

TECHNICAL DOCUMENTATION FRONT SHEET

OWNER:
NUMALIGARH REFINERY LIMITED

Total pages: 45

NUMALIGARH REFINERY EXPANSION PROJECT SULPHUR RECOVERY BLOCK (SRU / ARU / SWSU)

WELDING PROCEDURE (WPS/PQR)& WELD MAP

**TAG NO. 1P32-VV-3916
(PHENOLIC SWS FEED SURGE DRUM)**

TEN TECHNIP ENERGY CONTRACTOR DOCUMENT REVIEW	
<input type="checkbox"/> 1 - NOT APPROVED/ RESUBMIT <input type="checkbox"/> 2 - REVIEWED / APPROVED WITH COMMENTS <input type="checkbox"/> 3 - REVIEWED/ APPROVED (NO COMMENTS) <input checked="" type="checkbox"/> 4 - RETAINED FOR INFORMATION	
<small>THIS REVIEW / APPROVAL DOES NOT ABSOLVE THE SUPPLIER / CONTRACTOR OF THEIR CONTRACTUAL OBLIGATIONS / RESPONSIBILITIES</small>	

Signed By Natarajan Koodaling:

Date February 23, 2024

Reviewed
13-02-24

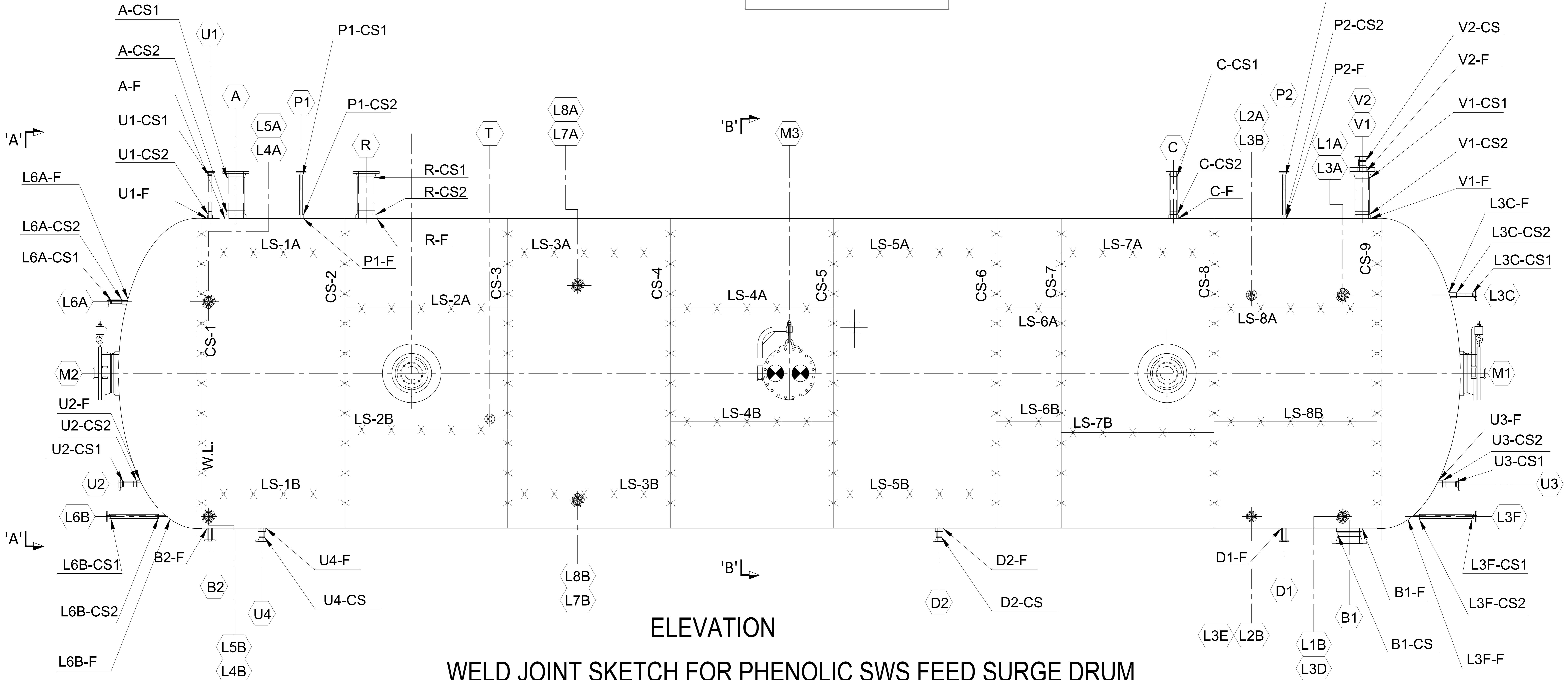
Rev	Date	Reason for Issue	Prepared	Checked	Approved	Prepared	Review	Review			
02	15-01-2024	Issue for review and approval	Amit Kumar	Satish Kumar	Satish Kumar						
01	14-11-2023	Issue for review and approval	Krishna Prasad	Ghanshyam Shukla	Ghanshyam Shukla						
00	21-10-2023	Issue for review and approval	Krishna Prasad	Ghanshyam Shukla	Ghanshyam Shukla						
			Disc. Eng.	Disc. Lead	Contr Rep	Disc. Eng.	Project Eng.	Com.Rep. Dept. Head			
HEATMAX PROJECTS PVT. LTD						NRL / MPMC					
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Facility Area Code			1P32A (for multiple units use 1P35)		SRB						
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					Revision						
					02						



COMMENT RESOLUTION SHEET

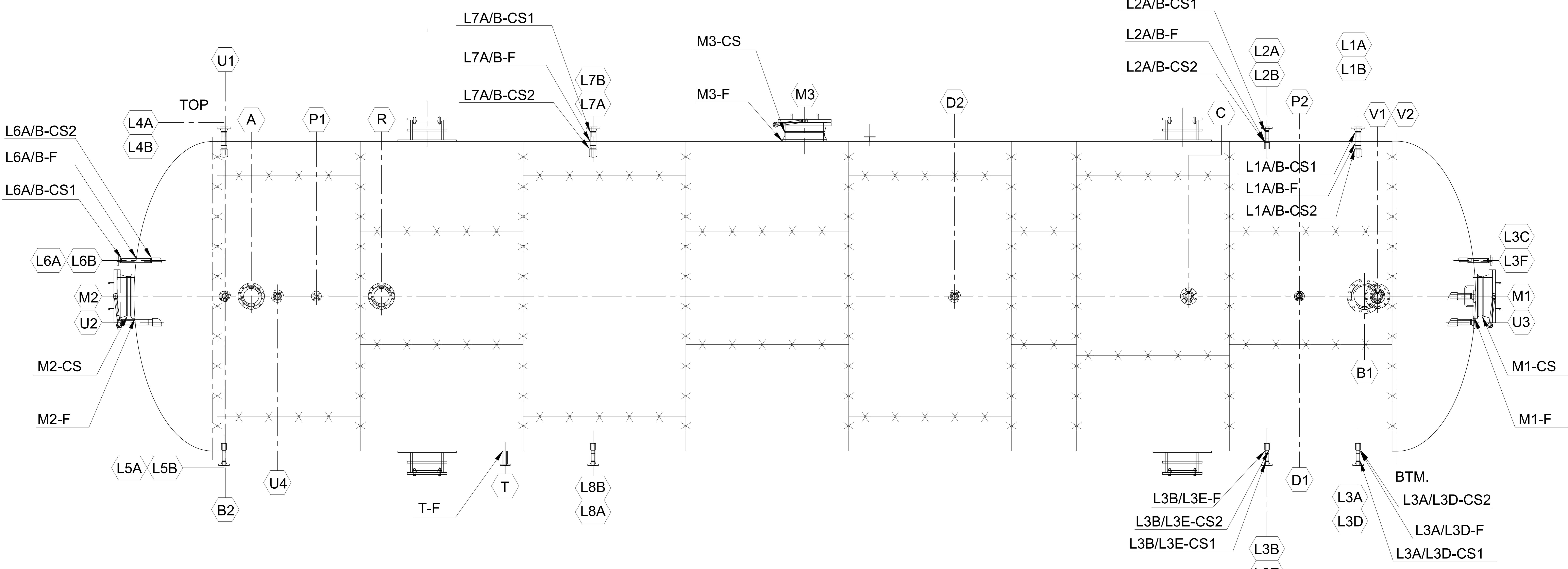
THERMAX WELD BOOK CRS (VESSEL TAG NO.1P32-VV-3916)

SHEET : 01 OF 03



THERMAX PO. NO. 1000073579
HEATMAX PROJECTS PRIVATE LTD.
NEW DELHI - 110087 (INDIA)

SHEET : 02 OF 03



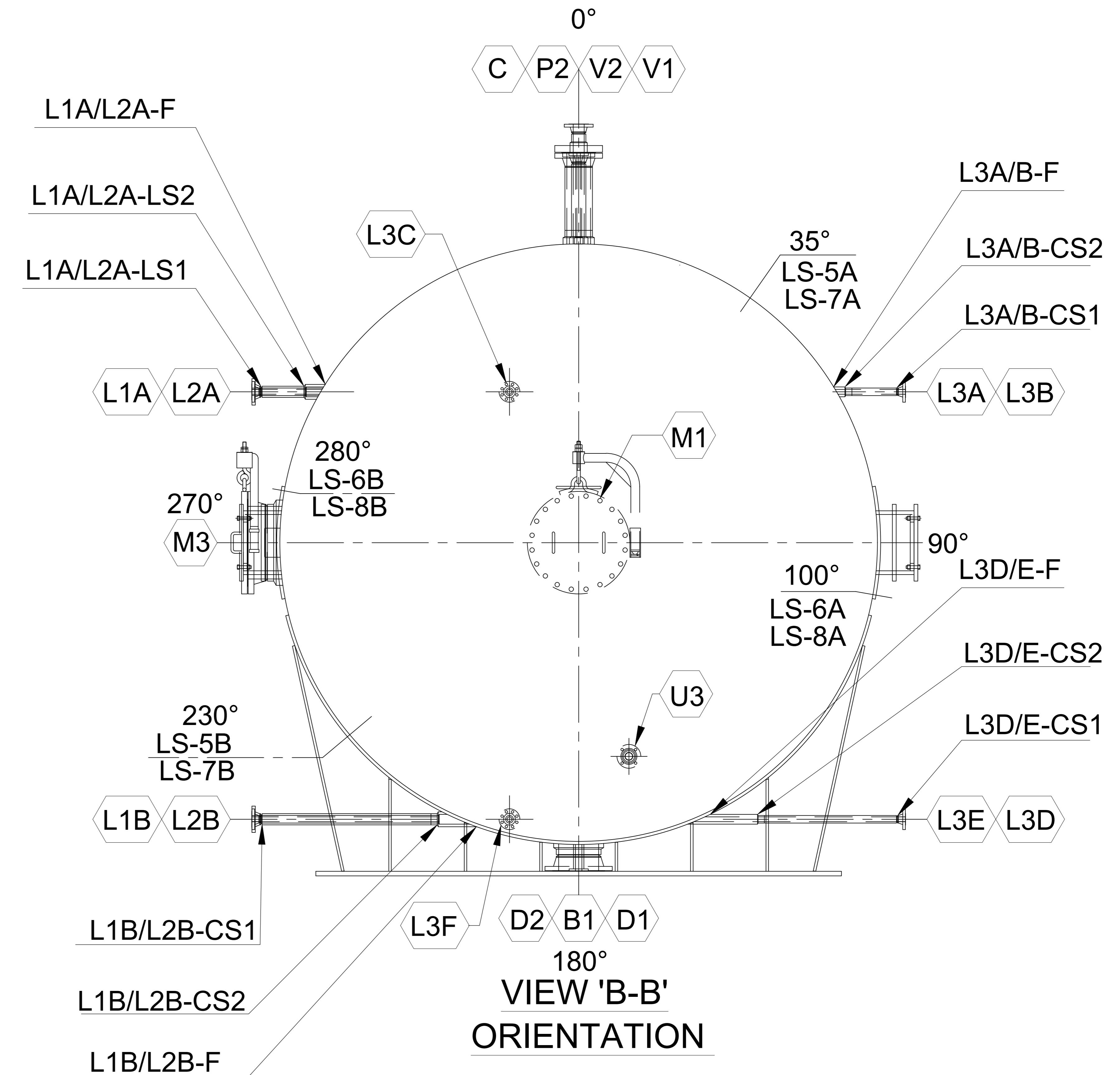
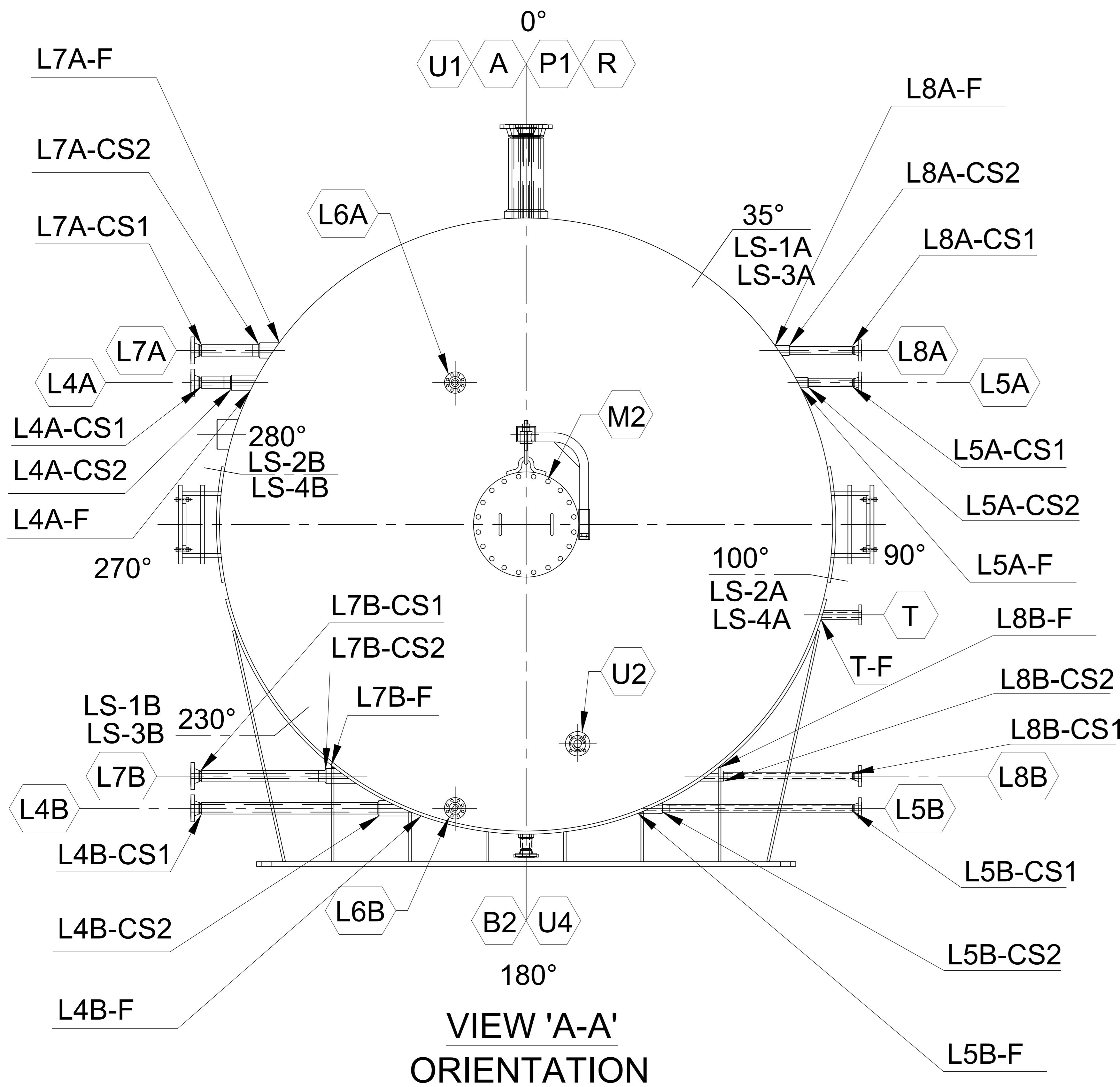
PLAN

