

**WELDING PROCEDURE SPECIFICATION (WPS)**

PT. REXLINE ENGINEERING INDONESIA  
Company Name

0  
Revision No.

01/WPS/REI/FCAW/2023  
WPS No.

March 15, 2023  
Date.

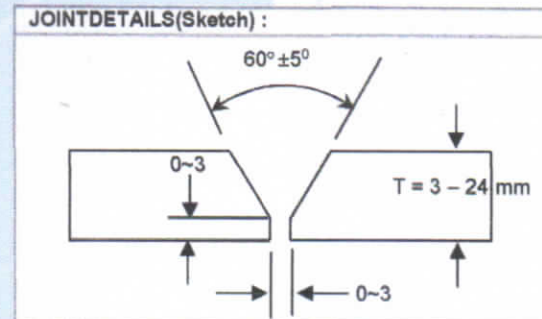
01/PQR/REI/FCAW/2023  
Supporting PQR No.

CVN Report.

BASE METALS	Specification	Type or Grade	AWS Group No.
Base Material	A36	UNS K02600	I
Welded to	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°
Root Opening	0 - 3 mm
Root Face	0 - 3 mm
Back gauging	With (if Req)
Method	Air Arc Gouging or Grinding



POSTWELD HEAT TREATMENT	
Temperature	-
Time at Temperature	-
Other	-

PROCEDURE	
Weld Layer(s)	All
Weld Pass(es)	All
Process	FCAW
Type (Semi Automatic, Mechanized, etc)	Semi Automatic
Position	All
Vertical Progression	-
Filler Metal (AWS Spec.)	A5.20
AWS Classification	E71T-1C
Diameter (mm)	1.2
Manufacturer / Trade Name	Essab or Equivalent
Shielding Gas (Composition)	CO2
Flow Rate (L/Mn)	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 - 230
Maximum Heat Input	-
Technique	-----
Stringer or Weave	Both
Multi or Single Pass (per side)	Multi pass
Oscillation (Mechanized/Automatic)	-
Number of Electrode	1
Contact Tube to Work dist. (mm)	12 - 18
Peening	None
Interpass Cleaning	Wire Brush or Grinding
Other	-



**PROCEDURE QUALIFICATION RECORD (PQR)**

PT. REXLINE ENGINEERING INDONESIA  
Company Name

0  
Revision No.

01/PQR/REI/FCAW/2023  
QR No.

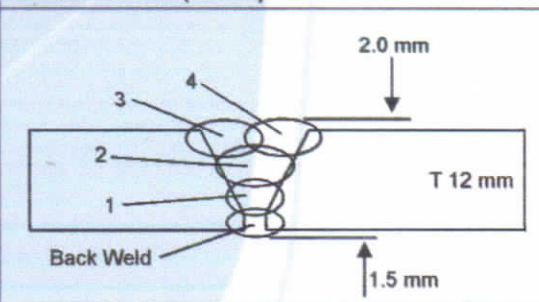
March 15, 2023  
Date.

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

**JOINT DETAILS**

Groove Type	Single V Groove Weld Joint
Groove Angle	60°
Root Opening	2 mm
Root Face	2 mm
Back gouging	-
Method	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	FCAW	FCAW	FCAW	FCAW	FCAW
Type (Semi Automatic, Mechanized, etc)	Semi Automatic	Semi Automatic	Semi Automatic	Semi Automatic	Semi Automatic
Position	2G	2G	2G	2G	2G
Vertical Progression	-	-	-	-	-
Filler Metal (AWS Spec.)	A5.20	A5.20	A5.20	A5.20	A5.20
AWS Classification	E71T-1C	E71T-1C	E71T-1C	E71T-1C	E71T-1C
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)	18	18	18	18	18
Nozzle Size (mm)	Ø 19	Ø 19	Ø 19	Ø 19	Ø 19
Preheat Temperature	None	None	None	None	None
Interpass Temperature	-	-	-	-	-
<b>Electrical Characteristics</b>					
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 )	140	195	210	210	170
Volts ( V )	23	24	25	25	23.5
Wire Feed Speed	-	-	-	-	-
Travel Speed (mm / Min)	140	170	190	195	170
Maximum Heat Input	-	-	-	-	-
<b>Technique</b>					
Stringer or Weave	Weave	Weave	Weave	Weave	Weave
Multi or Single Pass (perside)	Multi pass	Multi pass	Multi pass	Multi pass	Multi pass
Oscillation (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	-	-	-	-	-

