

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 1 of 39

WPS AND PQR for Site Erection

CLIENT : PT. CITRA PALU MINERALS (CPM)
PROJECT NAME : POBOYA 2000 TPD EXPANSION PROJECT
LOCATION : PALU, SULAWESI
CONSULTANT : PT. COMO ENGINEERS (PT. CE)
VENDOR : PT. HANAZONO ENGINEERING INDONESIA
DOCUMENT NO. : E2502-000-PRC-016

FOR APPROVAL

☐ AP	APPROVED
☐ AN	APPROVED AS NOTED
☐ RE	NOT APPROVED (Re-Submit)
☐ RV	REVIEWED
☐ RN	REVIEWED WITH NOTES
☐ NR	NOT BE RETURNED
RETURN DATE	
	

						
C	Sept 08, 2026	Issue For Approval	Afifah	Rusnandi	Murasato	
B	July 13, 2026	Issue For Approval	Benridho	Rusnandi	Murasato	
A	March 02, 2026	Issue For Approval	Benridho	Rusnandi	Murasato	
REV	DATE ISSUED	ISSUE PURPOSE	PREPARE	CHECKED	APPROVED	AUTHORIZED

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 3 of 39

CONTENTS

	Page
1. WPS No. : 04-WPS-HEI-MIGAS-26.....	4
2. WPS No. : 002/HEI/MIGAS/20	26

COMO ENGINEERS	POBOYA 2000 TPD EXPANSION PROJECT	 PT Citra Paha Minerals
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 4 of 39

1. WPS & PQR NO. 04-WPS-HEI-MIGAS-26 & 04-PQR-HEI-MIGAS-26

 PT. HANAZONO Engineering Indonesia We are always partner with you		Head Office : Jl. Raya Bojonegara-Serang No. 44 RT. 001/RW.001 Desa Kertasarna, Kecamatan Bojonegara, Kabupaten Serang Banten, Indonesia (42414) Telp : +62-254-7850344/45/46/47 e-mail : pqr@hanazono.co.id											
WELDING PROCEDURE SPECIFICATION (WPS) Applicable Code: AWS D1.1/1.1M: 2025, Structural Welding Code - Steel													
Page 1 of 3													
☐ PREQUALIFIED (Pra Kualifikasi)		☐ QUALIFIED BY TESTING (Kualifikasi dengan Pengujian)											
WPS NO. (No. PWPS) :	04-WPS-HEI-AWS-MIGAS-26	DATE (Tanggal) :	June 07, 2025										
REVISION NO. (Revisi No.) :	0	DATE (Tanggal) :	-										
WELDING PROCESS (ES) (Proses Pengelasan) :	SMAW	SUPPORTING PQR NO. (No. PQR Pendukung) :	04-PQR-HEI-AWS-MIGAS-26										
		TYPE (S) (Tipe) :	Manual										
JOINTS DESIGN USED (Desain Sambungan yang Digunakan) TYPE (Tipe) : See Joint Detail ☐ SINGLE ☐ DOUBLE WELD BACKING (Backing) : ☐ YES ☐ NO BACKING MATERIAL (Material Backing) : Weldmetal/Metal/Ceramic ROOT OPENING (Ukuran Celah Root) : See Joint Detail ROOT FACE DIMENSION (Ukuran Pinggiran Root) : See Joint Detail GROOVE ANGLE (Sudut Groove) : See Joint Detail RADIUS (J-U) (Jari-Jari (J-U)) : N/A BACK GOUGING (Back Gouging) : ☐ YES ☐ NO METHOD (Metode) : Carbon arc gouging and/or Grinding		JOINT DETAIL (Detail Sambungan) See page 2 of 3											
BASE METAL (Logam Dasar) MATERIAL SPEC. (Spesifikasi Material) : SS 400 to SS 409 TYPE OR GRADE (Tipe atau Kelas) : - THICKNESS (Rentang Ketebalan Logam Dasar) : - GROOVE : 3 - Unlimited FILLET : 3 - Unlimited DIAMETER (PIPE) (Diameter Pipa) : ≥ 600 mm		ELECTRICAL CHARACTERISTIC (Karakteristik Elektrik) TRANSFER MODE (GMAW) (Mode Transfer (GMAW)) ☐ SHORT CIRCUITING ☐ GLOBULAR/FCAW ☐ SPRAY CURRENT : ☐ AC ☒ DCEP ☐ DCEN ☐ PULSED OTHER : N/A TUNGSTEN ELECTRODE (GTAW) SIZE (Ukuran) : N/A TYPE (Tipe) : N/A											
FILLER METAL (Logam Pengisi) AWS SPECIFICATION (Spesifikasi AWS) : A5.1 AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R @ 2.5 3.2 4.0 BRAND NAME (Nama Merk) : -		TECHNIQUE (Teknik) STRINGER OR WEAWE BEAD (Lurus atau Mengayun) : Stringer and/or weaving MULTI PASS OR SINGLE PASS (PER SIDE) (Satu Pass atau Banyak Pass (Per Sisi)) : Multi or Single NUMBER OF ELECTRODE (Jumlah Elektroda) : Single Electrode ELECTRODE SPACING (Jarak antar Elektroda) LONGITUDINAL : N/A LATERAL : N/A ANGLE : N/A CONTACT TUBE TO WORK DISTANCE (Jarak kontak Tube ke Benda Kerja) : N/A PEENING (Peening) : N/A INTERPASS CLEANING (Pembersihan Antar Pass) : Grinding, Brushing, and Chipping											
SHIELDING (Pelindung) FLUX (Flux) : N/A GAS (Gas) : N/A COMPOSITION (Komposisi) : N/A ELECTRO - FLUX (CLASS) (Kelas Elektro Fluks) : N/A FLOW RATE (Laju Alir) : N/A GAS CUP SIZE (Ukuran Nozzle Gas) : N/A		PREHEAT (Pemanasan Awal) PREHEAT TEMP. MIN. (Temperatur Minimum Pemanasan Awal) <table border="1"> <tr> <th>Thickness/T (mm)</th> <th>≤ 20 mm</th> <th>20mm < T ≤ 38mm</th> <th>38 mm < T ≤ 65 mm</th> <th>> 65 mm</th> </tr> <tr> <td>Min. Temp (°C)</td> <td>0</td> <td>10</td> <td>65</td> <td>110</td> </tr> </table> INTERPASS TEMP. MAX. (Temperatur Minimum Antar Pass) : 250°C		Thickness/T (mm)	≤ 20 mm	20mm < T ≤ 38mm	38 mm < T ≤ 65 mm	> 65 mm	Min. Temp (°C)	0	10	65	110
Thickness/T (mm)	≤ 20 mm	20mm < T ≤ 38mm	38 mm < T ≤ 65 mm	> 65 mm									
Min. Temp (°C)	0	10	65	110									
POSITION (Posisi) POSITION OF GROOVE (Posisi Groove) : F, H, V POSITION OF FILLET (Posisi Fillet) : F, H, V VERTICAL PROGRESSION (Pergerakan Vertikal) ☐ UP ☐ DOWN		POST WELD HEAT TREATMENT (Pemanasan Pasca Las) TEMPERATURE (Temperatur) : N/A TIME (Waktu) : N/A											


 Nomor Registrasi Migas : 11580
 ATG - B - 560 / 0509 / 2026

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

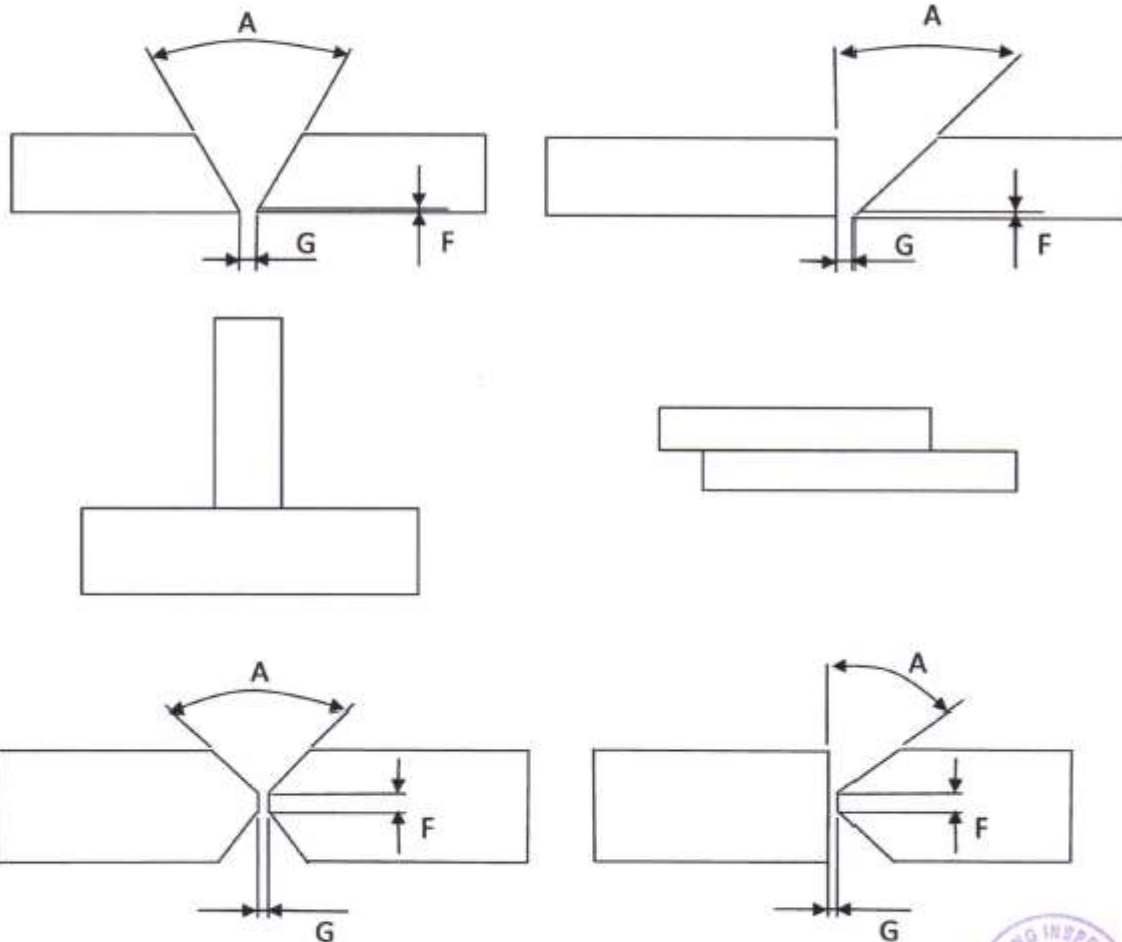
Page 5 of 39

WELDING PROCEDURE SPECIFICATION (WPS)

Applicable Code: AWS D1.1/1.1M: 2025, Structural Welding Code - Steel

Page 2 of 3

Attachment of Joint Detail



$A = 45^\circ (+10, -5)$

$G = 0 - 4 \text{ mm}$

$F = 0 - 2 \text{ mm}$

Nomor Registrasi Migas
AYG-B-569/0589/2026



(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 6 of 39

WELDING PROCEDURE SPECIFICATION (WPS)

Applicable Code: AWS D1.1/1.1M: 2025, Structural Welding Code - Steel

WPS No. : 04-WPS-HEI-AWS-MIGAS-26

Rev : 0

Page 3 of 3

WELDING PARAMETER

PASS OR WELD LAYER(S)	PROCESS	FILLER METAL		CURRENT		VOLT (V)	TRAVEL SPEED (mm/MIN.)	Heat Input (KJ/mm)	REMARK
		AWS CLASS	DIA. (mm)	TYPE & POLARITY	AMP (A)				
FLAT AND HORIZONTAL									
Root/Hot	SMAW	E7018-H4R	2.5, 3.2, 4.0	DCEP	80 ~ 120	20 ~ 25	50 ~ 100	0,95 ~ 3,6	
Fill					110 ~ 150	22 ~ 27	65 ~ 230	0,63 ~ 3,06	
Cap					100 ~ 130	22 ~ 26	70 ~ 200	0,66 ~ 2,89	
VERTICAL									
Root/Hot	SMAW	E7018-H4R	2.5, 3.2, 4.0	DCEP	70 ~ 110	20 ~ 24	45 ~ 65	1,29 ~ 3,52	
Fill					100 ~ 130	23 ~ 27	50 ~ 100	1,32 ~ 4,21	
Cap					90 ~ 125	22 ~ 25	60 ~ 105	1,13 ~ 3,13	

0

June 07, 2026



ANDI ISKANDAR



RUSNANDI

Nomor Registrasi Migas

ANG - B - 569 / 0589 / 2026

No.