WELD JOINT SKETCH FOR PHENOLIC SWS FEED SURGE DRUM
1P32-VV-3916



THERMAX PO. NO. 1000073579
HEATMAX PROJECTS PRIVATE LTD.
NEW DELHI - 110087 (INDIA)

SHEET : 03 OF 03



Welding Book - Weld Joints Sketch

<p>SHELL TO HEAD WELD</p>	<p>SHELL LONG / CIRC. SEAM WELD DETAIL</p>
<p>W1</p> <p>(SINGLE SIDE FULL PENETRATION WELD) WELD DETAIL-W6 (FPW)</p>	<p>W2</p> <p>(DOUBLE SIDE FULL PENETRATION WELD) WELD DETAIL-W12 (FPW)</p>
<p>W6</p> <p>(SINGLE SIDE FULL PENETRATION WELD) WELD DETAIL-W9 (FPW)</p>	<p>W12</p> <p>(SINGLE SIDE FULL PENETRATION WELD) WELD DETAIL-W7 (FPW)</p>
<p>W9</p>	<p>W7</p>



HEATMAX PROJECTS PVT. LTD
WELDING BOOK FOR LARGE CARBON STEEL PRESSURE VESSEL

Owner	Numaligarh Refinery Limited			Description	Phenolic SWS Feed Surge Drum				WP NO.	HMPPL/WM/3916 Rev.03			
PMC	Technip Energies India Limited			Vessel tag no.	1P32-VV-3916				Impact test	NA			
Purchaser	Thermex Limited			GA DRG NO.	TL/1P32A/ME/3579/GAS/1001				PWHT/P FHT	YES			
PO No.	1000073759 dated 27.09.2022			Inspection by	TPIA/ THERMAX /PMC				MDMT / Service	5° C / NA	Preheat temp (Min)	25 ° C	

WELDBOOK

JOINT NO.	JOINT BETWEEN	WELD DETAIL	JOINT CATEG ORY	MATERIAL	P NO.	THK MM	Welding Process	Filler material	WPS & PQR	INTERPA SS TEMP	GAS/ FLUX	NDT	PWHT	REMARKS
LS1A & LS1B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS2A & LS2B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS3A & LS3B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS4A & LS4B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS5A & LS5B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS6A & LS6B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	

LS7A & LS7B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
LS8A & LS8B	SHELL LS TO SHELL LS	W-2	A	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS1	DISH END TO SHELL	W-1	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS2	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS2	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS3	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS4	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS5	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS6	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS7	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	

CS8	SHELL TO SHELL C SEAM	W-2	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
CS9	DISH END TO SHELL	W-1	B	SA 516 GR 60N TO SA 516 GR 60N	P1 TO P1	26	SMAW+ SAW	E7018+ EH10K	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	100% RT & 100% DP AFTER ASR	YES	
A-CS1	FLANGE TO PIPE	W-6	C	SA 105N TO SA 106 GR.B	P1 TO P1	18.26	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR.B TO SA 105N	P1 TO P1	18.26	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
A-F	SR NOZZLE TO SHELL	W12	D	SA 516 GR. 60N TO SA 105N	P1 TO P1	50-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
B1-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	19.05	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
B1-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR.60N	P1 TO P1	40-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
B2-F	LWN NOZZLE NECK TO SHELL	W12	D	SA 105N TO SA 516 GR.70N	P1 TO P1	16.6-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
C-CS1	FLANGE TO PIPE	W6	C	SA 105N TO SA 106 GR.B	P1 TO P1	13.49	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
C-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR.B TO SA 105N	P1 TO P1	13.49	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

C-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR.60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
D1-F	LWN NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR.60N	P1 TO P1	13.6-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
D2-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
D2-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR. 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
V1-CS1	FLANGE TO PIPE	W6	C	SA 105N TO SA 106 GR.B	P1 TO P1	15.09	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
V1-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR.B TO SA 105N	P1 TO P1	15.09	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
V1-F	SR NOZZLE TO SHELL	W12	D	SA 105 N TO SA 516 GR.60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
V2-CS	FLANGE TO SR NOZZLE	W6	C	SA 105 N TO SA 105 N	P1 TO P1	13.49	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
V2-F	SR NOZZLE TO BLIND FLANGE	W12	B	SA 105 N TO SA 105 N	P1 TO P1	25 -53	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
R-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA106 GR.B	P1 TO P1	18.26	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

R-CS2	PIPE NECK TO SR NOZZLE	W9	C	SA 106 GR.B TO SA 105N	P1 TO P1	18.26	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
R-F	SR NOZZLE TO SHELL	W12	D	SA 105 N TO SA 516 GR.60N	P1 TO P1	50-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
U1-CS1	FLANGE TO PIPE	W6	C	SA 105N TO SA 106 GR. B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U1-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR.B TO 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U1-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
U2-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR. B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U2-CS2	PIPE TO SR NOZZLE	W9	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U2-F	SR NOZZLE TO DISHED END	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
U3-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR. B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U3-CS2	PIPE TO SR NOZZLE	W9	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

U3-F	SR NOZZLE TO DISHED END	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
U4-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
U4-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR. 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L1A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L1A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L1A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L1B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L1B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L1B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L2A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

L2A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L2A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L2B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L2B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L2B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L3A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L3B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

L3B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L3C-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3C-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3C-F	SR NOZZLE TO DISHED	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L3D-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3D-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3D-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L3E-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3E-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3E-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	

L3F-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3F-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L3F-F	SR NOZZLE TO DISHED	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L4A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L4A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L4A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L4B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L4B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L4B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L5A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

L5A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L5A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L5B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L5B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L5B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L6A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L6A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L6A-F	SR NOZZLE TO DISHED	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	NA	DP OF FINAL WELD	YES	
L6B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L6B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT/04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

L6B-F	SR NOZZLE TO DISHED	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L7A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L7A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L7A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L7B-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L7B-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	15.24	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L7B-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	30-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
L8A-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L8A-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	11.07	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
L8A-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	

P1-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	10.15	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
P1-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	10.15	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
P1-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
P2-CS1	FLANGE TO PIPE	W6	C	SA 105 N TO SA 106 GR B	P1 TO P1	10.15	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
P2-CS2	PIPE TO SR NOZZLE	W9	C	SA 106 GR B TO SA 105N	P1 TO P1	10.15	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
P2-F	SR NOZZLE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	20-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
T-F	LWN PIPE TO SHELL	W12	D	SA 105N TO SA 516 GR 60N	P1 TO P1	15.95-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
M1-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	16	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
M1-F	SR NOZZLE TO DISHED	W7	D	SA 105N TO SA 516 GR 60N	P1 TO P1	50-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
M2-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	16	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	

M2-F	SR NOZZLE TO DISHED	W7	D	SA 105N TO SA 516 GR 60N	P1 TO P1	50-30	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
M3-CS	FLANGE TO SR NOZZLE	W6	C	SA 105N TO SA 105N	P1 TO P1	16	GTAW+ SMAW	ER70S-2 + E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	ARGON	100% RT & 100% DP AFTER ASR	YES	
M3-F	SR NOZZLE TO SHELL	W7	D	SA 105N TO SA 516 GR 60N	P1 TO P1	50-26	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	YES	
SHELL TO LIFTING TRUNNIONS PAD AND SADDLE REINFORCEMENT PAD	-	FILLET	-	SA 516 GR 70 N TO SA 516 GR 70 N	P1 TO P1	25	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	NA	
LIFTING TRUNNIONS PAD AND SADDLE REINFORCEMENT PAD	-	FILLET	-	SA 516 GR 70 N TO SA 516 GR 70 N	P1 TO P1	25	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	NA	
EXTERNAL TEMPORARY ATTACHMENT	-	FILLET	-	SA 516 GR 70 TO SA 516 GR 70 N	P1 TO P1	ANY	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	DP OF FINAL WELD	NA	
INTERNAL WELDS	-	FILLET	-	CS-CS	P1 TO P1	ANY	SMAW	E7018	HMPPL/GEN/WPS/2022/04 & HMPPL/PQR/2022/PWHT /04	250 °C	NA	10% PT AND 10% DPT	NA	



HEATMAX PROJECTS PVT. LTD

WPS & PQR TABLE



HEATMAX PROJECTS PVT. LTD

ISMAILA 11, KIRWA, CITY SAMPLA,
TALUKA SAMPLA, DISTRICT- ROHTAK,
PIN CODE-124501, HARYANA

PROCEDURE QUALIFICATION RECORD (PQR) - QW 483

Procedure Qualification Record No.

: HMPPL/PQR/2022/PWHT-04 REV.0

Dated : 28-06-2022

Qualification Standards

: ASME SEC IX (Edition 2021)

Supporting pWPS No.

