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	

CPM PT Citra Palu Minerals

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

Revision History

REV. No.	DATE	DESCRIPTION	REVISION BY
A	March 02, 2026	Issue For Approval	BR
B	July 13, 2026	Issue For Approval	BR

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

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Head Office : Jl. Raya Bojonegara-Serdang No. 44 RT. 001/RW.001
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Banten, Indonesia (42414)
Telp : +62-254-7850344/45/46/47

WELDING PROCEDURE SPECIFICATION (WPS)

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

Page 1 of 2

☐ PREQUALIFIED (Pra-Kualifikasi) ☐ QUALIFIED BY TESTING (Kualifikasi dengan Pengujian)

WPS NO. (No. PWPS) : 04-WPS-HEI-AWS-MIGAS-26 DATE (Tanggal) : June 07, 2026 SUPPORTING PQR NO. (No. PQR Pendukung) : 04A-PQR-HEI-AWS-MIGAS-26, 04B-PQR-HEI-AWS-MIGAS-26

REVISION NO. (Revisi No.) : 0 DATE (Tanggal) : -

WELDING PROCESS (ES) (Proses Pengelasan) : SMAW 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 Penggiran 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 400

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) SMAW

AWS SPECIFICATION (Spesifikasi AWS) : A5.1

AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R ø 2.5 3.2 4.0

BRAND NAME (Nama Merk) : -

SHIELDING (Pelindung) SMAW

FLUX (Flux) : N/A GAS (Gas) : N/A

COMPOSITION (Komposisi) : N/A

ELECTRO - FLUX (CLASS) (Kelas Elektro Fluks) : NA

FLOW RATE (Laju Alir) : N/A

GAS CUP SIZE (Ukuran Nozzle Gas) : NA

TECHNIQUE (Teknik)

STRINGER OR WEAVE 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) : NA

PEENING (Peening) : N/A

INTERPASS CLEANING (Pembersihan Antar Pass) : Grinding, Brushing, and Chipping

PREHEAT (Pemanasan Awal)

PREHEAT TEMP. MIN. Minimum Pemanasan Awal) (Temperatur : See Table Below

Thickness/T (mm)	≤ 20 mm	20mm < T ≤38mm	38 mm < T ≤ 65 mm	> 65 mm
Min. Temp (°C)	0	10	65	110

