



SHEET	REVISION			
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1	X			
2	X			
3	X	X		
4	X	X		
5	X			
6	X	X		
7	X	X		
8	X	X		
9	X			
10	X	X		
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15	X			
16	X	X		
17	X	X		
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20	X	X		
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20000m3 FUEL OIL STEEL STORAGE TANK
Welding Procedure Specification (WPS)

Vendor Doc No: VD-ST-PR-002
Client Doc No.:.....

Vendor :



MACHINE SAZI PARS CO.
(MSP)

1) SCOPE

THIS PROCEDURE IS APPLICABLE FOR WELDING OF FUEL OIL STEEL TANKS AND DESCRIBES THE NECESSARY REQUIREMENTS AND PROCEDURES TO PERFORM COMPLETE WELDING OF MATERIALS.

2) APPLICABLE CODE



- 2.1. API 650 STANDARD, 14th. Ed. AUG.2025
- 2.2. ASME CODE SECTION IX-2015

3) ABBREVIATION

4.1. WELDING PROCESS

SMAW : SHIELDED METAL - ARC WELDING

4.2. POLARITY

- AC : ALTERNATIVE CURRENT**
- DC : DIRECT CURRENT**
- EN : ELECTRODE NEGATIVE (STRAIGHT POLARITY)**
- EP : ELECTRODE POSITIVE (REVERSE POLARITY)**



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(MSP)

WELDING PROCEDURE SPECIFICATION

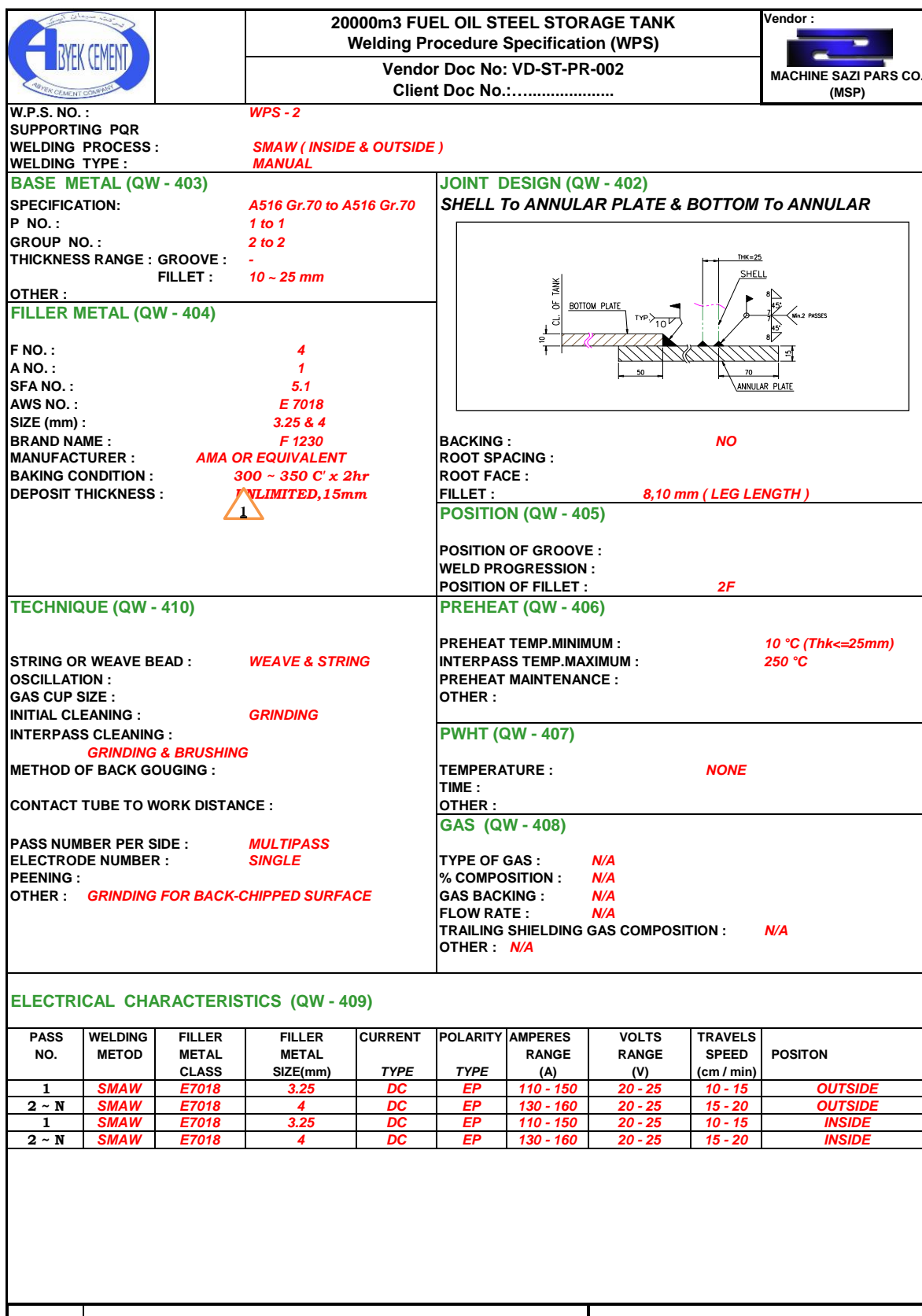
PART NAME	MATRETERAL	THICKNESS (mm)
ANNULAR	A516 Gr.70	15
BOTTOM	A516 Gr.70	10
SUMP	A516 Gr.70	15
SHELL	A516Gr.70	10~25
ROOF	A516 Gr.70	6
MANHOLE FLANGE	A516Gr.70	Variable Schedule
NOZZLE FLANGE	A105	Variable Schedule
NOZZLE NECK	A516Gr.70/A106Gr.B	Variable Schedule
STAIRWAY	A-36	--
TOP ANGLE&WIND GIRDER	A-36	--
STRUCTURE PART	A-36	--
Earth Lug	A 240 TP 304	8




