 Clause 7
Item/s Tested: 300x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld.
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: N/A
Weld Finish: As Welded – SP1
Time of Test: N/A

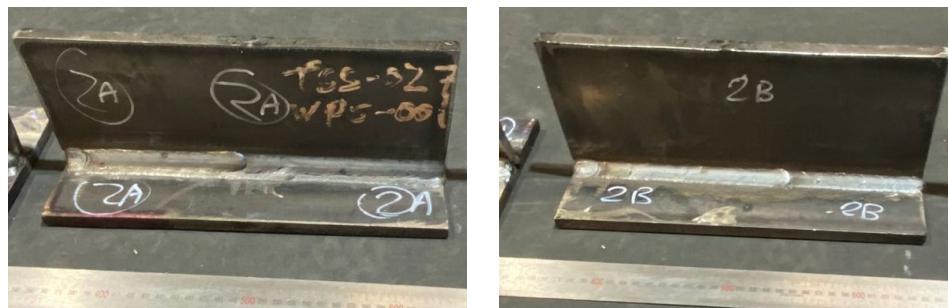


Figure 1. Photos of the test sample as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611

Accredited for compliance with ISO/IEC 17025 – Testing.

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 06-July-2023



Mechanical Test Report

ARL Report No.

MTSS-319-146-M

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Category (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital

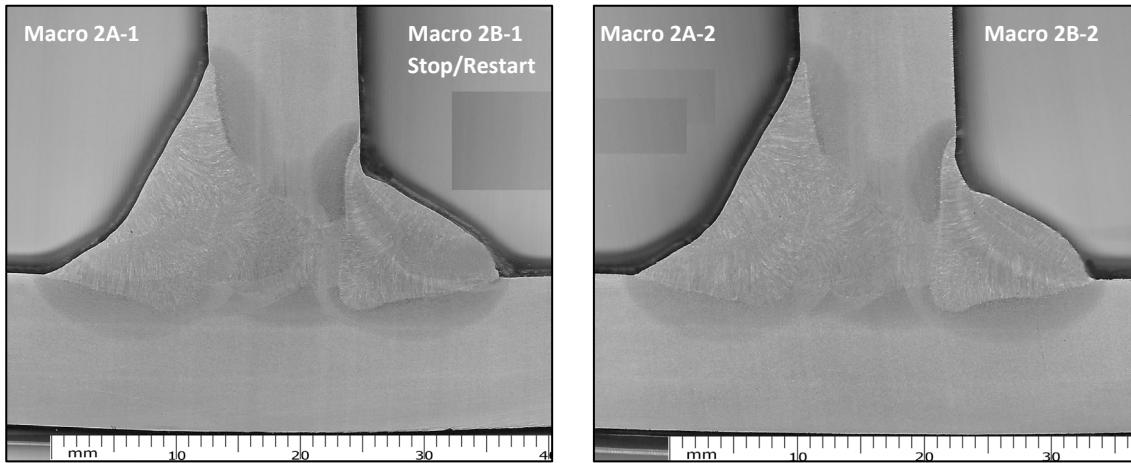


Figure 2. Etched Macro Sections. Magnification at 5X approx.

Test Result: The macros complied as Single Bevel Butt Welds T-Joints with superimposed 8mm Single Run Fillet welds on the root side.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE



Designation: AS/NZS ISO 9606.1/135/P/BW/FM1/S/12t/12D/PB.PC/ml

Welder name:	Seung Hwangbo	
Identification Number:	TSS-052	
PQR No:	PQR-001	
WPS No:	WPS-001	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1 :2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

Variable:	Test Piece	Range of Qualification	References
referenced Standard(s):	AS/NZS ISO 9606.1: 2017	AS/NZS ISO 9606.1 : 2017	AS/NZS ISO 9606.1 : 2017
welding Process (es):	GMAW(135)	GMAW(135)	Clause 4.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	N/A
Test Plate Type:	Plate	Plate	Table 10
Type of Weld:	Single bevel butt weld T joint, Welded both side	Fillet weld in combination with a butt weld	Clause 5.4 (b)
Parent Metal and Group:	Steel Group 1	Steel Group 1	Clause 5.5.1 (ISO/TR15608 2017 Table 1)
Filler material group	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid wire electrode, rod (S) Metal cored electrode, Rod (M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	N/A
Code of current and polarity:	DCEP	DCEP	Clause 10
Material Thickness:	12mm	3mm-Unlimited	Table 8
Outside Diameter (mm):	N/A	N/A	N/A
Welding Position:	PB,PC	PA,PB,PC	Table 9
Weld details:	Single bevel butt weld T joint, Welded both side	Material backing (ss,mb) Welding from both sides (bs)	Table 11
Multi-layer/Single layer:	Multi-Layer	Signle & Multi-Layer	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-202-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Ultrasonic Testing	Complied	TSS-117-294 UT	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-202-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Name	Signature	Position or Title	Date	Name	Position or Title
10/04/2024	Juwon Ha		WELDING SUPERVISOR		Juwon Ha	

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS ISO 9606.1:2017 Sec 9.2)

Date	Name	Signature	Position or Title	Date	Name	Signature	Position or Title
10/04/2024	Juwon Ha		WELDING SUPERVISOR				

The statements in this record are true and correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-202-VM

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welder Performance Qualification Test to WPS No. 001
Welding Process/es: GMAW-135 Welding Position/s: 2G-PC / 2F-PB
Base Material/s: AS/NZS 3678 Grade 350 (Nominal thickness: 12mm)
Welder ID: Seung Hwangbo (TSS-052)
Order No.: TSS_870 **Work Voucher No.:** D3233
Tested By: S. Sameem/ K. Hadley/ A. Hao **Test Date/s:** 10-Apr-2024

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Table 6.1.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested: 250 x 12mm thick double-sided welded test plate as supplied
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: External weld surfaces only
Weld Finish: As Welded – SP1
Time of Test: Final weld inspection



Figure 1. Photos of the test samples as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 10-Apr-2024



Mechanical Test Report

ARL Report No.