DATE

PREPARED BY

REVIEWED BY

REGISTERED BY MIGAS

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 7 of 39

PROCEDURE QUALIFICATION RECORD (PQR)

Applicable Code: AWS D1.1M/D1.1: 2025, Structural Welding Code - Steel

Page 1 of 3

PQR NO. (No. PQR) : 04A-PQR-HEI-AWS-MIGAS-26	DATE (Tanggal) : June 07, 2026	WPS NO. (No. WPS) : 04-WPS-HEI-AWS-MIGAS-26
REV NO. (No. Rev.) : 0	DATE (Tanggal) : -	
WELDING PROCESS (ES) (Proses Pengelasan) : SMAW	TYPE (S) (Tipe) : Manual	
JOINTS DESIGN USED (Desain Sambungan yang Digunakan) TYPE (Tipe) : Double V Groove ☐ SINGLE ☒ DOUBLE WELD BACKING (Backing) : ☒ YES ☐ NO BACKING MATERIAL (Material Backing) : Weld Metal ROOT OPENING (Ukuran Celah Root) : 2-3 mm ROOT FACE DIMENSION (Ukuran Pinggiran Root) : 0-1 mm GROOVE ANGLE (Sudut Groove) : 45° RADIUS (J-U) (Jari-Jari (J-U)) : NA BACK GOUGING (Back Gouging) : ☐ YES ☒ NO METHOD (Metode) : Grinding		POSITION (Posisi) POSITION OF GROOVE (Posisi Groove) : 2G POSITION OF FILLET (Posisi Fillet) : NA VERTICAL PROGRESSION (Pergerakan Vertikal) ☐ UP ☐ DOWN
BASE METAL (Logam Dasar) MATERIAL SPEC. (Spesifikasi Material) : SS 400 to SS 400 TYPE OR GRADE (Tipe atau Kelas) : - THICKNESS (Rentang Ketebalan Logam Dasar) GROOVE : 25 mm FILLET : NA DIAMETER (PIPE) (Diameter Pipa) : N/A		ELECTRICAL CHARACTERISTIC (Karakteristik Elektrik) TRANSFER MODE (GMAW) (Mode Transfer (GMAW)) ☐ SHORT CIRCUITING ☐ GLOBULAR/FCAW ☐ SPRAY CURRENT : ☐ AC ☒ DCEP ☐ DCEN ☐ PULSED POWER SOURCE : ☒ CC ☐ CV OTHER : N/A TUNGSTEN ELECTRODE (GTAW) SIZE (Ukuran) : N/A TYPE (Tipe) : N/A
FILLER METAL (Logam Pengisi) : SMAW AWS SPECIFICATION (Spesifikasi AWS) : A5.1 AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R BRAND NAME (Nama merk) : Bohler		TECHNIQUE (Teknik) STRINGER OR WEAVE BEAD (Lurus atau Mengayun) : Stringer MULTI PASS OR SINGLE PASS (PER SIDE) : Multi Pass (Satu Pass atau Banyak Pass (Per Sisi)) NUMBER OF ELECTRODE (Jumlah Elektroda) : Single Electrode ELECTRODE SPACING (Jarak antar Elektroda) LONGITUDINAL : N/A LATERAL : N/A ANGLE : N/A
SHIELDING (Pelindung) : SMAW FLUX (Flux) : NA GAS (Gas) : NA COMPOSITION (Komposisi) : NA ELECTRO - FLUX (CLASS) (Kelas Elektro Flux) : NA FLOW RATE (Laju Alir) : NA GAS CUP SIZE (Ukuran Nozzle Gas) : NA		CONTACT TUBE TO WORK DISTANCE (Jarak kontak Tube ke Benda Kerja) : N/A PEENING (Peening) : N/A INTERPASS CLEANING (Pembersihan Antar Pass) : Grinding, brushing, and chipping
PREHEAT (Pemanasan Awal) PREHEAT TEMP. MIN. (Temperatur Minimum Pemanasan Awal) : Ambient Temp (33°C) INTERPASS TEMP. MAX. (Temperatur Maksimum Antar Pass) : 234 °C		POST WELD HEAT TREATMENT (Pemanasan Pasca Las) TEMPERATURE (Temperatur) : N/A TIME (Waktu) : N/A

WELDING PROCEDURE

PASS OR WELD LAYER(S)	PROCESS	FILLER METAL		CURRENT		VOLTS (V)	TRAVEL SPEED (mm/Min)	HEAT INPUT (J/mm)	JOINT DETAILS
		CLASS	DIA.	TYPE & POLARITY	AMPS (A)				
See Page 2 of 3									
 Nomor Registrasi Migas : AYG - B.569 / DSB9 / 2026									

(CPM Work No.)
11580

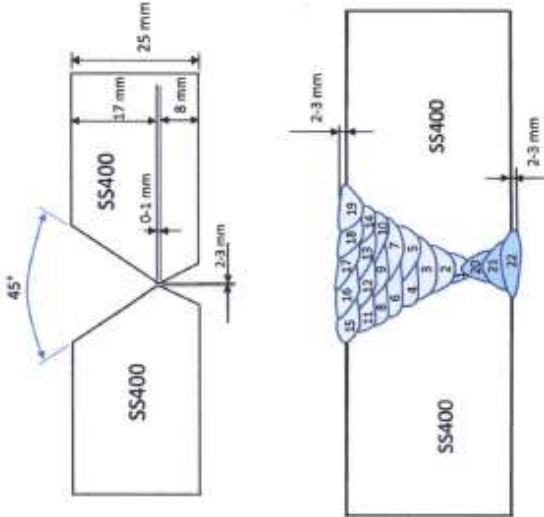
Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 8 of 39

WELDING RECORD OF QUALIFICATION TEST										WPS NO. : 04-WPS-HEI-AWS-MIGAS-26
WELDING POSITION : 2G										PQR NO. : 04A-PQR-HEI-AWS-MIGAS-26
WELDING PROCESS : SMAW										Welding Date : May 20, 2026 (PAGE 2 of 3)
Pass	Filler Metal Type	Size	Polarity	Interpass Temp (°C)	AMP. (A)	VOLTT (V)	Welding Speed (mm/min)	Heat Input (J/mm)	Sketch for joint preparation and passes location	
1	E7018-H4R	Ø 3.2	DCEP	A.T (33)	115	23	83,33	1904,48		
2	E7018-H4R	Ø 3.2	DCEP	48	115	23	105,34	1506,55		
3	E7018-H4R	Ø 3.2	DCEP	78	140	27	107,43	2111,14		
4	E7018-H4R	Ø 3.2	DCEP	101	140	27	100,57	2255,15		
5	E7018-H4R	Ø 3.2	DCEP	128	140	27	128,21	1768,97		
6	E7018-H4R	Ø 3.2	DCEP	141	140	27	154,19	1470,91		
7	E7018-H4R	Ø 3.2	DCEP	167	140	27	166,67	1360,77		
8	E7018-H4R	Ø 3.2	DCEP	188	140	27	225,81	1004,38		
9	E7018-H4R	Ø 3.2	DCEP	201	140	27	192,31	1179,35		
10	E7018-H4R	Ø 3.2	DCEP	210	140	27	214,72	1056,26		
11	E7018-H4R	Ø 3.2	DCEP	215	140	27	191,26	1185,82		
12	E7018-H4R	Ø 3.2	DCEP	220	140	27	204,68	1108,07		
13	E7018-H4R	Ø 3.2	DCEP	227	140	27	176,77	1283,02		
14	E7018-H4R	Ø 3.2	DCEP	234	140	27	181,35	1250,62		
15	E7018-H4R	Ø 3.2	DCEP	136	125	25	177,66	1055,39		
16	E7018-H4R	Ø 3.2	DCEP	147	125	25	178,57	1050,01		
17	E7018-H4R	Ø 3.2	DCEP	156	125	25	187,17	1001,76		
18	E7018-H4R	Ø 3.2	DCEP	163	125	25	183,25	1023,19		
19	E7018-H4R	Ø 3.2	DCEP	170	125	25	184,21	1017,86		
BACK SIDE (2G)										
20	E7018-H4R	Ø 3.2	DCEP	121	140	26	196,63	1110,72		
21	E7018-H4R	Ø 3.2	DCEP	131	140	26	212,12	1029,61		
22	E7018-H4R	Ø 3.2	DCEP	163	125	25	181,35	1033,91		

*size in mm

Kind Of Base Metal : SS400 to SS400

Filler Metal Trade Name (Maker) : E7018-H4R

Shielding Gas & Flow Rate : N/A

Stick Out : N/A

Torch Work Angle : N/A

Torch Travel Angle : N/A

Welder Name / ID : Juhanda

* A.T. Normor Registrar: Ambient Temperature

AYG - B - 369 / 0589 / 2026

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 9 of 39

PQR no : 04A-PQR-HEI-AWS-MIGAS-26

PROCEDURE QUALIFICATION RECORD (PQR)

Applicable Codes AWS D1.1M/D1.1: 2025, Structural Welding Code - Steel

Page 3 of 3

TEST RESULT TENSILE TEST

SPECIMEN NO.	WIDTH (mm)	THICKNESS (mm)	AREA (mm ²)	ULTIMATE TENSILE LOAD, kN	ULTIMATE UNIT STRESS, N/mm ²	CHARACTER OF FAILURE AND LOCATION
04A-PQR-HEI-AWS-MIGAS-26-T1	20,51	24,68	506,19	266,08	526	Base Metal (Ductile)
04A-PQR-HEI-AWS-MIGAS-26-T2	20,51	24,66	505,78	266,15	526	Base Metal (Ductile)

GUIDED BEND TEST

SPECIMEN NO.	TYPE OF BEND	RESULT	REMARK
04A-PQR-HEI-AWS-MIGAS-26-SB1	Side Bending	Accepted	Discontinuity 0,28 mm of opening was Observed
04A-PQR-HEI-AWS-MIGAS-26-SB2	Side Bending	Accepted	No Open Discontinuity was Observed
04A-PQR-HEI-AWS-MIGAS-26-SB3	Side Bending	Accepted	Discontinuity 0,44 mm of opening was Observed
04A-PQR-HEI-AWS-MIGAS-26-SB4	Side Bending	Accepted	No Open Discontinuity was Observed

TOUGHNESS TEST

SPECIMEN NO.	NOTCH LOCATION	NOTCH TYPE	TEST TEMPERATURE (°C)	IMPACT VALUE (Joule)				REMARK
				1	2	3	Average	
N/A								
N/A								

HARDNESS TEST

Type:	Maximum acceptable value:	
	LINE	Obtained Values
N/A	1	NA
	2	NA
	3	NA

MACROETCH TEST : N/A

APPEARANCE : Good	RT REPORT NO. : KIM-HEI-RT-01	RESULT : Passed
UNDERCUT : No	UT REPORT NO. : N/A	RESULT : N/A
PIPING POROSITY : N/A	FILLET WELD TEST RESULTS	
CONVEXITY : N/A	MINIMUM SIZE MULTIPASS	MAXIMUM SIZE MULTIPASS
TEST DATE : May 29, 2026	MACROETCH	MACROETCH
WITNESSED BY :	1. N/A	3. N/A
	2. N/A	2. N/A

OTHER TEST

ALL-WELD-METAL TENSION TEST	
TENSILE STRENGTH, PSI	: N/A
YIELD POINT/STRENGTH, PSI	: N/A
ELONGATION IN 2 IN., %	: N/A
LABORATORY TEST NO.	: HT/JKT/0626/0039
CLOCK NO.	: NA
STAMP NO.	: JH-1006
LABORATORY	: PT. Hi-Test - Tangerang
TEST NUMBER	: 04A-PQR-HEI-AWS-MIGAS-26
PER	: Hadi Amwar

WELDER'S NAME : JUHANDA
TESTS CONDUCTED BY : PT. Hi-Test Laboratory

WE, THE UNDERSIGNED, CERTIFY THAT THE STATEMENTS IN THIS RECORD ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED, AND TESTED IN CONFORMANCE WITH THE REQUIREMENTS OF SECTION 9 OF AWS D1.1/D1.1M:2025 STRUCTURAL WELDING CODE - STEEL.