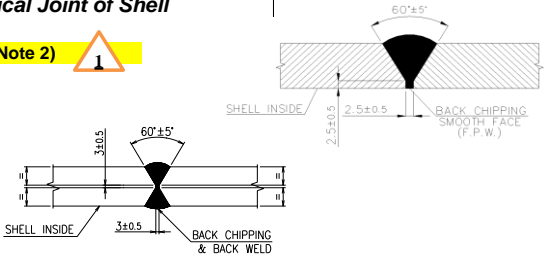
Joint	WELDING PROCESS	WPS No.	Supporting PQR	PAGE	ELECTRODE USED
CIRCUMFERENTIAL SHELL	SMAW (INSIDE & OUTSIDE)	WPS - 1	-	5	E 7018
SHELL & BOTTOM TO ANNULAR	SMAW (INSIDE & OUTSIDE)	WPS - 2	-	6	E 7018
Vertical Joint of Shell	SMAW (INSIDE & OUTSIDE)	WPS - 3	-	7	E 7018
BOTTOM PLATE & ALL FILLET WELD	SMAW(OUTSIDE)	WPS - 4	-	8	E 7018
ANNULAR TO ANNULAR PL.	SMAW(OUTSIDE)	WPS - 5	-	9	E 7018
ROOF PLATE	SMAW(OUTSIDE)	WPS - 6	-	10	E 7018
ROOF MANHOLE	SMAW(OUTSIDE)	WPS - 7	-	11	E 7018
NOZZLE NPS ≤ 12"	SMAW(INSIDE&OUTSIDE)	WPS - 8	-	12	E 7018
FLANGE TO NECK >2"	GTAW+ SMAW	WPS - 9	-	13	ER 70S-6 E 7018
FLANGE TO NECK ≤2"	GTAW+ SMAW	WPS - 10	-	14	ER 70S-6 E 7018
PIPE JOINTS / FITTING TO PIPE	GTAW + SMAW (OUTSIDE)	WPS - 11	-	15	ER 70S-6 E 7018
STAIRWAY	SMAW(OUTSIDE)	WPS - 12	-	16	E7018
ROOF TO SHELL JUNCTION	SMAW(INSIDE&OUTSIDE)	WPS - 13	-	17	E 7018
TOP ANGLE, WIND GIRDER SPLICE	SMAW(OUTSIDE)	WPS - 14	-	18	E 7018
WIND GIRDER TO SHELL	SMAW(OUTSIDE)	WPS - 15	-	19	E 7018
SHELL MANHOLE & NOZZLE NPS ≥ 12"	SMAW(INSIDE&OUTSIDE)	WPS - 16	-	20	E 7018
EARTH LUG TO SHELL	SMAW (BOTH SIDE)	WPS - 17	-	21	E 309 L16

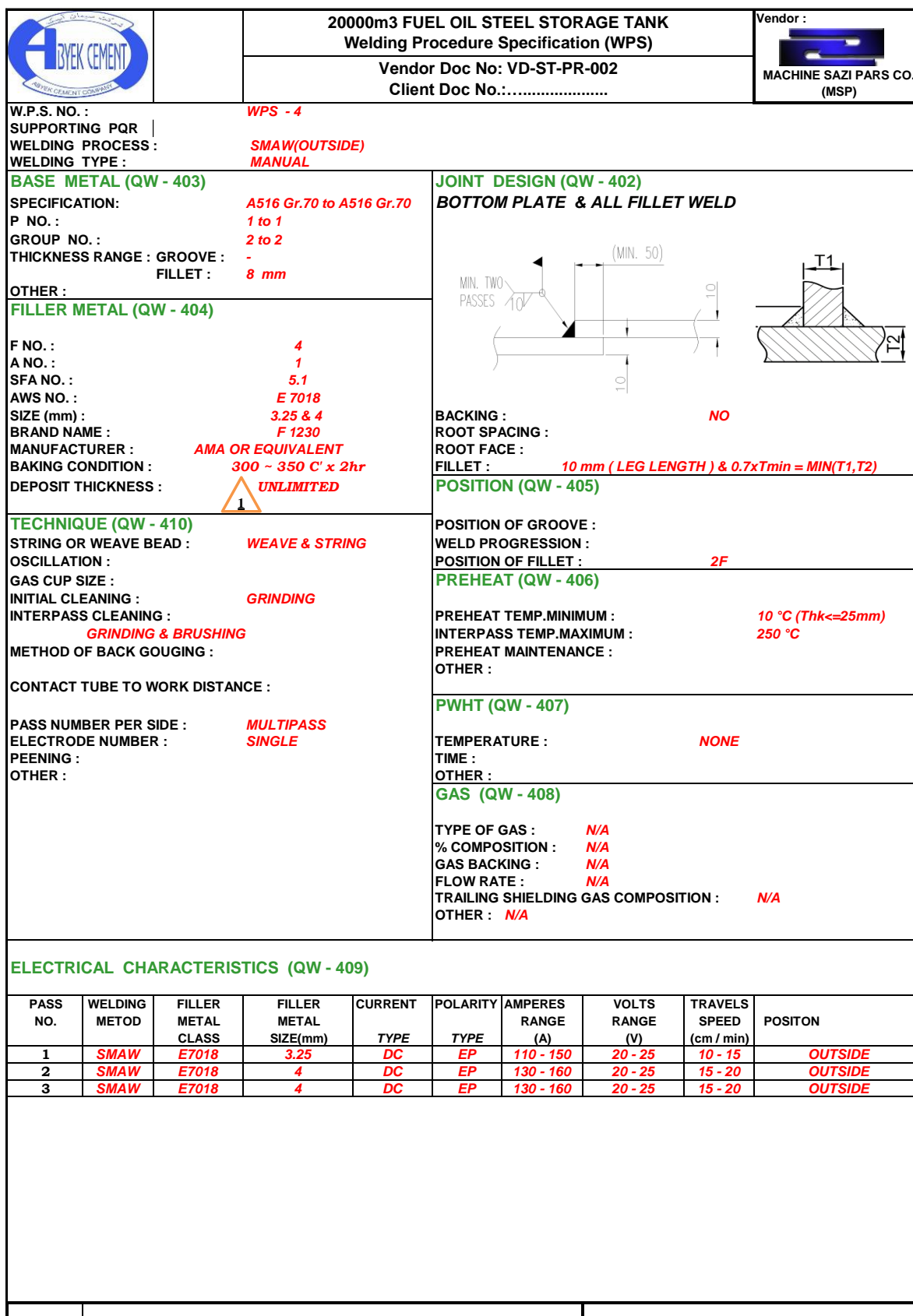
WPS No.	Joint Type	Thickness of Joint	PWHT	Impact Test	Remark
WPS - 1	Groove	8~25 mm	N/A	No	-
WPS - 2	Fillet	10~25mm	N/A	No	-
WPS - 3	Groove	8~25 mm	N/A	No	Impact only on Test coupon
WPS - 4	Fillet	8 mm	N/A	No	-
WPS - 5	Groove	15 mm	N/A	No	-
WPS - 6	Fillet	6 mm	N/A	No	-
WPS - 7	Groove & Fillet	6 mm	N/A	No	-
WPS - 8	Groove & Fillet	8~25 mm	Yes	No	-
WPS - 9	Fillet	8~12.7 mm	N/A	No	-
WPS - 10	Fillet	8~12.7 mm	N/A	No	-
WPS - 11	Groove	8~12.7 mm	N/A	No	-
WPS - 12	Fillet	6~25 mm	N/A	No	-
WPS - 13	Fillet	6~14 mm	N/A	No	-
WPS - 14	Groove	12~20 mm	N/A	No	-
WPS - 15	Fillet	12~20 mm	N/A	No	-
WPS - 16	Groove & Fillet	8~20 mm	Yes	No	-
WPS - 17	Fillet	5 mm	N/A	No	-



