PT. REXLINE ENGINEERING INDONESIA
Jl. Margomulyo 46, Pergudangan Margomulyo Angtropolis H9
Kel. Greges, Kec. Asemrowo, Surabaya, Jawa Timur 60183
www.rexlineengineering.com
Phone: (031) 9934 3867

WELDING PROCEDURE SPECIFICATION (WPS)

PT. REXLINE ENGINEERING INDONESIA
Company Name

0
Revision No.

03/WPS/REI/GMAW/2023
WPS No.

March 15, 2023
Date.

03/PQR/REI/GMAW/2023
Supporting PQR No.

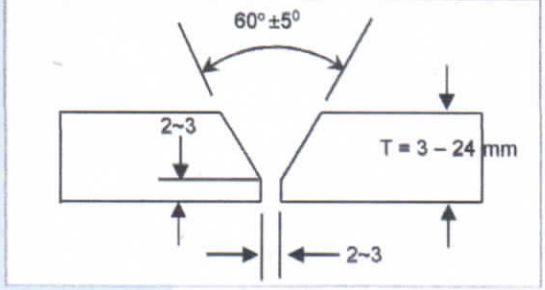
CVN Report.

BASE METALS	Specification	Type or Grade	AWS Group No.
Base Material	ASTM A36	UNS K02600	I
Welded to	ASTM A36	UNS K02600	I
Backing Material	-	-	-
Other	Weld Metal / Back Weld (if Req)		

BASEMETAL THICKNESS	As-Welded	With PWHT
CJP Groove Welds	3 mm - 24 mm	-
CJP Groove w/CVN	-	-
PJP Groove Welds	-	-
Fillet Welds	3 mm - 24 mm	-
DIAMETER	-	-

JOINT DETAILS	
Groove Type	Single V Groove or Fillet
Groove Angle	60^0
Root Opening	0 – 3 mm
Root Face	0 – 3 mm
Back gauging	With (if Req)
Method	Air Arc Gouging or Grinding

JOINTDETAILS(Sketch) :



POSTWELD HEAT TREATMENT	
Temperature	-
Time at Temperature	-
Other	-

PROCEDURE						
Weld Layer(s)	All					
Weld Pass(es)	All					
Process	GMAW					
Type (Semi Automatic / Mechanized, etc)	Semi Automatic					
Position	2G					
Vertical Progression	-					
Filler Metal (AWS Spec.)	A5.18					
AWS Classification	ER70S					
Diameter (mm)	1.2					
Manufacturer / Trade Name	Essab or Equivalent					
Shielding Gas (Composition)	CO_2					
Flow Rate (L/min)	10 – 25					
Nozzle Size (mm)	Ø 19					
Preheat Temperature	None					
Interpass Temperature	-					
Electrical Characteristics	------					
Current Type & Polarity	DCEP					
Transfer Mode	Spray					
Power Source Type (cc,cv,etc)	CV					
Amps (A)	100 - 250					
Volts (V)	20 - 30					
Wire Feed Speed	-					
Travel Speed (mm/min)	120 -250					
Maximum Heat Input	-					
Technique	-------					
Stringer or Weave	Both					
Multi or Single Pass (per side)	Multipass					
Oscillation(Mechanized/Automatic)	-					
Number of Electrode	1					
Contact Tube to Work dist.(mm)	12 - 18					
Peening	None					
Interpass Cleaning	Wire Brush or Grinding					
Other	-					

PEMERINTAH PROVINSI JAWA TIMUR
DISNAKERTRANS

PT. REXLINE ENGINEERING INDONESIA

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PROCEDURE QUALIFICATION RECORD (PQR)

PT.REXLINE ENGINEERING INDONESIA
Company Name

0
Revision No.

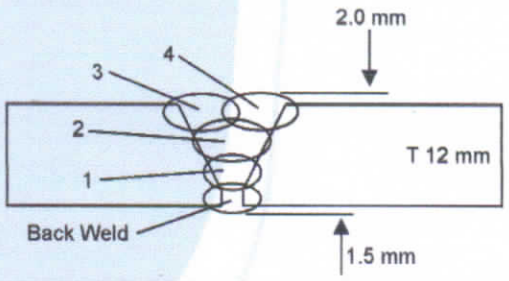
03/PQR/REI/GMAW/2023
PQR No.