0	June 07, 2026	 ANDI ISKANDAR Prepared by	 RUSNANDI Reviewed by	 Registered by MIGAS
REV NO.	DATE			

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 10 of 39

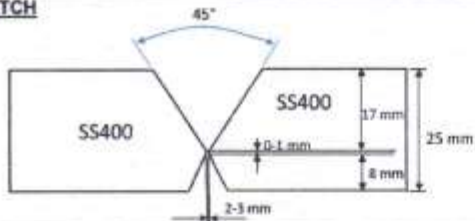


KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA DIREKTORAT JENDRAL MINYAK DAN GAS BUMI

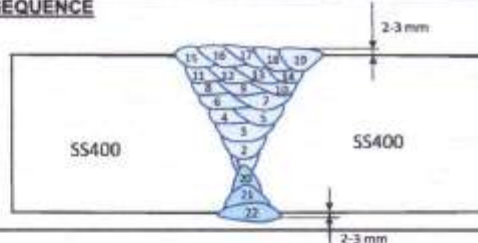
LAPORAN PENGUJIAN KUALIFIKASI PROSEDUR / JURU LAS / OPERATOR LAS

Nama Juru Las	: JUANDA	No. Ujian	: -
Perusahaan	: PT. HEI	Project	: -
Tempat Pengujian	: WORKSHOP PT HEI Cilegon	Tanggal Pengujian	: May 29, 2026
Standar yang dipakai	: AWS D1.1:2025	WPS No.	: 04-WPS-HEI-AWS-MIGAS-26
Jenis mesin Las	: Miller	Supporting PQR No.	: 04A-PQR-HEI-AWS-MIGAS-26
Proses Pengelasan	: SMAW	Ampere	: See Table
Jenis Arus Listrik	: DCEP	Voltage	: See Table
Gas Pelindung	: N/A	Serbuk Las Pelindung	: N/A
Batas Aliran	: N/A	Arah Pengelasan	: N/A
Posisi Pengelasan	: 2G	Pabrik	: N/A
Jenis Bahan	: Carbon Steel Plate	Tebal Dinding	: 25 mm
(Pipa/Pelat)	: SS400	(Pipa/Pelat)	: -
Diameter	: N/A	Pabrik	: N/A
Jenis Bahan Pengisi	: E7018-H4R	Pembersih	: grinding and Brushing
Panjang yang disambung	: 350 mm	Melepaskan Klem	: N/A
Jenis Klem	: None	Sudut Kampuh	: 45°
Penyerongan	: DOUBLE V GROOVE	Bukaan Muka Akar	: 0-1 mm
Bukaan Las Muka	: 2-3 mm	Tinggi Las Akar	: 2-3 mm
Tinggi Las Muka	: 2-3 mm	Pemanasan Akhir	: N/A
Pemanasan Mula	: Ambient temperature	Backing Plate/Backweld	: Backweld
Interpass Temp. Range	: See Table		

SKETCH



SEQUENCE



No. Lapisan Pada Lasan	1	2	3	4	5	6	7
Jenis	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R
Ukuran Kawat Las (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Ampere, A	115	115	140	140	140	140	140
Volt, V	23	23	27	27	27	27	27
Mulai Mengelas	13:33	13:41	13:47	13:58	14:05	14:09	14:13
Selesai Mengelas	13:40	13:46	13:50	14:04	14:08	14:12	14:16
Durasi Waktu / Lapisan (min)	4,20	4,30	2,75	3,48	2,73	2,27	2,10
Kec.Pengelasan, mm/min	83,33	105,34	107,43	100,57	128,21	154,19	166,67
Heat Input, KJ/mm	1,90	1,51	2,11	2,26	1,77	1,47	1,36
Suhu Antar Sambungan °C	33	48	78	101	128	141	167
Selang Waktu Antara Lasan, min	1	1	8	1	1	1	1

No. Lapisan Pada Lasan	8	9	10	11	12	13	14
Jenis	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R
Ukuran Kawat Las (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Ampere, A	140	140	140	140	140	140	140
Volt, V	27	27	27	27	27	27	27
Mulai Mengelas	14:17	14:20	14:23	14:27	14:30	14:33	14:36
Selesai Mengelas	14:19	14:22	14:25	14:29	14:32	14:35	14:38
Durasi Waktu / Lapisan (min)	1,55	1,82	1,63	1,83	1,71	1,98	1,93
Kec.Pengelasan, mm/min	225,81	192,31	214,72	191,26	204,68	176,77	181,35
Heat Input, KJ/mm	1,00	1,18	1,06	1,19	1,11	1,28	1,25
Suhu Antar Sambungan °C	188	201	210	215	220	227	234
Selang Waktu Antara Lasan, min	1	1	2	1	1	1	30

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 11 of 39

No. Lapisan Pada Lasan	15	16	17	18	19	20	21
Jenis	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R
Ukuran Kawat Las (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Ampere, A	125	125	125	125	125	140	140
Volt, V	25	25	25	25	25	26	26
Mulai Mengelas	15:08	15:11	15:15	15:18	15:21	15:53	15:56
Selesai Mengelas	15:10	15:13	15:17	15:20	15:23	15:55	15:59
Durasi Waktu / Lapisan (min)	1,97	1,96	1,87	1,91	1,90	1,78	1,65
Kec.Pengelasan, mm/min	177,66	176,57	187,17	183,25	184,21	196,63	212,12
Heat Input, KJ/mm	1,06	1,05	1,00	1,02	1,02	1,11	1,03
Suhu Antar Sambungan °C	136	147	156	163	170	121	131
Selang Waktu Antara Lasan, min	1	2	1	1	30	1	1

No. Lapisan Pada Lasan	22						
Jenis	E7018-H4R						
Ukuran Kawat Las (mm)	3.2						
Ampere, A	125						
Volt, V	25						
Mulai Mengelas	16:00						
Selesai Mengelas	16:03						
Durasi Waktu / Lapisan (min)	1,93						
Kec.Pengelasan, mm/min	181,35						
Heat Input, KJ/mm	1,03						
Suhu Antar Sambungan °C	153						
Selang Waktu Antara Lasan, min							

PENGUJIAN VISUAL :

BENTUK CACAT LAS	LOKASI	UKURAN	KETERANGAN
None	None	None	None

MACAM CACAT : None

HASIL UJIAN VISUAL : Accepted

PENGUJIAN TIDAK RUSAK : RT

HASIL UJI	NO. LAPORAN	TANGGAL
RT : Lulus/ Tidak Lulus	KIM-HEI-RT-01	May 30, 2026
UT : Lulus/ Tidak Lulus	N/A	N/A
PT : Lulus/ Tidak Lulus	N/A	N/A

HASIL UJI TIDAK MERUSAK : Accepted

PENGUJIAN MERUSAK : Side Bend 4 ea, Tensile Test 2 ea

TENSILE TEST

NO. BATANG UJI	UKURAN		LUAS (mm ²)	BEBAN MAKSIMUM (kN)	KUAT TARIK kgf/mm ² (Mpa)	SIFAT CACAT DAN LOKASI
	LEBAR (mm)	TEBAL (mm)				
TENSION - 1	20.51	24.68	506.19	266.08	526	Ductile; Base Metal
TENSION - 2	20.51	24.66	505.78	266.15	526	Ductile; Base Metal

NICK BREAK TEST

NO. BATANG UJI	CACAT	
	UKURAN (mm)	HASIL UJI
NICK BREAK - 1	N/A	
NICK BREAK - 2	N/A	

BENDING TEST

NO. BATANG UJI	CACAT	
	UKURAN (mm)	HASIL UJI
SB1	150 mm x 10 mm	Accepted
SB2	150 mm x 10 mm	Accepted
SB3	150 mm x 10 mm	Accepted
SB4	150 mm x 10 mm	Accepted

HASIL PENGUJIAN MERUSAK : "LULUS" Laporan pengujian : HT/JKT/0626/0039

DISIAPKAN OLEH QC

DIPERIKSA OLEH IWE

DIREVIEW OLEH QA/QC

DISETUJUI OLEH,

PT. ISTEK

PT. ISTEK

PT HEI

MIGAS

(
Ferdin
05-Jun-26

(
Andi Iskandar
05-Jun-26

(
Rusnandi
05-Jun-26

(
Puji Trijasmiko

RADIOGRAPHY TEST REPORT

[illegible]

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 13 of 39



OFFICIAL TESTING REPORT



Report No : HT/JKT/0626/0039
Date Issued : 06/06/2026
Page : 1 of 3

CUSTOMER : PT. Hanazono Engineering Indonesia
ADDRESS : Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasan, Kecamatan Bojonegara, Kab. Serang
REFERENCE CODE : AWS D1.1: 2025

Sample description and object to be tested (As Received / the Customer states):

Plate, Size : Thickness 25 mm, Material spec : SS400 to SS400, PQR No: 04A-PQR-HEI-AWS-MIGAS-26, Welding Process: SMAW, Welding Position: 2G, for Welding Procedure Specification Test.

PT Hi-Test Sample Marking : 6. HEI 1
Date of Received : 02/06/2026
Date Tested : 05/06/2026
Testing Result : Please refer to the following page (s)
Test Conducted By : - Rifaldi Reza Haikal, ST (Tensile Welding Transverse)
- Fikri Taufik Iskandar., ST (Bending)
Witnessed By : - Mr. Rusnandi from PT. Hanazono Engineering Indonesia
- Mr. Andi Iskandar from PT. Iskandar Jaya Teknik
- Mr. Haris T. from JGC

Approved Signatory
Laboratory Manager
PT Hi Test




Suhadi, ST



Term & Conditions

The Report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test. The Report is not intended to be representative of similar or equivalent Services on similar or equivalent Items. The Report does not constitute an endorsement by PT. Hi-Test of the Item. PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test. This report shall not be reproduced except in full unless permission for the reproduction of an approved abstract has been obtained in writing from PT. Hi-Test. PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives shows ever arising or whether connected with the Services provided by PT. Hi-Test herein.

PT Hi-Test
Taman Tekno Block A2 No. 49
Bumi Serpong Damai (BSD),
Tangerang – Indonesia.
Telp: +62 21 75881884
E-mail: hi-test@hittestlab.com

COMO ENGINEERS	POBOYA 2000 TPD EXPANSION PROJECT	 PT Citra Paha Minerals
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 14 of 39



OFFICIAL TESTING REPORT

(This Report is issued to the terms & conditions set out below)



Customer	: PT. Hanazono Engineering Indonesia	Job No.	: B26397
Address	: Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasari, Kecamatan Bojonegara, Kab. Serang	Report No.	: HT/JKT/0626/0039
Reference Code	: AWS D1.1: 2025	Date Tested	: 05 June 2026
Sample Marking	: 6. HEI1	Test Method	: ASTM E8/EBM - 25
Type of Test	: Tensile Welding Transverse	Direction	: Butt Weld
Temperature	: 25.4 °C	Page	: 2 of 3

Specimen No.		T1	T2
Thickness	(mm)	24.68	24.66
Width	(mm)	20.51	20.51
Area	(mm ²)	506.19	505.78
Force at Tensile Strength	(kN)	266.08	266.15
Tensile Stress at Tensile Strength	(MPa)	526	526
Location Failure		Base Metal	Base Metal
Type of Failure		Ductile	Ductile

Testing Machine	GOTECH COMPUTERISED UNIVERSAL TESTING MACHINE, Model : GT-7001-LS 50, S/N : TC0900251, Capacity : 500 kN
Test Conducted	Rifaldi Reza Haikal, ST

Approved Signatory
Laboratory Manager
PT Hi Test




Suhadi, ST



Term and Condition

- The Report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test.
- PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test.
- The Report may not be reproduced in part or in full unless approval in writing has been given by PT. Hi-Test.
- PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives howsoever arising or whether connected with the Services provided by PT. Hi-Test, herein.
- Above sample information and sample (s) was/were submitted and confirmed by the client, PT. Hi-Test, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Form No. : HT/QM1/TENSILE/REDA-SLC/3 Rev.3

(The results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (SKJ/LC 17025:2017)

Date of Issue: 23/06/2025

COMO ENGINEERS	POBOYA 2000 TPD EXPANSION PROJECT	 PT Citra Paha Minerals
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 15 of 39



OFFICIAL TESTING REPORT

(This Report is issued to the terms & conditions set out below)



Customer	: PT. Hanazono Engineering Indonesia	Job No.	: B26397
Address	: Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasari, Kecamatan Bojonegara, Kab. Serang	Report No.	: HT/JKT/0626/0039
Reference Code	: AWS D1.1: 2025	Date Tested	: 05 June 2026
Sample Marking	: 6. HEI 1	Test Method	: ASTM E190-21
Type of Test	: Bending	Direction	: Butt Weld
Temperature	: 25.4 °C	Page	: 3 of 3

Bending Test	Transversal Specimen
Test Specimen Width	10 mm
Test Specimen Thickness	25 mm
Former Diameter	38.1 mm
Shoulder Distance	60.3 mm
Bend Angle	180°

Sample Identification	Type of Bend	Observation	Result
SB1	Side Bend	Discontinuities 0.28 mm	Accepted
SB2	Side Bend	No Discontinuities	Accepted
SB3	Side Bend	Discontinuities 0.44 mm	Accepted
SB4	Side Bend	No Discontinuities	Accepted

Testing Machine	MOTOR PUMP BENDING TEST MACHINE, Model : Daventry England, S/N : DG 8881, Capacity : 700 Bar
-----------------	--

Test Conducted	Fikri Taufik Iskandar., ST
----------------	----------------------------

Approved Signatory
Laboratory Manager
PT Hi Test




Suhadi, ST



Term and Condition

- The Report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test.
- PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be imposed directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test.
- The Report may not be reproduced in part or in full unless approval in writing has been given by PT. Hi-Test.
- PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives howsoever arising or whether consistent with the Services provided by PT. Hi-Test herein.
- Above sample information and sample (i) was/were submitted and confirmed by the client. PT. Hi-Test, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

(CPM Work No.)
11580

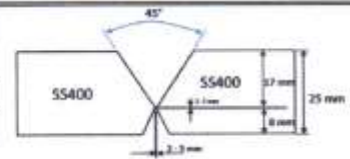
Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 16 of 39