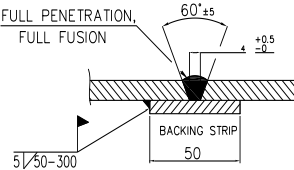




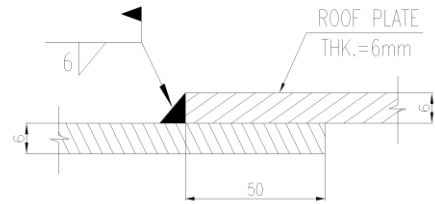
NOTE: 1- Edge Preparation , 2-Cleaning , 3-SMAW (Outside) , 4- Back Grinding ,5-PT,6-SMAW (Inside)

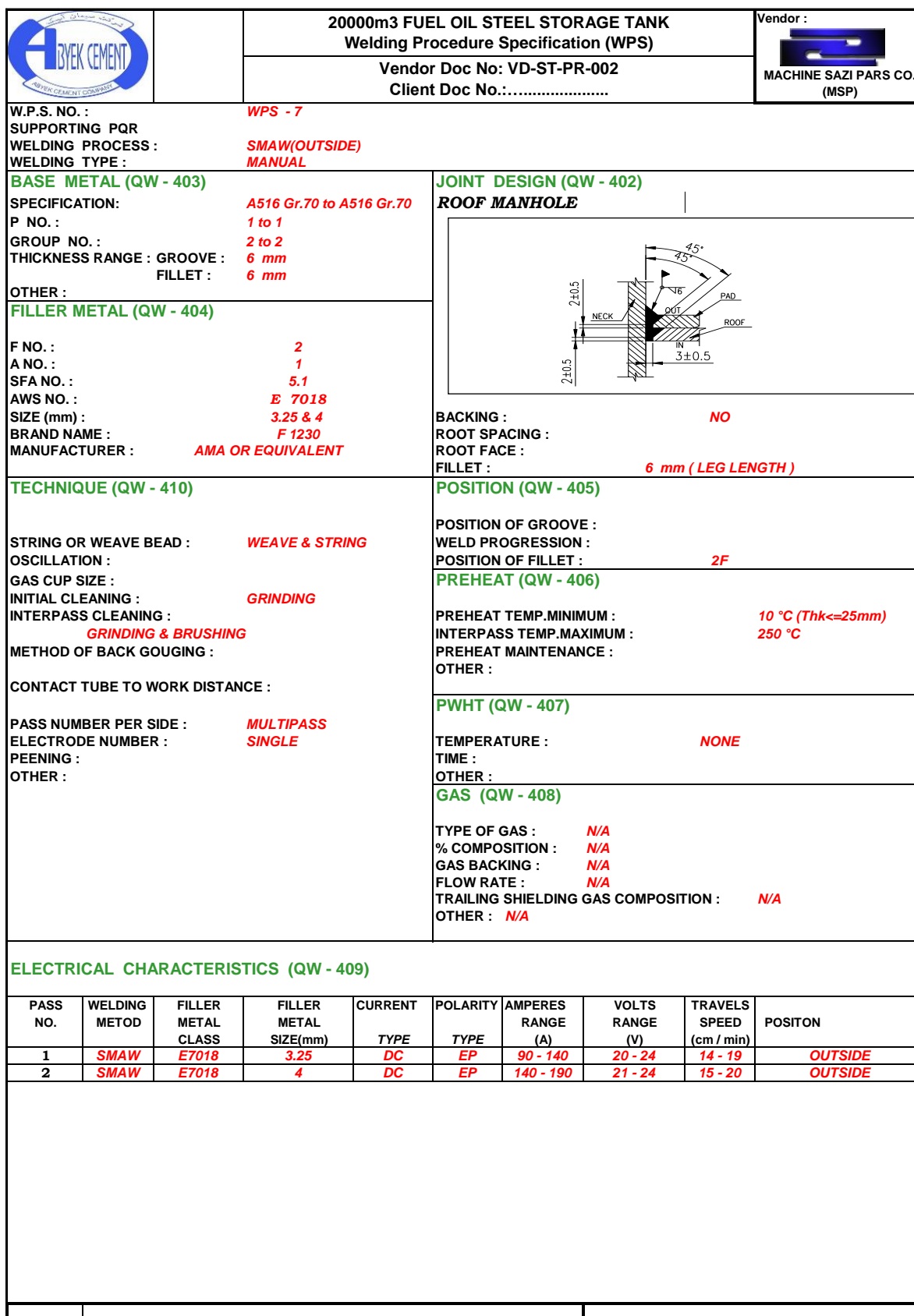


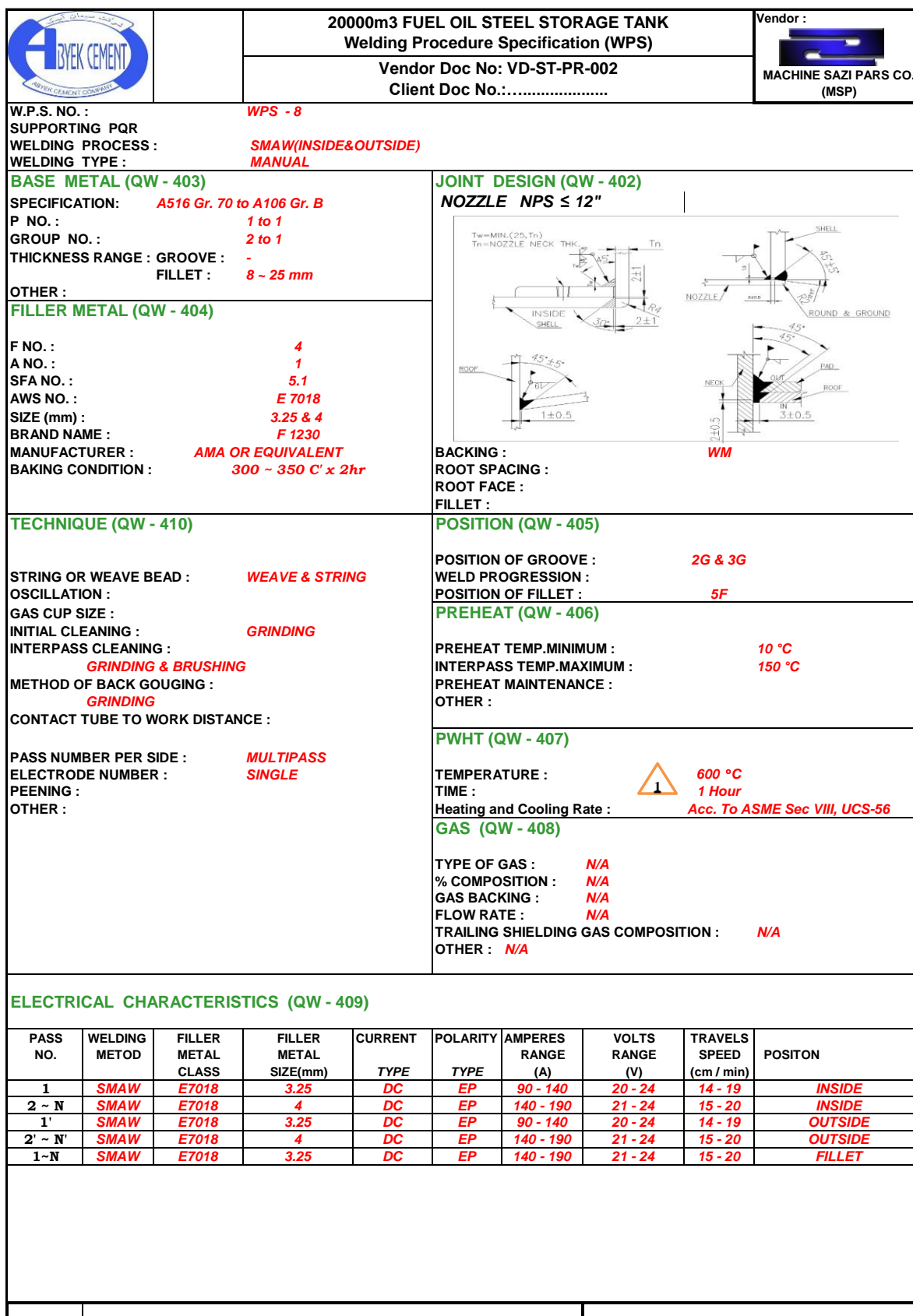
		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS) Vendor Doc No: VD-ST-PR-002 Client Doc No.:	Vendor :  MACHINE SAZI PARS CO. (MSP)						
W.P.S. NO. : WPS - 3 SUPPORTING PQR : WELDING PROCESS : SMAW (INSIDE & OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: A516 Gr.70 to A516 Gr.70 P NO. : 1 to 1 GROUP NO. : 2 to 2 THICKNESS RANGE : GROOVE : 8 ~ 25 mm FILLET : - OTHER :		JOINT DESIGN (QW - 402) Vertical Joint of Shell <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> (See Note 2)  </div>  </div>							
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E 7018 SIZE (mm) : 3.25 & 4 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr DEPOSITE THICKNESS: 8 ~ 25 mm		BACKING : WELD METAL YES ROOT SPACING : 2 mm ROOT FACE : 2 mm OTHER :							
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : GRINDING CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER : GRINDING FOR BACK-CHIPPED SURFACE		POSITION (QW - 405) POSITION OF GROOVE : 3G WELD PROGRESSION : UP OTHER : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 10 °C (Thk<=25mm) INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A							
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E7018	3.25	DC	EP	110 - 150	20 - 25	10 - 15	OUTSIDE
2nd~other	SMAW	E7018	3.25 , 4	DC	EP	130 - 160	20 - 25	15 - 20	OUTSIDE
Back Weld	SMAW	E7018	3.25	DC	EP	130 - 160	20 - 25	15 - 20	INSIDE
NOTE: 1- Edge Preparation , 2-Cleaning , 3-SMAW (Outside) , 4- Back Grinding ,5-PT,6-SMAW (Inside) NOTE: 2- In accordance with API 650 Clause 9.2.2.3, impact testing is required only for qualification of the Welding procedure (PQR) for vertical joints when the design metal temperature is below 10°C. Imact testing is not required on production (Vertical) welds of the tank.									