March 15, 2023
Date.

BASE METAL	Specification	Type or Grade	AWS Group No	Thickness	Size (NPS)	Schedule	Diameter
Base Material	ASTM A36	UNS K02600	I	12 mm	-	-	-
Welded To	ASTM A36	UNS K02600	I	12 mm	-	-	-
Backing Material	-	-	-	-			
Other	—						

JOINTDETAILS	
Groove Type	Single V Groove Weld Joint
Groove Angle	60^0
Root Opening	2 mm
Root Face	2 mm
Back gouging	-
Methode	Grinding

JOINT DETAILS (Sketch) :



POST WELD HEAT TREATMENT	
Temperature	-
Time at Temperature	-
Other	-

PROCEDURE								
Weld Layer(s)	-	-	-	-	-			
Weld Pass(es)	1	2	3	4	Back Weld			
Process	GMAW	GMAW	GMAW	GMAW	GMAW			
Type (*Semiautomatic, Mechanize, etc*)	Semi automatic	Semi automatic	Semi automatic	Semi automatic	Semi automatic			
Position	2G	2G	2G	2G	2G			
Vertical Progression	-	-	-	-	-			
Filler Metal (AWS Spec.)	A5.18	A5.18	A5.18	A5.18	A5.18			
AWS Classification	ER70S-6	ER70S-6	ER70S-6	ER70S-6	ER70S-6			
Diameter (mm)	1.2	1.2	1.2	1.2	1.2			
Manufacturer / Trade Name	Essab	Essab	Essab	Essab	Essab			
Shielding Gas Composition	CO2	CO2	CO2	CO2	CO2			
Flow Rate (L/min)	20	20	20	20	20			
Nozzle Size (mm)	Ø 19	Ø 19	Ø 19	Ø 19	Ø 19			
Preheat Temperature	None	None	None	None	None			
Interpass Temperature	-	-	-	-	-			
Electrical Characteristics	------	------	------	------	------			
Current Type & Polarity	DCEP	DCEP	DCEP	DCEP	DCEP			
Transfer mode (GMAW)	Spray	Spray	Spray	Spray	Spray			
Power Source Type (cc, cv, etc)	CV	CV	CV	CV	CV			
Amps (A)	145	190	205	205	180			
Volts (V)	22.5	24	25	25	23			
Wire Feed Speed	-	-	-	-	-			
Travel Speed (mm / Min)	150	170	190	190	175			
Maximum Heat Input	-	-	-	-	-			
Technique	------	------	------	------	------			
Stringer or Weave	Both	Both	Both	Both	Both			
Multi or Single Pass (perside)	Multipass	Multipass	Multipass	Multipass	Multipass			
Oscilation (Mechanized/Automatic)	-	-	-	-	-			
Number of Electrodes	1	1	1	1	1			
Contact Tube to Work Dist, (mm)	12 - 18	12 - 18	12 - 18	12 - 18	12 - 18			
Peening	None	None	None	None	None			
Interpass Cleaning	Wire Brush and Grinding	Wire Brush and Grinding	Wire Brush and Grinding	Wire Brush and Grinding	Wire Brush and grinding			
Other	-	-	-	-	-			