INTERPASS TEMP. MAX. (Temperatur Minimum Antar Pass) : 250°C

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 : AIG - B - 560/0509/2026

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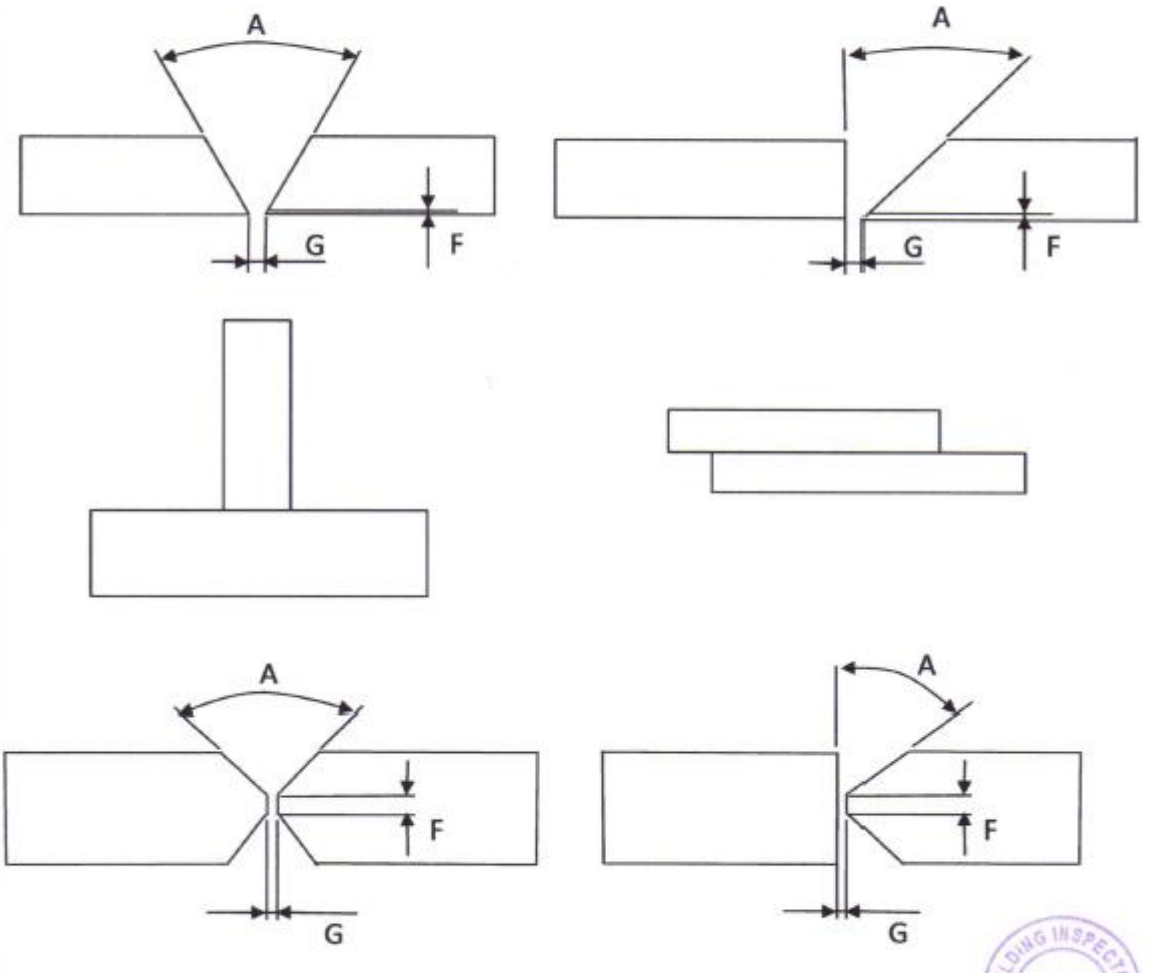
Telp : +62-254-7850344/45/46/47
e-mail : project@hanazono.co.id

WELDING PROCEDURE SPECIFICATION (WPS)

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

Attachment of Joint Detail



A = 45° (+10, -5)
G =0 - 4 mm
F = 0 - 2 mm

WELDING INSPECTOR IM

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

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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

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	0,96 ~ 3,6	
Fill					110 ~ 150	22 ~ 27	65 ~ 230	0,63 ~ 3,86	
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	

No.	DATE	PREPARED BY	REVIEWED BY	REGISTERED BY MIGAS
0	June 07, 2026	ANDI ISKANDAR	RUSNANDI	Nomor Registrasi Migas AYG - B - 569/0589/2026

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PROCEDURE QUALIFICATION RECORD (PQR)

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

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

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

FILLER METAL (Logam Pengisi)

SMAW

AWS SPECIFICATION (Spesifikasi AWS) : A5.1

AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R

BRAND NAME (Nama merk) : Bohler

SHIELDING (Pelindung)

SMAW

FLUX (Flux) : NA GAS (Gas) : NA

COMPOSITION (Komposisi) : NA

ELECTRO - FLUX (CLASS) (Kelas Elektro Fluks) : NA

FLOW RATE (Laju Alir) : NA

GAS CUP SIZE (Ukuran Nozzle Gas) : NA

PREHEAT (Pemanasan Awal)

PREHEAT TEMP. MIN. (Temperatur Minimum Pemanasan Awal) : Ambient Temp (33°C)

INTERPASS TEMP. MAX. (Temperatur Maksimum Antar Pass) : 234 °C

POSITION (Posisi)

POSITION OF GROOVE (Posisi Groove) : 2G

POSITION OF FILLET (Posisi Fillet) : NA

VERTICAL PROGRESSION (Pergerakan Vertikal)

☐ UP ☐ DOWN

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

TECHNIQUE (Teknik)

STRINGER OR WEAVE BEAD (Lurus atau Mengayun) : Stringer

MULTI PASS OR SINGLE PASS (PER SIDE) (Satu Pass atau Banyak Pass (Per Sisi)) : Multi Pass

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

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

WELDING INSPECTOR IM

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

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WELDING RECORD OF QUALIFICATION TEST