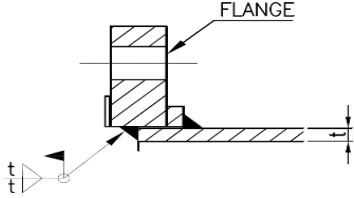




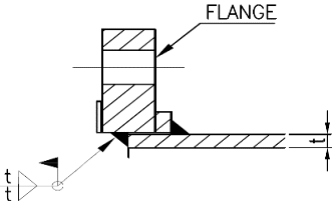
		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS) Vendor Doc No: VD-ST-PR-002 Client Doc No.:	Vendor :  MACHINE SAZI PARS CO. (MSP)						
W.P.S. NO. : WPS - 5 SUPPORTING PQR : WELDING PROCESS : SMAW(OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: A516 Gr.70 to A516 Gr.70 P NO. : 1 to 1 GROUP NO. : 2 to 2 THICKNESS RANGE : GROOVE : 15mm FILLET : - OTHER :		JOINT DESIGN (QW - 402) ANNULAR TO ANNULAR PL. <div style="text-align: center;">  </div> BACKING : BASE METAL YES ROOT SPACING : 4 mm ROOT FACE : OTHER :							
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E 7018 SIZE (mm) : 3.25 & 4 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr		TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :							
POSITION (QW - 405) POSITION OF GROOVE : 1G WELD PROGRESSION : POSITION OF FILLET : 2F		PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 10 °C (Thk<=25mm) INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER :							
PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER :		GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A							
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE



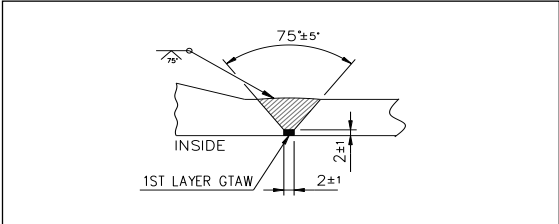
		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)				Vendor :  MACHINE SAZI PARS CO. (MSP)			
		Vendor Doc No: VD-ST-PR-002 Client Doc No.:							
W.P.S. NO. : SUPPORTING PQR WELDING PROCESS : WELDING TYPE :		WPS - 6 SMAW(OUTSIDE) MANUAL							
BASE METAL (QW - 403) SPECIFICATION: P NO. : GROUP NO. : THICKNESS RANGE : GROOVE : Fillet : OTHER :		A516 Gr.70 to A516 Gr.70 1 to 1 2 to 2 - 6 mm		JOINT DESIGN (QW - 402) ROOF PLATE 					
FILLER METAL (QW - 404) F NO. : A NO. : SFA NO. : AWS NO. : SIZE (mm) : BRAND NAME : MANUFACTURER : DEPOSIT THICKNESS :		2 1 5.1 E 7018 3.25 & 4 F 1230 AMA OR EQUIVALENT UNLIMITED							
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : INTERPASS CLEANING : METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE :		WEAVE & STRING GRINDING GRINDING & BRUSHING 		POSITION (QW - 405) POSITION OF GROOVE : WELD PROGRESSION : POSITION OF FILLET : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : INTERPASS TEMP.MAXIMUM : PREHEAT MAINTENANCE : OTHER :					
PASS NUMBER PER SIDE : ELECTRODE NUMBER : PEENING : OTHER :		MULTIPASS SINGLE 		POSITION (QW - 405) POSITION OF GROOVE : WELD PROGRESSION : POSITION OF FILLET : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : INTERPASS TEMP.MAXIMUM : PREHEAT MAINTENANCE : OTHER :					
				PWHT (QW - 407) TEMPERATURE : TIME : OTHER :					
				GAS (QW - 408) TYPE OF GAS : % COMPOSITION : GAS BACKING : FLOW RATE : TRAILING SHIELDING GAS COMPOSITION : OTHER :					
				GAS (QW - 408) TYPE OF GAS : % COMPOSITION : GAS BACKING : FLOW RATE : TRAILING SHIELDING GAS COMPOSITION : OTHER :					
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE



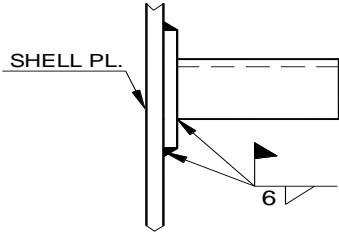





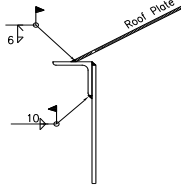





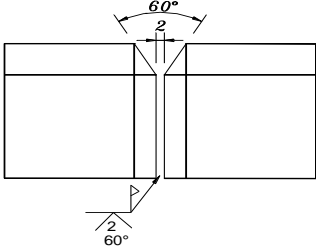
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	Vendor Doc No: VD-ST-PR-002 Client Doc No.:																							
W.P.S. NO. : WPS - 9 SUPPORTING PQR : WELDING PROCESS : GTAW+ SMAW WELDING TYPE : MANUAL																								
BASE METAL (QW - 403) SPECIFICATION: A105 to A106 Gr. B P NO. : 1 to 1 GROUP NO. : 2 to 1 THICKNESS RANGE : GROOVE : 8-12.7 FILLET : - OTHER :			JOINT DESIGN (QW - 402) FLANGE TO NECK >2" 																					
FILLER METAL (QW - 404) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>F NO. :</td><td style="text-align: center;">4</td></tr> <tr><td>A NO. :</td><td style="text-align: center;">1</td></tr> <tr><td>SFA NO. :</td><td style="text-align: center;">5.1</td></tr> <tr><td>AWS NO. :</td><td style="text-align: center;">E 7018</td></tr> <tr><td>SIZE (mm) :</td><td style="text-align: center;">3.25 & 4</td></tr> <tr><td>BRAND NAME :</td><td style="text-align: center;">F 1230</td></tr> <tr><td>MANUFACTURER :</td><td style="text-align: center;">AMA OR EQUIVALENT</td></tr> <tr><td>DEPOSITE THICKNESS:</td><td style="text-align: center;">UNLIMITED</td></tr> </table>					F NO. :	4	A NO. :	1	SFA NO. :	5.1	AWS NO. :	E 7018	SIZE (mm) :	3.25 & 4	BRAND NAME :	F 1230	MANUFACTURER :	AMA OR EQUIVALENT	DEPOSITE THICKNESS:	UNLIMITED				
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TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :			POSITION (QW - 405) POSITION OF GROOVE : 1G,5G WELD PROGRESSION : POSITION OF FILLET : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A																					
ELECTRICAL CHARACTERISTICS (QW - 409) <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>PASS NO.</th> <th>WELDING METOD</th> <th>FILLER METAL CLASS</th> <th>FILLER METAL SIZE(mm)</th> <th>CURRENT TYPE</th> <th>POLARITY TYPE</th> <th>AMPERES RANGE (A)</th> <th>VOLTS RANGE (V)</th> <th>TRAVELS SPEED (cm / min)</th> <th>POSITON</th> </tr> </thead> <tbody> <tr> <td>1~N</td> <td style="color: red;">SMAW</td> <td style="color: red;">E 7018</td> <td style="color: red;">3.25,4</td> <td style="color: red;">DC</td> <td style="color: red;">EP</td> <td style="color: red;">110 - 140</td> <td style="color: red;">20 - 24</td> <td style="color: red;">14 - 19</td> <td></td> </tr> </tbody> </table>					PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON	1~N	SMAW	E 7018	3.25,4	DC	EP	110 - 140	20 - 24	14 - 19	
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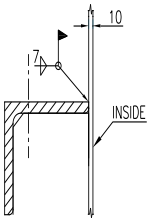

	20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)		Vendor :  MACHINE SAZI PARS CO. (MSP)																						
	Vendor Doc No: VD-ST-PR-002 Client Doc No.:																								
W.P.S. NO. : WPS - 10 SUPPORTING PQR : WELDING PROCESS : GTAW+ SMAW WELDING TYPE : MANUAL																									
BASE METAL (QW - 403) SPECIFICATION: A105 to A106Gr. B P NO. : 1 to 1 GROUP NO. : 2 to 1 THICKNESS RANGE : GROOVE : 8-12.7 FILLET : - OTHER :			JOINT DESIGN (QW - 402) FLANGE TO NFCK <= 2" 																						
FILLER METAL (QW - 404) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>F NO. :</td><td style="text-align: center;">6</td></tr> <tr><td>A NO. :</td><td style="text-align: center;">1</td></tr> <tr><td>SFA NO. :</td><td style="text-align: center;">5.18</td></tr> <tr><td>AWS NO. :</td><td style="text-align: center;">ER70S-6</td></tr> <tr><td>SIZE (mm) :</td><td style="text-align: center;">2.4</td></tr> <tr><td>BRAND NAME :</td><td></td></tr> <tr><td>MANUFACTURER :</td><td style="color: red;">AMA OR EQUIVALENT</td></tr> <tr><td>DEPOSITE THICKNESS:</td><td style="color: red;">UNLIMITED</td></tr> </table>						F NO. :	6	A NO. :	1	SFA NO. :	5.18	AWS NO. :	ER70S-6	SIZE (mm) :	2.4	BRAND NAME :		MANUFACTURER :	AMA OR EQUIVALENT	DEPOSITE THICKNESS:	UNLIMITED				
F NO. :	6																								
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DEPOSITE THICKNESS:	UNLIMITED																								
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :			POSITION (QW - 405) POSITION OF GROOVE : 1G,5G WELD PROGRESSION : POSITION OF FILLET : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : ARGON % COMPOSITION : 99.90% GAS BACKING : N/A FLOW RATE : 8-10 Lit/min TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A																						
ELECTRICAL CHARACTERISTICS (QW - 409) <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>PASS NO.</th> <th>WELDING METOD</th> <th>FILLER METAL CLASS</th> <th>FILLER METAL SIZE(mm)</th> <th>CURRENT TYPE</th> <th>POLARITY TYPE</th> <th>AMPERES RANGE (A)</th> <th>VOLTS RANGE (V)</th> <th>TRAVELS SPEED (cm / min)</th> <th>MAX, Heat Input Kj/cm</th> </tr> </thead> <tbody> <tr> <td>1~N</td> <td style="color: red;">GTAW</td> <td style="color: red;">ER70S-6</td> <td style="color: red;">2.4</td> <td style="color: red;">DC</td> <td style="color: red;">EP</td> <td style="color: red;">70-80</td> <td style="color: red;">13-14</td> <td style="color: red;">6-10</td> <td style="color: red;">11.2</td> </tr> </tbody> </table>						PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	MAX, Heat Input Kj/cm	1~N	GTAW	ER70S-6	2.4	DC	EP	70-80	13-14	6-10	11.2
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	MAX, Heat Input Kj/cm																
1~N	GTAW	ER70S-6	2.4	DC	EP	70-80	13-14	6-10	11.2																