REXLINE ENGINEERING

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PROCEDURE QUALIFICATION RECORD (PQR) TEST RESULTS

03/PQR/REI/GMAW/2023 — *PQR No.*
0 — *Rev.No.*

TESTS

	Type of Test	Clause / Figure (s) Reference	Acceptance Criteria	Result	Remark
√	Visual Inspection	6.10.1	6.10.1	Acceptable	-
√	Radiographic Examination	6.10.2.1	6.10.2.2	Acceptable	-
	Ultrasonic Testing	6.10.2.1	6.10.2.2	-	-
	2 Transverse Root Bends	6.10.3.1 / Fig. 6.8	6.10.3.3	-	-
	2 Transverse Face Bends	6.10.3.1 / Fig. 6.8	6.10.3.3	-	-
	2 Longitudinal Root Bends	6.10.3.1 / Fig. 6.8	6.10.3.3	-	-
	2 Longitudinal Face Bends	6.10.3.1 / Fig. 6.8	6.10.3,3	-	-
	2 Side Bends	6.10.3.1 / Fig. 6.9	6.10.3.3	-	-
√	4 Side Bends	6.10.3.1 / Fig. 6.9	6.10.3.3	Acceptable	-
√	2 Tensile Test	6.10.3.1 / Fig. 6.10	6.10.3.5	Acceptable	-
	All-Weld-Metal Tensions	6.10.3.1 / Figs. 6.14 and 6.18	6.15.1.3(2)	-	-
	3 Macroetch	6.10.4	6.10.4.1	-	-
	4 Macroetch	6.10.4	6.10.4.1	-	-
	CVN Test	6 Part D/Fig. 6.28	6.30 and Table 6.14	-	-

TENSILE TEST DETAILS

Specimen Number	Width	Thickness	Area	Ultimate Tensile Load	Ultimate Unit Stress	Type of Failure and Location
3T1	20.06 mm	11.54 mm	231.49 mm^2	89.00 kN	384.47 MPa	Base Metal
3T2	20.15 mm	11.49 mm	231.52 mm^2	90.00 kN	388.74 MPa	Base Metal

TOUGHNESS TEST DETAILS

Specimen Number	Notch Location	Specimen Size	Test Temperature	Absorbed Energy	Percent Shear	Lateral Expansion	Average

GUIDED BEND TEST DETAILS

Specimen No.	Type of Bend	Result	Width (mm)	Thick (mm)	Remark
3SB1	Side Bend	Acceptable	10.24	12.00	None Open Defect
3SB2	Side Bend	Acceptable	9.93	12.00	None Open Defect
3SB3	Side Bend	Acceptable	10.20	12.00	Open Defect 0.35 mm
3SB4	Side Bend	Acceptable	10.15	12.00	Open Defect 0.49 mm

CERTIFICATION

Welder's Name	ID Number	Stamp Number
Sigit Gunarso	-	WD - 03

Tests Conducted by	
Laboratory	Fakultas Teknologi Kelautan - ITS
Test Number	0305/IT2.4.I.1/PM.05.02/2023
File Number	-

We, the undersigned, 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 Clause 6 of AWS D1.1 / D1.1M, 2020 *Structural Welding Code – Steel.*

Prepared by,
PT.Rexline Engineering Indonesia

Chandra Bintang
Welding Inspector

Approved by,
Disnaker Prov. Jatim

PEMERINTAH PROVINSI JAWA TIMUR DISNAKERTRANS

Suwondo
NIP. 19630325 199103 1009

LABORATORIUM KONSTRUKSI DAN KEKUATAN KAPAL
DEPARTEMEN TEKNIK PERKAPALAN
FAKULTAS TEKNOLOGI KELAUTAN
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
Gedung W – Lantai 1, Kampus ITS Sukolilo, Surabaya 60111
Telp./Fax. 031 599 4933, Email: labkonjtp@gmail.com

REPORT ON TEST RESULT NO. : 0305/IT2.4.I.1/PM.05.02/2023

DATE : March 13, 2023
ORDER FROM : PT.REXLINE ENGINEERING INDONESIA
TEST STANDARD : AWS.D1.1
WPS NUMBER : 03/WPS/REI/GMAW/2023
PQR NUMBER : 03/PQR/REI/GMAW/2023
MATERIAL SPEC. : Plate A36 to Plate A36
THICKNESS : 12 mm to 12 mm
JOINT DESIGN : Butt Joint (Single Groove)
WELDING PROCESS : GMAW
TEST POSITION : 2G
WELDER NAME : Sigit Gunarso
CERTIFICATE PLATE NO. : 200109-FPQ81N-0016A1-0004

1. TENSILE TEST

TEST PIECE CODE	VISUAL	SAMPLE SPECIFICATION					TENSILE TEST RESULTS		
		WIDTH (mm)	THICK. (mm)	C.S.A (mm^2)	Fy (kN)	Fu (kN)	YIELD STRENGTH (MPa)	TENSILE STRENGTH (MPa)	BREAKING
3T1	Good	20.06	11.54	231.49	63.50	89.00	274.31	384.47	Base Metal
3T2	Good	20.15	11.49	231.52	65.00	90.00	280.75	388.74	Base Metal

Equipment: Universal Testing Machine "MFL Systeme, UPD-20", 200 kN capacity.