**PROCEDURE QUALIFICATION RECORD (PQR) TEST RESULTS**

01/PQR/REI/FCAW/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
1T1	20.14 mm	11.34 mm	228.39 mm <sup>2</sup>	87.00 kN	380.93 MPa	Base Metal
1T2	20.15 mm	11.35 mm	228.70 mm <sup>2</sup>	90.50 kN	395.71 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
1SB1	Side Bend	Acceptable	10.19	12.00	Open Defect 0.60 mm
1SB2	Side Bend	Acceptable	9.98	12.00	Open Defect 0.52 mm
1SB3	Side Bend	Acceptable	10.22	12.00	Open Defect 0.55 mm
1SB4	Side Bend	Acceptable	10.24	12.00	None Open Defect

**CERTIFICATION**

Welder's Name	ID Number	Stamp Number
Shandi Okta Bianda S	-	WD - 01

Tests Conducted by	
Laboratory	Fakultas Teknologi Kelautan - ITS
Test Number	0303/IT2.4.1.1/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

Approved by,  
Disnaker Prov. Jatim

Chandra Bintang  
Welding Inspector



**REPORT ON TEST RESULT NO. : 0303/IT2.4.1.1/PM.05.02/2023**

Page 1 of 2

DATE : March 13, 2023  
ORDER FROM : PT.REXLINE ENGINEERING INDONESIA  
TEST STANDARD : AWS.D1.1  
WPS NUMBER : 01/WPS/REI/FCAW/2023  
PQR NUMBER : 01/PQR/REI/FCAW/2023  
MATERIAL SPEC. : Plate A36 to Plate A36  
THICKNESS : 12 mm to 12 mm  
JOINT DESIGN : Butt Joint ( Single Groove )  
WELDING PROCESS : FCAW  
TEST POSITION : 2G  
WELDER NAME : Shandi Okta Bianda Saputra  
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 <sup>2</sup> )	Fy (kN)	Fu (kN)	YIELD STRENGTH (MPa)	TENSILE STRENGTH (MPa)	BREAKING
1T1	Good	20.14	11.34	228.39	71.00	87.00	310.87	380.93	Base Metal
1T2	Good	20.15	11.35	228.70	70.00	90.50	306.08	395.71	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)	
1SB1	Side Bend	10.19	12.00	0.60
1SB2	Side Bend	9.98	12.00	0.52
1SB3	Side Bend	10.22	12.00	0.55
1SB4	Side Bend	10.24	12.00	None

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



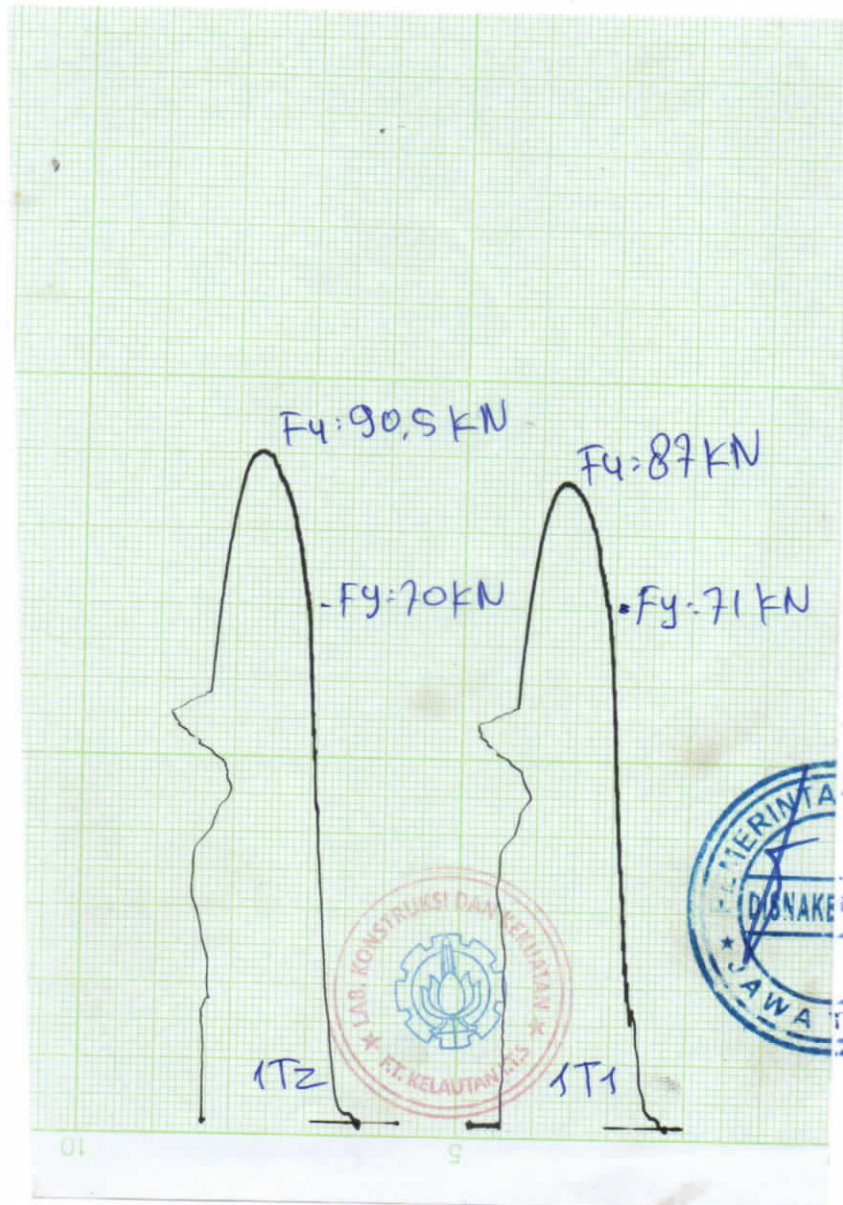
Head of the Laboratory  
Ships Strength and Construction