MTSS-319-202-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital (A.1) – Swab Method

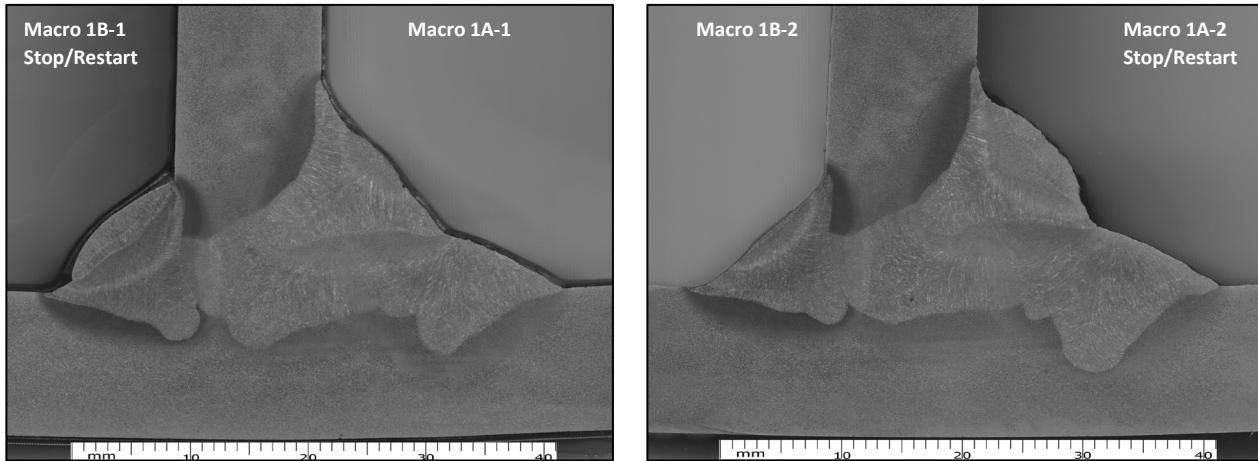


Figure 2. Etched macro sections. Magnification at 5X Approx.

Test Result: The macros complied as Single Bevel Butt Welds with superimposed fillet welds as below:
Macros 1B-1 and 1B-2 complied as 8mm Single Run Fillet Welds (Superimposed).
Macros 1A-1 and 1A-2 complied as 16mm Multi Run Fillet Welds (Superimposed).

Note Weld, welder and materials details supplied by the client.

===== End of Report =====



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

Ultrasonic Test Report

Unit 13 & 14, 55-61 Pine Road

Yennora NSW 2161

Phone (02) 9681 1316

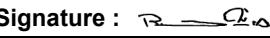
Fax (02) 9681 6375

Report No.	TSS-117-294 UT	Date of test	10-Apr-24	to	10-Apr-24	Page	1	of	1
Client	TSS Engineering Pty Ltd				ARL Job No. TSS-117	Work Voucher No.	D3233		
Client Address	21 Pullman Place, Emu Plains, NSW 2750					Order No.	TSS_00870		
Project	Welder Performance Qualification testing as below					Client Job No.	TSS_00870		
Items Tested	250x12mm thick Single Bevel Butt Weld T-Joint with superimposed 8mm Single Run Fillet Weld					Client Request No.	TSS_00870		
Test Location	21 Pullman Place, Emu Plains, NSW 2750					Drawing No.	N/A		
Acceptance	AS/NZS 1554.1 - 2014 SP Table 6.2.1 / ASNZS ISO 9606.1 - 2017 Clause 7					Flaw Detector	Epoch IV -		
Method	AS 2207-2007					Material	AS/NZS 3678 Grade 350		
Technique	Pulsed Echo					Surface Condition	As Welded		
Sizing Method	6 dB Drop					Weld Finish	SP1-Undressed		
ARL Procedure	QTP-121 Rev. 2					Time of Test	Final weld inspection		
Technicians	Jinwoo Ahn					Heat Treatment	N/A		
Restrictions	Nil					Weld Process	GMAW-135		

Test Method Designation						Probe	Angle	Type	Size	MHz	Serial No
UMA	UMB	UMC	UMF	UMG		MSEB-4	0°	Dual	3.5X10	4	24094
Double Prep.	Single Prep.	T-Butt	Set Through	Set On		MWB70-4E	70°	Single	8x9	4	41678
						MWB60-4E	60°	Single	8x9	4	36965
						N/A	N/A	N/A	N/A	N/A	N/A
Date	Item	Welder ID	Weld No	Test Length	Test Method	Wall Thickness (mm)	Interpretation (mm)			Result	
10-Apr-24	Welder Performance Qualification Test to WPS No. 001, Pos: 2G/2F Single Bevel Butt Weld T-Joint Welder: Seungho Hwangbo	TSS-052	W1	100%	UMC	12mm	NRD			C	

===== End of Report =====

ARL Laboratory Services - Abbreviations						NATA Accredited Laboratory No. 12611				
C	Complies	IL	Linear Inclusion	IN	Inclusion's	 WORLD RECOGNISED ACCREDITATION	NATA Accredited Laboratory No. 12611 Accredited for compliance with ISO/IEC 17025 - Testing.			
DNC	Does Not Comply	PI	Point Indication's	KT	Transverse Crack					
NRD	No Recordable Discontinuities	KL	Longitudinal Crack	SXP	Excess Penetration					
LP	Lack of Penetration									
LF	Lack of Fusion									
LR	Lack Of Root Fusion									
SUC	Undercut									

ARL Signatory : Rizwan Ali Signature :  Date : 10-Apr-24



This WPS and supporting PQR test packs were independently reviewed and approved by

Name	Qualification	Signature	Dated
Sameer Sameem	AU/IWI S/0476		03/06/2024
Anu Mathew	AU/IWI S/0358		03/06/2024

TSS ENGINEERING Pty. Ltd.