		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS) Vendor Doc No: VD-ST-PR-002 Client Doc No:.....	Vendor :  MACHINE SAZI PARS CO. (MSP)																								
W.P.S. NO. : WPS - 11 SUPPORTING PQR WELDING PROCESS : GTAW + SMAW (OUTSIDE) WELDING TYPE : MANUAL																											
BASE METAL (QW - 403) SPECIFICATION: A234-WPB / A106 Gr.B To A106 Gr.B P NO. : 1,1 to 1 GROUP NO. : 1,1 to 1 THICKNESS RANGE : GROOVE : 8-12.7 FILLET : - OTHER :		JOINT DESIGN (QW - 402) PIPE JOINTS / FITTING TO PIPE <div style="text-align: center;">  </div>																									
FILLER METAL (QW - 404) <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">F NO. :</td> <td style="width: 35%; text-align: center; color: red;">6</td> <td style="width: 35%; text-align: center; color: red;">4</td> </tr> <tr> <td>A NO. :</td> <td style="text-align: center; color: red;">1</td> <td style="text-align: center; color: red;">1</td> </tr> <tr> <td>SFA NO. :</td> <td style="text-align: center; color: red;">5.18</td> <td style="text-align: center; color: red;">5.1</td> </tr> <tr> <td>AWS NO. :</td> <td style="text-align: center; color: red;">ER 70S-6</td> <td style="text-align: center; color: red;">E 7018</td> </tr> <tr> <td>SIZE (mm) :</td> <td style="text-align: center; color: red;">2.4</td> <td style="text-align: center; color: red;">3.25 & 4</td> </tr> <tr> <td>BRAND NAME :</td> <td colspan="2" style="text-align: center; color: red;">F 1230</td> </tr> <tr> <td>MANUFACTURER :</td> <td colspan="2" style="text-align: center; color: red;">AMA OR EQUIVALENT</td> </tr> <tr> <td>DEPOSITE THICKNESS:</td> <td style="text-align: center; color: red;">1-6mm</td> <td style="text-align: center; color: red;">6-12.7mm</td> </tr> </table>		F NO. :	6	4	A NO. :	1	1	SFA NO. :	5.18	5.1	AWS NO. :	ER 70S-6	E 7018	SIZE (mm) :	2.4	3.25 & 4	BRAND NAME :	F 1230		MANUFACTURER :	AMA OR EQUIVALENT		DEPOSITE THICKNESS:	1-6mm	6-12.7mm	BACKING : NO ROOT SPACING : 2 mm ROOT FACE : 2 mm OTHER :	
F NO. :	6	4																									
A NO. :	1	1																									
SFA NO. :	5.18	5.1																									
AWS NO. :	ER 70S-6	E 7018																									
SIZE (mm) :	2.4	3.25 & 4																									
BRAND NAME :	F 1230																										
MANUFACTURER :	AMA OR EQUIVALENT																										
DEPOSITE THICKNESS:	1-6mm	6-12.7mm																									
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :		POSITION (QW - 405) POSITION OF GROOVE : 1G , 2G & 5G WELD PROGRESSION : POSITION OF FILLET : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : ARGON % COMPOSITION : 99.90% GAS BACKING : N/A FLOW RATE : 10 ~ 15 Lit/Min TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A																									
ELECTRICAL CHARACTERISTICS (QW - 409)																											
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	MAX, Heat Input Kj/cm)																		
1	GTAW	ER 70S-6	2.4	DC	EN	80 - 100	13-14	6-10	12.6																		
2	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	8-12	28.12																		
3 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	8-12	28.12																		

	20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)							Vendor :  MACHINE SAZI PARS CO. (MSP)	
	Vendor Doc No: VD-ST-PR-002 Client Doc No.:								
W.P.S. NO. : WPS - 12 SUPPORTING PQR : WELDING PROCESS : SMAW(OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: A516 Gr.70 to A36 P NO. : 1 to 1 GROUP NO. : 2 to 1 THICKNESS RANGE : GROOVE : - FILLET : ALL OTHER :					JOINT DESIGN (QW - 402) STAIRWAY 				
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E7018 SIZE (mm) : 3.25 & 4 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT DEPOSIT THICKNESS : UNLIMITED 									
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :					POSITION (QW - 405) POSITION OF GROOVE : WELD PROGRESSION : POSITION OF FILLET : 2F & 3F & 4F PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A				
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE



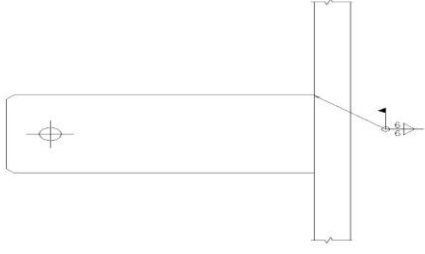

	20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)							Vendor :  MACHINE SAZI PARS CO. (MSP)	
	Vendor Doc No: VD-ST-PR-002 Client Doc No.:								
W.P.S. NO. : WPS - 13 SUPPORTING PQR : WELDING PROCESS : SMAW(INSIDE&OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: SA36 to A516 Gr.70 P NO. : 1 to 1 GROUP NO. : 1 to 2 THICKNESS RANGE : GROOVE : - FILLET : 6 TO 14 mm OTHER :									
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E 7018 SIZE (mm) : 3.25 , 4 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr DEPOSIT THICKNESS : UNLIMITED 									
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :					JOINT DESIGN (QW - 402) ROOF TO SHELL JUNCTION				
					BACKING : NO ROOT SPACING : ROOT FACE : FILLET : 6,10 mm (FILLET LEG LENGTH)				
					POSITION (QW - 405) POSITION OF GROOVE : POSITION OF FILLET : 2F & 4F OTHER :				
					PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER :				
					PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER :				
					GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A				
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm/min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE
1'	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	INSIDE
2' ~ N'	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	INSIDE