M.Nurul Misbah, ST., MT.  
NIP. 197304041997021001

**REPORT ON TEST RESULT NO. : 0303/IT2.4.I.1/PM.05.02/2023**

Page 2 of 2



Order No. : Q8S1016932

PO No. : GWK/LOMBOK/MTXII/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			Chemical Composition											
						YP (MPa)	TS (MPa)	EL (%)	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	Nb (%)	V (%)	
12x1800x12000	PK62519701	1	2,035	SK55821	T	370	427	26	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003	
*** Sub Total (0950) ***		1	2,035 (kg)						0.1606	0.214	1.373	0.0130	0.0038	0.020	0.009	0.012	0.002	0.015	0.004	
14x1800x12000	PK62519801-9802	2	4,748	SK55821	T	370	427	26	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003	
14x1800x12000	PK62519601-9602	2	4,748	SK55821	T	361	415	26	0.1550	0.196	1.392	0.0126	0.0032	0.022	0.010	0.013	0.001	0.015	0.003	
*** Sub Total (1050) ***		4	9,496 (kg)						0.1606	0.214	1.373	0.0130	0.0036	0.020	0.009	0.012	0.002	0.015	0.004	
*** 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 : 200mm (Rectangular).  
\* YP Method : 0.2% off-set  
\* Division - L : Ladle Analysis, P : Products Analysis  
\* Supply Condition : As-Rolled unless otherwise Heat Treated.

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	Shandi Okta Bianda Saputra		Test Date	13/03/2023	Rev.
ID Number	-		Record No.	WPQ-01	0
Stamp No.	WD - 01		Std. Test No.	-	0
Company	PT. Rexline Engineering Indonesia		WPS No.	01/WPS/REI/FCAW/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	FCAW	FCAW
Type (Manual, Semiautomatic, Mechanized, Automatic)	Semiautomatic	Semiautomatic
Backing	Weld metal	Back gouging and Back welding
Filler Metal (AWS Spec.)	A5.20	A5.20
AWS Classification	E71T-1C	All
F-Number	6	6
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	Spray	Spray, Pulse, Globular
Single or Multiple Electrodes	Single	Single
Gas/Flux Type	CO2	CO2

### 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	01/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,  
Disaker Prov. Jatim