2. BEND TEST

ANGLE OF BEND : 180° DIA. OF FORMER : 50 mm

TEST PIECE CODE		WIDTH (mm)	THICK. (mm)	TEST RESULTS
				OPEN DEFECT (mm)
3SB1	Side Bend	10.24	12.00	None
3SB2	Side Bend	9.93	12.00	None
3SB3	Side Bend	10.20	12.00	0.35
3SB4	Side Bend	10.15	12.00	0.49

Equipment: Universal Testing Machine "MFL Systeme, UPD-20", 200 kN capacity.

NOTES : This report is valid only for the specimen tested on the Laboratory of Ships Strength and Construction

Witnessed by :
DISNAKERTRANS
Prov. Jatim

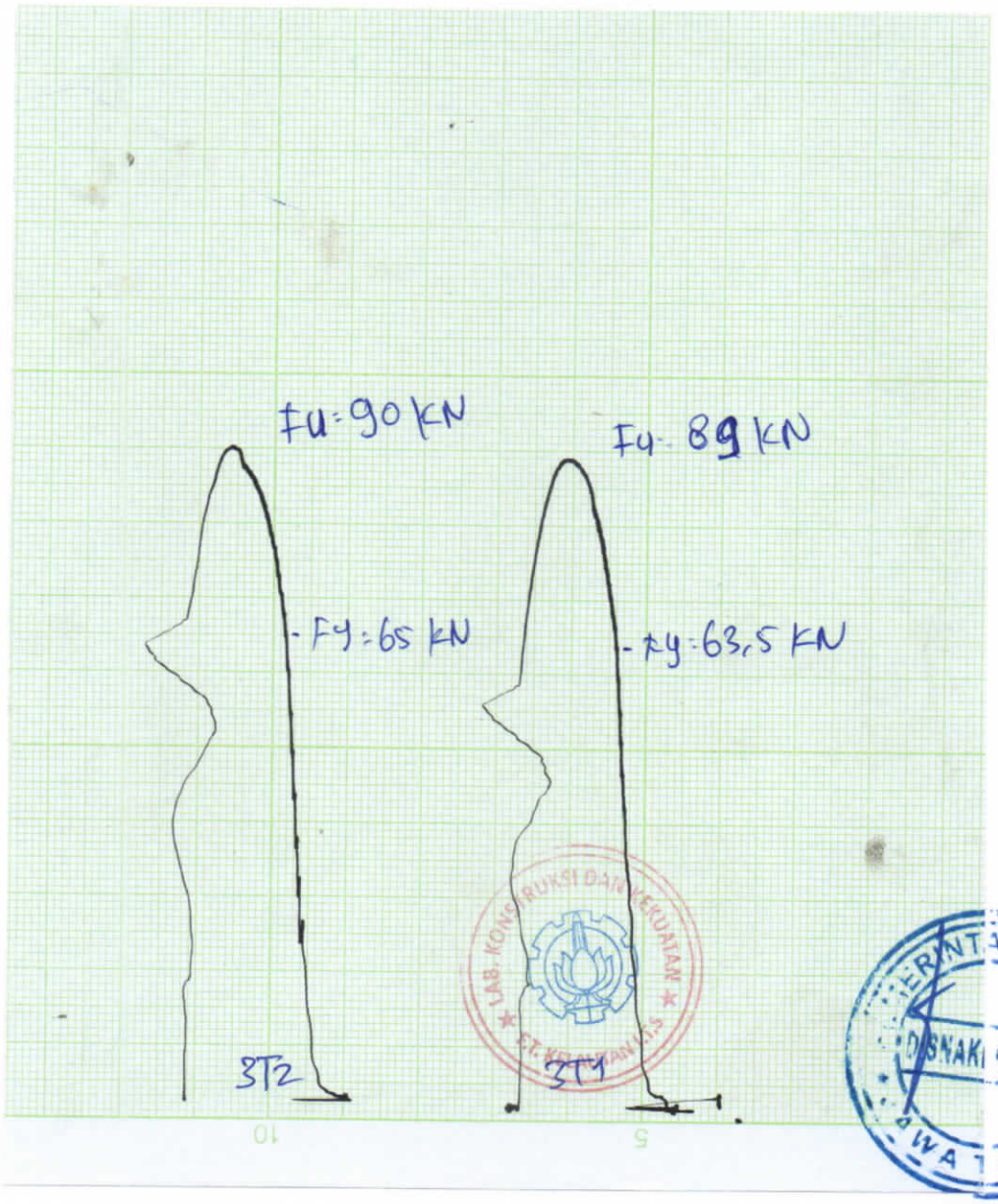
Suwondo
NIP. 19630325 199103 1 009

Head of the Laboratory
Ships Strength and Construction

M.Nurul Misbah, ST., MT.
NIP. 19730404 199702 1001

LABORATORIUM KONSTRUKSI DAN KEKUATAN KAPAL
DEPARTEMEN TEKNIK PERKAPALAN
FAKULTAS TEKNOLOGI KELAUTAN
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
Gedung W – Lantai 1, Kampus ITS Sukolilo, Surabaya 60111
Telp./Fax. 031 599 4933, Email: labkonjtp@gmail.com

REPORT ON TEST RESULT NO. : 0305/IT2.4.I.1/PM.05.02/2023



KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 200109-FPQ8IN-0016A1-0004
Date of Issue : Jan., 10. 2020

Order No. : Q8S1016932
PO No. : GWK/LOMBOK/MT/XII/19/02
Supplier : PT. GHEWANTIKA KONSTRUKSI
Commodity : PLATE
Customer : PT. GHEWANTIKA KONSTRUKSI
Spec & Type : ASTM A36

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (MPa)	Tensile Test TS (MPa)	Tensile Test EL (%)		Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	Nb (%)	V (%)
12x1800x12000	PK62519701	1	2,035	SK55821	T	370	427	26		L	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003
										P	0.1606	0.214	1.373	0.0130	0.0038	0.020	0.009	0.012	0.002	0.015	0.004