 PT. HANAZONO Engineering Indonesia <i>We are always partner with you</i>		Head Office : Jl. Raya Bojonegara-Serang No. 44 RT. 001/RW.001 Desa Kertanegara, Kecamatan Bojonegara, Kabupaten Serang Banten, Indonesia (43414) Telp : +62-254-7850344/45/46/47 e-mail : info@hanazono.co.id							
PROCEDURE QUALIFICATION RECORD (PQR) Applicable Code: AWS D1.1M/D1.1: 2025, Structural Welding Code - Steel									
Page 1 of 2									
PQR NO. (No. PQR) : 045-PQR-HE-AWS-MIGAS-26		DATE (Tanggal) : June 07, 2026							
REV NO. (No. Rev.) : 0		WPS NO. (No. WPS) : 04-WPS-HE-AWS-MIGAS-26							
WELDING PROCESS (ES) (Proses Pengelasan) : SMAW		TYPE (S) (Tipe) : Manual							
JOINTS DESIGN USED (Desain Sambungan yang Digunakan) TYPE (Tipe) : Double V Groove ☐ SINGLE ☒ DOUBLE WELD BACKING (Backing) : ☒ YES ☐ NO BACKING MATERIAL (Material Backing) : Weld Metal ROOT OPENING (Ukuran Celah Root) : 2 - 3 mm ROOT FACE DIMENSION (Ukuran Pinggiran Root) : 1 - 2 mm GROOVE ANGLE (Sudut Groove) : 45° RADIUS (J-U) (Jari-Jari (J-U)) : NA BACK GOUGING (Back Gouging) : ☐ YES ☒ NO METHOD (Metode) : Grinding		POSITION (Posisi) POSITION OF GROOVE (Posisi Groove) : 3G POSITION OF FILLET (Posisi Fillet) : NA VERTICAL PROGRESSION (Pergerakan Vertikal) : ☒ UP ☐ DOWN							
BASE METAL (Logam Dasar) MATERIAL SPEC. (Spesifikasi Material) : SS 400 to SS 400 TYPE OR GRADE (Tipe atau Kelas) : - THICKNESS (Rantang Ketebalan Logam Dasar) : - GROOVE : 25 mm FILLET : NA DIAMETER (PIPE) (Diameter Pipa) : NA		ELECTRICAL CHARACTERISTIC (Karakteristik Elektrik) TRANSFER MODE (GMAW) (Mode Transfer (GMAW)) : ☒ SHORT CIRCUITING ☐ GLOBULAR/FCAW ☐ SPRAY CURRENT : ☐ AC ☒ DCEP ☐ DCEN ☐ PULSED POWER SOURCE : ☒ CC ☐ CV OTHER : NA TUNGSTEN ELECTRODE (GTAW) : NA SIZE (Ukuran) : NA TYPE (Tipe) : NA							
FILLER METAL (Logam Pengisi) : SMAW AWS SPECIFICATION (Spesifikasi AWS) : A5.1 AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R BRAND NAME (Nama merk) : Bohler		TECHNIQUE (Teknik) STRINGER OR WEAVE BEAD (Lurus atau Mengayun) : Weave MULTI PASS OR SINGLE PASS (PER SIDE) : Multi Pass (Satu Pass atau Banyak Pass (Per Sisi)) : Single Electrode NUMBER OF ELECTRODE (Jumlah Elektroda) : Single Electrode ELECTRODE SPACING (Jarak antar Elektroda) : NA LONGITUDINAL : NA LATERAL : NA ANGLE : NA							
SHIELDING (Pelindung) : SMAW FLUX (Flux) : NA GAS (Gas) : NA COMPOSITION (Komposisi) : NA ELECTRO - FLUX (CLASS) (Kelas Elektro Flux) : NA FLOW RATE (Laju Alir) : NA GAS CUP SIZE (Ukuran Nozzle Gas) : NA		CONTACT TUBE TO WORK DISTANCE (Jarak kontak Tube ke Benda Kerja) : NA IPENING (Pearing) : NA INTERPASS CLEANING (Pembersihan Antar Pass) : Grinding, brushing, and chipping							
PREHEAT (Pemanasan Awal) PREHEAT TEMP. MIN. (Temperatur Minimum Pemanasan Awal) : 33 °C INTERPASS TEMP. MAX. (Temperatur Maksimum Antar Pass) : 243 °C		POST WELD HEAT TREATMENT (Pemanasan Pasca Las) TEMPERATURE (Temperatur) : NA TIME (Waktu) : NA							
WELDING PROCEDURE									
PASS OR WELD LAYER(S)	PROCESS	FILLER METAL CLASS	DIA.	CURRENT TYPE & POLARITY	AMPS (A)	VOLTS (V)	TRAVEL SPEED (mm/Min)	HEAT INPUT (J/mm)	JOINT DETAILS
1	SMAW	E7018-H4R	3,2	DCEP	95	22	49,86	2.515	
2			108		23	52,87	2.845		
3			120		25	65,79	2.736		
4			120		25	60,55	2.973		
5			120		25	65,18	2.762		
6			120		25	61,30	2.936		
7			120		25	67,70	2.658		
8			115		24	70,99	2.333		
9			115		24	70,71	2.342		
10			115		24	72,16	2.295		
Back side									
11	SMAW	E7018-H4R	3,2	DCEP	110	23	65,32	2.324	
12	SMAW	E7018-H4R	3,2	DCEP	115	24	82,35	2.014	

Nomor Registrasi Migas

AyB - B - 569 / 0590 / 2026

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 17 of 39

PROCEDURE QUALIFICATION RECORD (PQR)

Applicable Code: AWS D1.1M/D1.1: 2025, Structural Welding Code Steel

Page 2 of 2

TEST RESULT TENSILE TEST

SPECIMEN NO.	WIDTH (mm)	THICKNESS (mm)	AREA (mm ²)	ULTIMATE TENSILE LOAD, kN	ULTIMATE UNIT STRESS, N/mm ²	CHARACTER OF FAILURE AND LOCATION
04B-PQR-HEI-AWS-MIGAS-26 -T1	20,49	24,63	504,67	257,30	510	Base Metal (Ductile)
04B-PQR-HEI-AWS-MIGAS-26 -T2	20,47	24,65	504,59	254,23	504	Base Metal (Ductile)

GUIDED BEND TEST

SPECIMEN NO.	TYPE OF BEND	RESULT	REMARK
04B-PQR-HEI-AWS-MIGAS-26 -SB1	Side Bending	Accepted	No Open Discontinuity was Observed
04B-PQR-HEI-AWS-MIGAS-26 -SB2	Side Bending	Accepted	No Open Discontinuity was Observed
04B-PQR-HEI-AWS-MIGAS-26 -SB3	Side Bending	Accepted	No Open Discontinuity was Observed
04B-PQR-HEI-AWS-MIGAS-26 -SB4	Side Bending	Accepted	No Open Discontinuity was Observed

TOUGHNESS TEST

SPECIMEN NO.	NOTCH LOCATION	NOTCH TYPE	TEST TEMPERATURE (°C)	IMPACT VALUE (Joule)				REMARK
				1	2	3	Average	
N/A								
N/A								

HARDNESS TEST

LINE	Type:	Maximum acceptable value:
	Obtained Values	
	1	NA
2	NA	
3	NA	

MACROETCH TEST : N/A

APPEARANCE : Good
UNDERCUT : No
PIPING POROSITY : N/A
CONVEXITY : N/A
TEST DATE : May 29, 2026
WITNESSED BY : _____

RT REPORT NO. : KIM-HEI-RT-02 RESULT : Passed
UT REPORT NO. : N/A RESULT : N/A

FILLET WELD TEST RESULTS

MINIMUM SIZE MULTIPASS : _____ MAXIMUM SIZE MULTIPASS : _____
MACROETCH : _____
1. N/A 3. N/A 1. N/A 3. N/A
2. N/A 2. N/A

OTHER TEST

ALL-WELD-METAL TENSION TEST
TENSILE STRENGTH, PSI : N/A
YIELD POINT/STRENGTH, PSI : N/A
ELONGATION IN 2 IN., % : N/A
LABORATORY TEST NO. : HT/JKT/0626/0040
CLOCK NO. : NA STAMP NO. : RM-0815
LABORATORY : PT. Hi-Test - Tangerang
TEST NUMBER : 04B-PQR-HEI-AWS-MIGAS-26
PER : Hadi Anwar

WELDER'S NAME : ROMLI
TESTS CONDUCTED BY : PT. Hi-Test Laboratory

WE, THE UNDERSIGNED, CERTIFY THAT THE STATEMENTS IN THIS RECORD ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED, AND TESTED IN CONFORMANCE WITH THE REQUIREMENTS OF SECTION 8 OF AWS D1.1/D1.1M:2025 STRUCTURAL WELDING CODE - STEEL.

0	June 07, 2026			
REV NO.	DATE	Prepared by	Reviewed by	Registered by MIGAS

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 18 of 39

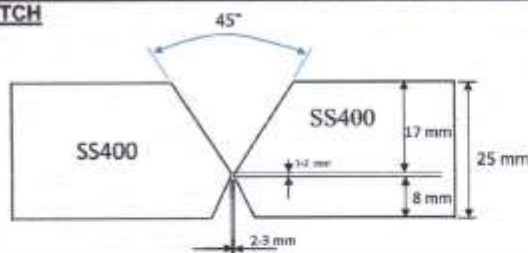


KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA DIREKTORAT JENDRAL MINYAK DAN GAS BUMI

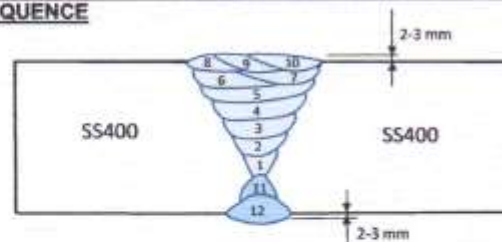
LAPORAN PENGUJIAN KUALIFIKASI PROSEDUR / JURU LAS / OPERATOR LAS

Nama Juru Las	: ROMLI	No. Ujian	: -
Perusahaan	: PT. HEI	Project	: -
Tempat Pengujian	: WORKSHOP PT HEI Cilegon	Tanggal Pengujian	: January 20, 2026
Stander yang dipakai	: AWS D1.1:2025	WPS No.	: 04-WPS-HEI-AWS-MIGAS-26
Jenis mesin Las	: Miller	Supporting PQR No.	: 04B-PQR-HEI-AWS-MIGAS-26
Proses Pengelasan	: SMAW	Ampere	: See Table
Jenis Arus Listrik	: DCEP	Voltage	: See Table
Gas Pelindung	: N/A	Serbuk Las Pelindung	: N/A
Batas Aliran	: N/A	Arah Pengelasan	: Uphill
Posisi Pengelasan	: 3G	Pabrik	: N/A
Jenis Bahan	: Carbon Steel Plate	Tebal Dinding	: 25 mm
(Pipa/Pelat)	: SS400	(Pipa/Pelat)	: -
Diameter	: N/A	Pabrik	: N/A
Jenis Bahan Pengisi	: E7018-H4R	Pembersih	: grinding and Brushing
Panjang yang disambung	: 350 mm	Melepaskan Klem	: N/A
Jenis Klem	: None	Sudut Kampuh	: 45°
Penyerongan	: DOUBLE V GROOVE	Bukaan Muka Akar	: 1-2 mm
Bukaan Las Muka	: 2-3 mm	Tinggi Las Akar	: 2-3 mm
Tinggi Las Muka	: 2 - 3 mm	Pemanasan Akhir	: N/A
Pemanasan Mula	: Ambient temperature	Backing Plate/Backweld	: Backweld
Interpass Temp. Range	: See Table		

SKETCH



SEQUENCE



No. Lapisan Pada Lasan	1	2	3	4	5	6	7
Jenis	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R
Ukuran Kawat Las (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Ampere, A	95	109	120	120	120	120	120
Volt, V	22	23	25	25	25	25	25
Mulai Mengelas	13:21	13:32	13:45	13:57	14:07	14:20	14:27
Selesai Mengelas	13:30	13:41	13:54	14:04	14:17	14:24	14:35
Durasi Waktu / Lapisan (min)	7,02	6,62	5,32	5,78	5,37	5,71	5,17
Kec. Pengelasan, mm/min	49,86	52,87	65,79	60,55	65,18	61,30	67,70
Heat Input, KJ/mm	2,52	2,85	2,74	2,97	2,76	2,94	2,66
Suhu Antar Sambungan °C	33	90	122	153	176	193	243
Selang Waktu Antara Lasan, min	2	4	3	3	3	3	30

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 19 of 39

No. Lapisan Pada Lasan	8	9	10	11	12		
Jenis	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R	E7018-H4R		
Ukuran Kawat Las (mm)	3.2	3.2	3.2	3.2	3.2		
Ampere, A	115	115	115	110	115		
Volt, V	24	24	24	23	24		
Mulai Mengelas	15:05	15:14	15:23	15:54	16:04		
Selesai Mengelas	15:11	15:20	15:29	16:00	16:10		
Durasi Waktu / Lapisan (min)	4,93	4,95	4,85	4,25	4,25		
Kec.Pengelasan, mm/min	70,99	70,71	72,16	65,32	82,35		
Heat Input, KJ/mm	2,33	2,34	2,29	2,32	2,01		
Suhu Antar Sambungan °C	95	135	179	30	113		
Selang Waktu Antara Lasan, min	3	3	25	4			

PENGUJIAN VISUAL :

BENTUK CACAT LAS	LOKASI	UKURAN	KETERANGAN
None	None	None	None

MACAM CACAT : None

HASIL UJIAN VISUAL : Accepted

PENGUJIAN TIDAK RUSAK : RT

HASIL UJI	NO. LAPORAN	TANGGAL
RT : Lulus/ Tidak Lulus	KIM-HEI-RT-02	May 30, 2026
UT : Lulus/ Tidak Lulus	N/A	N/A
PT : Lulus/ Tidak Lulus	N/A	N/A

HASIL UJI TIDAK MERUSAK : Accepted

PENGUJIAN MERUSAK : Side Bend 4 ea, Tensile Test 2 ea

TENSILE TEST

NO. BATANG UJI	UKURAN		LUAS (mm ²)	BEBAN MAKSIMUM (kN)	KUAT TARIK kgf/mm ² (Mpa)	SIFAT CACAT DAN LOKASI
	LEBAR (mm)	TEBAL (mm)				
TENSION - 1	20.49	24.63	504.67	257.30	510	Ductile; Base Metal
TENSION - 2	20.47	24.65	504.59	254.23	504	Ductile; Base Metal

NICK BREAK TEST

NO. BATANG UJI	CACAT	
	UKURAN (mm)	HASIL UJI
NICK BREAK - 1	N/A	
NICK BREAK - 2	N/A	

n

NO. BATANG UJI	CACAT	
	UKURAN (mm)	HASIL UJI
SB1	150 mm x 10 mm	Accepted
SB2	150 mm x 10 mm	Accepted
SB3	150 mm x 10 mm	Accepted
SB4	150 mm x 10 mm	Accepted

HASIL PENGUJIAN MERUSAK : "LULUS" Laporan pengujian : HT/JKT/0626/0040

DISIAPKAN OLEH QC

DIPERIKSA OLEH IWE

DIREVIEW OLEH QA/QC

DISETUJUI OLEH,

PT. ISTEK

PT. ISTEK

PT HEI

MIGAS

(Ferdi)
05-Jun-26

(Andi Iskandar)
05-Jun-26

(Rusnandi)
05-Jun-26

(Puji Trijatmiko)

[illegible]

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 21 of 39



OFFICIAL TESTING REPORT



Report No : HT/JKT/0626/0040
Date Issued : 06/06/2026
Page : 1 of 3

CUSTOMER : PT. Hanazono Engineering Indonesia
ADDRESS : Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasan, Kecamatan Bojonegara, Kab. Serang
REFERENCE CODE : AWS D1.1: 2025

Sample description and object to be tested (As Received / the Customer states):

Plate, Size : Thickness 25 mm, Material spec : SS400 to SS400, PQR No: 04B-PQR-HEI-AWS-MIGAS-26, Welding Process: SMAW, Welding Position: 3G, for Welding Procedure Specification Test.