WELDING PROCESS : SMAW
WELDING POSITION : 2G

WPS NO. : 04-WPS-HEI-AWS-MIGAS-26
PQR NO. : 04A-PQR-HEI-AWS-MIGAS-26
Welding Date : May 29, 2026 (PAGE 2 of 3)

Sketch for joint preparation and passes location

*size in mm

Pass	Filler Metal Type	Size	Polarity	Interpass Temp (°C)	AMP. (A)	VOLTT (V)	Welding Speed (mm/min)	Heat Input (J/mm)
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	153	125	25	181,35	1033,91

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 : Ambient Temperature

WELDING INSPECTOR IM

Nomor Registrasi : AYG-B-360/0585/2026

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Telp : +62-254-7850344/45/46/47

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

PROCEDURE QUALIFICATION RECORD (PQR)

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

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) 1	2	3	Average	REMARK
N/A								
N/A								

HARDNESS TEST

	Type:	Maximum acceptable value:
N/A	LINE	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-01 RESULT : Passed
UT REPORT NO. : N/A RESULT : N/A

FILLET WELD TEST RESULTS

MINIMUM SIZE MULTIPASS MACROETCH		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/0626/0039

WELDER'S NAME : JUHANDA
TESTS CONDUCTED BY : PT. Hi-Test Laboratory
CLOCK NO. : NA STAMP NO. : JH-1006
LABORATORY : PT. Hi-Test - Tangerang
TEST NUMBER : 04A-PQR-HEI-AWS-MIGAS-26
PER : Hadi Anwar

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 6 OF AWS D1.1/D1.1M:2025 STRUCTURAL WELDING CODE - STEEL.

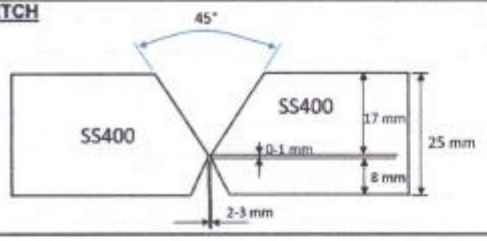
REV NO.	DATE	Prepared by	Reviewed by	Registered by MIGAS
0	June 07, 2026	ANDI ISKANDAR	RUSNANDI	Nomor Registrasi Migas AYG - B. 569/0589/2026

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

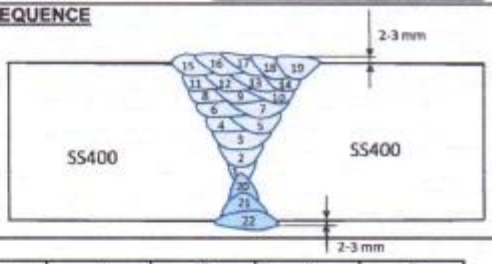
LAPORAN PENGUJIAN KUALIFIKASI PROSEDUR / JURU LAS / OPERATOR LAS

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

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

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	178,57	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**
(Ferdi)	(Andi Iskandar)	(Rusnandi)	(Puji Trijatmiko)
05-Jun-26	05-Jun-26	05-Jun-26	

RADIOGRAPHY TEST REPORT

PT. KOSTEC INDONESIA MANDIRI
Office : Lingkar Selatan Street (Opposite Horison Hotel)
RT 005 / RW.002 Desa Harjatani Kecamatan Kramatwatu Serang Banten
Phone : (0254) 781 - 3765 Fax : Fax : (0254) 781 - 4752

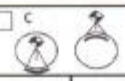
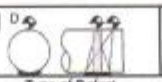
Report No. : KIM-HEI-RT-01
Inspection Date : 29 Mei 2026
Report Date : 30 Mei 2026
Page No. : 1 Of 1

Customer	: PT. HANAZONO ENGINEERINBG INDONESIA	Item Name	: PLATE
Project	: pWP5	DWG. No.	: - Rev. No. 0
Applied Spec.	: AWS D1.1	Procedure No.	: KIM-NDE-AWS-RTP-02 Rev. No. 0
Base Material Type	: A-36 Plate ☑ to SS400 PIPE ☐	Diameter (OD)	: - TO - ☑ mm ☐ inch
		Weld Reinforcement Thickness	: 2
Base Material Thickness	: 25 to 25 ☑ mm ☐ inch	Weld Thickness	: 25 ☑ mm ☐ inch
Item Type	☑ Welding ☐ Casting	Welding Process	: ☑ SMAW ☐ SAW ☐ GMAW ☐ GTAW ☐ FCAW