*** Sub Total (090) ***		1	2,035 (kg)																		
14x1800x12000	PK62519801-9802	2	4,748	SK55821	T	370	427	26		L	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003
										P	0.1606	0.214	1.373	0.0130	0.0038	0.020	0.009	0.012	0.002	0.015	0.004
14x1800x12000	PK62519601-9602	2	4,748	SK55821	T	361	415	26		L	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003
										P	0.1606	0.214	1.373	0.0130	0.0038	0.020	0.009	0.012	0.002	0.015	0.004
*** Sub Total (100) ***		4	9,496 (kg)																		
*** Grade Total ***		25	38,992 (kg)																		
*** Grand Total ***		25	38,992 (kg)						=== Last Item ===												

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test. Direction : Transversal, Gauge Length : 200㎜(Rectangular).
  YP Method : 0.2% off-set
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

PEMERINTAH PROVINSI JAWA TIMUR DISNAKERTRANS

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process.
This material has been made by vacuum degassing process.
Test Certificate is issued according to EN10204 3.1.

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

Surveyor To :

Choi Jong Seog

WELDER PERFORMANCE QUALIFICATION TEST RECORD

Name	Sigit Gunarso		Test Date	13/03/2023	Rev.
ID Number	-		Record No.	WPQ-03	0
Stamp No.	WD - 03		Std. Test No.	-	0
Company	PT. Rexline Engineering Indonesia		WPS No.	03/WPS/REI/GMAW/2023	0
Division	-		Qualified To	AWS D1.1	

BASE METALS	Specification	Type or Grade	AWS Group No.	Size (NPS)	Schedule	Thickness	Diameter
Base Material	ASTM A36	UNS K02600	I	-	-	12 mm	-
Welded to	ASTM A36	UNS K02600	I	-	-	12 mm	-