: HMPPL/GEN/PWPS/2022/03 REV.0

Dated : 09-05-2022

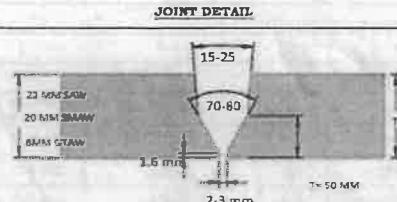
Welding Process(es)

: GTAW+ SMAW+ SAW

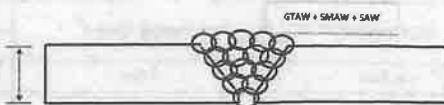
Manual : Manual + Machine

JOINTS - (QW 402)

Groove Design	:	As Per Groove Sketch
Root Spacing	:	3-4 mm
Backing	:	No For Root Run & yes for Hot Pass & Subsequent passes
Backing Material	:	No For Root Run & Weld metal For Hot Pass & Subsequent passes
Retainers	:	Not Used
Other	:	Nil



WELD SEQUENCE



BASE METAL - (QW 403)

	Product Form	Spec.(Type or Grade)	P.No.	Grp No.	Thk. (mm)
Welded to:	PLATE	SAS16 Gr. 60/70	P1	1 and 2	50
	PLATE	SAS16 Gr. 60/70	P1	1 and 2	50
t Pass > 13 mm	No				

FILLER METALS - (QW 404)

	Welding Process				
	GTAW	SMAW	SAW		
Specification No. (SFA)	:	5.18	5.1	5.17	
AWS Class	:	ER70S-2	E7018-1	EH10K	
F. No.	:	6	4	6	
A. No.	:	1	1	1	
Size(Dia.) of Filler Metal (in mm)	:	Ø2.5MM	Ø3.15MM	Ø3.15MM	
Addition or Deletion of Filler	:	With Filler Wire	Not Applicable	Not Applicable	
Filler Metal Product Form	:	Bare (Solid)	Not Applicable	Solid (bare)	
Consumable Insert	:	None	Not Applicable	None	
Addition or Deletion of Flux	:	Not Applicable	Not Applicable	Not Applicable	
Flux Wire classification	:	Not Applicable	Not Applicable	F7P5-EH10K	
Flux Designation		Not Applicable	Not Applicable	Premierweld BF-1 Flux/premierweld IN 61	
Deposited Weld thickness (mm)	:	Groove	8 MM	20 MM	22MM
Maximum Weld Pass Thickness (mm)	:		3 MM	4 MM	4 MM
Diameter >1/4 in. (6mm)	:	Not Applicable	Not Allowed	Not Allowed	
Alloy Element	:	Not Applicable	Not Applicable	NONE	
Alloy	:	Not Applicable	Not Applicable	Basic	
Alloy Flux	:	Not Applicable	Not Applicable	NONE	
Recrushed Slag	:	Not Applicable	Not Applicable	Not Used	
Brand Name	:	G WELD	D & H SECHERON	D & H SECHERON	
Other		Nil	Nil	Nil	

POSITIONS - (QW 405)

Position(s) of Groove	:	3G	PREHEAT - (QW 406)		PWHT - (QW 407)	
			Preheat Temp. Min"	: 80°C	Temperature Range	: 620 +_ 10°C
Weld Progression	:	Uphill if Vertical	Interpass Temp. Max"	: 225°C	Soaking Time	: 2 Hr. 30 Min
			Preheat Maintenance	: None	Heating Rate	: 123 °C/Hr
Other(s)	:	Nil	Others : Nil		Cooling Rate	: 125 °C/Hr
					Other(s)	: Nil

GAS - (QW 408)		Gas(es)	Mixture Ratio (%)	Flow Rate
Shielding Gas (GTAW)		Argon	99.995%	13-17 LPM
Trailing Gas		NIL	NIL	NIL
Backing Gas		NIL	NIL	NIL



Guarantor



HEATMAX PROJECTS PVT. LTD
SAMPLE, DISTRICT- ROHTAK, PIN CODE-124501, HARYANA
PROCEDURE QUALIFICATION RECORD (PQR) - QW 452 - Test Results

Procedure Qualification Record No.	HMPPL/PQR/2022/PWHT-04 REV.0			Dated : 28-06-2022					
Qualification Standards	ASME Section IX, Edition 2019			Dated : 09-05-2022					
Supporting PWPS No.	HMPPL/PWPS/PI/2022/01 REV.0								
Welding Process(es)	GTAW+ SMAW+ SAW			Type : Manual And Machine					
TRANSVERSE TENSILE TEST (QW-150) (DDEL/LAB/PQR/1127)									
Specimen No.	SAMPLE SIZE (mm)	Area (mm ²)	Ultimate Tensile load (KN)	Ultimate unit stress (Mpa)	Type of failure and location				
TT1(TOP)	18.95 X 23.18	439.261	213	484.905	BROKEN IN PARENT METAL ; DUCTILE FRACTURE				
TT2(TOP)	18.93 X 23.65	447.694	217.5	485.822	BROKEN IN PARENT METAL ; DUCTILE FRACTURE				
TT1(BOTTOM)	19.00 X 24.20	459.8	223.5	486.061	BROKEN IN PARENT METAL ; DUCTILE FRACTURE				
TT1(BOTTOM)	18.97 X 23.73	450.158	219	486.496	BROKEN IN PARENT METAL ; DUCTILE FRACTURE				
Comments									
BEND TEST (QW-150) (DDEL/LAB/PQR/1127)									
TYPE OF TEST	Acceptance criteria	Result			Remarks				
SIDE1	180° at 4t	Satisfactory			Accepted				
SIDE3	180° at 4t	Satisfactory			Accepted				
SIDE3	180° at 4t	Satisfactory			Accepted				
SIDE4	180° at 4t	Satisfactory			Accepted				
Comments									
TOUGHNESS TEST (QW-170) (DDEL/LAB/PQR/IMPACT/1128-A)									
Specimen No.	Notch Location	Notch type	Specimen size mm x mm	Test Temperature	Impact Absorbed Energy (J)			Avg (Joule)	Remarks
					1	2	3		
1	WELD, Within 1.5 mm From top SAW -22 (SAW)	V-Notch	10 X 10 X 55	-46°C	42	44	40	42.00	Accepted
2	HAZ, Within 1.5 mm From top SAW -22 (SAW)	V-Notch	10 X 10 X 55	-46°C	58	64	56	59.33	Accepted
3	HAZ, Within 11mm - 5.5 (1/2 TO 1/4t) From top HAZ -22 (SAW)	V-Notch	10 X 10 X 55	-46°C	70	64	70	70.00	Accepted
4	WELD, Within 22mm - 23.5mm From top SMAW -20 (SMAW)	V-Notch	10 X 10 X 55	-46°C	82	24	66	57.33	Accepted
5	WELD, Within 22mm - 23.5mm From top SMAW -20 (SMAW)	V-Notch	10 X 10 X 55	-46°C	15	24	22	20.67	Accepted
6	HAZ, Within 27mm-32mm (1/2 TO 1/4t) From top SMAW -20 (SMAW)	V-Notch	10 X 10 X 55	-46°C	18	32	28	26.00	Accepted
7	WELD, Within 1.5mm From root side top 8 MM GTAW	V-Notch	5 X 10 X 55	-57°C	38	26	10	24.67	Accepted
8	HAZ, Within 1.5mm From root side top 8 MM GTAW	V-Notch	5 X 10 X 55	-57°C	20	22	24	22.00	Accepted
9	HAZ, Within 2mm TO 4mm (1/2 to 1/4t) From root side top 8 MM GTAW	V-Notch	5 X 10 X 55	-57°C	22	22	20	21.33	Accepted
Comments									
HARDNESS TEST (ASTM E92) Values in vickers , Load HV10									
ID Mark	PM-1	HAZ-1	WELD	PM-2	HAZ-2	REMARKS			
TOP	150,152	176,172,173	157,153,186	149,151	165,162,163				
MIDDLE		175,177,173	163,180,182		173,170,171				
BOTTOM		164,162,161	173,172,175		166,163,164				
FILLET WELD TESTS									
Type of test	Result			Remarks					
Not Applicable	Not Applicable			Not Applicable					
OTHER TESTS									
Type of test	Result			DATE			Report No.		
Visual Examination	Accepted			25-01-2022			HMPPL/VT/PQR/2022/03		
Radiographic Testing	Accepted			26-01-2022			ERICO/RG/1009		
Hardness Testing	Accepted			23-06-2022			IRC/0622/22793A		
CERTIFICATION									
WELDER NAME	Welder Stamp Number			Test Conducted By :			IRC Engineering services India Pvt. Ltd		
GUDDU RAJESHWAR (GTAW)	W28			Test Witnessed By :			HMPPL-WE & TPI (Loyola)		
MANIKESHWAR (EMAW)	W07								
MANKISHORE (SAW)	W24								
Date of Welding	09-05-2022								
We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX, Edition 2021 of the ASME Boiler and Pressure Vessel Code.									
Engg. (Welding)		Manager (Testing)			TPI				
HRG's	Signature/Seal	Name	Signature/Seal	Name	Signature/Seal	Name	Signature/Seal	Approved/Reviewed by TPI/Client if required	
Engineering		Certified By							

(u) Chetan
19/7/2022



HEATMAX PROJECTS PVT. LTD

SHAILA 11 BIHWA, CITY SAMPLA,
TALUKA SAMPLA, DISTRICT- ROSTAN,
PIN CODE-124501, HARYANA

PROCEDURE QUALIFICATION RECORD (PQR) - QW 483

Procedure Qualification Record No.

: HMPPL/PQR/2022/PWHT-04 REV.0

Dated : 28-06-2022

Qualification Standards

: ASME SEC IX (Edition 2021)

Supporting pWPS No.

: HMPPL/GEN/PWPS/2022/03 REV.0

Dated : 09-05-2022

Welding Process(es)

: GTAW+SMAW+SAW

Manual : Manual + Machine

Other(s)

Nil

ELECTRICAL CHARACTERISTICS - (QW 409)

Weld Pass(es)	Welding Process	Filler Metal		Current		Voltage (Volts)	Travel Speed (mm/min.)	Others (Remarks, Hot Wire Addition, Technique, Torch Angle Etc.)
		Class	Dia (mm)	Type & Polarity	Amperage (Amperes)			
1st Root	GTAW	ER70S-2	2.5	DCEN	85-95	11-16	58-62	NA
2nd Root Pass	GTAW	ER70S-2	2.5	DCEN	130-140	13-16	65-90	
3rd layer	GTAW	ER70S-2	2.5	DCEN	130-140	13-16	65-90	
4 Layer	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
5 Layer	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
6 and other all	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
7 Layer	SAW	F7A6-EH10K	3.15	DCEP	370-390	28-34	400-450	
8 Layer	SAW	F7A6-EH10K	3.15	DCEP	420-440	28-34	400-450	
9th & Subsequent Pass	SAW	F7A6-EH10K	3.15	DCEP	450-470	28-34	400-450	

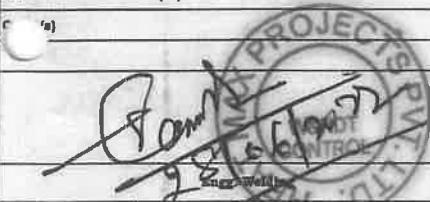
Weld Current : Not Applicable

Heat Input Max. : GTAW ~ 1.57 KJ/MM, SMAW 2.37 KJ/MM, SAW 2.24 KJ/MM

Electrode Size & Type : Ø 2.4mm SPA 5.12 EWTb-2 (Thoriated 2%)

Other(s) : Nil

TECHNIQUE - (QW 410)	Welding Process		
	GTAW	SMAW	SAW
String or Weave	: Weave/String	String /Weave (not more than 3 time of electrode)	String
Orifice or Gas Cup Size (mm)	: 6.25 to 10 mm	Not Applicable	Not Applicable
Method of Cleaning	: Grinding /Wire Brushing	Grinding /Wire Brushing	Grinding /Wire Brushing
Method of Back Gauge	: Not used	None	Not used
Oscillation	Width	Not Applicable	Not Applicable
	Frequency	Not Applicable	Not Applicable
	Dwell Time	Not Applicable	Not Applicable
Tube to work Distance	: Not Applicable	Not Applicable	15-25mm
Multiple or Single Pass per Side	: Multipass	Multipass	Multipass
Closed or Out of Chamber	: Not Applicable	Not Applicable	Not Applicable
Single or Multiple Electrodes	: Single	Single	Single
Electrode Spacing	: Not Applicable	Not Applicable	Not Applicable
Manual or Automatic	: Manual	Manual	Semi-Automatic
Peening	: Not used	Not used	Not used
Use of Thermal Process(es)	: Not Applicable	Not Applicable	Not Applicable
's)	: Nil		



Harish Sharma

Manager Welding



Name	Signature/Seal	Name	Signature/Seal	Name	Signature/Seal
Prepared By		Certified By		Approved / Reviewed By TPIA/Client	(If required)

19/7/2022



IRC ENGINEERING SERVICES INDIA PRIVATE LIMITED

A-53, Sector-63, Noida - 201301, (U.P.) | Tel.0120-4276613, 9599371153,9810401316
NABL ACCREDITED AND CENTRAL BOILERS BOARD APPROVED TEST HOUSE.

Your Asset Integrity Specialist Since 1995

E-mail : lab@ircengg.co.in, ircengg@gmail.com



NABL CERTIFICATE No. TC-7212

SAMPLE SR. NO.: 23137-1/2

REPORT NO:IRC/0622/22193A

CUSTOMER : M/S. HEAT MAX PROJECTS PVT. LTD.

CLIENT : -

CUSTOMER LOCATION : KHEWAT NO.709, KHATONI NO.847, ISMAILA 11 BISWA, SAMPLA, DISTT.- ROHTAK, HARYANA-124501.