PT Hi-Test Sample Marking : 6. HEI 2
Date of Received : 02/06/2026
Date Tested : 05/06/2026
Testing Result : Please refer to the following page (s)
Test Conducted By : - Rifaldi Reza Haikal, ST (Tensile Welding Transverse)
- Fikri Taufik Iskandar., ST (Bending)
Witnessed By : - Mr. Rusnandi from PT. Hanazono Engineering Indonesia
- Mr. Andi Iskandar from PT. Iskandar Jaya Teknik
- Mr. Haris T. from JGC

Approved Signatory
Laboratory Manager
PT Hi Test




Suhadi, ST



Term & Conditions

The Report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test. The Report is not intended to be representative of similar or equivalent Services on similar or equivalent Items. The Report does not constitute an endorsement by PT. Hi-Test of the Item. PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test. This report shall not be reproduced except in full unless permission for the reproduction of an approved abstract has been obtained in writing from PT. Hi-Test. PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives shows ever arising or whether connected with the Services provided by PT. Hi-Test herein.

PT Hi-Test

Taman Tekno Block A2 No. 49
Bumi Serpong Damai (BSD),
Tangerang - Indonesia.
Telp: +62 21 75881884
E-mail: hi-test@hittestlab.com

COMO ENGINEERS	POBOYA 2000 TPD EXPANSION PROJECT	 PT Citra Paha Minerals
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 22 of 39



OFFICIAL TESTING REPORT

(This Report is issued to the terms & conditions set out below)



Customer	: PT. Hanazono Engineering Indonesia	Job No.	: B26397
Address	: Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasan, Kecamatan Bojonegara, Kab. Serang	Report No.	: HT/JKT/0626/0040
Reference Code	: AWS D1.1: 2025	Date Tested	: 05 June 2026
Sample Marking	: 6. HEI 2	Test Method	: ASTM E8/E8M - 25
Type of Test	: Tensile Welding Transverse	Direction	: Butt Weld
Temperature	: 25.4 °C	Page	: 2 of 3

Specimen No		T1	T2
Thickness	(mm)	24.63	24.65
Width	(mm)	20.49	20.47
Area	(mm ²)	504.67	504.59
Force at Tensile Strength	(kN)	257.30	254.23
Tensile Stress at Tensile Strength	(MPa)	510	504
Location Failure		Base Metal	Base Metal
Type of Failure		Ductile	Ductile

Testing Machine	GOTECH COMPUTERISED UNIVERSAL TESTING MACHINE, Model: GT-7001-LS 50, S/N: TC0900251, Capacity: 500 kN
Test Conducted	Rifaldi Reza Haikal, ST

Approved Signatory
Laboratory Manager
PT HI Test




Suhadi, ST



Term and Condition

The Report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. HI-Test. PT. HI-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. HI-Test. The Report may not be reproduced in part or in full unless approval in writing has been given by PT. HI-Test. PT. HI-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives howsoever arising or whether connected with the Services provided by PT. HI-Test. However, PT. HI-Test, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client. Above sample information and its role (s) was/were submitted and confirmed by the client. PT. HI-Test, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Rev No: HI/QM-F/TENSILE/MD-SEC/3 Rev. 1
or results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (SKA) No. 17025:2017.

Date of Issue: 23/05/2025

COMO ENGINEERS	POBOYA 2000 TPD EXPANSION PROJECT	 PT Citra Paha Minerals
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 23 of 39



OFFICIAL TESTING REPORT

(This Report is issued to the terms & conditions set out below)



Customer	: PT. Hanazono Engineering Indonesia	Job No.	: 826397
Address	: Jl. Raya Bojonegara - Serdang No. 44 RT. 001/RW. 001, Desa Kertasari, Kecamatan Bojonegara, Kab. Serang	Report No.	: HT/JKT/0626/0040
Reference Code	: AWS D1.1; 2025	Date Tested	: 05 June 2026
Sample Marking	: 6, HEI 2	Test Method	: ASTM E190-21
Type of Test	: Bending	Direction	: Butt Weld
Temperature	: 25,4 °C	Page	: 3 of 3

Bending Test	Transversal Specimen
Test Specimen Width	10 mm
Test Specimen Thickness	25 mm
Former Diameter	38.1 mm
Shoulder Distance	60.3 mm
Bend Angle	180°

Sample Identification	Type of Bend	Observation	Result
SB1	Side Bend	No Discontinuities	Accepted
SB2	Side Bend	No Discontinuities	Accepted
SB3	Side Bend	No Discontinuities	Accepted
SB4	Side Bend	No Discontinuities	Accepted

Testing Machine	MOTOR PUMP BENDING TEST MACHINE, Model : Daventry England, S/N : DG 8881, Capacity : 700 Bar
-----------------	--

Test Conducted : Fikri Taufik Iskandar, ST

Approved Signatory
Laboratory Manager
PT Hi Test




Suhadi, ST



Term and Condition

The Report is prepared for the sole use of the Client and is prepared based upon the items submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test. PT. Hi-Test agrees to use reasonable diligence to the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test. The Report may not be reproduced in part or in full unless approval in writing has been given by PT. Hi-Test. PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representatives howsoever arising or whether connected with the Services provided by PT. Hi-Test herein. Above sample information and sample (s) were submitted and confirmed by the client, PT. Hi-Test, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

S/N: No. : HI/0004/00003 Rev. 3
The results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (ISO/IEC 17025:2017)

Date of Issue: 23/05/2025

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 24 of 39

PT. voestalpine Böhler Welding Asia Pacific

PT. voestalpine Böhler Welding Asia Pacific

A. Industri Gegeran 2 Blok A1 RD. 1-10
Jl. Kertanegara, Jakarta, Indonesia
17260 Indonesia

www.voestalpine.com/welding

PT Bhinneka Bajasas

Inspection certificate 3.1

JL. Karang Bojong Raya No. 5
14430 Jakarta
Indonesia

as per : EN 10204
No. : 2025-2047022999-10-A102941-025
Rev. 0 Page 1 of 1

PQ no.	PO.BB-BOHLER.X.2025.075	of	14.10.2025
Order no.	1042009391		
Delivery note/pas./split	2047022999/000000/000010	of	20.11.2025
Product	covered electrode		
Trade name	BÖHLER FOX 5 EV 50		
Standard designation	EN ISO 2560-B - E 49 18 A U H5 EN ISO 2560-A - E 42 3 B 42 H5 AWS A5.1/ASME SFA-5.1: E7018-H4R		
Dimension	5MAW 3,25 x 350 mm		
Lot no.	A102941		
Quantity	4000,0 KG		

Chemical composition in % of the weld metal

C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu	Nb					
0,05	0,50	1,11	0,022	0,001	0,023	0,005	0,012	0,001	0,018	0,002					

Mechanical properties

ASME II C, Sec. F

Tensile test								according to : ASTM E8							
Specimen preparation								according to : AWS B4.0							
	ReL / Rp 0,2	Rp 1,0	Rm	A (La = 4d)	Z	WBH	Remarks								
	MPa	MPa	MPa	%	%	PWHT									
23°C	490		560	30		AW									
Impact test								according to : ASTM E23							
Specimen preparation								according to : AWS B4.0							
T	Impact energy	Average	Lateral expansion	Shear fracture	WBH	Remarks									
	KV / J	KV / J	mm	%	PWHT										
40°C		55			AW										

The product BÖHLER FOX 5 EV 50 meets the requirements of the filler metal specification ASME sec II, part C, AWS A5.1/ASME SFA-5.1: E7018-H4R when tested in accordance with that specification.

38928/WD/V/2026

TGL. 20 MEI 2026

PT. BINNEKA BAJANAS

Issued

Date

Printed

26.11.2025

This certificate was issued by DP-equipment and does not require signature.

Authorized representative

Hiltron Fard

R. OBO JGC,
30/11/25
Hans T.

voestalpine



POBOYA 2000 TPD EXPANSION PROJECT



(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 25 of 39

Dipindai dengan CamScanner

Certificate No. : 230813-FPQ8IN-0012A1-0004
Date of Issue : Aug , 16, 2023

Mill Test Certificate

KRAKATAU posco

Order No. : Q8S1033498
Supplier :
Customer :
PO No. : MIT-PO-20230607-VII-206
Commodity : PLATE
Spec & Type : SS400

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP TS EL (MPa)	Chemical Composition
19x2400x2000 19x2400x2000 Sub Total (19)	PK140M1421-1407 PK140M1421-1408	7 2 9	14,758 4,228 19,000 (kg)	SK02015 SK02017	T T	292 431 31 269 434 31	C (%) 0.1985 0.244 0.303 0.0133 0.0071 Si (%) 0.1983 0.245 0.309 0.0124 0.0063
20x2400x2000 Sub Total (20)	PK140M1501-0907	7 7	15,562 15,562 (kg)	SK02015	T T	290 436 31	C (%) 0.1985 0.244 0.303 0.0133 0.0071
25x2400x2000 Sub Total (25) Grade Total	PK140M1601-1602	2 2 18	5,577 5,572 (kg) 40,180 (kg)	SK02017	T T	269 434 31	C (%) 0.1983 0.245 0.305 0.0124 0.0063

"P. 050 JSC, 30% 36
Hans T.

* Position : T : Top, M : Middle, B : Bottom
* Tensile Test Direction : Transversal, Gauge Length : 200 mm (Rectangular).
* YP Method : Upper Platen
* Division : L : Ladle Analysis
* Supply Condition : As-fabricated unless otherwise Heat Treated.

Upper section can be impinged on forging. Impingement rate of product can ensure safety issues.



UK. FALAH

Surveyor To :

Physical Testing Team Leader

PT. KRAKATAU POSCO J. Atika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

4 PAGE : 4

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 26 of 39

2. WPS & PQR NO. 002/HEI/MIGAS/20



Office & Work Shop Address: Jl. Raya Bojonegara - Serdang RT/RW. 001/001 No.44
Desa Kertasana, Kec. Bojonegara, Kab. Serang, Banten - Indonesia 42454
Phone : +62-254-7850344/5/6, Fax : +62-254-785037

WELDING PROCEDURE SPECIFICATION (WPS) In accordance with Section IX, ASME Boiler and Pressure Vessel Code																																																
Organization Name PT. HANAZONO ENGINEERING INDONESIA		By Quality Department																																														
Welding Procedure Specification No. 002/HEI/MIGAS/20		Date 01/10/2020 Supporting PQR No.(s) 002/HEI/MIGAS/20																																														
Revision No. 0		Date 01/10/2020																																														
Welding Process (es) GTAW & SMAW		Type (s) Manual																																														
(Automatic, Manual, Machine or Semi-Auto)																																																
JOINT (QW - 402) Joint Design <u>Single Vee or Any</u> Root Spacing <u>0 ~ 3 mm</u> Backing <u>With / Without</u> Backing Material (Type) <u>Gas (GTAW) / Base Nor Weld Metal (GTAW / SMAW)</u>		Details See Joint Details																																														
Sketches, production Drawings, Weld Symbols or Written Description Should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove maybe specified. Sketches may be attached to illustrate joint design, weld layers, and bead sequence (e.g., for toughness procedures, for multiple process procedures, etc.)																																																
*BASE METALS (QW - 403) P. No. <u>8</u> Group No. <u>-</u> to P. No. <u>1</u> Group No. <u>-</u> OR Specification type, grade, or UNS <u>-</u> to Specification type, grade, or UNS <u>-</u> OR Chem. Analysis and Mech. Prop <u>-</u> to Chem. Analysis and Mech. Prop <u>-</u> Thickness Range : Base Metal : Groove <u>1.5 ~ 19.52 mm</u> Fillet <u>All</u> Maximum Pass Thickness $\leq \frac{1}{8}$ in. (13mm) (Yes) <u>All</u> (No) <u>-</u> Other <u>-</u>																																																
*FILLER METALS (QW - 404) <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th></th> <th style="text-align: center;">1 GTAW</th> <th style="text-align: center;">2 SMAW</th> </tr> </thead> <tbody> <tr> <td>Spec. No. (SFA)</td> <td style="text-align: center;">5.9</td> <td style="text-align: center;">5.4</td> </tr> <tr> <td>AWS No. (Class)</td> <td style="text-align: center;">ER309L</td> <td style="text-align: center;">E309L-16</td> </tr> <tr> <td>F - No.</td> <td style="text-align: center;">6</td> <td style="text-align: center;">5</td> </tr> <tr> <td>A - No.</td> <td style="text-align: center;">8</td> <td style="text-align: center;">8</td> </tr> <tr> <td>Size of Filler Metals</td> <td style="text-align: center;">$\varnothing$ 1.6 mm ~ 2.4 mm</td> <td style="text-align: center;">$\varnothing$ 3.2 ~ 4.0 mm</td> </tr> <tr> <td>Weld Metal</td> <td></td> <td></td> </tr> <tr> <td>Deposit Thickness:</td> <td></td> <td></td> </tr> <tr> <td> Groove</td> <td style="text-align: center;">Max. 6 mm</td> <td style="text-align: center;">Max. 13.52 mm</td> </tr> <tr> <td> Fillet</td> <td style="text-align: center;">All</td> <td style="text-align: center;">All</td> </tr> <tr> <td>Electrode Flux (Class)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Flux Type</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">Lime Titania</td> </tr> <tr> <td>Flux Trade Name</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Consumable Insert</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Other</td> <td colspan="2"> Manufacturer : BOHLER / AVESTA Electrode Name : Bohler S CN 23/12-IG & Avesta 309L-16 </td> </tr> </tbody> </table>					1 GTAW	2 SMAW	Spec. No. (SFA)	5.9	5.4	AWS No. (Class)	ER309L	E309L-16	F - No.	6	5	A - No.	8	8	Size of Filler Metals	$\varnothing$ 1.6 mm ~ 2.4 mm	$\varnothing$ 3.2 ~ 4.0 mm	Weld Metal			Deposit Thickness:			Groove	Max. 6 mm	Max. 13.52 mm	Fillet	All	All	Electrode Flux (Class)	N/A	N/A	Flux Type	N/A	Lime Titania	Flux Trade Name	N/A	N/A	Consumable Insert	N/A	N/A	Other	Manufacturer : BOHLER / AVESTA Electrode Name : Bohler S CN 23/12-IG & Avesta 309L-16	
	1 GTAW	2 SMAW																																														
Spec. No. (SFA)	5.9	5.4																																														
AWS No. (Class)	ER309L	E309L-16																																														
F - No.	6	5																																														
A - No.	8	8																																														
Size of Filler Metals	$\varnothing$ 1.6 mm ~ 2.4 mm	$\varnothing$ 3.2 ~ 4.0 mm																																														
Weld Metal																																																
Deposit Thickness:																																																
Groove	Max. 6 mm	Max. 13.52 mm																																														
Fillet	All	All																																														
Electrode Flux (Class)	N/A	N/A																																														
Flux Type	N/A	Lime Titania																																														
Flux Trade Name	N/A	N/A																																														
Consumable Insert	N/A	N/A																																														
Other	Manufacturer : BOHLER / AVESTA Electrode Name : Bohler S CN 23/12-IG & Avesta 309L-16																																															
*Each base metal-filler metal combination should be specified individually.																																																

1 OF 6

Nomer Registrasi Migas

AUG - 07981 / 0842 / 2020

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 27 of 39

WELDING PROCEDURE SPECIFICATION (WPS)

In accordance with
Section IX, ASME Boiler and Pressure Vessel Code

Welding Procedure Specification No. : 002/HEI/MIGAS/20

Rev. 0

POSITIONS (QW - 405) Position(s) of Groove: All Welding Progression: All Position(s) of Fillet: All				POSTWELD HEAT TREATMENT (QW - 407) Temperature Range: N / A Time Range: N / A																																						
PREHEAT (QW - 406) Preheat Temp. Min.: 36 °C Interpass Temp. Max.: 150 °C Preheat Maintenance: N/A *) Other: _____ <i>(Continuous or special heating, where applicable, should be specified)</i>				GAS (QW - 408) <table border="1"> <thead> <tr> <th colspan="3">Percent Composition</th> </tr> <tr> <th>Gas (es)</th> <th>Mixture</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Argon</td> <td>99,99%</td> <td>7 - 15 LPM</td> </tr> <tr> <td>Shielding</td> <td>-</td> <td>-</td> </tr> <tr> <td>Trailing</td> <td>-</td> <td>-</td> </tr> <tr> <td>Backing</td> <td>Argon</td> <td>99,99%</td> </tr> <tr> <td>Other</td> <td>-</td> <td>-</td> </tr> </tbody> </table>				Percent Composition			Gas (es)	Mixture	Flow Rate	Argon	99,99%	7 - 15 LPM	Shielding	-	-	Trailing	-	-	Backing	Argon	99,99%	Other	-	-														
Percent Composition																																										
Gas (es)	Mixture	Flow Rate																																								
Argon	99,99%	7 - 15 LPM																																								
Shielding	-	-																																								
Trailing	-	-																																								
Backing	Argon	99,99%																																								
Other	-	-																																								
ELECTRICAL CHARACTERISTIC (QW - 409) <table border="1"> <thead> <tr> <th rowspan="2">Weld Pass(es)</th> <th rowspan="2">Process</th> <th colspan="2">Filler Metal</th> <th rowspan="2">Current Type & Polarity</th> <th rowspan="2">Amps. (Range)</th> <th rowspan="2">Wire Feed Speed (Range)</th> <th rowspan="2">Energy or Power (Range)</th> <th rowspan="2">Volts (Range)</th> <th rowspan="2">Travel Speed (Range)</th> <th rowspan="2">Other (e.g., Branches, Compositions, Hot Wire Addition, Technique, Process Torch Angle, etc.)</th> </tr> <tr> <th>Class</th> <th>Dia.</th> </tr> </thead> <tbody> <tr> <td>Root & Hot</td> <td>GTAW</td> <td>ER309L</td> <td>1.6 ~ 2.4</td> <td>DCEN</td> <td>80 - 160</td> <td>-</td> <td>-</td> <td>10 - 18</td> <td>24 - 88</td> <td>-</td> </tr> <tr> <td>Fill & Capping</td> <td>SMAW</td> <td>E309L-16</td> <td>3.2 ~ 4.0</td> <td>DCEP</td> <td>60 - 160</td> <td>-</td> <td>-</td> <td>18 - 28</td> <td>32 - 135</td> <td>-</td> </tr> </tbody> </table>								Weld Pass(es)	Process	Filler Metal		Current Type & Polarity	Amps. (Range)	Wire Feed Speed (Range)	Energy or Power (Range)	Volts (Range)	Travel Speed (Range)	Other (e.g., Branches, Compositions, Hot Wire Addition, Technique, Process Torch Angle, etc.)	Class	Dia.	Root & Hot	GTAW	ER309L	1.6 ~ 2.4	DCEN	80 - 160	-	-	10 - 18	24 - 88	-	Fill & Capping	SMAW	E309L-16	3.2 ~ 4.0	DCEP	60 - 160	-	-	18 - 28	32 - 135	-
Weld Pass(es)	Process	Filler Metal		Current Type & Polarity	Amps. (Range)	Wire Feed Speed (Range)	Energy or Power (Range)			Volts (Range)	Travel Speed (Range)								Other (e.g., Branches, Compositions, Hot Wire Addition, Technique, Process Torch Angle, etc.)																							
		Class	Dia.																																							
Root & Hot	GTAW	ER309L	1.6 ~ 2.4	DCEN	80 - 160	-	-	10 - 18	24 - 88	-																																
Fill & Capping	SMAW	E309L-16	3.2 ~ 4.0	DCEP	60 - 160	-	-	18 - 28	32 - 135	-																																
Amps and volts, or power or energy range, should be specified for each electrode size, position, and thickness, etc. Pulsing Current: N/A Heat Input (max.): 2.0 J Tungsten Electrode Size and Type: 1.6 ~ 2.4 mm & 2% Thoriated (EWTh-2) <i>(Pure Tungsten, 2% Thoriated, etc.)</i> Mode of Metal Transfer for GMAW (FCAW): N/A <i>(Spray Arc, Short-Circuiting Arc, etc.)</i> Other: N/A																																										
TECHNIQUE (QW - 410) <table border="1"> <tbody> <tr> <td>String or Weave Bead</td> <td>Max. stringer or weaver within 2.5 time diameter of electrodes</td> </tr> <tr> <td>Orifice, Nozzle, or Gas Cup Size</td> <td>5, 6, or 7</td> </tr> <tr> <td>Initial and Interpass Cleaning (Brushing, Grinding, etc.)</td> <td>Brushing & Grinding with SS Material</td> </tr> <tr> <td>Method of Back Gouging</td> <td>Back Grinding with SS Material</td> </tr> <tr> <td>Oscillation</td> <td>N/A</td> </tr> <tr> <td>Contact Tube to Work Distance</td> <td>12 ~ 19 mm (GTAW)</td> </tr> <tr> <td>Multiple or Single Pass (Per Side)</td> <td>Single & Multiple</td> </tr> <tr> <td>Multiple or Single electrode</td> <td>Single</td> </tr> <tr> <td>Electrode Spacing</td> <td>N/A</td> </tr> <tr> <td>Peening</td> <td>N/A</td> </tr> <tr> <td>Other</td> <td>Welds shall be cleaned between each pass. When completed, remove all slag & projection with SS grinding & Brushing</td> </tr> </tbody> </table>								String or Weave Bead	Max. stringer or weaver within 2.5 time diameter of electrodes	Orifice, Nozzle, or Gas Cup Size	5, 6, or 7	Initial and Interpass Cleaning (Brushing, Grinding, etc.)	Brushing & Grinding with SS Material	Method of Back Gouging	Back Grinding with SS Material	Oscillation	N/A	Contact Tube to Work Distance	12 ~ 19 mm (GTAW)	Multiple or Single Pass (Per Side)	Single & Multiple	Multiple or Single electrode	Single	Electrode Spacing	N/A	Peening	N/A	Other	Welds shall be cleaned between each pass. When completed, remove all slag & projection with SS grinding & Brushing													
String or Weave Bead	Max. stringer or weaver within 2.5 time diameter of electrodes																																									
Orifice, Nozzle, or Gas Cup Size	5, 6, or 7																																									
Initial and Interpass Cleaning (Brushing, Grinding, etc.)	Brushing & Grinding with SS Material																																									
Method of Back Gouging	Back Grinding with SS Material																																									
Oscillation	N/A																																									
Contact Tube to Work Distance	12 ~ 19 mm (GTAW)																																									
Multiple or Single Pass (Per Side)	Single & Multiple																																									
Multiple or Single electrode	Single																																									
Electrode Spacing	N/A																																									
Peening	N/A																																									
Other	Welds shall be cleaned between each pass. When completed, remove all slag & projection with SS grinding & Brushing																																									

Nomor Registrasi Migas

ANG-07981/0892/200

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 28 of 39

WELDING PROCEDURE SPECIFICATION (WPS)

In accordance with
Section IX, ASME Boiler and Pressure Vessel Code

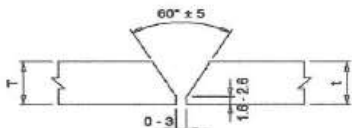
Welding Procedure Specification No. : 002/HEI/MIGAS/20

Rev. 0

JOINT DETAILS

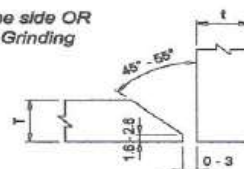
SINGLE VEE GROOVE **T = t**

Welded from one side



SINGLE BEVEL - CORNER JOINT **T = t**

Welded from one side OR
both side Back Grinding



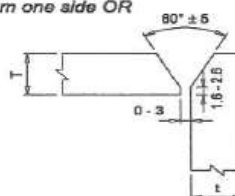
SQUARE BUTT

Welded from BOTH SIDES, T = 6 mm Max
Root gap, 0 - 1/2



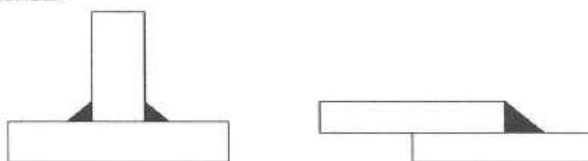
SINGLE VEE GROOVE **T = t**

Welded from one side OR
both side



SINGLE OR DOUBLE FILLET

UNLIMITED



For Non-Impact tested applications only, the following AWS/SFA classification can be used with this procedure :

GTAW : ER309L / 5.9 & SMAW : E309L-16 / 5.4

Weld Joint description shown are not inclusive of all of those found on job site. Weld joint design reference in an engineering specification or design shall take precedence over weld joint shown in this WPS.