VARIABLES	Actual Values		RANGE QUALIFIED
Type of Weld Joint	Plate - Single V Groove		Groove, Fillet, Plug, and Slot Welds (T-, Y-, K-Groove PJP only)
Base Metal	Group I to Group I		Any AWS D1.1 Qualified Base Metal

	Groove	Fillet		Groove	Fillet
Plate Thickness	12 mm	-		3 - 24 mm	3 - 24 mm
Pipe/Tube Thickness	-	-		3 - 24 mm	3 - 24 mm
Pipe Diameter	-	-		Min. 24 in	Min. 24 in

Welding Process	**GMAW**		**GMAW**
Type *(Manual, Semiautomatic, Mechanized, Automatic)*	Semiautomatic		Semiautomatic
Backing	Weld metal		Backgouging and Backwelding
Filler Metal (AWS Spec.)	A5.18		A5.18
AWS Classification	ER70S-6		All
F-Number	-		-
Position	2G		-----
Groove - Plate & Pipe ≥ 24 in	-		F, H
Groove – Pipe < 24 in	-		-
Fillet - Plate & Pipe ≥ 24 in	-		F, H
Fillet - Pipe < 24 in	-		F, H
Progression	-		-
GMAW Transfer Mode	-		-
Single or Multiple Electrodes	Single		Single
Gas/Flux Type	CO_2		CO_2

TEST RESULTS

Type of Test	Acceptance Criteria	Results	Remarks
Visual Examination per 6.10.1	6.10.1	Acceptable	-
Radiographic Examination	6.10.2.2	Acceptable	-
Each Position: 1 Root Bend per 6.10.3.1 and Fig. 6.8	6.10.3.3	-	-
Each Position: 1 Face Bend per 6.10.3.1 and Fig. 6.8	6.10.3.3	-	-

CERTIFICATION

Test Conducted by	
Laboratory	PT. Quarta Sejahtera Perkasa
Test Number	03/RT/QSP-REI/2023
File Number	-

We, the undersigned, 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 Clause .6. of AWS D1.1/D1.1M (2020) *Structural Welding Code-Steel.*

Prepared by,
PT.Rexline Engineering Indonesia

Chandra Bintang
Welding Inspector

Approved by,
Disnaker Prov. Jatim

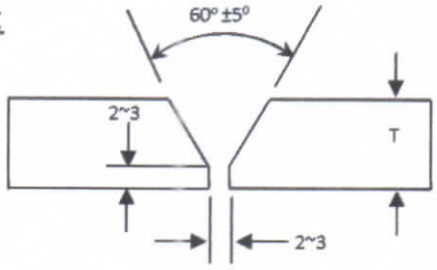
PEMERINTAH PROVINSI JAWA TIMUR DISNAKERTRANS

Suwondo
NIP 19630325 199103 1009

RECORD OF WELDER QUALIFICATION TEST

Welder Name	: **Sigit Gunarso**	Test No.	: **WQT-03**
Company Name	: PT. REI	WPS No.	: 03/WPS/REI/GMAW/2023
Location	: Workshop Lamongan	PQR No.	: 03/PQR/REI/GMAW/2023
Standard	: AWS D1.1	Date	: 13 - 3 - 2023
Welding Machine	: Mitech NBC 500M	Current (A)	: See Table
Welding Process	: FCAW	Voltage (V)	: See Table
Shielding Gas	: CO2	Gas Flow Rate	: See Table
Backing Material	: Weld Metal	Polarity	: DCEP
Position of Welding	: 2G	Progression	: -
Material Spec.	: ASTM A36	Thickness	: 12 mm
Plate / Pipe	: Plate	Schedule	: -
Manufacture Plate	: Krakatau Posko	Diameter	: -
Heat No.	: SK55821	Interpass Cleaning	: Wire Brush and Grinding
Filler Metal Spec.	: A5.18	AWS Classification	: ER70S-6
Manufacture Filler	: Essab or Equivalent	Length of Weld	: 300 mm
Joint Design	: Single V Groove	Groove Angle	: $60^0 \pm 5^0$
Root Opening	: 2 mm	Root Face	: 2 mm
Face Reinforcement	: 2 mm	Root Reinforcement	: 1.5 mm
Preheat Temp.	: -	Post Weld Heat	: -
Inter pass Temp.	: -		