REFERENCE : LETTER Dt. 25.05.2022

SAMPLE SR. NO. : 23137-1/2

SAMPLE IDENTIFICATION : 1) HMPPPL-PQR-2022-PWHT-04/WELDING PROCESS:8mm GTAW+20mm SMAW+22mm SAW/SIZE:500X300X50mm THK WELDED PLATE.

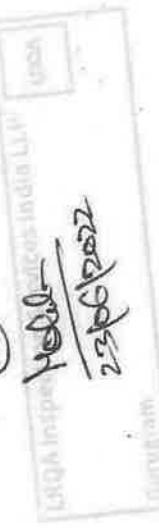
DESCRIPTION : WELDED PLATE SAMPLE BEARING "AP" MARK FOR POST WELD HEAT TREATMENT & CUSTOMER'S REQUIREMENTS.

TEST PROTOCOL:ASTM E8

TRANSVERSE TENSILE TEST

ID Mark	Gauge Dimension (mm)	Area (mm ²)	Ultimate Load (kN)	Ultimate Tensile Stress (N/mm ²)	REMARKS
TT1 (TOP)	18.95x23.18	439.261	213.0	484.905	BROKEN IN PARENT METAL, DUCTILE FRACTURE.
TT2(TOP)	18.93x23.65	447.694	217.5	485.822	BROKEN IN PARENT METAL, DUCTILE FRACTURE.
TT1 (BOTTOM)	19.00x24.20	459.800	223.5	486.081	BROKEN IN PARENT METAL, DUCTILE FRACTURE.
TT2 (BOTTOM)	18.97x23.73	450.158	219.0	486.496	BROKEN IN PARENT METAL, DUCTILE FRACTURE.

(3)





IRC ENGINEERING SERVICES INDIA PRIVATE LIMITED

A-53, Sector-63, Noida - 201301, (U.P.) | Tel.0120-4276613, 9599371153, 9810401316
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Your Asset Integrity Specialist Since 1995

E-mail : lab@ircengg.co.in, ircengg@gmail.com



NABL CERTIFICATE Nos. TC-7212

SAMPLE SR. NO.- 23137-1/2

SCALE: VICKERS

ID Mark	PM-1	HAZ-1	WELD	PM-2	LOAD: HV 10
TOP	150,152	176,172,173	187,183,186	149,151	165,162,163
MIDDLE	-	175,177,173	183,180,182	-	173,170,171
BOTTOM	-	164,162,161	175,172,175	-	166,163,164

HARDNESS TEST

TEST PROTOCOL : ASTM E92

TEST PROTOCOL: ASTM E190
Mandrel Dia.: 4t

Test Detail: AS PER ASME SEC_IX_2021

Angle of Bend: 180 DEGREE

ID Mark	Result	ID. Mark	Result
SB1	SATISFACTORY	SB3	SATISFACTORY
SB2	SATISFACTORY	SB4	SATISFACTORY

CONFORMITY TO REQUIRED SPECIFICATION: YES,

NOTE#1- PRIOR TO MECHANICAL TESTING THE TEST SAMPLES HAVE BEEN POST WELD HEAT TREATED AT 620 DEGREE CENTIGRADE ±10 DEGREE CENTIGRADE FOR 2.5 HOURS FOLLOWED BY AIR COOLING. REFER TIME- TEMPERATURE CHART Dt.26.05.2022.

NOTE#2- CHARPY IMPACT TEST TEMPERATURE CORRECTION FACTOR APPLIED FOR SUB-SIZE TEST SPECIMENS.
REFERENCE DOCUMENT: ASME SECTION VIII DIV.1 UG 84.

WITNESSED,
FOR LRQA
(LQ)

TESTED BY
CHECKED BY

FOR IRC ENGINEERING SERVICES (I).
PVT. LTD
(AUTHORIZED SIGNATORY)

..... END OF THE TEST REPORT

23/06/2022
S.K.HANDA





Your Asset Integrity Specialist Since 1995

IRC ENGINEERING SERVICES INDIA PRIVATE LIMITED

A-53, Sector-63, Noida - 201301, (U.P.) | Tel.0120-4276613, 9599371153, 9810401316
NABL ACCREDITED AND CENTRAL BOILERS BOARD APPROVED TEST HOUSE.

E-mail : lab@ircengg.co.in, ircengg@gmail.com



NABL CERTIFICATE No. TC-7212

SAMPLE SR. NO.- 23137-1/2

TEST PROTOCOL: ASTM E23 SAMPLE SIZE: - CVN: 2mm DEEP CHARPY V NOTCH IMPACT TEST

LOCATION	IRC SAMPLE CODE: #601			TEST TEMP: -	SOAKING TIME: 10 MINUTS
	(I)	(II)	(III)		
WELD, WITHIN 1.5mm FROM TOP-SAW -22mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	42	44	40		42.000
HAZ, WITHIN 1.5mm FROM TOP-SAW -22mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	58	64	56		59.333
HAZ, BETWEEN 11mm-5.5mm(1/2 to 1/4t)FROM TOP-SAW -22mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	70	64	76		70.000
WELD, WITHIN 22mm-23.5mm, FROM TOP-SMAW -20mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	82	24	66		57.333
HAZ, WITHIN 22mm-23.5mm FROM TOP-SMAW -20mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	16	24	22		20.667
HAZ, WITHIN 27mm-32mm(1/2to1/4t) FROM TOP-SMAW -20mm(SIZE-10X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT.	18	32	28		26.000
WELD, WITHIN 1.5mm FROM ROOT SIDE TOP -GTAW- 8mm(SIZE-5X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT. + (-)11 DEGREE= (-)57 DEGREE CENT	38	26	10		24.667
HAZ, WITHIN 1.5mm FROM ROOT SIDE TOP -GTAW- 8mm(SIZE-5X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT. + (-)11 DEGREE= (-)57 DEGREE CENT	20	22	24		22.000
HAZ, WITHIN 2mm to 4mm(1/2to1/4t) FROM ROOT SIDE TOP -GTAW-8mm(SIZE-5X10X55mm)TEST TEMP: AT (-)46 DEGREE CENT. + (-)11 DEGREE= (-)57 DEGREE CENT	22	22	20		21.333



Mr. S.K. Rana
23/06/2022

POST WELD HEAT-TREATMENT CYCLE

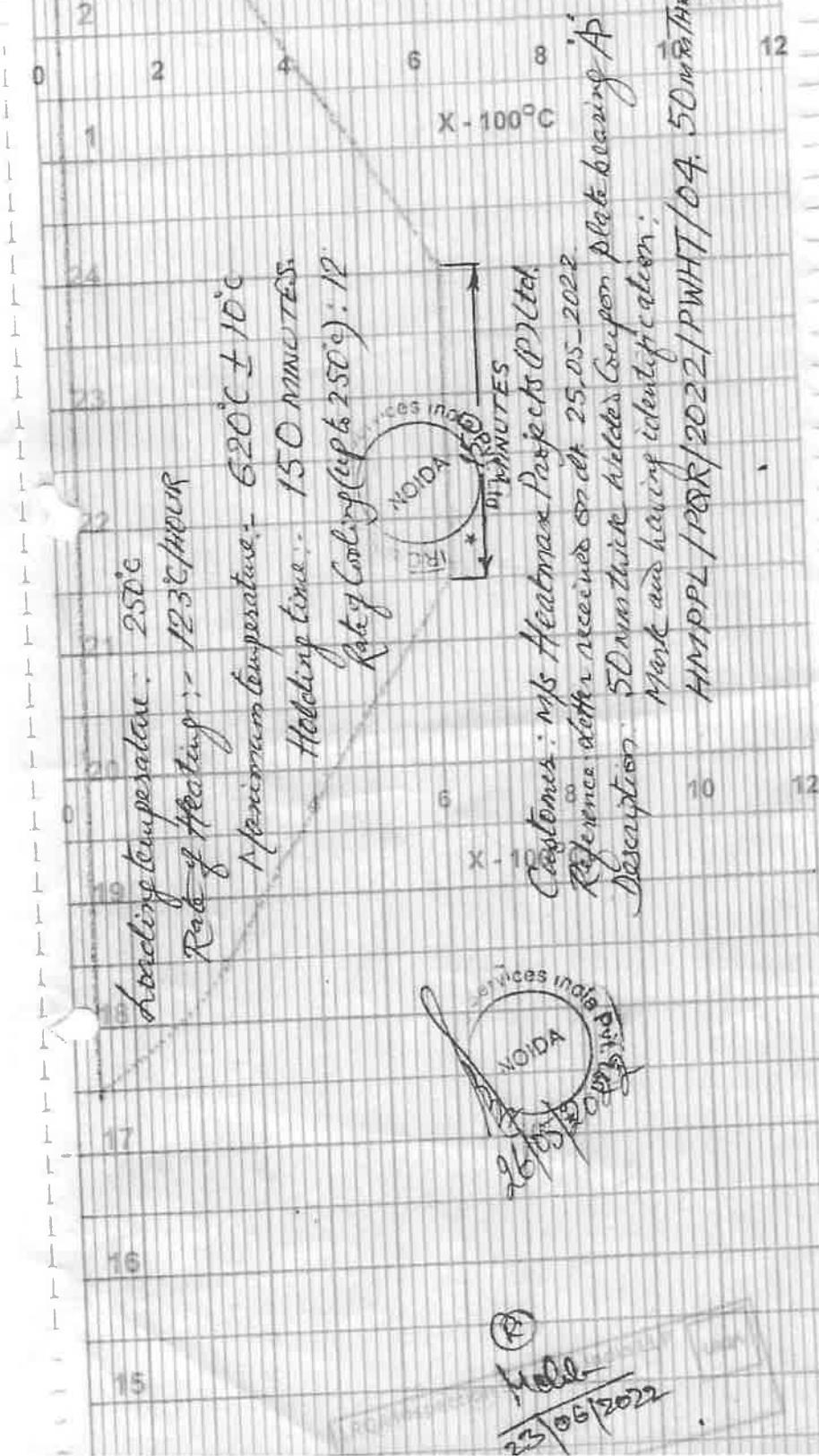
DT 26.05.2022



SCALE : 0-1200°C

1 DIVISION = 20°C

IRC WO: 23137-1



**AMNS
INDIA**

ArcelorMittal Nippon Steel India Limited (Formerly Ess. Steel India Limited)

HAZIRA - 394270, DIST. SURAT, GUJARAT, INDIA

CIN : U27100GJ1976FLC013787

MILL TEST AND INSPECTION CERTIFICATE

For STEEL PLATES USED FOR PRESSURE VESSELS AT MODERATE AND LOW TEMPERATURE

Date : 19.07.2020

HPL/TCD/2010/111869
IS 2041 Gr. R220 : 2009 / IS 2041 Gr. R260 : 2009

Material also conforms to SA 516 Grade 60/70 of ASME Sec II, Part A, Edition 2017.

2110066495

CERTIFY THAT THE MATERIAL DESCRIBED BELOW FULLY CONFORMS TO IS:2041-2009 CHEMICAL COMPOSITION & MECHANICAL PROPERTIES OF THE PRODUCT, AS TESTED

IN ACCORDANCE WITH THE SCHEME OF TESTING & INSPECTION CONTAINED IN THE BIS CERTIFICATION MARKS LICENCE NO.CML/3925976 ARE AS INDICATED BELOW

AGAINST EACH ORDER NO. ETC. (PLEASE REFER TO IS:2041-2009 FOR DETAILS OF SPECIFICATION REQUIREMENTS).