Welding Procedure Specification



Project : Standard Procedure				PQR No. 063			WPS No. 063					
Welding Code		AS/NZS 1554.1 2014 SP Cat.				Material Grade			AS/NZS 1163-C450L0 and below			
Welding Process		GMAW - 135				Material Thickness			Unlimited			
Welding Position		1F-PA, 2F-PB, 4F-PD (NOTE 1)				Material Type No			Type No 7B and below			
Joint Type		FILLET WELD WITH EQUAL LEG SIZE AND NO ROOT GAP				Weldability Group No			Weldability Grop 4 and below			
Joint Preparation				Pass Sequence								
Joint Tolerances		Diameter - Thickness				Thermal Treatment						
Bevel Angle	N/A	Thickness Range	Unlimited	Unlimited	Unlimited	Preheat		25°C Min. (NOTE3)				
Root Gap	(Note 2)					Inter-pass		MAX 300°C				
Root face	N/A					P.W.H.T		N/A				
Consumable Details and Welding Parameters												
Consumable Classification			AS/NZS14341 : B G 49A 3 U C1/ M21 /M24 S6			Technique		Semi-Automatic Push and Stringer				
Trade Name			Cigweld / Autocraft LW1-6 or any brand equivalent			Electrode Stick-out		13 - 19mm Avg.				
						Welding Transfer mode		Spray				
Shielding Gas			ISO 14175 M24 (Note4)			Inter-run Cleaning		Grinding & Steel brush				
Flow rate			18 - 25 L/MIN			Back Gouging		N/A				
Run	Side	Pos.	Electrode / Wire	Shield Gas	Amps	Volts	Polarity	Travell speed mm/min	Interpass Temp.	Heat Input kJ/mm		
Side A												
1	A	2F-PB	1.2mm	AS/NZS14341: B G 49A 3 U C1/ M21 /M24 S6	ISO 14175 M24	260 - 318	26 - 30	DCEP	438 - 592	MAXIMUM INTERPASS TEMP. 300 °C		
2	A	2F-PB				234 - 286	26 - 30	DCEP	510 - 690			
3	A	2F-PB				235 - 287	26 - 30	DCEP	403 - 545			
Side B												
1	B	2F-PB	1.2mm	AS/NZS14341: B G 49A 3 U C1/ M21 /M24 S6	ISO 14175 M24	239 - 292	26 - 30	DCEP	340 - 460	MAXIMUM INTERPASS TEMP. 300 °C	0.81 - 1.54	
Notes and Approvals												
Note 1. Procedure qualification for fillet welds on plate or pipe 2F position qualify 1F,2F,4F as per AS/NZS 1554.1-2014 Table 4.1.3. Note 2. Where the speration is 1.5mm or greater, the size of the fillet weld shall be increased by the amount of the speration as per AS/NZS 1554.1-2014 CL5.2.3. Note 3. Pre-heat shall be calculated & applied as per CL5.3 of AS/NZS 1554.1-2014 SP before commencing weld. Note 4. Core Gas 5/2 SG or any equivalent with addition to the requirements of the table 4.11D.												
Prepared By : Juwon Ha (WS)	Date	17/05/2024					WELDING SUPERVISOR JUWON HA					
Approved for Construction :												



This WPS and supporting PQR test packs were independently reviewed and approved by

Name	Qualification	Signature	Dated
Sameer Sameem	AU/ IWI S/0476		03/06/2024
Anu Mathew	AU/ IWI S/0358		03/06/2024

TSS ENGINEERING Pty. Ltd.

Welding Procedure Qualification Record



Page 1 of 1				PQR No. 063							
Welding Code	AS/NZS 1554.1 2014 SP Cat.			Material Grade	AS/NZS 1163-C450L0						
Welding Process	GMAW - 135			Material Thickness	9mm						
Welding Position	2F - PB			Material Type No Weldability Group No	Type No 7B, Weldability Grop 4						
Joint Type	FILLET WELD WITH EQUAL LEG SIZE AND NO ROOT GAP			Material Heat No	75627						
Joint Preparation				Pass Sequence							
Joint Tolerances		Diameter - Thickness			Thermal Treatment						
Bevel Angle	N/A	Pipe Diameter			N/A		Preheat	25°C Min. (IR Gun)			
Root Gap	N/A	Thickness Range			9mm		Inter-pass	220°C Max.			
Root face	N/A	Combined Thickness			27mm		P.W.H.T	N/A			
Consumable Details and Welding Parameters											
Consumable Classification			AS/NZS14341 : BG 49A 3 U C1/ M21 /M24 S6		Technique		SEMI-AUTOMATIC PUSH, STRINGER				
Trade Name			CIGWELD / AUTOCRAFT LW1-6		Electrode Stick-out Shroud size		16mm Avg 16mm				
Batch No			4010322025		Welding Transfer mode		SPRAY				
Shielding Gas			ISO 14175 M24		Inter-run Cleaning		GRINDING & STEEL BRUSH				
Flow rate			20L/MIN		Back Gouging		N/A				
Run	Side	Pos.	Electrode / Wire		Shield Gas	Amps	Volts	Polarity	Travel speed mm/min	Interpass Temp.	Heat Input kJ/mm
			Size	Filler Material							
Side A											
1	A	2F-PB	1.2mm	AS/NZS14341: BG 49A 3 U C1/ M21 /M24 S6	ISO 14175 M24	289	28	DCEP	515	32°C	0.94
2	A	2F-PB	1.2mm			260	28	DCEP	600	88°C	0.73
3	A	2F-PB	1.2mm			261	28	DCEP	474	220°C	0.93
Side B											
1	B	2F-PB	1.2mm	AS/NZS14341: BG 49A 3 U C1/ M21 /M24 S6	ISO 14175 M24	265	28	DCEP	400	25°C	1.11
Notes and Approvals											
Visual Inspection of welded coupons carried out at workshop and samples of size of single weld 8mm and multi run 10mm complied by Sameer Sameem (IWE) with AS/NZS1554.1-2014 SP Table 6.2.2.											
NDT				Mechanical Testing							
✓	VT: MTSS-319-212-VM			✓	Macros: MTSS-319-212-VM						
Welder Name / ID : Seongho Shin TSS-004				Weld Australia	Date		17/05/2024				
Prepared By : Juwon Ha (WELDING SUPERVISOR)				YASUO HIRAKAWA Registration No: YK880147-01 Rev 0.0	Witnesses By : Sungmook Park (RWC) Sameer Sameem (IWE)						
Manufacturer Approval :											



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-212-VM

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welding Procedure / Welder Performance Qualification Test to PQR-063
Welding Process/es: GMAW-135 Welding Position/s: 2F-PB
Base Material/s: AS/NZS 1163 Grade C450L0 (Nominal thickness: 9mm)
Welder ID: Seongho Shin (TSS-004)
Order No.: TSS_000881 **Work Voucher No.:** D3065
Tested By: S. Sameem/ K. Hadley/ A. Hao **Test Date/s:** 17-May-2024

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Table 6.1.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested: 300 x 9mm thick double-sided fillet welded test plate as supplied
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: External weld surfaces only
Weld Finish: As Welded – SP1
Time of Test: Final weld inspection



Figure 1. Photos of the test samples as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 17-May-2024



Mechanical Test Report

ARL Report No.