Sketch :



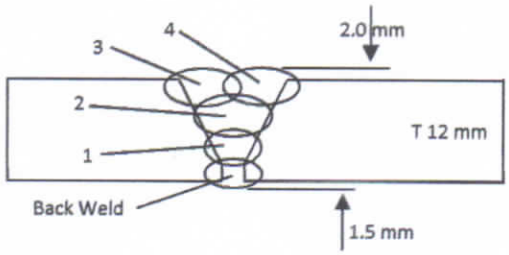


TABLE :

Welding Parameter						
Pass No.	1	2	3	4	Back Weld	
Electrode	ER70S-6	ER70S-6	ER70S-6	ER70S-6	ER70S-6	
Size (mm)	Ø 1.2	Ø 1.2	Ø 1.2	Ø 1.2	Ø 1.2	
Welding Time (mm/sec.)	2.5	2.8	3.1	3.2	2.9	
Ampere (A)	145	190	205	205	180	
Volt (V)	22.5	24	25	25	23	
Travel Speed (mm/min.)	150	170	185	190	175	
Inter pass Temp. (^{0}C)	-	-	-	-	-	
Heat Input (kj/mm)	-	-	-	-	-	

Prepared by,
PT.Rexline Engineering Indonesia

Chandra Bintang
Welding Inspector

Approved by,
Disnaker Prov. Jatim

PEMERINTAH PROVINSI JAWA TIMUR DISNAKERTRANS

Suwondo
NIP 19630325 199103 1009

PT. QUARTA SEJAHTERA PERKASA
INSPECTION AND CERTIFICATION

RADIOGRAPHIC INSPECTION REPORT

Job No. :
Report No : 03/RT/QSP-REI/2023
Test Date : 13-03-2023

CLIENT	: PT. REI				
Job Description	: WPS/PQR/WPQT				
Job Location	: SIDOARJO		Film Type	: FUJI XD	
Material	: A.36		Denstiy	: 2-4	
NDT Procedure	: QSP-RT-AWS D1.1		Screen (pb)	: 0,125 mm	
Test Method	: SWSV		IQI Type	: ASTM 1B	
Acceptance Code	: AWS D1.1		SFD	: 15 INCH	
Weld Process	: GMAW		Source	: Ir. 192 Act : 68 Ci	

Abbreviations Used in Interpretation

IPD :	Incomplete Penetration Due to Hi-Low	ESI :	Elongated Slag Inclusion	IU :	Internal Undercat	TI :	Tungsten Inclusion	
CR :	Crack	P :	Internal Porosity	IC :	Internal Concavity			
IF :	Incomplete Fusion	CP :	Cluster Porosity	EP :	Excess Penetration			
IP :	Incomplete Penetration	SCP :	Scattered Porosity	WH :	Worm Hole			
ISI :	Isolated Slag inclusion	EU :	External Undercat	BT :	Burn Through			
				EC (HB) :	Elongated Cavity (Hollow Bead)			
ACC :	Accepted	REP :	Repair	R1 / R2 :	Repair 1 or Repair 2	RW :	Re Weld	

TEST RESULTS

Line No. :
Drawing No. : 26
KP :

JOINT No.	Welder	Dia / Lgt (Inches)	Thickness (mm)	Interest Area	Interpretation	Evaluation ACC	Evaluation REP	REMARK
SIGIT	WD-03	—	12	A-B		V	—	
GUNARSO								

PEMERINTAH PROVINSI JAWA TIMUR DISNAKERTRANS

Total Welds : 1 Joints	Radiographer	QA/QC Approved	Client Representative	3rd Party Representative
Film Used Size	PT QUARTA SEJAHTERA PERKASA ACHMAD			
4 " x 10 " : — Sheets	NDE Level II			
4 " x 15 " : 1 Sheets	Date : 13-03-2023	Date :	Date :	Date :