Plate No.	Heat No.	Size in mm (T_W_L)	Weight (Mt.)	Mechanical Properties						Chemical Analysis (%)													
				YS (0.2%)	UTS MPa	% EL	Bend GL= 50mm & 5.65VAO	C	Mn	S	P	Si	Cr	Ni	Cu	Ti	V	Nb	Mo	Al	N	B	CE
4	ET3688112N	R03331	12_2500_12000	2.938																			
4	ET3688211N	R03331	12_2500_12000	2.938																			
5	ET3689111N	R03331	12_2500_12000	2.934	331	521	36	33	OK														
5	ET3689112N	R03331	12_2500_12000	2.933																			
5	ET3689211N	R03331	12_2500_12000	2.936																			
5	ET3692110N	R03331	18_2500_12000	4.339	330	511	35	30	OK														
5	ET3692211N	R03331	18_2500_12000	4.335																			
5	ET3698111N	R03331	28_2500_12000	6.767	323	506	35	33	OK														
5	ET3698112N	R03330	50_2500_12000	12.205	332	513	33	31	OK	LA	0.190	1.180	0.002	0.013	0.327	0.016	0.003	0.006	0.002	0.016	0.001		
5	ET3698211N	S03430	50_2500_12000	12.136	331	511	34	32	OK	PA	0.186	1.174	0.002	0.011	0.325	0.014	0.002	0.005	0.002	0.015	0.001		
5	ET3701111N	S03430	28_2500_12000	6.753	330	515	38	34	OK														
5	ET3701112N	S03430	28_2500_12000	6.782	336	519	34	32	OK														
5	ET3702111N	S03430	28_2500_12000	6.766	336	520	33	31	OK														
5	ET3702112N	S03430	36_2500_12000	8.744	341	525	33	31	OK														
5	ET3705111N	S03430	36_2500_12000	8.715	324	510	35	33	OK														
6	ET3124000N	S03430	50_2500_12000	12.205	332	513	33	31	OK	LA	0.190	1.180	0.002	0.013	0.327	0.016	0.003	0.006	0.002	0.016	0.001		
6	ET3124000N	S03430	50_2500_12000	12.136	331	511	34	32	OK	PA	0.186	1.174	0.002	0.011	0.325	0.014	0.002	0.005	0.002	0.015	0.001		
6	ET3124001N	S03430	50_2500_12000	6.753	330	515	38	34	OK														
6	ET3124002N	S03430	28_2500_12000	6.782	336	519	34	32	OK														
6	ET3124003N	S03430	28_2500_12000	6.766	336	520	33	31	OK														
6	ET3124004N	S03430	36_2500_12000	8.744	341	525	33	31	OK														
6	ET3124005N	S03430	36_2500_12000	8.715	324	510	35	33	OK														
6	ET3124006N	S03430	10_2500_12000	2.481	329	519	36	35	OK	LA	0.180	1.050	0.003	0.014	0.303	0.013	0.003	0.006	0.002	0.015	0.001		
6	ET3124007N	S03432	10_2500_12000	2.481						PA	0.178	1.051	0.002	0.012	0.300	0.012	0.002	0.005	0.002	0.014	0.001		
6	ET3124008N	S03432	10_2500_12000	2.481																			
6	ET3124009N	S03432	25_2500_12000	6.074	337	520	36	34	OK														
6	ET3124010N	S03432	25_2500_12000	6.079																			
6	ET3124011N	S03432	25_2500_12000	6.050	341	521	36	34	OK														
6	ET3124012N	S03432	25_2500_12000	6.056																			
7	ET3135111N	S03432	16_2500_12000	3.929	342	523	38	33	OK														
7	ET3135211N	S03432	16_2500_12000	3.929																			
7	ET3135212N	S03432	16_2500_12000	3.932																			



Authorised Signatory (Quality Assessor)
For ArcelorMittal Nippon Steel India Ltd.
(Formerly Essar Steel India Ltd.)
AMNSIL/CAC-PMR

Authorised Signatory (Quality Assessor)
For ArcelorMittal Nippon Steel India Ltd.
(Formerly Essar Steel India Ltd.)
AMNSIL/CAC-PMR

**AMNS
INDIA**

ArcelorMittal Nippon Steel India Limited (Formerly Essel India Limited)

HAZIRA - 394270, DIST.SURAT, GUJARAT, INDIA

CIN : U27100GUJ976FLC013787

MILL TEST AND INSPECTION CERTIFICATE

For STEEL PLATES USED FOR PRESSURE VESSELS AT MODERATE AND LOW TEMPERATURE

Date : 19.07.2020 Customer : Dish India Private Limited.

Test Certificate No. : HPL/TCD/2010/11869
Steel Specification : IS 2041 Gr. R220 : 2009 / IS 2041 Gr. R260 : 2009

Material also conforms to SA 516 Grade 60/70 of ASME Sec II, Part A, Edition 2017

Sales Order No. : 2110066495

WE CERTIFY THAT THE MATERIAL DESCRIBED BELOW FULLY CONFORMS TO IS:2041-2009 CHEMICAL COMPOSITION & MECHANICAL PROPERTIES OF THE PRODUCT AS TESTED IN ACCORDANCE WITH THE SCHEME OF TESTING & INSPECTION CONTAINED IN THE BIS CERTIFICATION MARKS LICENCE NO.CML:3925976 ARE AS INDICATED BELOW AGAINST EACH ORDER NO. ETC. (PLEASE REFER TO IS:2041-2009 FOR DETAILS OF SPECIFICATION REQUIREMENTS).

Sl. No.	Plate No.	Heat No.	Size in mm (T_W_L)	Weight (Mt.)	Mechanical Properties						Chemical Analysis (%)															
					YS (0.2%)	UTS MPa	%EL	Bend	C	Mn	S	P	Si	Cr	Ni	Cu	Ti	V	Nb	Mo	Al	N	B	CE		
					260	490- Min	25	21	M.R. Min	PA	0.210	0.79- 1.30	0.025	0.025	0.340	0.430	0.430	0.040	0.035	0.030	0.130	0.020	0.0120	0.0010	0.430	
22	EU1762211N	R03265	6_2500_8000		1.102		337	524	36	36	0.210	0.85-	0.025	0.025	0.15-	0.300	0.400	0.030	0.030	0.020	0.120	0.020	0.0120	0.0010	0.430	
23	EU2198101N	R03265	6_2500_8000		1.003																					
24	EU2198102N	R03265	6_2500_8000		1.093																					
25	EU2198103N	R03265	6_2500_8000		1.006																					
26	EU2199111N	R03265	6_2500_8000		1.011																					
27	EU2199112N	R03265	6_2500_8000		1.011																					
28	EU2199113N	R03265	6_2500_8000		1.066																					
29	EU2200111N	R03265	6_2500_8000		1.007																					
30	EU2200112N	R03265	6_2500_8000		1.006																					
31	EU2200113N	R03265	6_2500_8000		1.008																					
32	E13119111N	R03331	12_2500_12000		2.953																					
33	E13119112N	R03331	12_2500_12000		2.954																					
34	E13119211N	R03331	12_2500_12000		2.955																					
35	E13684111N	R03331	10_2500_12000		2.459																					
36	E13684211N	R03331	10_2500_12000		2.458																					
37	E13684212N	R03331	10_2500_12000		2.505																					
38	E13685111N	R03331	10_2500_12000		2.446																					
39	E13685112N	R03331	10_2500_12000		2.446																					
40	E13685113N	R03331	10_2500_12000		2.439																					
41	E13686111N	R03331	10_2500_12000		2.464																					
42	E13686112N	R03331	10_2500_12000		2.464																					
43	E13686113N	R03331	10_2500_12000		2.552																					
44	E13687111N	R03331	12_2500_12000		2.935																					
45	E13687112N	R03331	12_2500_12000		2.935																					
46	E13687113N	R03331	12_2500_12000		2.933																					
47	E13688111N	R03331	12_2500_12000		2.937																					
48	E13688112N	R03331	12_2500_12000		2.937																					
49	E13688113N	R03331	12_2500_12000		2.937																					

Authorised Signatory (Quality Assurance)
For ArcelorMittal Nippon Steel India Limited
(Formerly Essar Steel India Limited)
AMNSIL/QAAC-PMP/19/1

Gurugram
Noida
Bureau Veritas
Project Quality Control

**AMNS
INDIA**

ArcelorMittal Nippon Steel India Limited (Formerly Essar Steel India Limited)

HAZIRA - 394270, DIST.SURAT, GUJARAT, INDIA



CIN : U27100GJ1976FLC013787
CM/L3925976

MILL TEST AND INSPECTION CERTIFICATE

For STEEL PLATES USED FOR PRESSURE VESSELS AT MODERATE AND LOW TEMPERATURE

Date : 19.07.2020

TC Certificate No. : HPLUTC/D/2010/11869

IS 2041 Gr. R220 : 2009 / IS 2041 Gr. R260 : 2009

SI. no. Specification : Material also conforms to SA 516 Grade 60/70 of ASME Sec II, Part A, Edition 2017

Sales Order No. : 2110066495

WE CERTIFY THAT THE MATERIAL DESCRIBED BELOW FULLY CONFORMS TO IS:2041-2009 CHEMICAL COMPOSITION & MECHANICAL PROPERTIES OF THE PRODUCT AS TESTED IN ACCORDANCE WITH THE SCHEME OF TESTING & INSPECTION CONTAINED IN THE BIS CERTIFICATION MARKS LICENCE NO.CM/L3925976 ARE AS INDICATED BELOW IN INST EACH ORDER NO. ETC. (PLEASE REFER TO IS:2041-2009 FOR DETAILS OF SPECIFICATION REQUIREMENTS).

Sl. No.	Plate No.	Heat No.	Size in mm (T_W_L)	Mechanical Properties						Chemical Analysis (%)											
				YS (0.2%)	UTS	%EL	Bend	C	Mn	S	P	Si	Cr	Ni	Cu	Ti	V	Nb	Mo	Al	N
7	ET3693111N	S03432	18_2500_12000	4.356	331	520	36	31	OK												
7	ET3693211N	S03432	18_2500_12000	4.355																	
7	ET3693212N	S03432	18_2500_12000	4.369																	
7	ET3692111N	S03432	18_2500_12000	4.400	326	514	38	33	OK												
7	ET3692112N	S03432	18_2500_12000	4.398																	
7	ET3892211N	S03432	18_2500_12000	4.398																	
			Grand Total		262.902																

WE CERTIFY THAT THE PLATES HAVE BEEN MANUFACTURED, INSPECTED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF SA 516 Grade 60/70 of ASME Sec II, Part A, Edition 2017.

NC : (1) The Material Supplied conforms to the Standard Rolling and Weight tolerances.

(2) Test Certificate conforms to EN 10204:2004-3-1

(3) Process of manufacture : Hot Metal/HBU/DR/EA-F-LF(fully killed steel)-VD-CCM-RHF-Plate Rolling-Furnace Normalizing.

(4) Supply Condition of Material : Trimmed edge & Normalized at $910 \pm 10^\circ\text{C}$, soaking time is 1 min/mm of plate thickness. Cooling in still air.

(5) Vacuum degassing done as per supplementary requirements S1 of SA 20.

(6) Steel is fully killed and conforms to the fine austenitic grain size as per clause 6 of IS 2041:2009 & para 8.3 of SA 20.

(7) Orientation of Tensile and Bend Specimen is Transverse to the rolling direction.

(8) Tensile specimen size : 12.5mm wide full thickness flat specimen for thk $\leq 20\text{mm}$ & 12.5mm dia round specimen for thk $> 20\text{mm}$ at T/4 location as per SA 20.

(9) Tolerances on Length, Width & Thickness : Positive only as per SA 20.

(10) Reconditioning / Repairs of plates by welding on steel not done.

(11) Ultrasonic test found satisfactory as per SA578 Level B for thickness $\geq 10\text{mm}$ & AMNSIL_UT_1_B for thickness $< 10\text{mm}$.

(12) Stencilling marking details : Manufacturer's name, Plate No, Heat No, Size, Specification, MT, UT Code, BIS Licence No.

Low stress steel die stamping details: Plate No, Heat No, Size, Specification, MT, Manufacturer's Monogram

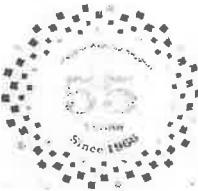
(13) Dimensional tolerances as per SA20.

(14) Final rolling is longitudinal.

(15) First 6 characters of Plate No. indicate mother plate number.

UOE : LA - Ladle Analysis/PA - Product Analysis(%), T - Thickness, W - Width, L - Length, CE - C(Mn)(6)+0.15+Cu+Ni/15, YS - Yield Strength, UTS - Ultimate Tensile Strength, EL - Elongation, MR - Mandrel radius
L : 1000mm, W : 1000mm, T : 10mm, CE : 0.15, YS : 250MPa, UTS : 450MPa, EL : 20%, MR : 10mm
Signature :

Authorised Signatory (Quality Assuror)
For ArcelorMittal Nippon Steel India Ltd.
Formerly Essar Steel India Ltd.
AMNSIL/QAC-PMP/2017



D&H SECHERON ELECTRODES PVT. LTD.

Serial No.	2021/E-0569	Brand Name & Size(mm) : SUPRATHERME (SPL) 3.15X450
Date of issue	05/01/2022	Batch No: B1229130569 Date of Mfg: 03/01/2022
PO No. & Date	-	
TDC No. & Date	-	

Chemical Composition of all Weld Metal wt. (%):

C	0.042
Mn	1.04
Si	0.287
S	0.012
P	0.028
Cr	0.036
Ni	0.001
Mo	0.128
V	0.007
Cu	0.017
Nb	0.001

Mn+Cr+Ni+Mo+V : < 1.75%

Mechanical Properties of All Weld Metal:

Test Condition	As Welded	
Y.S. 0.2% Offset (MPa)	449.0	
U.T.S. (MPa)	541.0	
Elongation (%)	29.0	
CVN Impact Energy at Joules Test Temp. at	-45°C	-40°C
CVN Impact Energy at Joules	54, 56, 66, 52, 52	88, 90, 78, 88, 90
Hardness (BHN)	172-180	
Radiography	Satisfactory	
Fillet Weld Test	Satisfactory	
Hydrogen (ml/100 gms of weld metal)	3.09	
Moisture content in coating %	0.26	

Special requirements:



Test Conducted as per : AWS/SFA 5.1:E7018-1

As per EN 10204 Type 3.1

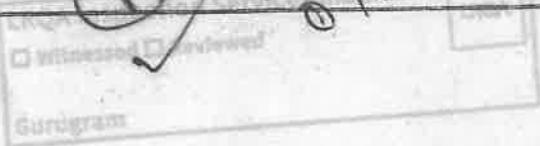
EN ISO 2560-A E 42 4 B 3 2

We certify that supply made against this certificate conforms to all mechanical requirements of ASME section-II, Part-C Edition 2021 in all respects. This clause is applicable for products identified to AWS code only.

Issued to:

Checked by :

S. SATHEESH KUMAR
(AGM - QA & QC)





GWELD
SEAL OF ILLINOIS

TEST CERTIFICATE

QR/BTC/01

ISO 9001:2015 Company

TESTED AND CERTIFIED IN ACCORDANCE TO EN10204, 3.1 (2004)

T.C.NO	TC ISSUE DATE	CLASSIFICATION	PRODUCT	SIZE	BATCH NO	DATE OF MFG
0011790552	17-Mar-2022	AWS/SFA 5.18 ER70S-2	GETIG 70S-2(SPL)..	2.5 X 1000 MM	TW120103205,	12-Nov-2021

CHEMICAL ANALYSIS

PHYSICAL PROPERTIES

WE CERTIFY THAT THE SUPPLY MADE AGAINST THIS T.C. IS MEETING ALL REQUIREMENT OF ASME SEC. II PART-C EDITION 2021 WITH LATEST EDITION								
Ultimate Tensile Strength MPa(N/mm ²)	Yield Strength at 0.2% Offset MPa(N/mm ²)	Elongation L= 4d %	Charpy V-Notch Impact Values(Average) at (-51 deg C) Joules	Moisture in the Flux coating %	Diffusible hydrogen content in the weld metal ml/100gm	Hardness of Weld BHN	Ferrite in Weld Deposit FN	Remarks Radiography=Satisfactory
516	418	30.2	56,52,40,46,50	3.10	150	

PASSES HIC TEST CONDUCTED IN ACCORDANCE WITH NACE TM0284

CSR C1B CTB - SNTI PASSES SSSCC TEST CONDUCTED IN ACCORDANCE WITH NACE TM0177

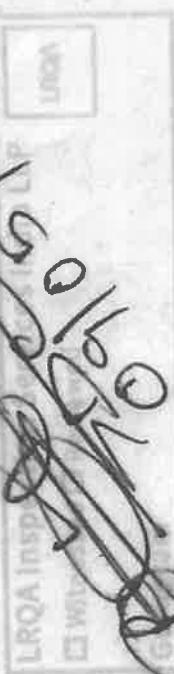
This hatch meets requirements of NACE MR 0103 specification

This batch meets lot classification 'SI' & Schedule 'K' of ASME SECTION II PART 'C'

GEB I imited

GECLIMITED
Plot No 12B,Sarvali MIDC, Kalyan Bhivandi Road,Kalyan(West) -Thane - 421311. Tel.No.: 91 02522 281176/88/90 Fax: 91 02522 281199
E-mail : sales@geclimited.com Website: www.geclimited.com

O.C. Manager



complete Welding Support

D&H SECHERON ELECTRODES PVT. LTD.

Serial No.	2021/U3/8008/G	Brand Name & Size (mm)	Autotherme grade-E 3.15 MM
Date of issue	08/12/2021	Batch No:	L-10508008 Date of Mfg: DEC-2021
PO No. & Date			

Chemical Composition of Wire (%):

C	0.100		
Mn	1.420		
Si	0.200		
S	0.010		
P	0.014		
Cu	0.110		

Special requirements:



Test Conducted as per: AWS-SFA:5.17 EH-10K (As per EN 10204 Type: 3.1)	EN ISO 14171-B-SUN31
We certify that supply made against this TC conforms to all requirements of ASME section-II, Part-C Edition 2021 in all respects. This clause is applicable for products identified to AWS code only.	
Issued to: 	Checked by: RAVINDRA KUMBHARE MANAGER (QA)

QC-21/Rev. 08/Dt. Oct-2021

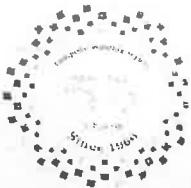
Head Office : 44/46, Industrial Estate, Kila Maidan, Post Bag No.3, Indore-452006. (M.P.) INDIA,
Tel.: +91-731 4229240/41, Fax: +91-731 4229260. Email: qc@dnhsecheron.net, tsd@dnhsecheron.net

www.dnhsecheron.com

Estd 1966

Complete Welding Support

D&H SECHERON ELECTRODES PVT. LTD.



Serial No :	2021/03/1340/G	Brand Name & Size(mm) :	MAXFLUX SAF-8 (LS)
Date of issue :	10-12-2021	Batch No:B111340	Date of Mfg: Nov-2021
PO No. & Date :			

Chemical Composition of all weld metal wt. (%):

C	0.130
Mn	1.790
Si	0.904
S	0.006
P	0.024
Cu	0.367

Mechanical Properties of All Weld Metal:

t Condition	As Welded	620 °C for 1 Hr
YS 0.2% Offset (MPa)	468	450
UTS (MPa)	552	540
Elongation (%)	29.0	32.0
CVN Impact Energy test at Temp -51 Deg C(Joules)	72,72,80,82,74	94,84,98,92,74
Hardness (BHN)	170-178	162-172
Radiography	Satisfactory	Satisfactory

Special Instruction:

Current	Arc Voltage (V)	Travel Speed (mm/min)	Electrode Extension (mm)	Remark if any
425-525	27-30	400	25-38	With Autotherme Grade-E (EH10K) wire 3.15 mm

Type of Flux: Neutral

Special Requirements :



1922-CPR-1471

Test Conducted as per : AWS/SFA:5.17 F7A6/P6-EH10K

As per EN 10204 Type : 3.1 EN ISO 14174 SA FB 1 67 DC

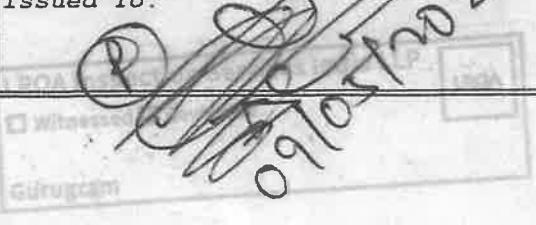
We certify that supply made against this TC conforms to all the requirements of ASME section-II, Part-C Edition 2021 in all respects. This clause is applicable for products identified to AWS code only.

Issued To:

Checked By:

Author: Authoritative

QC-21/Rev.08/Dt:OCT 2021





HEATMAX PROJECTS PVT. LTD
SAMPLA, DISTRICT- ROHTAK, PIN CODE-124501, HARYANA
WELDING PROCEDURE SPECIFICATIONS (#WPS) - QW482

Welding Procedure Specification No. : HMPPL/GEN/WPS/2022/04 **Rev.** : 0 **Dated :** 29-06-2022
Qualification Standards : ASME Section IX
Supporting FQR No. (s) : HMPPL/PQR/2022/PWHT-04 REV.0
Welding Process(es) : GTAW+SAW+SMAW **Type** : Manual + Manual + Machine

JOINTS - (QW 402)

Groove Design	As Per Groove production drawing
Root Spacing	As Per Groove production drawing
Backing	No For Root Run & Yes For Hot Pass & Subsequent Passes.
Retainers	None
<input checked="" type="checkbox"/> Metal	<input type="checkbox"/> Nonfusing Metal
<input type="checkbox"/> Non metallic	<input type="checkbox"/> Other

As per drawing

BASE METAL - (QW 403)

P. No. : 1 & Group No. : 1 and 2 To P. No. : 1 & Group No. : 1 and 2

t Pass>1/2 in. (13 mm)	Change in P No. Qualified	Other(s)	Thickness Qualified (mm)			
			As Welded		With PWHT	
			Min.	Max.	Min.	Max.
			Groove Thickness in mm (Without Impact tested)	5	200	--
			Groove Thickness in mm (With Impact Tested)	16	200	--
			Fillet	All	All	--

Welding Process

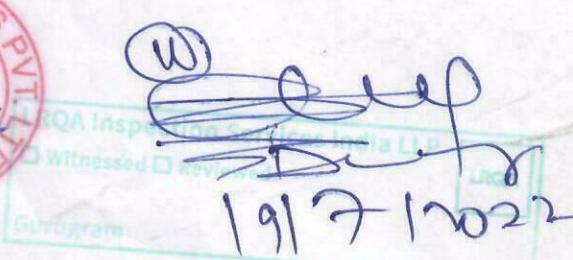
Specification No. (SFA)	GTAW			SMAW		SAW	
	5.18	5.1	5.17	E7018-2	E7018-1	EH10K	
AWS Class							
F. No.		6			4		6
A. No.		1			1		1
Size & Dia. of Filler Metal (in mm)		Ø 2.5		Ø3.15		Ø 3.15	
Addition or Deletion of Filler Metal		With Filler Only		Not Applicable		Not Applicable	
Filler Metal Product Form		Solid(Bare)		Not Applicable		Solid(Bare)	
Supplemental filler Metal		Not Applicable		Not Applicable		None	
Consumable Insert		None		Not Applicable		Not Applicable	
Deposited Weld Metal Thickness		16 MM		200MM		200MM	
Alloy Element		Not Applicable		Not Applicable		Not Applicable	
Flux Designation		Not Applicable		Not Applicable		Premierweld BF-1 Flux/premierweld IN 61	
Flux Wire classification		Not Applicable		Not Applicable		F7P6-EH10K	
Alloy Flux		Not Applicable		Not Applicable		Not Applicable	
Addition or Deletion of Flux		None		Not Applicable		Not Applicable	
F' re		Not Applicable		Not Applicable		Neutral	
Recommended Slag		Not Applicable		Not Applicable		Not Allowed	
Other(s)					HII		

POSITIONS - (QW 405)

		PREHEAT - (QW 406)		PWHT - (QW 407)	
Position(s) of Groove	GTAW, SMAW All AND SAW 1G Uphill (If Vertical)	Preheat Temp. Min ^{°C}	80°C	Temperature Range	620 +_ 10°C
Weld Progression		Interpass Temp. Max ^{°C}	280°C	Time	Min. - 1 hr, 1hr/inch for thk
Position(s) of Fillet	All	Preheat Maintenance	None	Other(s)	s2 inch (50 mm), above 50mm thickness plus 15 min for each additional inch
Change in Position	Not Applicable	Other(s)	Nil		
Other(s)	Nil				

GAS - (QW 408)

		Gas(es)		Mixture Ratio		Flow Rate	
Shielding Gas (GTAW)		Argon		Single		8-12LPM	
Shielding Gas (SMAW)		Not Applicable		Not Applicable		Not Applicable	
Shielding Gas (SAW)		Not Applicable		Not Applicable		Not Applicable	
Trailing Gas		NIL		NIL		NIL	
Backing Gas		NIL		NIL		NIL	



Welding Procedure Specification No.	: HMPPL/GEN/WPS/2022/04	Rev.	: 0	Dated :	29-06-2022
Qualification Standards	: ASME Section IX				
Supporting FQR No. (s)	: HMPPL/PQR/2022/PWHT-04 REV.0				
Welding Process(es)	: GTAW+SAW+SMAW	Type	:	Manual + Manual + Machine	

ELECTRICAL CHARACTERISTICS - (QW 409)

Weld Pass(es)	Welding Process	Filler Metal		Current		Voltage (Volts)	Travel Speed (mm/min.)	Others (Remarks, Hot Wire Addition, Technique, Torch Angle Etc.)
		Class	Dia (mm)	Type & Polarity	Amperage (Amperes)			
1st Root	GTAW	ER70S-2	2.5	DCEN	85-95	11-16	58-62	NA
2nd hot Pass	GTAW	ER70S-2	2.5	DCEN	130-140	13-16	65-90	
3rd layer	GTAW	ER70S-2	2.5	DCEN	130-140	13-16	65-90	
4 Layer	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
5 Layer	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
6 and other all	SMAW	E7018-1	3.15	DCEP	115-120	23-28	85-95	
7 Layer	SAW	F7A6-EH10K	3.15	DCEP	370-390	28-34	400-450	
8 Layer	SAW	F7A6-EH10K	3.15	DCEP	420-440	28-34	400-450	
9th & Subsequent Pass	SAW	F7A6-EH10K	3.15	DCEP	450-470	28-34	400-450	

Pulsing Current : Not Applicable Heat Input Max^m : GTAW :- 1.57 KJ/MM, SMAW 2.37 KJ/MM, SAW 2.24 KJ/MM

Tungsten Electrode Size & Type : SFA 5.12 EWTH-2(2% Thoriated) Ø 2.4

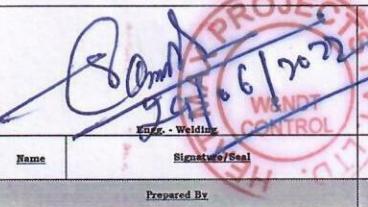
Metal Transfer Mode : Not Applicable

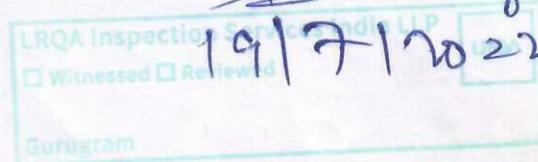
Wire Feed Speed Range (m/min.) : SAW 1.5 To 3 Mtr / Minute.