MTSS-319-212-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital (A.1) – Swab Method

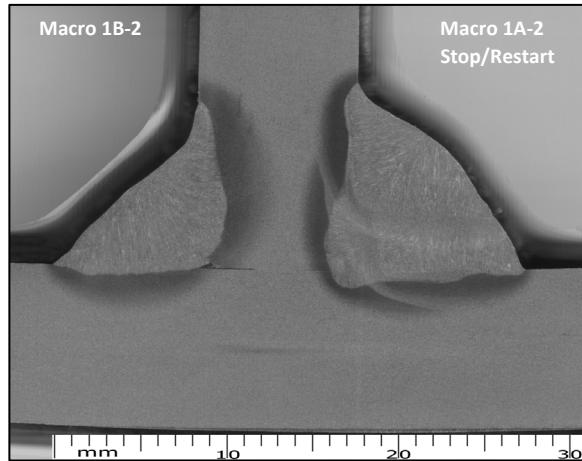
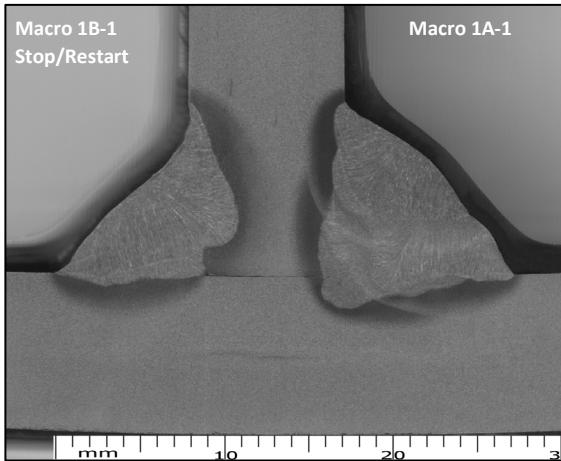


Figure 2. Etched macro sections. Magnification at 5X Approx.

Test Results: Macros 1B-1 and 1B-2 complied as 8mm Single Run Fillet Welds.
Macros 1A-1 and 1A-2 complied as 10mm Multi Run Fillet Welds.

Note Weld, welder and materials details supplied by the client.

===== End of Report =====



AustubeMills

Certificate No: I180265-0001

LOT NO: I180265

Version: 1

Page 1 of 2

Date Printed: 10/12/2018

TEST CERTIFICATE

SUPPLIER: Austube Mills Pty Ltd
146 Ingram Road
Acacia Ridge, QLD4109
ABN 21 123 666 679

PRODUCT DESCRIPTION

SPECIFICATION: AS/NZS 1163:2016 C450L0

MATERIAL: ERW Steel Tube with no subsequent overall heat treatment on the finished product

STEELMAKING: Basic Oxygen, Fully Killed, Continuous Cast, Fine Grained

STEEL FEED: Coil from Hot Strip Mill. Coil that has been subjected to a cold rolling reduction of more than 15%, following the reduction has been subjected to a subcritical annealing cycle that has recrystallized the structure and formed new ferrite grains

ITEMS COVERED BY THIS CERTIFICATE

GTIN	DESCRIPTION	Date Range
99317869553221	150X100X9.0 LITEOIL RHS 8.0M AS/NZS1163-C450L0	N/A - N/A N/A - N/A

NOTES - Items:

(1) The Date Range indicates the mill manufactured date range. Line marking on further processed product may be after these dates.

CHEMICAL ANALYSIS

Test No	Heat No	Test Lab	Analysis Category	Percentage of Elements by Mass							
				C	P	Mn	Si	S	Ni	Cr	Mo
10174/17878	75627	RTL00070	L	0.160	0.015	0.850	0.010	0.003	0.010	0.010	0.010
		SPEC LIMITS	L/P	0.200	0.030	1.600	0.250	0.030	0.250	0.300	0.100

Test No	Heat No	Test Lab	Analysis Category	Percentage of Elements by Mass							
				Cu	Al-s	Ti	Nb	V	B	CE	CF2
10174/17878	75627	RTL00070	L	0.010	0.023	0.016	0.033	0.001	<=0.0006	0.30	0.050
		SPEC LIMITS	L/P	0.250	0.015-0.100	0.040	0.150	0.100	0.0008	0.43	0.150

Test No	Heat No	Test Lab	Analysis Category	Percentage of Elements by Mass							
				CF3							
10174/17878	75627	RTL00070	L						0.048		
		SPEC LIMITS	L/P						0.090		

NOTES - Chemical Analysis:

(1) The Test No. represents the test report reference for this analysis.

(2) For details on Test Lab - see Laboratories section below.

(3) L/P: L=Ladle or Cast analysis ; P=Product analysis.

(4) Spec Limits represent maximum values. For Al the spec limits are minimum and maximum values (Al-t=Total; Al-s=Soluble).

(5) For products less than 6 mm thick with Al below the min. limit, finished product Ferrite Grain Size is greater than or equal to 6 as required by Clause 9.4.2.3(b) of AS/NZS 1163:2016 (separate report available on request).

(6) CE = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15; CF2 = Nb+V+Ti; CF3 = Si+2.5P.

(7) C450PLUS meets the maximum chemical requirements for C350L0

(8) Analysis results are taken from supplier laboratory accredited Test Certificates and are not rounded.

MECHANICAL PROPERTIES

Tensile Test

Test No	Heat No	Test Lab	Test Cat	Test Type	Yield Strength (MPa)	Tensile Strength (MPa)	Elong (%)	Gauge Length Method	Comments
10174/17878-3	75627	RTL03420	B	LSA	495	600	21.00	1	
		SPECIFICATION b/t <= 15		LSA	450	500	12	--	Minimum Values

NOTES - Tensile:

(1) The Test No. represents the test report reference for this analysis.

(2) For details on Test Lab - see Laboratories section below.

(3) TEST CATEGORY (Cat.): B = Batch; S = Statistical Sampling.

For Test Category S, demonstration of process verification for product conformity (App. B3.2 of AS/NZS 1163:2016) can be supplied upon request for the relevant product listed.

(4) TEST TYPE : LSA=Longitudinal strip specimen tested in the artificially aged condition. LFA=Longitudinal full section tested in the artificially aged condition

(5) Proof Strength Extension Method is Rp0.2, Tensile Strength is Rm

(6) C450PLUS meets the minimum elongation percentage for C350L0

(7) GAUGE LENGTH METHOD: 1 = 5.65 x SQRT(So) ; 2 = 50 mm converted to proportional gauge length in accordance with ISO 2566-1; 3 = 2 inches.

(8) All properties determined and tested in accordance with Australian Standard AS 1391.



Certificate No: I180265-0001
LOT NO: I180265
Version: 1
Page 2 of 2
Date Printed: 10/12/2018

TEST CERTIFICATE

Impact Test

Test No	Heat No	Test Lab	Report No	Test Cat	Test Type	Specimen Size mm	Test Temp	Absorbed Energy Joules		
10174/17878-3	75627	RTL03420	10174/17878	B	LSA	10 x 7.5	0°C	139	110	146
SPECIFICATION					LSA	10 x 7.5	0°C	Min 16	Min 16	Min 16
Ave 3 tests 22										

NOTES - Impact:

- (1) The Test No. represents the test report reference for this analysis.
- (2) For details on Test Lab - see Laboratories section below.
- (3) TEST CATEGORY (Cat.): B = Batch; S = Statistical Sampling.
For Test Category S, demonstration of process verification for product conformity (App. B3.2 of AS/NZS 1163:2016) can be supplied upon request for the relevant product listed.
- (4) TEST TYPE : LSA=Longitudinal strip specimen tested in the artificially aged condition.
- (5) All properties determined by the listed Test Laboratories and tested in accordance with Australian Standard AS 1544.2.

LABORATORIES:

- RTL00070 JFE Kurashiki - This laboratory has been accredited by the Japan Accreditation Board, a signatory of the ILAC-MRA.
RTL03420 Maruichi Steel Tube Ltd., Sakai - This laboratory has been accredited by the Japan Accreditation Board, a signatory of the ILAC-MRA.

OVERALL NOTES:

- (1) For analyses not performed by Austube Mills the Test No. and Report No. represents the test report reference number for this analysis.
- (2) The results fall within the distribution of properties for this product and not actual values of the pack/length.
- (3) The quality management system of Maruichi Steel Tube Ltd has been certified by Japanese Standard Association to meet ISO9001:2015 requirements, as detailed in certificate JSAQ 1357.
- (4) Items displayed on this test certificate are compliant with the requirements of AS/NZS 1163:2016.

I certify that the above information is in accordance with the records of the company and conforms to the specification(s) stated.

Milan Bijok
Signatory for Austube Mills

The pack number/s listed below were manufactured from this production LOT

9818124137

9818124142

PRODUCT INFORMATION

Product / Tradename	Autocraft LW1-6	Certificate No.	42672
Standard / Classification	AS/NZS 14341: B G 49A 3U C1/M21/M24 S6 AWS/ASME-SFA A5.18: ER70S-6	Date	13/02/24
Size	1.2 mm	Batch No.	4010322025
		Part Number	720096
		Consumable Type	Solid Mig Wire
		Country of Origin	Vietnam

[2.2] - TYPICAL CHEMICAL ANALYSIS

TYPICAL DATA: ACC TO EN 10204 2.2

C	Mn	Si	P	S	Ni	Cr	Mo	V	Cu	Nb	Ti	Al	B	Zr
0.07	1.44	0.85	0.014	0.008	0.02	0.04	0.02		0.14					

Notes
[2.2] - TYPICAL MECHANICAL PROPERTIES

TYPICAL DATA: ACC TO EN 10204 2.2

TENSILE PROPERTIES

Condition	As Welded	Shielding	ISO 14175: M21
Test Temp	R _p 0.2% 0.2% Yield	R _m UTS	A ₅ Elongation
Ambient	460 MPa	552 MPa	27%

IMPACT PROPERTIES

TYPICAL DATA: ACC TO EN 10204 2.2

Temp	Impact Value	Lateral Expansion
-30°C	80 J avg.	

OTHER MECHANICAL PROPERTIES - TYPICAL AVG.

Hardness	
----------	--

OTHER PROPERTIES / INFORMATION

Diffusible Hydrogen (typical) ml H/100g weld metal		Radiographic Soundness	
---	--	------------------------	--

COMPLIANCE

<p>Cigweld Pty. Ltd. certifies that the material listed in the certificate conforms to the listed specifications and this product is supplied under a QA Program fulfilling the EN ISO 9001 standard</p>	<p>This certificate is produced electronically and is valid without signature.</p> <table> <tr> <td>Issued by Vida Mokhtar Quality Manager</td><td>Reviewed by Damian Bibby Senior Brand Manager - Consumables</td></tr> </table>	Issued by Vida Mokhtar Quality Manager	Reviewed by Damian Bibby Senior Brand Manager - Consumables	<p>Company Details</p> <p>Cigweld Pty Ltd 71 Gower Street, Preston Victoria, Australia, 3072 Tel: (03) 94747400 Fax: (03) 94747391</p>
Issued by Vida Mokhtar Quality Manager	Reviewed by Damian Bibby Senior Brand Manager - Consumables			

CERTIFICATE OF CONFORMANCE

COREGAS 5/2 SG

Product Code: 271150

This is to certify that quality verification tests have been performed on representative samples of Coregas 5/2 from Coregas' approved production plants and the results of the tests comply with the requirements of the Coregas 5/2 specification.

Component	Chemical Formula	Specification	Unit
Argon	Ar	Balance	
Carbon dioxide	CO ₂	5	%
Oxygen	O ₂	2	%

Cylinder connection as per AS2473

Type 10

Cylinder pressure at 15°C

20,000 kPa

Package content at 15°C, 101 kPa

10.6 m³

Remarks:



Approved by:

National Quality and Compliance Manager

Date of issue:

1 September 2018



Complies with requirements
of ISO 9001

WELDER'S QUALIFICATION TEST CERTIFICATE



TOTAL STEEL SOLUTIONS

Designation: AS/NZS ISO 9606.1/135/P/FW/FM1/S/9t/150x100D/PB/MI

Welder name:	Seungho Shin	
Identification Number:	TSS-004	
PQR No:	PQR-063	
WPS No:	WPS-063	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1-2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

Variable:	Test Piece	Range of Qualification	References
Preferred Standard(s):	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017
Welding Process(es):	GMAW(135)	GMAW-135 & 138	Clause 5.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	Clause 5.2
Test Plate Type:	RHS	Plate & Pipe (Fixed ≥500mm OD) Rotating Pipe With ≥75mm OD	Clause 5.3
Type of Weld:	Fillet weld	Fillet weld	Clause 5.4
Parent Metal and Group	AS/NZS 1161 C460L0 Group 2	Group 2,1	Clause 5.5.1 and ISO/TR 15608 Clause 10 (Non-essential variable)
Filler Material Group	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid Wire (s) Metal cored wire(M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	Clause 10 (Non-essential variable)
Type of current and polarity:	DCEP	DCEP	Clause 10 (Non-essential variable)
Material Thickness:	9mm	3mm~unlimited	Table 8
Pipe Outside Diameter (mm):	150mmx100mm	NA	RHS (No outside diameter applicable)
Welding Position:	PB	PA ,PB	Table 10
Weld details:	N/A	N/A	Table 11
Multi-layer/Single layer:	Multi-layer (ml)	Single layer (si) & Multi-layer (ml)	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-212-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-212-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
17/05/2024		Juwon Ha	WELDING SUPERVISOR				

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS 1554.1 2014 CL 4.12.2.4 (a))

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
17/05/2024		Juwon Ha	WELDING SUPERVISOR				

The statements in this record are true, correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



Mechanical Test Report

ARL Report No.

MTSS-319-212-VM

Client:	TSS Engineering
Client Address:	21 Pullman Place, Emu Plains, NSW 2750
Project Job:	Welding Procedure / Welder Performance Qualification Test to WPQR-002 Rev 1
Welding Process/es:	GMAW-135
Welding Position/s:	2F-PB
Base Material/s:	AS/NZS 1163 Grade C450L0 (Nominal thickness: 9mm)
Welder ID:	Seongho Shin (TSS-004)
Order No.:	TSS_000881
Tested By:	S. Sameem/ K. Hadley/ A. Hao
Work Voucher No.:	D3065
Test Date/s:	17-May-2024

Visual Test Results

Method Code:	AS/NZS ISO 17637:2019
ARL Test Procedure:	QTP-105 Rev_02
Acceptance Code:	AS/NZS 1554.1:2014 – SP Cat. (Table 6.1.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested:	300 x 9mm thick double-sided fillet welded test plate as supplied
Test Technique:	Visual scan and measurements
Equipment Used:	Visual test kit # 11
Viewing Conditions:	Good – Natural Light > 1000 Lux
Access Conditions:	External weld surfaces only
Weld Finish:	As Welded – SP1
Time of Test:	Final weld inspection

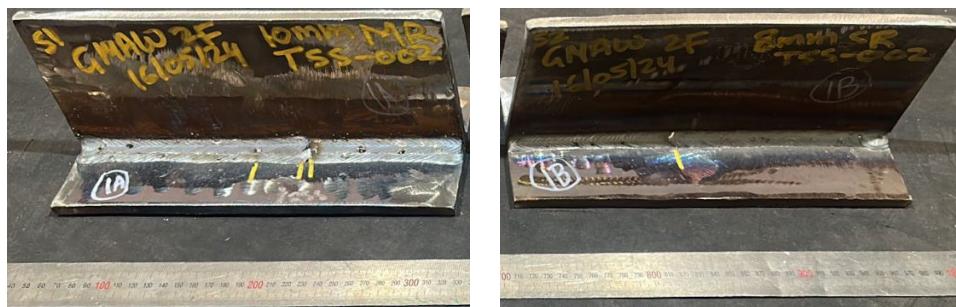


Figure 1. Photos of the test samples as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 17-May-2024



Mechanical Test Report

ARL Report No.

MTSS-319-212-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital (A.1) – Swab Method

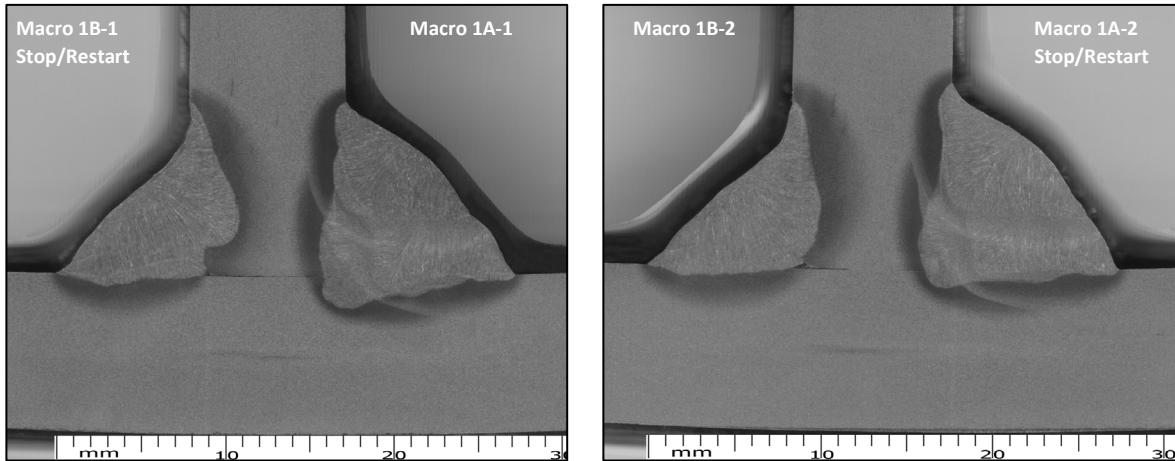


Figure 2. Etched macro sections. Magnification at 5X Approx.

Test Results: Macros 1B-1 and 1B-2 complied as 8mm Single Run Fillet Welds.
Macros 1A-1 and 1A-2 complied as 10mm Multi Run Fillet Welds.

Note Weld, welder and materials details supplied by the client.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE



TOTAL STEEL SOLUTIONS

Designation: AS/NZS ISO 9606.1/135/P/FW/FM1/S/9t/150x100D/PB/ml

Welder name:	Yuzhen PIAO	
Identification Number:	TSS-027	
PQR No:	PQR-063	
WPS No:	WPS-063	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1-2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

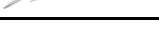
Variable:	Test Piece	Range of Qualification	References
Preferred Standard(s):	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017
Welding Process(es):	GMAW(135)	GMAW-135 & 138	Clause 5.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	Clause 5.2
Test Plate Type:	RHS	Plate & Pipe (Fixed ≥500mm OD) Rotating Pipe With ≥75mm OD	Clause 5.3
Type of Weld:	Fillet weld	Fillet weld	Clause 5.4
Parent Metal and Group:	AS/NZS 1161 C450L0 Group 2	Group 2,1	Clause 5.5.1 and ISO/TR 15608 Clause 10 (Non-essential variable)
Filler Material Group:	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid Wire (s) Metal cored wire(M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	Clause 10 (Non-essential variable)
Type of current and polarity:	DCEP	DCEP	Clause 10 (Non-essential variable)
Material Thickness:	9mm	3mm~unlimited	Table 8
Pipe Outside Diameter (mm):	150mmx100mm	NA	RHS (No outside diameter applicable)
Welding Position:	PB	PA ,PB	Table 10
Weld details:	N/A	N/A	Table 11
Multi-layer/Single layer:	Muli-Layer (ml)	Single layer (si) & Muli-Layer (ml)	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-213-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-213-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1-2017 Sec 9.3a).

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
17/05/2024		Juwon Ha	WELDING SUPERVISOR				

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS 1554.1 2014 CL 4.12.2.4 (a))

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
17/05/2024		Juwon Ha	WELDING SUPERVISOR				

The statements in this record are true, correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-213-VM

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welder Performance Qualification Test to WPS-002 Rev 1
Welding Process/es: GMAW-135 **Welding Position/s:** 2F-PB
Base Material/s: AS/NZS 1163 Grade C450L0 (Nominal thickness: 9mm)
Welder ID: Yuzhen Piao (TSS-027)
Order No.: TSS_000881 **Work Voucher No.:** D3065
Tested By: S. Sameem/ K. Hadley/ A. Hao **Test Date/s:** 17-May-2024

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Table 6.1.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested: 300 x 9mm thick double-sided fillet welded test plate as supplied
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: External weld surfaces only
Weld Finish: As Welded – SP1
Time of Test: Final weld inspection



Figure 1. Photos of the test samples as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 17-May-2024



Mechanical Test Report

ARL Report No.

MTSS-319-213-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital (A.1) – Swab Method

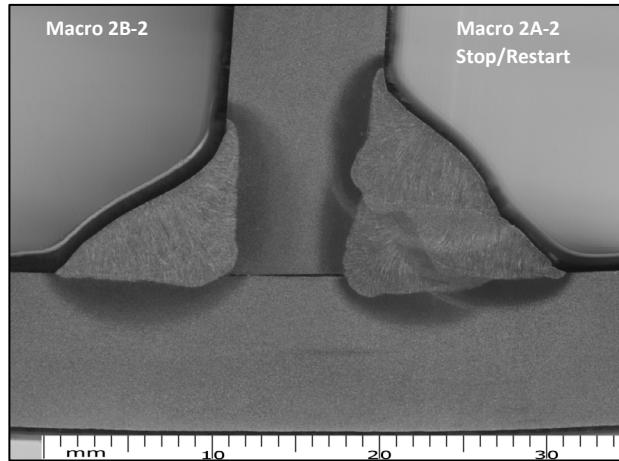
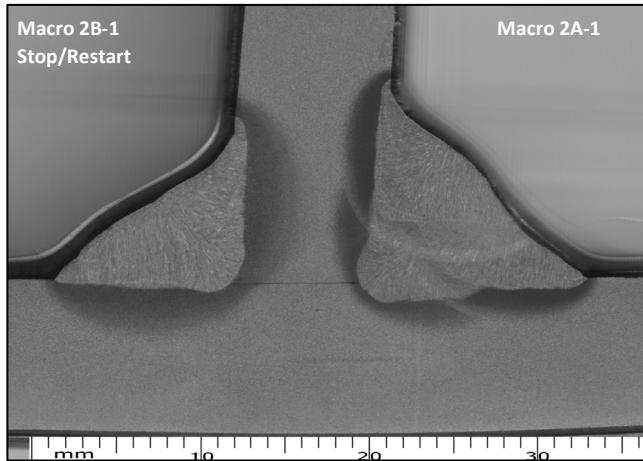


Figure 2. Etched macro sections. Magnification at 5X Approx.

Test Results: Macros 2B-1 and 2B-2 complied as 8mm Single Run Fillet Welds.
Macros 2A-1 and 2A-2 complied as 10mm Multi Run Fillet Welds.

Note Weld, welder and materials details supplied by the client.

===== End of Report =====

WELDER'S QUALIFICATION TEST CERTIFICATE



TOTAL STEEL SOLUTIONS

Designation: AS/NZS ISO 9606.1/135/P/FW/FM1/S/9t/150x100D/PB/ml

Welder name:	Seung Hwangbo	
Identification Number:	TSS-052	
PQR No:	PQR-063	
WPS No:	WPS-063	
Employer:	TSS ENGINEERING PTY LTD	
Testing standard	AS/NZS ISO 9606.1-2017	
Job Knowledge:	Acceptable <input type="checkbox"/> Not Tested <input checked="" type="checkbox"/>	

Variable:	Test Piece	Range of Qualification	References
Preferred Standard(s):	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017	AS/NZS ISO 9606.1-2017
Welding Process(es):	GMAW(135)	GMAW-135 & 138	Clause 5.2
Transfer mode:	Spary/Short Arc	Spary/Short Arc	Clause 5.2
Test Plate Type:	RHS	Plate & Pipe (Fixed ≥500mm OD) Rotating Pipe With ≥75mm OD	Clause 5.3
Type of Weld:	Fillet weld	Fillet weld	Clause 5.4
Parent metal and Group	AS/NZS 1161 C450L0 Group 2	Group 2,1	Clause 5.5.1 and ISO/TR 15608 Clause 10 (Non-essential variable)
Filler Material Group	FM1	FM1,FM2	Table 2,3
Filler Material Type:	ER70S-6 Solid wire(S)	Solid Wire (s) Metal cored wire(M)	Table 5
Shielding Gas:	Argon/Co2 5%/2%	N/A	Clause 10 (Non-essential variable)
Type of current and polarity:	DCEP	DCEP	Clause 10 (Non-essential variable)
Material Thickness:	9mm	3mm~unlimited	Table 8
Pipe Outside Diameter (mm):	150mmx100mm	NA	RHS (No outside diameter applicable)
Welding Position:	PB	PA ,PB	Table 10
Weld details:	N/A	N/A	Table 11
Multi-layer/Single layer:	Multi-layer (ml)	Single layer (si) & Multi-layer (ml)	Table 12

Type of Test	Results	Test report	Examiner/Examining body
Visual Testing	Complied	MTSS-319-214-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611
Macro Examination	Complied	MTSS-319-214-VM	ARL Laboratory Service PTY LTD NATA Mech Lab 12611

Revalidation for qualification by examiner or examining body for the following 3 years (AS/NZS ISO 9606.1:2017 Sec 9.3a).

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
14/05/2024		Juwon Ha	WELDING SUPERVISOR				

Conformation of the validity by employer/welding coordinator/examiner or examining body for the following 6 months (AS/NZS 1554.1 2014 CL 4.12.2.4 (a))

Date	Signature	Name	Position or Title	Date	Signature	Name	Position or Title
14/05/2024		Juwon Ha	WELDING SUPERVISOR				

The statements in this record are true, correct and that the test coupons were prepared, welded and tested in accordance with the referenced codes and acceptance criteria.



ARL Laboratory Services Pty Ltd

ABN 60 075 523 689

14/55-61 Pine Road
Yennora NSW 2161
Phone: (02) 9632 3077
Fax: (02) 9681 6375

Mechanical Test Report

ARL Report No.

MTSS-319-214-VM

Client: TSS Engineering
Client Address: 21 Pullman Place, Emu Plains, NSW 2750
Project Job: Welder Performance Qualification Test to WPS-002 Rev 1
Welding Process/es: GMAW-135 Welding Position/s: 2F-PB
Base Material/s: AS/NZS 1163 Grade C450L0 (Nominal thickness: 9mm)
Welder ID: Seung Hwangbo (TSS-052)
Order No.: TSS_000881 **Work Voucher No.:** D3065
Tested By: S. Sameem/ K. Hadley/ A. Hao **Test Date/s:** 17-May-2024

Visual Test Results

Method Code: AS/NZS ISO 17637:2019
ARL Test Procedure: QTP-105 Rev_02
Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Table 6.1.2) and AS/NZS ISO 9606.1:2017 (Clause 7)
Item/s Tested: 300 x 9mm thick double-sided fillet welded test plate as supplied
Test Technique: Visual scan and measurements
Equipment Used: Visual test kit # 11
Viewing Conditions: Good – Natural Light > 1000 Lux
Access Conditions: External weld surfaces only
Weld Finish: As Welded – SP1
Time of Test: Final weld inspection

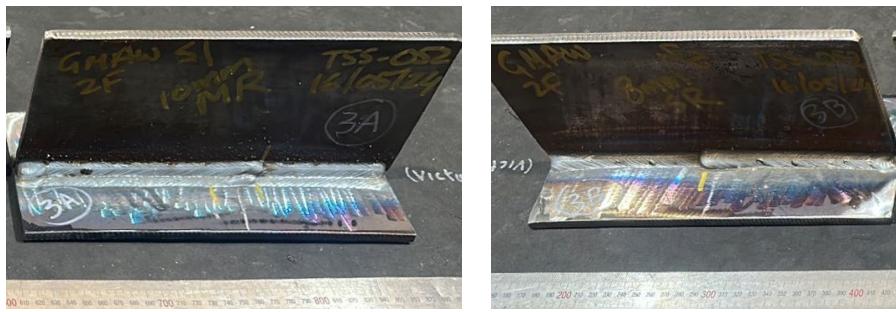


Figure 1. Photos of the test samples as received.

Test Results: The visual test **complied** with the specified requirements.



NATA Accredited Laboratory No. 12611
Accredited for compliance with ISO/IEC 17025 – Testing.

This test report is issued in accordance with our terms and conditions that
can be found on <https://www.arllabservices.com.au>

Reviewed By: Wayne Robinson
Signed By: Sam Sameem
Signature:
Dated: 17-May-2024



Mechanical Test Report

ARL Report No.

MTSS-319-214-VM

Macro - Etching Examination

Method Code: AS/NZS 2205.5.1:2019

Acceptance Code: AS/NZS 1554.1:2014 – SP Cat. (Clause 4.7.4) and AS/NZS ISO 9606.1:2017 (Clause 7)

Specimen ID: See Below

Surface Prep: Transverse cross section was polished using SiC abrasive paper (800 Grit)

Etchant Used: 10% Nital (A.1) – Swab Method

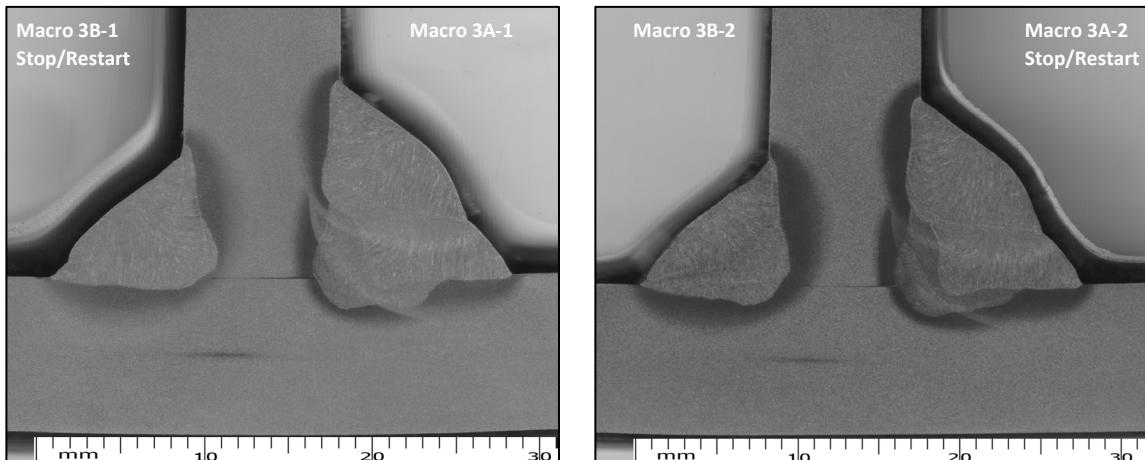


Figure 2. Etched macro sections. Magnification at 5X Approx.

Test Results: Macros 3B-1 and 3B-2 complied as 8mm Single Run Fillet Welds.
Macros 3A-1 and 3A-2 complied as 10mm Multi Run Fillet Welds.

Note Weld, welder and materials details supplied by the client.

===== End of Report =====