		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)	Vendor :  MACHINE SAZI PARS CO. (MSP)						
		Vendor Doc No: VD-ST-PR-002 Client Doc No.:							
W.P.S. NO. : WPS - 14 SUPPORTING PQR : WELDING PROCESS : SMAW(OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: SA 36 to SA36 P NO. : 1 to 1 GROUP NO. : 1 to 1 THICKNESS RANGE : 12~20 mm GROOVE : FILLET : - OTHER :		JOINT DESIGN (QW - 402) TOP ANGLE, WIND GIRDER SPLICE 							
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E 7018 SIZE (mm) : 3.25 , 4 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr DEPOSITE THICKNESS: 12~14 mm		BACKING : NO ROOT SPACING : 2 mm ROOT FACE : OTHER :							
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :		POSITION (QW - 405) POSITION OF GROOVE : 1G & 3G (UP) POSITION OF FILLET : OTHER : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A							
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm/min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE
3	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE

		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS)	Vendor :  MACHINE SAZI PARS CO. (MSP)						
		Vendor Doc No: VD-ST-PR-002 Client Doc No.:							
W.P.S. NO. : WPS - 15 SUPPORTING PQR : WELDING PROCESS : SMAW(OUTSIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: SA36 to A516 Gr.70 P NO. : 1 to 1 GROUP NO. : 1 to 2 THICKNESS RANGE : GROOVE : - FILLET : 12 TO 7 mm OTHER :		JOINT DESIGN (QW - 402) WIND GIRDER TO SHELL <div style="text-align: center;">  </div>							
FILLER METAL (QW - 404) F NO. : 4 A NO. : 1 SFA NO. : 5.1 AWS NO. : E 7018 SIZE (mm) : 3.25 BRAND NAME : F 1230 MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr DEPOSIT THICKNESS : UNLIMITED 		BACKING : NO ROOT SPACING : ROOT FACE : FILLET : 7 mm (LEG LENGTH)							
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :		POSITION (QW - 405) POSITION OF GROOVE : POSITION OF FILLET : 2F & 4F OTHER : PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 20 °C INTERPASS TEMP.MAXIMUM : 250 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A							
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm/min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE



PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	INSIDE
2 ~ N	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	INSIDE
1'	SMAW	E7018	3.25	DC	EP	90 - 140	20 - 24	14 - 19	OUTSIDE
2' ~ N'	SMAW	E7018	4	DC	EP	140 - 190	21 - 24	15 - 20	OUTSIDE

		20000m3 FUEL OIL STEEL STORAGE TANK Welding Procedure Specification (WPS) Vendor Doc No: VD-ST-PR-002 Client Doc No.:	Vendor :  MACHINE SAZI PARS CO. (MSP)						
W.P.S. NO. : WPS - 17 SUPPORTING PQR : WELDING PROCESS : SMAW(BOTH SIDE) WELDING TYPE : MANUAL									
BASE METAL (QW - 403) SPECIFICATION: SA240-304 TO A516-70 P NO. : 8 to 1 GROUP NO. : 1 to 2 THICKNESS RANGE : GROOVE : - FILLET : 5 mm OTHER :		JOINT DESIGN (QW - 402) EARTHING LUG TO SHELL 							
FILLER METAL (QW - 404) F NO. : 5 A NO. : 8 SFA NO. : 5.4 AWS NO. : E 309 L16 SIZE (mm) : 3.25 & 4 BRAND NAME : 1464 JA MANUFACTURER : AMA OR EQUIVALENT BAKING CONDITION : 300 ~ 350 C' x 2hr DEPOSIT THICKNESS : UNLIMITED 		BACKING : NO ROOT SPACING : ROOT FACE : FILLET : 6 mm (LEG LENGTH)							
TECHNIQUE (QW - 410) STRING OR WEAVE BEAD : WEAVE & STRING OSCILLATION : GAS CUP SIZE : INITIAL CLEANING : GRINDING INTERPASS CLEANING : GRINDING & BRUSHING METHOD OF BACK GOUGING : GRINDING CONTACT TUBE TO WORK DISTANCE : PASS NUMBER PER SIDE : MULTIPASS ELECTRODE NUMBER : SINGLE PEENING : OTHER :		POSITION (QW - 405) POSITION OF GROOVE : WELD PROGRESSION : POSITION OF FILLET : 1F&2F&3F PREHEAT (QW - 406) PREHEAT TEMP.MINIMUM : 10 °C INTERPASS TEMP.MAXIMUM : 150 °C PREHEAT MAINTENANCE : OTHER : PWHT (QW - 407) TEMPERATURE : NONE TIME : OTHER : AS PER CODE(API 650) GAS (QW - 408) TYPE OF GAS : N/A % COMPOSITION : N/A GAS BACKING : N/A FLOW RATE : N/A TRAILING SHIELDING GAS COMPOSITION : N/A OTHER : N/A							
ELECTRICAL CHARACTERISTICS (QW - 409)									
PASS NO.	WELDING METOD	FILLER METAL CLASS	FILLER METAL SIZE(mm)	CURRENT TYPE	POLARITY TYPE	AMPERES RANGE (A)	VOLTS RANGE (V)	TRAVELS SPEED (cm / min)	POSITON
1	SMAW	E 309 L16	3.25	DC	EP	70 - 100	20 - 24	14 - 19	OUTSIDE
2 ~ N	SMAW	E 309 L16	4	DC	EP	110 - 150	21 - 24	15 - 20	OUTSIDE
1'	SMAW	E 309 L16	3.25	DC	EP	70 - 100	20 - 24	14 - 19	INSIDE
2' ~ N'	SMAW	E 309 L16	4	DC	EP	110 - 150	21 - 24	15 - 20	INSIDE