γ-Ray		X-Ray	
Type	Sentinel ☑ Ir-192 ☐ Co-60	Manufacturer	:
Serial No.	HCD743	Serial No.	:
Curie	10 Ci		kV mA
Source Size	3 x 3 mm	Focal Size	x ☐ mm

Film Brand	☑ FUJI ☐ AGFA	TYPE	☐ D4 ☑ D7	FILM SIZE	☐ 4X610inch ☑ 4X15 inch
Screen	☑ Lead Front 0.125 ☑ mm ☐ Fluorescent Back 0.125 ☐ inch				
IQI Type	☑ ASTM ☐ KS(JIS) ☐ MIL	IQI No.	☐ 1A ☐ 1C ☑ 1B ☐ 1D	IQI Placement	☐ Source Side ☑ Film Side
Source to Object Distance	406 ☑ mm ☐ inch	Exposure Time	30 Second		
Distance from Source side of object to film	381 ☑ mm ☐ inch				
Set up	Exposure ☑ Single-wall exposure ☐ Double-wall exposure				
	Viewing ☑ Single-wall viewing ☐ Double-wall viewing				Ug = 0.5
Development	Temperature 20°C	Developing Time 3 Minutes			Film Density = 2 ~ 4

Sketch

☑ A ☐ B ☐ C  ☐ D  ☐ E ☐ F

Identification No.	GRADE	RESULT ACCEPT	RESULT REJECT	Type of Defect ① P	② S	③ IP	④ LF	⑤ TI	⑥ UC	⑦ SD	⑧ RC	⑨ BT	⑩ C	⑪ SI	⑫ OT	Welder Stamp	Remarks
JUANDA/JH1 006	A-B	PASS															
04A-PQR-HEI-AWS-MIGAS-26																	
POSITION : 2G																	

	Interpreted By	Evaluated By	Reviewed By	Client Representative
Name	Slamet Ariadi S			Haris T.
Designation	PCN RT level 2			QBO 360
Signature				
Date	30/05/2026	30-05-2026		30/05/2026

NOTE :
① P : Porosity
② S : Slag Inclusion
③ IP : Incomplete Penetrat
④ LF : Lack of Fusion
⑤ TI : Tungsten Inclusion
⑥ UC : Undercut
⑦ SD : Surface Defect
⑧ RC : Root Concavity
⑨ BT : Burn-Through
⑩ C : Crack
⑪ SI : Surface Indicater
⑫ OT : Others

HI-TEST LAB

ilac-MRA KAN Laboratorium Penguji LP - 422 - IDN

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

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ilac-MRA KAN Laboratorium Pengu LP - 422 - IDN

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/0626/0039
		Date Tested	: 05 June 2026
Reference Code	: AWS D1.1: 2025	Test Method	: ASTM E8/E8M - 25
Sample Marking	: 6. HEI 1	Direction	: Butt Weld
Type of Test	: Tensile Welding Transverse	Page	: 2 of 3
Temperature	: 25.4 °C		

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

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5. 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, adequate and completeness of the sample information provided by client.

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ilac-MRA KAN Laboratorium Pengujian LP - 422 - IDN

OFFICIAL TESTING REPORT

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

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

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Form No : HT/QM-F/BLND/3 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 Issued: 23/09/2025

PT. HANAZONO Engineering Indonesia
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Desa Kertasana, Kecamatan Bojonegara, Kabupaten Serang
Banten, Indonesia (42414)
Telp : +62-254-7850344/45/46/47

PROCEDURE QUALIFICATION RECORD (PQR)

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

Page 1 of 2

PQR NO. (No.PQR) : 04B-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) : 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

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)

SIZE (Ukuran) : NA

TYPE (Tipe) : NA

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) : NA

TECHNIQUE (Teknik)

STRINGER OR WEAVE BEAD (Lurus atau Mengayun) : Weave

MULTI PASS OR SINGLE PASS (PER SIDE) (Satu Pass atau Banyak Pass (Per Sisi)) : Multi Pass