Organization Prepared by,
PT. HANAZONO ENG. INDONESIA

Verified by
MINISTRY OF ENERGY AND MINERAL RESOURCES
DIRJEN MIGAS


Date : October 1, 2020

Nomor Registrasi Migas

Ayg - 07981 / 0842 / 2020

Date : October 1, 2020

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 29 of 39

PROCEDURE QUALIFICATION RECORD (PQR)

Record Actual Conditions Used to Weld Test Coupon

Organization Name **PT. HANAZONO ENGINEERING INDONESIA**

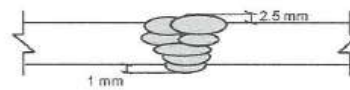
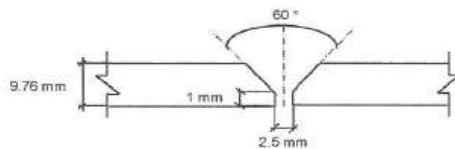
Procedure Qualification Record No. 002/HEI/MIGAS/20 Date 29/09/2020

WPS No. 002/HEI/MIGAS/20

Welding Process (es) GTAW & SMAW

Types (Manual, Automatic, Semi-Automatic) Manual

JOINTS (QW - 402)



Groove Design of Test Coupon

(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal and process used.)

BASE METAL (QW - 403)

Material Spec. SA-240 TO A516
Type or Grade, or UNS Number TP304 TO Gr. 70N
P-No. 8 Group No. 1 to P-No. 1 Group No. 2
Thickness of Test Coupon 9.76 mm
Diameter of Test Coupon N/A
Maximum Pass Thickness ≤ 1/2 in. (13mm)
Other

POSTWELD HEAT TREATMENT (QW - 407)

Temperature Range N/A
Time N/A
Others N/A

GAS (QW - 408)

	Percent Composition		
	Gas (es)	Mixture	Flow Rate
Shielding	Argon	99,99%	12 LPM
Trailing	-	-	-
Backing	Argon	99,99%	10 LPM

FILLER METAL (QW - 404)

SFA Specification	5.9	5.4
AWS Specification	ER309L	E309L-16
Filler Metal F-No.	6	5
Weld Metal Analysis A-No.	8	8
Size of Filler Metal	Ø2.4 mm	Ø3.2 mm
Filler Metal Product Form	Solid Bare	Flux Coated
Supplemental Filler Metal	N/A	N/A
Electrode Flux Classification	N/A	N/A
Flux Type	N/A	Lime Titania
Flux Trade Name	N/A	N/A
Weld Metal Thickness	3 mm	6,76 mm
Other	BOHLER S CN 23/12-IG	AVESTA 309L-16

ELECTRICAL CHARACTERISTIC (QW - 409)

Current DCEN (GTAW) & DCEP (SMAW)
Polarity See Table Welding Parameter
Amps See Table Welding Parameter
Waveform Control N/A
Power or Energy See Table Welding Parameter
Arc Time 5 - 10 Minutes / Pass
Weld Bead Length 4 mm (GTAW) & 5mm (SMAW)
Tungsten Electrode Size 2.4mm & 2% Thoriated (EWTh-2)
Mode of Metal Transfer for GMAW (FCAW) N/A
Heat Input See Table Welding Parameter
Other N/A

POSITION (QW - 405)

Position(s) of Groove 1G
Weld Progression (Uphill, Downhill) N/A
Other N/A

PREHEAT (QW - 406)

Preheat Temperature 36°C
Interpass Temperature 150°C
Other N/A

TECHNIQUE (QW - 410)

Travel Speed See Table Welding Parameter
String or Weave Bead String & Weave Bead
Oscillation N/A
Multipass or Single Pass (Per Side) Single & Multipass
Single or Multiple Electrodes Single
Other N/A

Nomor Registrasi Migas

AyG - 07081 / 0842 / 2020

4 OF 6

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 30 of 39

PROCEDURE QUALIFICATION RECORD (PQR)

Record Actual Conditions Used to Weld Test Coupon

Procedure Qualification Record No. : 002/HEI/MIGAS/20

Rev. 0

WELDING PARAMETER

Weld No.	Welding Process	Filer Metal		Type Polarity	Ampere	Volt	Travel Speed Range (mm/min)	Heat Input (J/mm)
		Class	Dia.					
1	GTAW	ER309L	2.4 mm	DCEN	80	10	24	2,0
2					167	14	72	1,9
3					100	21	63	2,0
4	SMAW	E309L-16	3.2 mm	DCEP	98	20	61	1,9
5					101	21	68	1,9
6					99	21	74	1,7
7					103	21	72	1,8

TENSILE TEST (QW - 160)

Specimen No.	Width (mm)	Thickness (mm)	Area (mm ²)	Ultimate Total Load (kN)	Ultimate Unit Stress (N/mm ²)	Type Failure & Location
T1	19,68	9,78	192,47	113,75	591	Fracture on Base Metal (CB)
T2	19,62	9,76	191,49	112,02	585	Fracture on Base Metal (CB)

GUIDE BEND TESTS (QW - 160)

Type and Figure No.	Result
SB1 - QW 462.2	No Open Discontinuity
SB2 - QW 462.2	
SB3 - QW 462.2	
SB4 - QW 462.2	

TOUGHNESS TESTS (QW - 170)

Specimen No.	Notch Location	Specimen Size	Test Temp. (°C)	Toughness Values		Drop Weight Break (Y/N)
				% Shear	Mils (in.) or mm	
Blank						

Comments

Nomor Registrasi Migas

ATG - 07981 / 0842 / 2012

PROCEDURE QUALIFICATION RECORD (PQR)

Record Actual Conditions Used to Weld Test Coupon

Procedure Qualification Record No. : 002/HEI/MIGAS/20

Rev. 0

FILLET-WELD TEST (QW - 180)

Result - Satisfactory : Yes - No - Penetration into Parent Metal : Yes - No -

Macro - Result None

HARDNESS TESTS

[illegible]

Other Tests

Type of Test	N/A
--------------	-----

Deposit Analysis N/A

Other	Radiography examination, Result : ACC, Report No. : 001/RT/HE/IX/20 by PT. Rire Sanjaya Sakti
-------	---

Welder's Name	ASMURI	Clock No.	-	Stamp No.	W - 01
---------------	--------	-----------	---	-----------	--------

Tests conducted by :	PT. HI-TEST	Laboratory Test No.:	HT/JKT/0920/0328
----------------------	-------------	----------------------	------------------

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 of the ASME Boiler and Pressure Vessel Code.

Organization Prepared by,
PT. HANAZONO ENG. INDONESIA

Verified by
MINISTRY OF ENERGY AND MINERAL RESOURCES
DIRJEN MIGAS

Nomor Registrasi Migas

AYG - 07981/0842/

Date : September 29, 2020

Date : September 29, 2020

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 32 of 39

PT. voestalpine Böhler Welding Asia Pacific

voestalpine Böhler Welding Asia Pacific

Kawasan Industri Jababeka Cikarang
Jl. Industri Selatan 2 Blok JJ NO. 7-10
17530 Bekasi
T. +6221893 7572, F. +6221893 7519
www.voestalpine.com/welding

PT ALLALLOY CAHAYA DYNAWELD
JL. PANTAI INDAH SELATAN KOMP.
KAMAL MUARA, PENJARINGAN
14470 Jakarta Utara
Indonesia

Inspection certificate 3.1

as per : EN 10204

No. : 2020-2047012236-30-20007-025

Rev. 0

Page 1 of 1

PO no.	ACD/AW-N/20/09/0794	of	07.09.2020
Order no.	1042004692		
Delivery note/pos./splitt	2047012236/000000/000030	of	21.09.2020
Product	GTAW rod/wire		
Trade name	BOHLER S CN 23/12-IG		
Standard designation	AWS A5.9 : ER309L ASME SFA5.9 : ER309L		
Dimension	GTAW 2,4 x 1000 mm		
Lot no.	20007		
Quantity	100,0 KG		

118955
77254
JSE6A60W
0425

Chemical composition in % of the product

C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	FN WRC				
0,01	0,40	1,84	0,024	0,009	23,42	0,05	12,55	0,03	0,12	10				

Mechanical properties

ASME II/Sched.F

Tensile test								according to : ASTM E8						
Specimen preparation								according to : AWS B4.0						
T	ReL / Rp 0,2	Rp 1,0	Rm	A (Lo = 4d)	Z	WBH	Remarks							
	MPa	MPa	MPa	%	%	PWHT								
25°C	≥ 320		≥ 520	≥ 30										
Impact test								according to : ASTM E23						
Specimen preparation								according to : AWS B4.0						
T	Impact energy	Average	Lateral expansion	Shear fracture	WBH	Remarks								
	KV / J	KV / J	mm	%	PWHT									
-60°C		≥ 46												

The product BOHLER S CN 23/12-IG meets the requirements of the filler metal specification ASME sec II, part C, AWS A5.9 : ER309L when tested in accordance with that specification.

Town
Bekasi

Date
21.09.2020

This certificate was issued by DP-equipment and does not require signature.

Authorized representative
Miftah Farid

voestalpine

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 33 of 39

PT. voestalpine Böhler Welding Asia Pacific

voestalpine Böhler Welding Asia Pacific

Kawasan Industri Jababeka Cikarang
Jl. Industri Selatan 2 Blok JJ NO. 7-10
17536 Bekasi
T. +6221893 7572, F. +6221893 7518
www.voestalpine.com/welding

PT ALLALLOY CAHAYA DYNAWELD
JL. PANTAI INDAH SELATAN KOMP.
KAMAL MUARA, PENJARINGAN
14470 Jakarta Utara
Indonesia

Inspection certificate 3.1

as per : EN 10204

No. : 2020-2047012235-20-20582-025

Rev. 0

Page 1 of 1

PO no.	ACD/DN-N/20/08/0702	of	05.08.2020
Order no.	1042004626		
Delivery note/pos./splitt	2047012235/000000/000020	of	21.09.2020
Product	covered electrode		
Trade name	BOHLER FOX S 309L-16		
Standard designation	EN ISO 3581-A : E 23 12 L R 3 2		
	AWS A5.4 : E309L-16		
Dimension	SMAW 3,25 x 350 mm		118955
Lot no.	20582		77298
Quantity	24,6 KG		JSES00E 0425

Chemical composition in % of the weld metal

C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	FN WRC				
0,02	0,87	0,70	0,015	0,025	23,35	0,03	12,74	0,05	0,05	14				

Mechanical properties

ASME II/Sched.F

Tensile test					according to : ASTM E8		
Specimen preparation					according to : AWS B4.0		
T	ReL / Rp 0,2	Rp 1,0	Rm	A (Lo = 4d)	Z	WBH	Remarks
	MPa	MPa	MPa	%	%	PWHT	
25°C	≥ 320		≥ 520	≥ 30		AW	
Impact test					according to : ASTM E23		
Specimen preparation					according to : AWS B4.0		
T	Impact energy	Average	Lateral expansion	Shear fracture	WBH	Remarks	
	KV / J	KV / J	mm	%	PWHT		
-40°C		≥ 35			AW		

The product BOHLER FOX S 309L-16 meets the requirements of the filler metal specification ASME sec II, part C, AWS A5.4 : E309L-16 when tested in accordance with that specification.

Town
Bekasi

Date
21.09.2020

This certificate was issued by DP-equipment and does not require signature.

Authorized representative
Miftah Farid

voestalpine

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 35 of 39



PT. Hi-Test
Laboratory of Mechanical Testing

BSD City :
Taman Tekno Blok A2 No. 49
Bumi Serpong Damai (BSD) – Tangerang - Indonesia
Telp : +62 21 75882884; Fax : +62 21 75882885
E-mail : hi-test@hiteslab.com
Website : www.hitestlab.com



Testing Report

(This Report is issued subjected to the term & conditions set out below)

Customer	: PT. Hanazono Engineering Indonesia	Job No	: B20625
Address	: Jl. Bojonegara No. 44 Kertasana, Serang, Banten 42454	No.	: HT/JKT/0920/0328
Reference Code	: ASME Sect. IX : 2019	Total of Page	: 1 of 2
Test Method	: ASTM A370-19	Date of Received	: 22 September 2020
Object to be tested	: (as received)	Date of Tested	: 29 September 2020
		PO No	: PO-E001-HTT-TOL-004
		Project Name	: --
		Sample Marking	: 9. HEI 2

One welded stainless to carbon steel plate joint test sample, size: 10 mm thickness, material spec: A 240-304 to A 516 Gr. 70N, PQR No. PQR002/HEI/MIGAS/20, welding process: GTAW+SMAW, welding position: 1G, for Procedure Qualification Record Test.

Type of Test : Reduced Section Tension Test (Transverse Specimen)
Environment Temp : 25.1°C

Test Specimen No	T1	T2
Measured Thickness (mm)	9.78	9.76
Measured Width (mm)	19.68	19.62
Effective Area (mm²)	192.47	191.49
Ultimate Tensile Load (kN)	113.72	112.03
Ultimate Tensile Strength (N/mm²)	591	585
Location of Failure	Base Metal at 516 Gr. 70N	Base Metal at 516 Gr. 70N
Type of Failure	Ductile	Ductile

Testing Machine Used : INSTRON 600 DX,
Model: 600 DX, S/N: S2513, Capacity : 600 kN
Remark : A : A 240-304
B : A 516 Gr. 70N
Test Conducted By : Canra Latipolia, ST
Witnessed By :

Approved Signatory


Suhadi ST
Laboratory Manager

Term & Conditions

- The report is prepared for the sole use of the Client and is prepared based upon the item submitted, the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test.
- The Report is not intended to be representative of similar or equivalent Services on similar or equivalent items. The Report does not constitute an endorsement by PT. Hi-Test of the item.
- PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test.
- The Report may not be reproduced in part or in full unless approval in writing has been given by PT. Hi-Test.
- PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client. Its agents, servants or representatives howsoever arising or whether connected with the Services provided by PT. Hi-Test herein.

Form No. HTQM-F/TENSILE/RED-SEC/3 Rev.0

This results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (ISO/IEC 17025:2005)

Date of Issued 06/10/2014

	POBOYA 2000 TPD EXPANSION PROJECT	
(CPM Work No.) 11580	Project Doc. No.: E2502-000-PRC-016	Revision No. : C
(Vendor Work No.) E2502	Purchase Order No. : 11580	Page 36 of 39



PT. Hi-Test
Laboratory of Mechanical Testing
 BSD City :
 Taman Tekno Blok A2 No. 49
 Bumi Serpong Damai (BSD) – Tangerang - Indonesia
 Telp : +62 21 75882884; Fax : +62 21 75882885
 E-mail : hi-test@hittestlab.com
 Website : www.hittestlab.com



Testing Report

(This Report is issued subjected to the term & conditions set out below)

Customer	: PT. Hanazono Engineering Indonesia	Job No	: B20625
Address	: Jl. Bojonegara No. 44 Kertasana, Serang, Banten 42454	No.	: HT/JKT/0920/0328
Reference Code	: ASME Sect. IX : 2019	Total of Page	: 2 of 2
Test Method	: ASTM E190-14	Date of Received	: 22 September 2020
Object to be tested	: (as received)	Date of Tested	: 29 September 2020
		PO No	: PO-E001-HTT-TOL-004
		Project Name	: --
		Sample Marking	: 9. HEI 2

One welded stainless to carbon steel plate joint test sample, size: 10 mm thickness, material spec: A 240-304 to A 516 Gr. 70N, PQR No. PQR002/HEI/MIGAS/20, welding process: GTAW+SMAW, welding position: 1G, for Procedure Qualification Record Test.

Type of Test : Bending Test (Transverse Specimen)

Test Temperature	: 25.1°C		
Test Weld Metal Thickness	: 10 mm	Test Specimen Width	: 38 mm
Former Diameter	: 40 mm	Bend Angle	: 180 Degree
Shoulder Distance	: 63.2 mm		

Specimen No	Type of Bend	Observation	Result
FB1	Face Bend	No Open Discontinuity was Observed	Accepted
FB2	Face Bend	No Open Discontinuity was Observed	Accepted
RB1	Root Bend	No Open Discontinuity was Observed	Accepted
RB2	Root Bend	No Open Discontinuity was Observed	Accepted

Testing Machine Used : MOTOR PUMP BENDING TEST MACHINE,
 Model : Daventry England, S/N : DG 8881, Capacity : 700 Bar

Remark : --

Test Conducted By : Canra Latipolia, ST

Witnessed By :

Approved Signatory


 Suhadi, ST
 Laboratory Manager

Term & Conditions

- The report is prepared for the sole use of the Client and is prepared based upon the item submitted; the Services required by the Client and the conditions under which the Services are performed by PT. Hi-Test.
 The Report is not intended to be representative of similar or equivalent Services on similar or equivalent items. The Report does not constitute an endorsement by PT. Hi-Test of the item.
 - PT. Hi-Test agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of PT. Hi-Test.
 - The Report may not be reproduced in part or in full unless approval in writing has been given by PT. Hi-Test.
 - PT. Hi-Test shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client. Its agents, servants or representatives howsoever arising or whether connected with the Services provided by PT. Hi-Test herein.
- Form No. HT/QM-F/BEND/3 Rev.0
 The results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (ISO/IEC 17025:2005)
 Date of Issued 06/01/2014

(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 37 of 39



검사 증명서 MILL TEST CERTIFICATE

주문번호/Order No. : P194500138
발주번호/PO No. :
품명/Commodity : STEEL PLATE
제품규격/Specification : ASTM A516-70N/ASME SA516-70N

고객사/Supplier : JUNGJIN
수요자/Customer : 탑스틸

검사증명서번호/Certificate No. : DP3-2-190606-022-001
발행일자/Date of issue : 2019-06-06

제품 치수 Dimension 단위 Unit Inch: ", mm: Space	제품 번호 Product No	수량 Quantity	중량 Weight kg	재강번호 Heat No	P o s i t i o n	인장시험 Tensile Test				경도시험 Hardness		화학성분(%) Chemical Composition											Remarks	
						GL	YPO2	TS	EL	%	HB	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	Nb	Ti		V
10.00*3048*6096 *Specimen No: DP08221216-a, DP08221215-d ** Normalized: 910 °C, 30min	A670179-01, 02		2,188	PK115635	T 1	345	527	25	139	L	16	37	139	18	4	20	10	10	3	2	18	2		
	Sub Total (20)	3	4,376																					
	A673276-01		2,772	PK656499	T 1	343	531	27	142	L	17	38	144	18	4	20	10	10	5	1	2	2		
19.00*3048*6096 *Specimen No: DP08266721-a, DP08266721-d ** Normalized: 910 °C, 35min	Sub Total (40)	1	2,772																					
	A673334-01		3,209	PK656496	T 1	365	541	25	147	L	16	37	142	20	3	20	10	10	5	1	2	2		
	Sub Total (50)	1	3,209																					
25.00*3100*6096 *Specimen No: DP0827619-a, DP0827613-d ** Normalized: 910 °C, 45min	A673275-01		3,708	PK404319	T 1	352	529	27	149	L	15	33	144	14	3	20	140	190	12	1	16	26		
	Sub Total (60)	1	3,708																					

We hereby certify that the material has been made by basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirement called for by the above order, if the amount of C, Mn, Cu, Mo, Ni, P, S, Ti, Nb, V is less than 0.008%, the heat analysis for that element is less than 0.02% and/or of Nb, V is less than 0.008%, * Inspection documents : According to EN 10204 type 3.1, NACE MR0175 Hardness only.

* Specimen No. : a-Tension, d-Hardness
* Position : T-Top, M-Middle, B-Bottom
* Division : L-Ladle Analysis, P-Product Analysis
* Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5-10, 2-5.0-10
* GI(Gauge Length, mm) : 1-200, 2-100, 3-80, 4-70, 5-50, 6-5.65-4, 7-5d, 8-4d, 9-8d
* T(S)AI : Total(Soluble) AI
* Tr : Trace
* NBL Result : G-No Break, B-Break
* TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

원본검증 방법 : 동국제강 홈페이지 접속 (www.dongkuk.co.kr) → e비즈니스 클릭(홈페이지 하단) → 검사증명서 원본검증 클릭 → 정보인력 후 검색

Surveyor to _____ Surveyor to _____ Surveyor to _____
Danglin Works, 25, Godeongdong 1-gil, Songak-eup, Dangjin-si, Chungcheongnam-do, Republic of Korea/Quality Control Team, TEL. 041-351-4633
Page : 1/2



(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 38 of 39



검 사 증 명 서 MILL TEST CERTIFICATE

주문번호/Order No. : P194500138
발주번호/PO No. :
품명/Commodity : STEEL PLATE
제품규격/Specification : ASTM A516-70N/ASME SA516-70N

검사증명서번호/Certificate No. : DP3-2-190606-022-001
발행일자/Date of issue : 2019-06-06

고객사/Supplier : JUNGJIN
수요자/Customer : 합스틸

제품 치 수 Dimension 단위 Unit Inch: ", mm: Space	제품 번호 Product No	수량 Quantity	중량 Weight kg	화학성분(%) Chemical Composition				Remarks
				T, Al 3	S, Si 3	C, Mn 3	P, S 4	
*Specimen No.: DP08227613-a, DP08227613-d ** Normalized: 910 ° C, 35min	A570179-01, 02		2,188	33	388	1		
	Sub Total (20)	3	4,376					
*Specimen No.: DP082276121-a, DP082276121-d ** Normalized: 910 ° C, 35min	A573275-01		2,772	40	417	1		
	Sub Total (40)	1	2,772					
	A573334-01		3,209	30	403	1		
	Sub Total (50)	1	3,209					
*Specimen No.: DP08227613-a, DP08227613-d ** Normalized: 910 ° C, 45min	A573275-01		3,708	37	424	1		
	Sub Total (60)	1	3,708					

We hereby certify that the material has been made by basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirement called for by the above order. If the amount of C, Ni, Cu, Mo, Ti or Si is blank, the heat analysis for that element is less than 0.02% and/or of Nb, V is blank, it is less than 0.008%. * Inspection documents : According to EN 10204 Type 3.1, NACE MR0175 Hardness only.

* Specimen No. : a-Tension, d-Hardness
* Position : 1-Top, M-Middle, B-Bottom
* Division : 1-Ladle Analysis, P-Product Analysis
* Sub(Size, Real Value, mm) : Blank-Full Size, 1-7.5x10, 2-5.0x10
* GI(Gauge Length, mm) : 1-200, 2-100, 3-60, 4-70, 5-50, 6-5.5x4,
* T(S), B-Bottom, S-Subsize) Al *Tr: Trace
* NSI Result: G-No Break B-Break
* TTP(Through Thickness Position) : 1-Surface, 2=1/4T, 3=1/2T

원본검증 방법 : 동국제강 홈페이지 접속 (www.dongkuk.co.kr) → e비즈니스 클릭(홈페이지 하단) → 검사증명서 원본검증 클릭 → 정보입력 후 검색

Surveyor to _____ Surveyor to _____ Chief of Quality Control Team
Dangjin Works, 25, Godaejeongdan 1-gil, Songak-eup, Dangjin-si, Chungcheongnam-do, Republic of Korea/Quality Control Team, TEL. 041-351-4633



(CPM Work No.)
11580

Project Doc. No.: E2502-000-PRC-016

Revision No. : C

(Vendor Work No.)
E2502

Purchase Order No. : 11580

Page 39 of 39

		INSPECTION CERTIFICATE 3.1						ISSUE DATE: 2017-08-26	
		ACCORDING TO EN 10204						CERTIFICATE NO IS2121	
MANUFACTURER'S MARK BHS		INSPECTOR'S STAMP 		MELTING PROCESS		E/AOD			
CUSTOMER: PT PARADISE PERKASA JL PANGERAN JAYAKARTA 66 KOMPLEK PESONA JAYAKARTA LESTARI BLOK B 6 MANGGA DUA SELATAN SAWAH BESAR JAYAKARTA PUSAT DKI JAKARTA 10730 Indonesia				ORDER No. BE05338		ITEM No. 11		DELIVERY NOTE No. DEL044196	
				CUSTOMER ORDER No. 2117100086					
SPECIFICATIONS ASTM A240 / A240M-15a ASME BPVC-III SA240 / SA240M-2013				MATERIAL CODE 304L 304 304L 304		CASE BPC1031756 (1750 kg) BPC1031757 (2075 kg) BPC1031758 (2110 kg) Item No. : CERTIFIED TRUE COPY Signature : PT. PARADISE PERKASA			
TOLERANCE: ASTM/ASME						KURZNAME:			
PRODUCT: No. 1 Finish, Hot rolled annealed and pickled						HEAT No.: 410812			
DIMENSIONS: 10 mm X 1220 mm X 2440 mm		QUANTITY: 25		MASS: 2928 Kg		MATERIAL No.: A0038966			
CHEMICAL COMPOSITION (%)									
	C	S	P	Mn	Si	Cr	Ni	N	
Min						17.5	8.0		
Max	0.030	0.030	0.045	2.00	0.75	19.5	10.5	0.10	
Actual	0.019	0.001	0.033	1.72	0.40	18.7	8.1	0.07	
MECHANICAL PROPERTIES									
TEMPERATURE	DIRECTION	POSITION	Rm MPa	Rp0.2 MPa	A50 %	HRBW HRBW			
Ambient	Transverse	Requirement Min	515	305	40	92			
		Max							
Ambient	Transverse	Head	643	316	49	85			
		Tail				88			
INTERGRANULAR CORROSION									
SPECIFICATION ASTM A262 Practice E		RESULT PASS		This material is free from mercury contamination. The reduction level established by this material is not greater than the normal background level. This document is issued without obligation or liability and may only be reproduced in full. Tests to verify label and quality have been made. Verwechslungsprüfung wurde durchgeführt. Visual and dimensional control, no exception. Beanspruchungs- und Abmessung: ohne Beanstandung. The delivery is in accordance with the order. Die Lieferung entspricht den Bestelldetails. This material meets the Hardness requirement of Nace MR-0175 & Nace MR-0103. Material has been PMI Tested. Rm = Tensile strength (UTS) Rp0.2 = Yield proof strength at 0.2% strain Rp1.0 = Yield proof strength at 1.0% strain A5 = Elongation with gage length 5.65" Squircle section (mm) A5 = Elongation with gage length 50mm HRBW = Rockwell hardness B scale Bahru Stainless 304 Bhd is certified with ISO 9001 & ISO 14001 BAHRU STAINLESS SDN BHD IS MEMBER OF ACEKINON GROUP					
HEAT TREATMENT (SOLUTION ANNEALED)									
Anneal °C 1050 - 1100		Quench AIR/SPRAY							
						BAHRU STAINLESS PTD 4069 (PLOT 188), Jalan Rumbia 4 Tanjung Langsat Industrial Complex 81700 Pasir Gudang, Johor, Malaysia Swin Le Teoh QC ENGINEER			