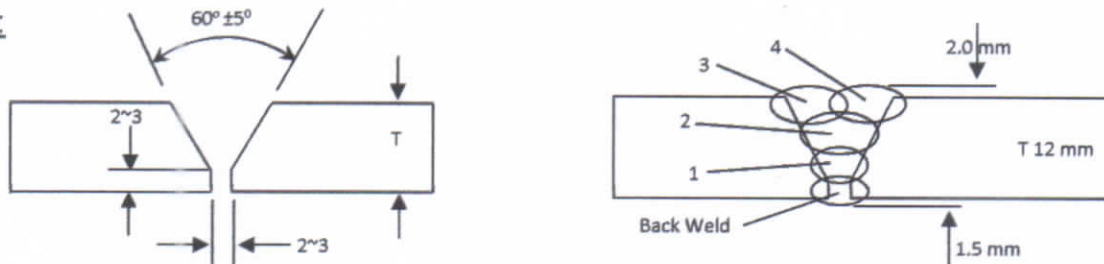


Suwondo  
NIP. 196303251991031009

## RECORD OF WELDER QUALIFICATION TEST

Welder Name : <b>Shandy Okta Bianda S</b>	Test No. : <b>WQT-01</b>
Company Name : <b>PT. REI</b>	WPS No. : <b>01/WPS/REI/FCAW/2023</b>
Location : <b>Workshop Lamongan</b>	PQR No. : <b>01/PQR/REI/FCAW/2023</b>
Standard : <b>AWS D1.1</b>	Date : <b>13 - 3 - 2023</b>
Welding Machine : <b>Mitech NBC 500M</b>	Current (A) : <b>See Table</b>
Welding Process : <b>FCAW</b>	Voltage (V) : <b>See Table</b>
Shielding Gas : <b>CO2</b>	Gas Flow Rate : <b>See Table</b>
Backing Material : <b>Weld Metal</b>	Polarity : <b>DCEP</b>
Position of Welding : <b>2G</b>	Progression : <b>-</b>
Material Spec. : <b>ASTM A36</b>	Thickness : <b>12 mm</b>
Plate / Pipe : <b>Plate</b>	Schedule : <b>-</b>
Manufacture Plate : <b>Krakatau Posko</b>	Diameter : <b>-</b>
Heat No. : <b>SK55821</b>	Interpass Cleaning : <b>Wire Brush and Grinding</b>
Filler Metal Spec. : <b>A5.20</b>	AWS Classification : <b>E71T-1C</b>
Manufacture Filler : <b>Essab or Equivalent</b>	Length of Weld : <b>300 mm</b>
Joint Design : <b>Single V Groove</b>	Groove Angle : <b>60° ± 5°</b>
Root Opening : <b>2 mm</b>	Root Face : <b>2 mm</b>
Face Reinforcement: <b>2 mm</b>	Root Reinforcement: <b>1.5 mm</b>
Preheat Temp. : <b>-</b>	Post Weld Heat : <b>-</b>
Inter pass Temp. : <b>-</b>	

**Sketch :**



**TABLE :**

Pass No.	Welding Parameter				
	1	2	3	4	Back Weld
Electrode	E71T-1C	E71T-1C	E71T-1C	E71T-1C	E71T-1C
Size (mm)	Ø 1.2	Ø 1.2	Ø 1.2	Ø 1.2	Ø 1.2
Welding Time (mm/sec.)	2.3	2.8	3,2	3.3	2.8
Ampere (A)	140	195	210	210	170
Volt (V)	23	24	25	25	23,5
Travel Speed (mm/min.)	140	170	190	195	170
Gas Flow Rate (L/min)	18	18	18	18	18
Inter pass Temp. (°C)	-	-	-	-	-
Heat Input (kj/mm)	-	-	-	-	-

Prepared by,  
PT.Rexline Engineering Indonesia

Approved by,  
Disnaker Prov. Jatim

**Chandra Bintang**  
Welding Inspector







**RADIOGRAPHIC INSPECTION REPORT**

Job No. : \_\_\_\_\_  
Report No : 01/PT/QSP-REI/2023  
Test Date : 13-03-2023

CLIENT	<u>PT-REI</u>		
Job Description	<u>WPS / PQR / WPT</u>		
Job Location	<u>SIDARJO</u>	Film Type	<u>FUJIXD</u>
Material	<u>A.36</u>	Density	<u>2-4</u>
NDT Procedure	<u>QSP-PT-AWS D.I</u>	Screen (pb)	<u>0.125 mm</u>
Test Method	<u>SWSI</u>	IQI Type	<u>ASTM IB</u>
Acceptance Code	<u>AWS D.I</u>	SFD	<u>15 INCH</u>
Weld Process	<u>FCAW</u>	Source	<u>Ir. 192 Act : 68 Ci</u>

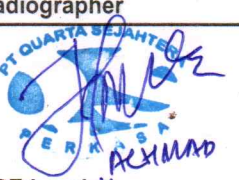
Abbreviations Used in Interpretation			
IPD : Incomplete Penetration Due to Hi-Low	ESI : Elongated Slag Inclusion	IU : Internal Undercut	TI : Tungsten Inclusion
CR : Crack	P : Internal Porosity	IC : Internal Concavity	
IF : Incomplete Fusion	CP : Cluster Porosity	EP : Excess Penetration	
IP : Incomplete Penetration	SCP : Scattered Porosity	WH : Worm Hole	
ISI : Isolated Slag inclusion	EU : External Undercut	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		REMARK
						ACC	REP	
<u>SANDI</u>	<u>WD-01</u>	<u>-</u>	<u>12</u>	<u>A-B</u>		<u>✓</u>	<u>-</u>	
<u>OKTA BS</u>								



Total Welds : <u>1</u>	Joints	Radiographer  ACTIMAD	QA/QC Approved	Client Representative	3 <sup>rd</sup> Party Representative
Film Used		NDE Level <u>II</u>			
Size		Date : <u>13-03-2023</u>	Date :	Date :	Date :
4 " x 10 " : <u>-</u>	Sheets				
4 " x 15 " : <u>1</u>	Sheets				