NUMBER OF ELECTRODE (Jumlah Elektroda) : Single Electrode

ELECTRODE SPACING (Jarak antar Elektroda)

LONGITUDINAL : NA

LATERAL : NA

ANGLE : NA

CONTACT TUBE TO WORK DISTANCE (Jarak kontak Tube ke Benda Kerja) : NA

PEENING (Peening) : NA

INTERPASS CLEANING (Pembersihan Antar Pass) : Grinding, brushing, and chipping

FILLER METAL (Logam Pengisi)

SMAW

AWS SPECIFICATION (Spesifikasi AWS) : A5.1

AWS CLASSIFICATION (Klasifikasi AWS) : E7018-H4R

BRAND NAME (Nama merk) : Bohler

SHIELDING (Pelindung)

SMAW

FLUX (Flux) : NA GAS (Gas) : NA

COMPOSITION (Komposisi) : NA

ELECTRO - FLUX (CLASS) (Kelas Elektro Fluks) : NA

FLOW RATE (Laju Alir) : NA

GAS CUP SIZE (Ukuran Nozzle Gas) : NA

PREHEAT (Pemanasan Awal)

PREHEAT TEMP. MIN. (Temperatur Minimum Pemanasan Awal) : 33 °C

INTERPASS TEMP. MAX. (Temperatur Maksimum Antar Pass) : 243 °C

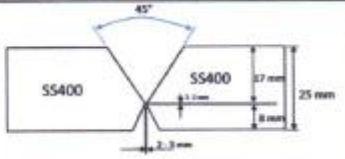
POST WELD HEAT TREATMENT (Pemanasan Pasca Las)

TEMPERATURE (Temperatur) : NA

TIME (Waktu) : NA

WELDING PROCEDURE

PASS OR WELD LAYER(S)	PROCESS	FILLER METAL CLASS	FILLER METAL DIA.	CURRENT TYPE & POLARITY	CURRENT 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			3,2		109	23	52,87	2.845	
3			3,2		120	25	65,79	2.736	
4			3,2		120	25	60,55	2.973	
5			3,2		120	25	65,18	2.762	
6			3,2		120	25	61,30	2.936	
7			3,2		120	25	67,70	2.659	
8			3,2		115	24	70,99	2.333	
9			3,2		115	24	70,71	2.342	
10			3,2		115	24	72,16	2.295	
Back side									
11	SMAW	E7018-H4R	3,2	DCEP	110	23	65,32	2.324	
12			3,2		115	24	82,35	2.01	



Nomor Registrasi Migas
AYG - B - 569 / 0590 / 2026

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Banten, Indonesia (42414)
Telp : +62-254-7850344/45/46/47
e-mail : [redacted]

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

PROCEDURE QUALIFICATION RECORD (PQR)

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

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

	Type:	Maximum acceptable value:
N/A	LINE	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 MACROETCH		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

WELDER'S NAME : ROMLI
CLOCK NO. : NA
STAMP NO. : RM-0815
TESTS CONDUCTED BY : PT. Hi-Test Laboratory
LABORATORY : PT. Hi-Test - Tangerang
TEST NUMBER : 04B-PQR-HEI-AWS-MIGAS-26
PER : Hadi Anwar

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 6 OF AWS D1.1/D1.1M:2025 STRUCTURAL WELDING CODE - STEEL.

REV NO.	DATE	Prepared by	Reviewed by	Registered by MIGAS
0	June 07, 2026	ANDI ISKANDAR	RUSNANDI	Nomor Registrasi Migas: ATG - B - 569/0590/2026

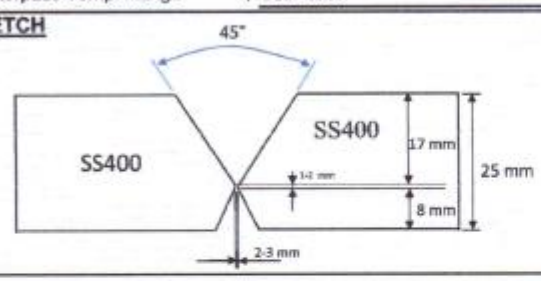
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA

DIREKTORAT JENDRAL MINYAK DAN GAS BUMI

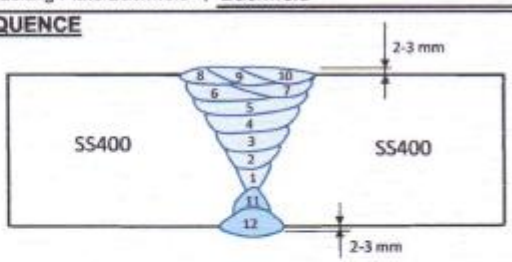
LAPORAN PENGUJIAN KUALIFIKASI PROSEDUR / JURU LAS / OPERATOR LAS

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

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

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)	(Andi Iskandar)	(Rusnandi)	(Puji Trijatmiko)
05-Jun-26	05-Jun-26	05-Jun-26	

RADIOGRAPHY TEST REPORT

PT. KOSTEC INDONESIA MANDIRI
Lingkar Selatan Street (Opposite Horison Hotel)
Office : RT 005 / RW.002 Desa Harjatani Kecamatan Kramatwatu Serang Banten
Phone : (0254) 781 - 3765 Fax : Fax : (0254) 781 - 4752

Report No. : KIM-HEI-RT-02
Inspection Date : 29 Mei 2026
Report Date : 30 Mei 2026
Page No. : 1 Of 1

Customer	: PT. HANAZONO ENGINEERINBG INDONESIA	Item Name	: PLATE
Project	: pWPS	DWG. No.	: - Rev. No. 0
Applied Spec.	: AWS D1.1	Procedure No.	: KIM-NDE-AWS-RTP-02 Rev. No. 0
Base Material Type	: SS400 to SS400 — Plate ☑ PIPE ☐	Diameter (OD) / Weld Reinforcement Thickness	: - TO - ☑ mm ☐ inch ; : 2
Base Material Thickness	: 25 to 25 ☑ mm ☐ inch	Weld Thickness	: 25 ☑ mm ☐ inch
Item Type	☑ Welding ☐ Casting	Welding Process	: ☑ SMAW ☐ SAW ☐ GMAW ☐ GTAW ☐ FCAW

γ-Ray

Type	Sentinel ☑ Ir-192 ☐ Co-60
Serial No.	HCD743
Curie	10 Ci
Source Size	3 x 3 mm

X-Ray

Manufacturer	:
Serial No.	:
kV	mA
Focal Size	x ☐ mm

Film Brand	☑ FUJI ☐ AGFA	TYPE	☐ D4 ☑ D7	FILM SIZE	☑ 4X610inch ☑ 4X15 Inch
Screen	☑ Lead ☐ Fluorescent	Front 0.125 ☑ mm ☐ inch	Back 0.125		
IQI Type	☑ ASTM ☐ KS(JIS) ☐ MIL	ID No.	☐ 1A ☐ 1C ☑ 1B ☐ 1D	IQI Placement	☐ Source Side ☑ Film Side
Source to Object Distance	406 ☑ mm ☐ inch	Exposure Time	30 Second		
Distance from Source side of object to film	381 ☑ mm ☐ inch				
Set up	Exposure ☑ Single-wall exposure ☐ Double-wall exposure				
	Viewing ☑ Single-wall viewing ☐ Double-wall viewing			Ug = 0.5	
Development	Temperature 20°C	Developing Time 3 Minutes		Film Density = 2 ~ 4	

Sketch

☑ A ☐ B ☐ C ☐ D ☐ E ☐ F

Identification No.	GRADE	RESULT ACCEPT	RESULT REJECT	Type of Defect ① P	② S	③ IP	④ LF	⑤ TI	⑥ UC	⑦ SD	⑧ RC	⑨ BT	⑩ C	⑪ SI	⑫ OT	Welder Stamp	Remarks
ROMLI / RM 0815	A-B	PASS	-														
048-PQR-HEI-AWS-MIGAS-26																	
POSITION: 3G																	

	Interpreted By	Evaluated By	Reviewed By	Client Representative
Name	Slamet			Haris T.
Designation	PCN RT Level 2			QBO 3GC
Signature				
Date	30/05/2026	14 my 30. 2026		30/05/2026