Other(s) : NIL

TECHNIQUE - (QW 410)	Welding Process		
	GTAW	SMAW	SAW
String or Weave	Weave/String	String/ Weave(not more than 3 times of Electrode dia.)	String
Orifice or Gas Cup Size (mm)	6.25 TO 10mm	Not Applicable	Not Applicable
Method of Cleaning	Wire Brushing Or Grinding	Wire Brushing/Grinding	Wire Brushing Or Grinding
Method of Back Gouge	Grinding If Required	Grinding if required	Grinding If Required
Oscillation	Not Applicable	Not Applicable	Not Applicable
Tube to Work Distance	Not Applicable	Not Applicable	15-25mm
Mutiple or Single Pass Side	Multiple	Multiple	Multiple
Single to Mutiple Electrodes	Single	Single	Single
Closed to Out of Chamber	Not Applicable	Not Applicable	Not Applicable
Electrode Spacing	Not Applicable	Manual	Not Applicable
Manual or Automatic	Manual	Manual	Machine
Thermal Process(es)	Not Applicable	Not Applicable	Not Applicable
Other(s)	Not Allowed	Not Allowed	Not Allowed

1] This WPS Shall Be Used For Tacking, Welding & Weld Repair.
 2] Welding Joint Shall be Cleaned min. 50 mm on Either Side of The Joint by Wire Brushing to Remove Impurities Like Rust, Dirt & Oil Grease etc.
 3] Welding flux shall be baked as per manufacture recommendations or as per established procedure.

 Engg. - Welding Signature/Seal		 Manager Welding Signature/Seal			
Name	Prepared By	Name	Checked By	Name	Approved By



HEATMAX PROJECTS PVT. LTD

SAMPLA, DISTRICT- ROHTAK, PIN CODE-124501, HARYANA
ISMAILA 11 BISWA, CITY SAMPLA,
TALUKA SAMPLA, DISTRICT- ROHTAK,
PIN CODE-124501, HARYANA



PROCEDURE QUALIFICATION RECORD (PQR) - QW 483

Procedure Qualification Record No.

: HMPPL/PQR/2022/PWHT-04 REV.- 1

Date : 15-01-2024

Qualification Standards

: ASME SEC IX (Edition 2023)

Date : 09-05-2022

Supporting pWPS No.

: HMPPL/GEN/PWPS/2022/03 REV.- 0

Manual Manual + Machine

Welding Process(es)

: GTAW+SMAW+SAW

JOINTS - (QW 402)		JOINT DETAIL		WELD SEQUENCE	
Groove Design	: As Per Groove Sketch				
Root Spacing	: 3-4 MM				
Backing	: No For Root Run & yes for Hot Pass & Subsequent passes				
Backing Material	: No For Root Run & Weld metal For Hot Pass & Subsequent passes				
Retainers	: Not Used				
Other	: Nil				
BASE METAL - (QW 403)					
	Product Form	Spec.(Type or Grade)	P.No.	Grp No.	Thk. (mm)
Welded to:	PLATE	SA516 Gr. 60	P1	1 and 2	50 MM
	PLATE	SA516 Gr. 60	P1	1 and 2	50 MM
t Pass > 13 mm	No				
FILLER METALS - (QW 404)		Welding Process			
		GTAW	SMAW	SAW	
Specification No. (SFA)	:	5.18	5.1	5.17	
AWS Class	:	ER70S-2	E7018-1	EH10K	
F. No.	:	6	4	6	
A. No.	:	1	1	1	
Size(Dia.) of Filler Metal (in mm)	:	Ø 2.5 MM	Ø 3.15 MM	Ø 3.15 MM	
Addition or Deletion of Filler	:	With Filler Wire	Not Applicable	Not Applicable	
Filler Metal Product Form	:	Bare (Solid)	Not Applicable	Solid (Bare)	
Consumable Insert	:	None	Not Applicable	None	
Addition or Deletion of Flux	:	Not Applicable	Not Applicable	Not Applicable	
Flux Wire classification	:	Not Applicable	Not Applicable	F7P5- EH10K	
Flux Designation	:	Not Applicable	Not Applicable	Premierweld BF-1Flux/premierweld IN 61	
Deposited Weld thickness (mm)		8 MM	20 MM	22 MM	
Groove	Maximum Weld Pass Thickness (mm)	3 MM	4 MM	4 MM	
	Diameter >1/4 in. (6mm)	Not Applicable	Not Allowed	Not Allowed	
Alloy Element	:	Not Applicable	Not Applicable	None	
Flux type	:	Not Applicable	Not Applicable	Basic	
Alloy Flux	:	Not Applicable	Not Applicable	None	
Recrushed Slag	:	G Weld	D & H Secheron	D & H Secheron	
Other	:	Nil	Nil	Nil	
POSITIONS - (QW 405)		PWHT - (QW 407)			
		Parameter	Max. PWHT	Min. PWHT	
Position(s) of Groove	: 3G	Preheat Temp. Min. ^m	: 80°C	Temperature Range	: 620 ± 20°C 635 ± 15°C
Weld Progression	Uphill if Vertical	Interpass Temp. Max ^m	: 225°C	Soaking Time	: 2 hr. 30 min. 1 hr.
		Preheat Maintenance	: None	Heating Rate	: 123°C / hr. 110°C / hr.
Other(s)	: Nil	Others : Nil		Cooling Rate	: 125°C / hr. 110°C / hr.
				Other(s)	: Nil Nil
GAS - (QW 408)		Gas(es)	Mixture Ratio (%)	Flow Rate	
Shielding Gas (GTAW)		Argon	99.99%	13-17 LPM	
Trailing Gas		NIL	NIL	NIL	
Backing Gas		NIL	NIL	NIL	
Other(s)			Nil		



HEATMAX PROJECTS PVT. LTD

SAMPLA, DISTRICT- ROHTAK, PIN CODE-124501, HARYANA
ISMAILA 11 HISWA, CITY SAMPLA,
TALUKA SAMPLA, DISTRICT- ROHTAK,
PIN CODE-124501, HARYANA



PROCEDURE QUALIFICATION RECORD (PQR) - QW 483

Procedure Qualification Record No.

: HMPPL/PQR/2022/PWHT-04 REV.- 1

Date : 15-01-2024

Qualification Standards

: ASME SEC IX (Edition 2023)

Supporting pWPS No.

: HMPPL/GEN/PWPS/2022/03 REV.- 0

Date : 09-05-2022

Welding Process(es)

: GTAW+SMAW+SAW

Manual Manual + Machine

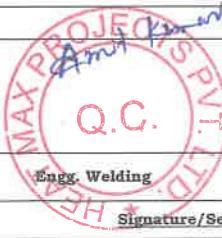
ELECTRICAL CHARACTERISTICS - (QW 409)

Weld Pass(es)	Welding Process	Filler Metal		Current		Voltage (Volts)	Travel Speed (mm/min.)	Others (Remarks, Hot Wire Addition, Technique, Torch Angle Etc.)
		Class	Dia (mm)	Type & Polarity	Amperage (Amps)			
1st Root	GTAW	ER70S-2	Ø 2.5	DCEN	85-95	11-16	58-62	NA
2nd Hot Pass	GTAW	ER70S-2	Ø 2.4	DCEN	130-140	13-16	65-90	
3rd Layer	GTAW	ER70S-2	Ø 2.4	DCEN	130-140	13-16	65-90	
4th Layer	SMAW	E7018	Ø 3.15	DCEP	115-120	23-28	85-95	
5th Layer	SMAW	E7018	Ø 3.15	DCEP	115-120	23-28	85-95	
6th and other all Layers	SMAW	E7018	Ø 3.15	DCEP	115-120	23-28	85-95	
7th Layer	SAW	EH10K	Ø 3.15	DCEP	370-390	28-34	100-150	
8th Layer	SAW	EH10K	Ø 3.15	DCEP	420-440	28-34	100-150	
9th & Subsequent pass	SAW	EH10K	Ø 3.15	DCEP	450-470	28-34	100-150	
Back Pass	Not Applicable	Heat Input Max ^m		GTAW : 1.57 KJ/MM, SMAW : 2.37 KJ/MM, SAW : 2.24 KJ/MM				

Tungsten Electrode Size & Type φ 2.4 mm SFA5.12 EWTh-2 (Thoriated 2%)

Other(s) Nil

TECHNIQUE - (QW 410)	Welding Process		
	GTAW	SMAW	SAW
String or Weave	Weave/String	Wave/String (not more than 3 times of electrode)	String
Orifice or Gas Cup Size (mm)	6.25 To 10 MM	Not Applicable	Not Applicable
Method of cleaning	Wire Brushing / Grinding	Wire Brushing / Grinding	Wire Brushing / Grinding
Method of Back Gauge	Not Used	None	Not Used
Oscillation	Width	Not Applicable	Not Applicable
	Frequency	Not Applicable	Not Applicable
	Dwell Time	Not Applicable	Not Applicable
Tube to work Distance	Not Applicable	Not Applicable	15-25 MM
Multiple or Single Pass per Side	Multipass	Multipass	Multipass
Closed or Out of Chamber	Not Applicable	Not Applicable	Not Applicable
Single or Multiple Electrodes	Single	Single	Single
Electrode Spacing	Not Applicable	Not Applicable	Not Applicable
Manual or Automatic	Manual	Manual	Semi-Automatic
Peening	Not Used	Not Used	Not Used
Use of Thermal Process(es)	Not Applicable	Not Applicable	Not Applicable
Other(s)	Nil	Nil	Nil



Engg. Welding



Manager Welding

Name	Signature/Seal	Name	Signature/Seal
Prepared By		Certified By	



HEATMAX PROJECTS PVT. LTD
SAMPLA, DISTRICT- ROHTAK, PIN CODE-124501, HARYANA
PROCEDURE QUALIFICATION RECORD (PQR) - QW 483 - Test Results

Procedure Qualification Record No.	HMPPL/PQR/2023/PWHT-04 REV. 01	Date	15-01-2024
Qualification Standards	ASME Section IX, Edition 2023		
Supporting PWPS No.	HMPPL/GEN/PWPS/2022/03 REV-0	Date	09-05-2022
Welding Process(es)	GTAW+SMAW+SAW	TYPE	Manual + Machine

HARDNESS TEST (ASTM E92 2017) Values in Vickers, Load HV10 AT WELD CROSS SECTION

ID Mark	PWHT AT SOAKING TIME 60 MINUTES (MIN.)			PWHT AT SOAKING TIME 2HRS. 30 MINUTES (MAX.)			REMARKS
	TOP	MIDDLE	BOTTOM	TOP	MIDDLE	BOTTOM	
At Weld	187, 190	-	193, 195	184, 185	-	187, 187	
At HAZ	185, 187, 185, 187	183, 185, 182, 185	187, 188, 185, 187	179, 182, 179, 181	180, 177, 179, 180	183, 184, 185, 185	
At Parent	169, 171	-	170, 171	165, 165	-	165, 166	

FILLET WELD TESTS

Type of test	Result	Remarks
Not Applicable	Not Applicable	Not Applicable

OTHER TESTS

Type of test	Result	Report No. & Date
Visual Examination	Accepted	HMPPL/VE/01 DT. 27-12-2023
Radiographic Testing	Accepted	0124/04F DT. 04-01-2024
Hardness Testing	Accepted	0124/ULR-TC525124000000448F DT. 09-01-2024

CERTIFICATION

WELDER NAME (Welding Process)	Welder Stamp Number	Test Conducted By
Rakesh Kumar (GTAW)	W-27	R. K. Inspection & Testing Services
Satendra Prasad (SMAW)	W-40	
Nand Kishore (SAW)	W-24	
Date of Welding	26-12-2023	

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX, Edition 2023 of the ASME Boiler and Pressure Vessel Code.



Engg. (Welding)

Manager (Welding)

Name	Signature/Seal	Name	Signature/Seal
Prepared By		Certified By	



T.M. REGD.

R.K. INSPECTION & TESTING SERVICES

NABL Accredited & Central Boilers Board Approved Test House

Approved Third Party Agency from P.E.S.O. Nagpur for SMPV (U) Rules 1981

Mechanical & Chemical Testing Of Ferrous, Non Ferrous Metals (Spectro & Wet)

Testing of Civil & Building Materials, Polymers, Paints, Protective Coatings,
Membranes, Epoxy Coatings etc. And N.D.T. Services



TC-5251

Office :

C-42, Manak Vihar Extn. (Tihar)
Subhash Nagar, New Delhi-110018

Works :

C-196/2, Mayapuri Industrial Area,
Phase-II, New Delhi-110064

REPORT NO : 0124 / ULR-TC52512400000448F

DATE OF REPORTING:09.01.2024

FORMAT NO. : F / HMLR / 06 / 00

HARDNESS TEST REPORT

WORK ORDER NO.: 13184-1/3

CUSTOMER: M/s HEATMAX PROJECTS PVT. LTD.; KHEWAT NO. 847, 11 BISWA, ISMAILA, TEHSIL SAMPLA, DIST. ROHTAK-124501 HARYANA.

REF.: EMAIL: DT.: 28.12.2023 DATE OF RECEIPT: 29.12.2023

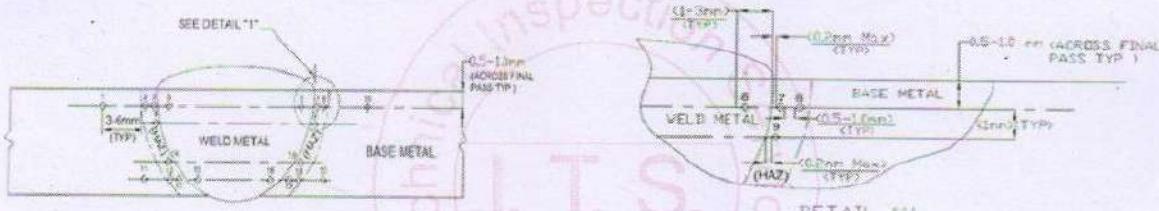
^DESC.: 50MM THICK CS WELDED COUPON PLATE SAMPLE FOR HARDNESS TEST AS PER ASME SEC. IX ED. 2023/
NRL DOC. 4.5 TP-1ZZZA-IP-SPE-0001 (PAGE NO. 9) (THERMAX REQUIREMENT)

^PQR NO.	^WELDER NAME & ID	^POSITION & PROCESS (WELDER ID)	PLATE HEAT NO.	^MATERIAL OF CONSTRUCTION
HMPPL/PQR/2022/PWHT-04	RAKESH KUMAR (W-27) + SATENDRA PRASAD (W-40)+ NAND KISHORE (W-24)	3G FOR GTAW (W-27) & SMAW (W-40), 1G FOR SAW (W-24)	S13365	ASME SA516 GR. 60 -2023

DATE OF TESTING:08.01.2024

Discipline: Mechanical

Group: Mechanical Properties of Metals



These sketches follow from NRL document no. 4.5 TP-1ZZZA-IP-SPE-0001

Hardness scale Vickers load:10KGF Test Method: ASTM E-92-2017 AT WELD CROSS SECTION						
OBERVATIONS	3A PWHT AT MINIMUM			2A PWHT AT MAXIMUM		
	TOP	MIDDLE	BOTTOM	TOP	MIDDLE	BOTTOM
AT WELD-POINT	5, 6	NIL	15, 16	5, 6	NIL	15, 16
	187, 190	-	193, 195	184, 185	-	187, 187
AT HAZ - POINT	2, 3, 7, 8	4, 9, 14, 19	12, 13, 17, 18	2, 3, 7, 8	4, 9, 14, 19	12, 13, 17, 18
	185, 187, 185, 187	183, 185, 182, 185	187, 188, 185, 187	179, 182, 179, 181	180, 177, 179, 180	183, 184, 185, 185
AT PARENT-POINT	1, 10	NIL	11, 20	1, 10	NIL	11, 20
	159, 171	-	170, 171	165, 165	-	165, 166

PRIOR TO MECHANICAL TESTING PWHT (MINIMUM) DONE AT 640°C FOR 1 HOURS ; REFER TIME TEMPERATURE CHART NO. ITS / 642 ; DT. 06.01.2024

PRIOR TO MECHANICAL TESTING PWHT (MAXIMUM) DONE AT 625°C FOR 2 HOURS 30 MINUTES : REFER TIME TEMPERATURE CHART NO. ITS / 643 ; DT. 07.01.2024

Tested by

Remarks 1. Report relates only to the samples submitted.

2. Selection of samples not done by M/s.RKITS

3. ^Provided By customer

4. Total liability of our works is limited to invoiced amount

5. This report can not be used as an evidence in court of law without return approval of the laboratory.

XXX END OF REPORT XXX

Reviewed and Authorized
A.P. Singh/ Karan Kohli
Lab Incharge / Quality Manager



We Also Undertake Testing Jobs under T. P. I. Agencies viz :-

LRA, PDIL, EIL, IBR, BAX COUNSEL, BVIL, DNV.GL, ABS, IRS,
QUEST, NPCIL, NTPC, TUV NORD, H&G, TÜV SÜD, VELOSI, SGS etc.

Phones Offi : 011-25121201, 28122201 Works : 011-28114161, 47340172

E-mail : rkits_its@yahoo.co.in • info@rkits.co.in • Visit us at # www.rkits.co.in





T.M. REGD.

R.K. INSPECTION & TESTING SERVICES

CENTRAL BOILERS BOARD (GOVT. OF INDIA) APPROVED TEST HOUSE

MECHANICAL & CHEMICAL TESTING OF FERROUS & NON FERROUS METALS (SPECTRO & WET)
& N.D.T. SERVICES LIKE ULTRASONIC, RADIOGRAPHY, D.P. TESTING, M.P.I. & P.M.I.

Approved Third Party Agency from P.E.S.O. Nagpur for SMPV (U) Rules 1981

Office : C -42, Manak Vihar Extn. (Tihar) Subhash Nagar, New Delhi-110018

Works : C -196/2, Mayapuri Indl. Area, Phase-II, New Delhi-110064 Ph : 011-28114161

REPORT NO.: 0124/04F	DATE : 04.01.2024	WORK ORDER NO.: 13184	SOURCE : X-RAY – 250 KVP		
CUSTOMER : M/s HEATMAX PROJECTS PVT. LTD. ; KHEWAT NO. 709, KHATONI NO. 847, 11 BISWA, ISMAILA, TEHSIL SAMPLA, DIST. ROHTAK-124501, HARYANA.					
DESCRIPTION: RADIOGRAPHY OF WELDED PLATE JOINT		MATERIAL : ASME SA 516 GR. 60	FILM : D7		
REFERENCE: LETTER DT.: 28.12.2023		THICKNESS : 50MM	SFD : AS REQUIRED		
ACCEPTANCE STANDARD: ASME SEC IX-2023		TECHNIQUE : SWSI	TIME : AS REQUIRED		
DENSITY : ON IQI 2.3 ON AREA OF INTREST DENSITY RANGE IS 2.4 TO 2.5		IQI : 6 ISO 12	BACK : 0.15 MM		
DATE OF TESTING : 03.01.2024		SENSITIVITY : 2%	PB SCREEN : FRONT 0.10MM		
S.NO.	IDENTIFICATION	SEG. NO.	OBSERVATION	REMARKS	FILM SIZE
1.	HMPPL/PQR/2022/PWHT-04/RK/SP/NK/ SIZE – 50X300X300MM/ WELDER NAME (ID) RAKESH KUMAR (W-27)+SATENDRA PRASAD(W-40) NAND KISHORE (W-24)/ WELDING PROCESS (WELDER ID) GTAW (W-27) + SMAW (W-40) + SAW (W-24)/ POSITION - 3G FOR GTAW & SMAW, 1G FOR SAW/ PLATE HEAT NO. - S13365	A – B	NO SIGNIFICATION INDICATION 	ACCEPTABLE	15" X 6"
APPROVED /NDT IN CHARGE 		INSPECTION AUTHORITY			

- Remarks 1. Report relates only to the samples submitted.
 2. Selection of samples not done by M/s. RKITS.
 3. The above testing not in NABL Scope 4. ^Provided By customer.
 5. Total liability of our works is limited to invoiced amount.
 6. This report can not be used as an evidence in court of law without written approval of the laboratory.

Ph. : 011-25121201, 28122201 Fax :+91-11-25122517 E-mail : rkits_its@yahoo.co.in

We Also Undertake Testing Jobs under T.P.I. Agencies viz :-
 LRA, PDIL, EIL, IBR, BAX COUNSEL, BVIL, DNV.GL, ABS, IRS, QUEST
 NPCIL, NTPC, TUV NORD, H&G, TÜV SÜD, VELOSI etc.

Chart No : 4400K01

Heat charge No ITS / 642

DT 06/01/24

a

Scale 0-1200

1000 = 20

W.O = 13184

3A PWHT cycle AT



0 1000 = 20
dust at 6400

24 → 60 minutes



23 M/s Heat M/s projects Pvt Ltd
T 28/12/23

22 Samith Bull Watched

21 Cupra Meti

20 No - HMLC / 84 / 2022 / PWHT - 04

MOC = SASIGR 60

19

Wednesday Name Rakesh Kumar (W-27)

18 Saturday Based W-40 + N AND Rishabh
W-24

17 Dec 2023 GIAW (W-27) + SMAW (W-40) +
SMAW (W-24) Post arc 3rd pass GIAW + SMAW (W-24)

16/5/2023 Date No S13365

15



PT 07/01/24

Scale 0-1200



$$100^{\circ}\text{C} = 80$$

11

2A ~~cycle~~

W.O. 13184

10 AT Maxima

Put AT Done At

625° for 2 hrs 30 mins

8

M/S Heat Max ~~Refrigerator~~ Ltd

7

PT 28/12/23

⑧ Job Desc

4 6 8 10 12

5 Scouring Ball weight 900gms

P.R.N. No. HMLK/PL/2022/WH-04

5 MOC: SASIG PG 60

4

Welder ID: Rakesh Kumar (W-27) +
Sandeep Basad (W-40) + Naveed Hussain (W-2)

GTA2 (W-27) + SMAW (W-40) + SAW (W-24)

2

3a For GTA2 & SMAW, 1a for SAW

1

Plot No. 513365

8 10 12

24

X - 100°C

23



Numaligarh Refinery Limited Purchase Requisition for Main Combustion Chamber						NRL Expansion Project TL-1P35A-QA-3579-ITP-0001 Rev. 02			
Sl. No.	DESCRIPTION	Ref. Documents / Acceptance Norm	Format of records	Quantum of check	Characteristic	Check points		Remarks	
						HPPL	TPI		

Table -1

NDT (Reference TP-1ZZZA-IP-SPE-0001 table 6 and Clause 9, 3 of TP-1ZZZA-ME-SPE-0001 (For Full Radiography)

Joint Type	Before PWHT				After PWHT (if required)					
	RT	DPT	MPT	UT	RT	DPT	MPT	UT		
All Long Seam (Butt Weld)	100%	-	-	-	-	100%	-	-		
All Circ Seam (Butt Weld) including Nozzle	100%	-	-	-	-	100%	-	-		
Welds Before Fittings reinforcing pad	-	100%	-	-	-	-	-	-		
Nozzle to Shell Root Pass and back gauged before back welding	-	100%	-	-	-	-	-	-		
Fabricated Head and nozzles weld seam	100%									
Shell to Nozzle Pipe	-	DPT OR MPT 100%		-	-	DPT OR MPT 100%		-		
Skirt to shell / head	-	100% DPT or MPT		-	-	10%	-	-		
Saddle to Shell	-	DPT OR MPT 100%			-	-	-	-		
Load Bearing attachment Joint & Lifting Lug, Trunnions	-	DPT OR MPT 100% & UT 100% more than 25 mm			-	-	100% MT + 100% UT more than 25 mm			
Skirt to skirt CS and LS (butt weld)	10%	-			-	100% DPT or MPT				
T joint in circumferential seam of skirt	100%	-			-	-				
Non-Loading bearing attachment Pad (Insulation support, Davit & Manway Support)	-	100% DPT OR MPT		-	-	10%	-	-		
Internal Welds	-	100% MPT or DPT		-	-	10% DPT or MPT		-		

NDT (Reference TP-1ZZZA-IP-SPE-0001 table 6 and Clause 9, 3 of TP-1ZZZA-ME-SPE-0001 (For Spot Radiography)

Joint Type	Before PWHT				After PWHT (If required)					
	RT	DPT	MPT	UT	RT	DPT	MPT	UT		
All Long Seam (Butt Weld)	10%	-	-	-	-	10%	-	-		
All Circ Seam (Butt Weld) including Nozzle	10%	-	-	-	-	10%	-	-		
Welds Before Fittings reinforcing pad	-	100%	-	-	-	-	-	-		
Nozzle to Shell Root Pass NDT	-	100%	-	-	-	-	-	-		
Fabricated Head and nozzles weld seam	100%	-								
Shell to Nozzle Pipe	-	DPT OR MPT 100%		-	-	DPT OR MPT 10%		-		
Skirt to shell / head	-	100% DPT or MPT		-	-	10%	-	-		
Saddle to Shell	-	DPT OR MPT 100%			-	-	-	-		
Load Bearing attachment Joint & Lifting Lug, Trunnions	-	DPT OR MPT 100% & UT 100% more than 25 mm			-	-	100% MT or DPT			
Skirt to skirt CS and LS (butt weld)	10%	-			-	100% DPT or MPT				
T joint in circumferential seam of skirt	100%	-			-	-				
Internal Welds	-	100% MPT or DPT		-	-	10% DPT or MPT	-	-		