NOTE :
① P : Porosity ④ LF : Lack of Fusion ⑦ SD : Surface Defect ⑩ C : Crack
② S : Slag Inclusion ⑤ TI : Tungsten Inclusion ⑧ RC : Root Concavity ⑪ SI : Surface Indicater
③ IP : Incomplete Penetrat ⑥ UC : Undercut ⑨ BT : Burn-Through ⑫ OT : Others

HI-TEST LAB

ilac-MRA KAN Laboratorium Penguji LP-422-IDN

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

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ilac-MRA KAN Laboratorium Pengujian LP - 422 - IDN

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
		Date Tested	: 05 June 2026
Reference Code	: AWS D1.1: 2025	Test Method	: ASTM E8/E8M - 25
Sample Marking	: 6. HEI 2	Direction	: Butt Weld
Type of Test	: Tensile Welding Transverse	Page	: 2 of 3
Temperature	: 25.4 °C		

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

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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, adequate and completeness of the sample information provided by client.

vn No : HI/QAM-T/LNSSLT/MED-SEC/3 Rev.3
e results reported herein have been performed in accordance with the laboratory's terms of accreditation under Komite Akreditasi Nasional (KAN/LEC 17025:2017)

Date of Issued: 23/09/2025

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ilac-MRA KAN Laboratorium Pengu LP - 422 - IDN

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
		Date Tested	: 05 June 2026
Reference Code	: AWS D1.1: 2025	Test Method	: ASTM E190-21
Sample Marking	: 6. HEI 2	Direction	: Butt Weld
Type of Test	: Bending	Page	: 3 of 3
Temperature	: 25.4 °C		

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

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vm No : HT/QM-F/BENT/3 Rev.3
he 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 Issued: 23/09/2025

PT. voestalpine Böhler Welding Asia Pacific

PT. voestalpine Böhler Welding Asia Pacific

PT Bhinneka Bajanas

Jl. Kurang Bolong Raya No. 5
14430 Jakarta
Indonesia

Inspection certificate 3.1

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

PO no.	PO.BB-BOHLER.X.2025.075	of	14.10.2025
Order no.	1042009391		
Delivery note/pos./split	2047022999/000000/000010	of	20.11.2025
Product	covered electrode		
Trade name	**BÖHLER FOX S 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	SMAW 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				
0,09	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; Sch F

Tensile test — according to : ASTM E8
Specimen preparation — according to : AWS B4.0

	Reh / Rp 0,2	Rp 1,0	Rm	A (Lo = 4d)	Z	WBH	Remarks
	MPa	MPa	MPa	%	%	PWHT	
25°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 S 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. BHINNEKA BAJANAS

Date
26.11.2025

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

Authorized representative
Hilfan Farid

R OBO 36C,

Hans T.

voestalpine

Dipindai dengan CamScanner

KRAKATAU POSCO

Mill Test Certificate

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

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 (Mpa)	Tensile Test TS (Mpa)	Tensile Test EL (%)	Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)
19x2400x6000	PK1404145I-1407	7	14,756	SK92815	T	292	431	31	L	0.1985	0.244	0.303	0.0133	0.0071
19x2400x6000	PK1402840404-0405	2	4,228	SK92817	T	269	434	31	L	0.1983	0.245	0.289	0.0124	0.0063
*** Sub Total (019) ***		9	19,026 (kg)											
20x2400x6000	PK1404091-0907	7	15,562	SK92815	T	290	436	31	L	0.1985	0.244	0.303	0.0133	0.0071
*** Sub Total (020) ***		7	15,562 (kg)											
25x2400x6000	PK1404160I-1602	2	5,372	SK92817	T	269	434	31	L	0.1983	0.245	0.289	0.0124	0.0063
*** Sub Total (036) ***		2	5,372 (kg)											
*** Grade Total ***		18	40,160 (kg)											

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

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 ISO 10474,EN 10204 3.1.
We hereby certify that the material herein has been made in accordance with the order and above specification.
Tensile Test Results was simulated by Mechanical Properties Prediction Model based on Statistical Analysis of Historical Production Data

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

Surveyor To :

< PAGE : 4 >

Physical Testing Team Leader

WK. Falah

PT.KRAKATAU POSCO Jl. Ahlika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia