

LAMPIRAN A
CONTOH PERHITUNGAN

Lampiran A. Contoh Perhitungan

1. Perhitungan Harga Impak

$$HI = \frac{\text{Energi Impak (Joule)}}{\text{Luas Penampang (cm}^2\text{)}}$$

$$\text{Luas Penampang} = \text{panjang takik} \times \text{lebar}$$

a. Elektroda Lokal 120 Ampere

HI pada -50°C

$$\text{Luas Penampang} = 11,5 \text{ mm} \times 7,79 \text{ mm} = 87,63 \text{ mm}^2 = 0,876 \text{ cm}^2$$

$$HI = \frac{14,5 \text{ Joule}}{0,876 \text{ m}^2} = 16,54 \text{ J/cm}^2$$

HI pada -20°C

$$\text{Luas Penampang} = 10,51 \text{ mm} \times 7,83 \text{ mm} = 82,29 \text{ mm}^2 = 0,829 \text{ cm}^2$$

$$HI = \frac{53 \text{ Joule}}{0,829 \text{ m}^2} = 64,403 \text{ J/cm}^2$$

HI pada -10°C

$$\text{Luas Penampang} = 10,41 \text{ mm} \times 7,1 \text{ mm} = 73,911 \text{ mm}^2 = 0,739 \text{ cm}^2$$

$$HI = \frac{90 \text{ Joule}}{0,739 \text{ m}^2} = 121,768 \text{ J/cm}^2$$

HI pada 0°C

$$\text{Luas Penampang} = 11,04 \text{ mm} \times 7,93 \text{ mm} = 87,547 \text{ mm}^2 = 0,875 \text{ cm}^2$$

$$HI = \frac{103 \text{ Joule}}{0,739 \text{ m}^2} = 121,768 \text{ J/cm}^2$$

HI pada 20°C

$$\text{Luas Penampang} = 10,97 \text{ mm} \times 7,32 \text{ mm} = 80,300 \text{ mm}^2 = 0,803 \text{ cm}^2$$

$$HI = \frac{99 \text{ Joule}}{0,739 \text{ m}^2} = 121,768 \text{ J/cm}^2$$

b. Elektroda Lokal 155 Ampere

HI pada -50°C

$$\text{Luas Penampang} = 9,45 \text{ mm} \times 8,96 \text{ mm} = 84,672 \text{ mm}^2 = 0,846 \text{ cm}^2$$

$$\text{HI} = \frac{11 \text{ Joule}}{0,846 \text{ m}^2} = 12,991 \text{ J/cm}^2$$

HI pada -20°C

$$\text{Luas Penampang} = 10,18 \text{ mm} \times 8,18 \text{ mm} = 83,272 \text{ mm}^2 = 0,833 \text{ cm}^2$$

$$\text{HI} = \frac{18 \text{ Joule}}{0,833 \text{ m}^2} = 21,991 \text{ J/cm}^2$$

HI pada -10°C

$$\text{Luas Penampang} = 10,44 \text{ mm} \times 8,17 \text{ mm} = 85,294 \text{ mm}^2 = 0,853 \text{ cm}^2$$

$$\text{HI} = \frac{144 \text{ Joule}}{0,852 \text{ m}^2} = 168,826 \text{ J/cm}^2$$

HI pada 0°C

$$\text{Luas Penampang} = 10,2 \text{ mm} \times 8,05 \text{ mm} = 82,593 \text{ mm}^2 = 0,829 \text{ cm}^2$$

$$\text{HI} = \frac{28 \text{ Joule}}{0,829 \text{ m}^2} = 33,901 \text{ J/cm}^2$$

HI pada 20°C

$$\text{Luas Penampang} = 8,81 \text{ mm} \times 7,63 \text{ mm} = 67,220 \text{ mm}^2 = 0,6722 \text{ cm}^2$$

$$\text{HI} = \frac{105 \text{ Joule}}{0,6722 \text{ m}^2} = 132,145 \text{ J/cm}^2$$

c. Elektroda Lokal 190 Ampere

HI pada -50°C

$$\text{Luas Penampang} = 9,45 \text{ mm} \times 8,96 \text{ mm} = 84,672 \text{ mm}^2 = 0,846 \text{ cm}^2$$

$$\text{HI} = \frac{7,5 \text{ Joule}}{0,846 \text{ m}^2} = 12,991 \text{ J/cm}^2$$

HI pada -20°C

$$\text{Luas Penampang} = 9,95 \text{ mm} \times 7,62 \text{ mm} = 75,819 \text{ mm}^2 = 0,758 \text{ cm}^2$$

$$\text{HI} = \frac{22 \text{ Joule}}{0,758 \text{ m}^2} = 29,016 \text{ J/cm}^2$$

HI pada -10° C

$$\text{Luas Penampang} = 10,24 \text{ mm} \times 7,83 \text{ mm} = 80,179 \text{ mm}^2 = 0,802 \text{ cm}^2$$

$$\text{HI} = \frac{37 \text{ Joule}}{0,802 \text{ m}^2} = 46,146 \text{ J/cm}^2$$

HI pada 0° C

$$\text{Luas Penampang} = 10,33 \text{ mm} \times 7,26 \text{ mm} = 74,995 \text{ mm}^2 = 0,749 \text{ cm}^2$$

$$\text{HI} = \frac{146 \text{ Joule}}{0,749 \text{ m}^2} = 194,677 \text{ J/cm}^2$$

HI pada 20° C

$$\text{Luas Penampang} = 10,18 \text{ mm} \times 8,05 \text{ mm} = 81,949 \text{ mm}^2 = 0,8195 \text{ cm}^2$$

$$\text{HI} = \frac{76 \text{ Joule}}{0,8195 \text{ m}^2} = 92,74 \text{ J/cm}^2$$

d. Elektroda Impor 120 Ampere

HI pada -50° C

$$\text{Luas Penampang} = 7,89 \text{ mm} \times 9,99 \text{ mm} = 78,821 \text{ mm}^2 = 0,788 \text{ cm}^2$$

$$\text{HI} = \frac{8,5 \text{ Joule}}{0,788 \text{ m}^2} = 10,7839 \text{ J/cm}^2$$

HI pada -20° C

$$\text{Luas Penampang} = 9,44 \text{ mm} \times 8,33 \text{ mm} = 78,635 \text{ mm}^2 = 0,7863 \text{ cm}^2$$

$$\text{HI} = \frac{140 \text{ Joule}}{0,7863 \text{ m}^2} = 178,037 \text{ J/cm}^2$$

HI pada -10° C

$$\text{Luas Penampang} = 10,35 \text{ mm} \times 8,05 \text{ mm} = 83,3175 \text{ mm}^2 = 0,83317 \text{ cm}^2$$

$$HI = \frac{44 \text{ Joule}}{0,8331 \text{ m}^2} = 52,8110 \text{ J/cm}^2$$

HI pada 0° C

$$\text{Luas Penampang} = 9,39 \text{ mm} \times 8,5 \text{ mm} = 79,815 \text{ mm}^2 = 0,7981 \text{ cm}^2$$

$$HI = \frac{52 \text{ Joule}}{0,7981 \text{ m}^2} = 65,150 \text{ J/cm}^2$$

HI pada 20° C

$$\text{Luas Penampang} = 9,45 \text{ mm} \times 7,58 \text{ mm} = 71,631 \text{ mm}^2 = 0,7163 \text{ cm}^2$$

$$HI = \frac{120 \text{ Joule}}{0,7163 \text{ m}^2} = 167,525 \text{ J/cm}^2$$

e. Elektroda Impor 155 Ampere

HI pada -50° C

$$\text{Luas Penampang} = 9,71 \text{ mm} \times 8,05 \text{ mm} = 81,949 \text{ mm}^2 = 0,8195 \text{ cm}^2$$

$$HI = \frac{7,5 \text{ Joule}}{0,8195 \text{ m}^2} = 10,326 \text{ J/cm}^2$$

HI pada -20° C

$$\text{Luas Penampang} = 9,61 \text{ mm} \times 7,11 \text{ mm} = 68,327 \text{ mm}^2 = 0,68327 \text{ cm}^2$$

$$HI = \frac{30 \text{ Joule}}{0,68327 \text{ m}^2} = 43,906 \text{ J/cm}^2$$

HI pada -10° C

$$\text{Luas Penampang} = 8,96 \text{ mm} \times 7,6 \text{ mm} = 68,096 \text{ mm}^2 = 0,6809 \text{ cm}^2$$

$$HI = \frac{96 \text{ Joule}}{0,6809 \text{ m}^2} = 140,977 \text{ J/cm}^2$$

HI pada 0° C

$$\text{Luas Penampang} = 9,75 \text{ mm} \times 7,04 \text{ mm} = 68,64 \text{ mm}^2 = 0,6864 \text{ cm}^2$$

$$HI = \frac{53 \text{ Joule}}{0,6864 \text{ m}^2} = 77,214 \text{ J/cm}^2$$

HI pada 20° C

$$\text{Luas Penampang} = 9,42 \text{ mm} \times 7,02 \text{ mm} = 66,1284 \text{ mm}^2 = 0,6613 \text{ cm}^2$$

$$\text{HI} = \frac{146 \text{ Joule}}{0,6613 \text{ m}^2} = 220,782 \text{ J/cm}^2$$

f. Elektroda Impor 190 Ampere

HI pada -50° C

$$\text{Luas Penampang} = 10,34 \text{ mm} \times 7,31 \text{ mm} = 75,5854 \text{ mm}^2 = 0,7558 \text{ cm}^2$$

$$\text{HI} = \frac{18 \text{ Joule}}{0,7558 \text{ m}^2} = 23,8141 \text{ J/cm}^2$$

HI pada -20° C

$$\text{Luas Penampang} = 9,65 \text{ mm} \times 7,15 \text{ mm} = 68,997 \text{ mm}^2 = 0,6899 \text{ cm}^2$$

$$\text{HI} = \frac{120 \text{ Joule}}{0,6899 \text{ m}^2} = 173,919 \text{ J/cm}^2$$

HI pada -10° C

$$\text{Luas Penampang} = 8,81 \text{ mm} \times 7,15 \text{ mm} = 62,991 \text{ mm}^2 = 0,6299 \text{ cm}^2$$

$$\text{HI} = \frac{42 \text{ Joule}}{0,6299 \text{ m}^2} = 66,675 \text{ J/cm}^2$$

HI pada 0° C

$$\text{Luas Penampang} = 9,55 \text{ mm} \times 7,33 \text{ mm} = 70,0015 \text{ mm}^2 = 0,7 \text{ cm}^2$$

$$\text{HI} = \frac{53 \text{ Joule}}{0,7 \text{ m}^2} = 75,712 \text{ J/cm}^2$$

HI pada 20° C

$$\text{Luas Penampang} = 9,31 \text{ mm} \times 7,04 \text{ mm} = 65,5424 \text{ mm}^2 = 0,6554 \text{ cm}^2$$

$$\text{HI} = \frac{123 \text{ Joule}}{0,6554 \text{ m}^2} = 187,664 \text{ J/cm}^2$$

2. Perhitungan Tegangan Tarik

$$\text{Tegangan (Mpa)} = \frac{\text{Energi (Newton)}}{\text{Luas Penampang (cm}^2\text{)}}$$

a. Elektroda Lokal

- 120 Ampere

$$\text{Tensile Strength} = \frac{72,5}{0,185} = 390,54 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 390,54 * 0,102097 \text{ (konversi)} = 39,48 \text{ Kgf/cm}^2$$

$$\text{Ultimate Tensile Strength (UTS)} = \frac{92,5}{0,185} = 498 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 498 * 0,102097 \text{ (konversi)} = 50,4 \text{ Kgf/cm}^2$$

- 155 Ampere

$$\text{Tensile Strength} = \frac{72,5}{0,178} = 405 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 498,2 * 0,102097 \text{ (konversi)} = 50,37 \text{ Kgf/cm}^2$$

$$\text{Ultimate Tensile Strength (UTS)} = \frac{95}{0,178} = 531 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 531 * 0,102097 \text{ (konversi)} = 53,69 \text{ Kgf/cm}^2$$

b. Elektroda Impor

- 120 Ampere

$$\text{Tensile Strength} = \frac{77,5}{0,179} = 433 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 433 * 0,102097 \text{ (konversi)} = 43,86 \text{ Kgf/cm}^2$$

$$\text{Ultimate Tensile Strength (UTS)} = \frac{97,5}{0,179} = 546 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 546 * 0,102097 \text{ (konversi)} = 55,19 \text{ Kgf/cm}^2$$

- 155 Ampere

$$\text{Tensile Strength} = \frac{75}{0,179} = 417 \text{ Mpa}$$

$$\text{Diubah dalam Kgf/cm}^2 = 417 * 0,102097 \text{ (konversi)} = 42,23 \text{ Kgf/cm}^2$$

$$\text{Ultimate Tensile Strength (UTS)} = \frac{97,5}{0,179} = 543 \text{ Mpa}$$

Diubah dalam $\text{Kgf/cm}^2 = 543 * 0,102097$ (konversi) = 54,89 Kgf/cm^2

- 190 Ampere

$$\text{Tensile Strength} = \frac{77,5}{0,177} = 436 \text{ Mpa}$$

Diubah dalam $\text{Kgf/cm}^2 = 436 * 0,102097$ (konversi) = 44,17 Kgf/cm^2

$$\text{Ultimate Tensile Strength (UTS)} = \frac{95}{0,177} = 536 \text{ Mpa}$$

Diubah dalam $\text{Kgf/cm}^2 = 536 * 0,102097$ (konversi) = 54,14 Kgf/cm^2

LAMPIRAN B
HASIL PENELITIAN

Lampiran B. Hasil Penelitian

RUN SHEET

WPS No. : 120 / 1 / Lok 1		PQR No. : 120 / 1 / Lok 1	
TEST MATERIAL : <input checked="" type="checkbox"/> Plate <input type="checkbox"/> Pipe		TEST POSITION :	
Specification : ASTM A36		10	
Diameter :			
Heat No. :			
Thickness : 10 mm			
Plate No. :			
Dimension : 300 x 240 x 10 mm			

CONSUMABLE							
	Process	Filler Metal	Size (mm)	Brand Name	Host/Lot No.	Flux/Gas	Flux Lot
Root	SMAW	E 7016	4	Yagu			
Fill	SMAW	E 7016	4	Yagu			
Cap	SMAW	E 7016	4	Yagu			

WELDER		
Task Weld	Welder Name	Welder Stamp
Root Pass	Maerul	
Fill Weld	Maerul	
Cap	Maerul	

JOINT		
Joint Id	Butt weld	
Type	60° Degree / Side	
Groove Angle	2 mm	
Root Gap	2 mm	
Root Face		

HEAT TREATMENT		
PWHT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
PREHEATING TEMPERATURE (MIN)	50	Degree
INTERPASS TEMPERATURE (MAX)	400	Degree

GASSES		
Nozzle Size		
Shielding Gas		
Charge Gas	Type	Flow

OTHER

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Test Date

PASS SEQUENCE

Start Time	Side	Pass	Electrode		Polarity	Amperage (A)		Voltage (V)		Wire Feed Speed (mm/Min)	Travel Speed (mm/Min)	Average Heat Input (kJ/MM)	Interpass Temp (°C)	Finish Time
			Size (mm)	Type		Min	Max	Min	Max					
12.12	1	1	4	7016	REP	118	125	9.6	2.9	01.52	160.71	0.28	60°	12.38
12.40	2	1	4	7016	REP	121	128	4.2	5.8	01.38	183.69	0.2	152	13.10
13.15	3	1	4	7016	REP	122	132	2.9	4.9	01.43	174.96	0.16	132	13.48
13.50	4	1	4	7016	REP	121	133	3.3	6.2	01.31	189.43	0.19	132	14.10

Recorded By : SANDY PERMANIA

Gambar B.1 Run Sheet Welding Elektroda Lokal 120 Ampere

RUN SHEET

WPS No. : 155/2/Lokal PQR No. : 155/2/Lokal

TEST MATERIAL : Plate Pipe TEST POSITION :

Specification : ASTM A36

Diameter : _____ TO _____

Heat No. : _____

Thickness : 10 mm

Plate No. : _____

Dimension : 300 x 200 x 10 mm

CONSUMABLE

Item	Process	Filler Metal	Size (mm)	Brand Name	Heat/Lot No.	Flux/Gas	Flux Lot
Root	SMAW	E 7016	4	TaiYiKai			
Fill	SMAW	E 7016	4	TaiYiKai			
Cap	SMAW	E 7016	4	TaiYiKai			

WELDER

Item	Welder Name	Welder Stamp
Tack Weld	Haerul	
Root Pass	Haerul	
Fill Weld	Haerul	
Cap	Haerul	

JOINT

Joint Id	
Type	Butt Weld
groove Angle	60° Degree / Side
Root Gap	2 mm
Root Face	2 mm

HEAT TREATMENT

PWHT YES NO

PREHEATING TEMPERATURE (MIN) : 50° Degree

INTERPASS TEMPERATURE (MAX) : 400° Degree

GASSES

Shield Gas : _____

Tungsten Electrode : _____

Purge Gas Type : _____

Flow : _____

OTHER

Test Date :

PASS SEQUENCE

Start Time	Side	Pass	Electrode		Polarity	Amperage (A)		Voltage (V)		Wire Feed Speed (mm/min)	Travel Speed (mm/min)	Average Heat Input (kJ/mm)	Interpass Temp (°C)	Finish Time
			Size (mm)	Type		Min	Max	Min	Max					
12:10	1	1	4	7016	DCRP	147	158	3,2	4,8	01,98	166,69	0,22	60°	12:45
12:59	2	1	4	7016	DCRP	149	152	4,1	6,2	01,39	181,81	0,26	120°	13:26
13:30	3	1	4	7016	DCRP	158	168	2,8	3,9	01,50	163,69	0,2	150	13:52
14:10	4	1	4	7016	DCRP	157	158	3,2	5,3	01,28	209,51	0,15	132	14:32

Recorded By : SANDY PERMANA

Gambar B.2 Run Sheet Welding Elektroda Lokal 155 Ampere

RUN SHEET

WPS No. : 190 / 3 / Lokal		PQR No. : 190 / 3 / Lokal	
TEST MATERIAL : <input checked="" type="checkbox"/> Plate	<input type="checkbox"/> Pipe	TEST POSITION :	
Specification : ASTM A36	10	Diameter :	
Heat No. :		Thickness : 10 MM	
Plate No. :		Dimension : 500 x 100 x 10 Ang.	
CONSUMABLE			
Process : SMAW		Filler Metal : E 7016	Size (mm) : 4
Root : SMAW	Filler Metal : E 7016	Size (mm) : 4	Brand Name : TIGY Fel
Fill : SMAW	Filler Metal : E 7016	Size (mm) : 4	Brand Name : TIGY Fel
Cap : SMAW	Filler Metal : E 7016	Size (mm) : 4	Brand Name : TIGY Fel

WELDER		JOINT	
Task Weld :	Welder Name : Haeval	Welder Stamp :	Joint Id :
Root Pass :	Haeval		Type : But Weld
Fill Weld :	Haeval		Groove Angle : 60° Degree / 90°
Cap :	Haeval		Root Gap : 2 mm
			Rough Face : 2 mm

HEAT TREATMENT

PWHT YES NO

PREHEATING TEMPERATURE (MIN) : 50 Degree

INTERPASS TEMPERATURE (MAX) : 100 Degree

GASSES

Shield Gas : -

Gas Flow Rate : -

OTHER

PASS SEQUENCE

Start Time	Side	Pass	Electrode		Polarity	Amperage (A)		Voltage (V)		Wire Feed Speed (mm/Min)	Travel Speed (mm/Min)	Average Heat Input (kJ/MM)	Interpass Temp (°C)	Finish time
			Size (mm)	Type		Min	Max	Min	Max					
12.50	1	1	4	7016	DCRP	188	191	9.3	6.2	01.25	211.76	0.28	60	13.02
13.29	2	1	4	7016	DCRP	189	191	3.8	5.9	01.31	197.8	0.28	120	13.29
13.31	3	1	4	7016	DCRP	192	194	3.2	5.2	01.29	202.25	0.29	189	13.39
13.42	4	1	4	7016	DCRP	199	200	4.2	5.1	01.27	206.89	0.26	150	13.52

Recorded By : SANDY PERMANA

Gambar B.3 Run Sheet Welding Elektroda Lokal 190 Ampere

RUN SHEET

WPS No. : 120/1/Impor PQR No. : 120/1/Impor

TEST MATERIAL : Plate Pipe TEST POSITION :

Specification : ASTM A36

Diameter : -

Heat No. : -

Thickness : 10 mm

Plate No. : -

Dimension : 300 x 200 x 10 mm

CONSUMABLE

	Process	Filler Metal	Size (mm)	Brand Name	Reel/Lot No.	Flux/Gas	Flux Lot
Base	SMAW	E 7016	9	Kobelco			
Fill	SMAW	E 7016	9	Kobelco			
Cap	SMAW	E 7016	9	Kobelco			

WELDER

	Welder Name	Welder Stamp
Tack Weld	HAEFU	
Root Pass	HAEFU	
Fill Weld	HAEFU	
Cap	HAEFU	

JOINT

Joint Id : 0144 Weld

Type : Groove

Groove Angle : 60° Degree / Side

Root Gap : 2 mm

Root Face : 2 mm

HEAT TREATMENT

PHWT YES NO

PREHEATING TEMPERATURE (MIN) : 50° Degree

INTERPASS TEMPERATURE (MAX) : 400° Degree

GASSES

Nozzle Size : -

Support Diameter : -

Purge Gas : Type : -

Flow : -

OTHER

Test Date :

PASS SEQUENCE

Start Time	Side	Pass	Electrode		Polarity	Amperage (A)		Voltage (V)		Wire Feed Speed (mm/Min)	Travel Speed (mm/Min)	Average Heat Input (kJ/MM)	Interpass Temp (°C)	Finish Time
			Size (mm)	Type		Min	Max	Min	Max					
10.01	1	1	9	7016	DCEP	121	129	3.8	4.6	03.09	95.29	0.32	129	10.13
10.15	2	1	9	7016	DCEP	121	123	3.7	4.2	01.53	159.29	0.18	208	10.22
10.23	3	1	9	7016	DCEP	123	130	4	5.6	02.42	111.11	0.33	329	10.31
10.33	4	1	9	7016	DCEP	123	130	5.6	8	01.14	293.29	0.21	193	10.41

Recorded By : SANDY PERMANG

Gambar B.4 Run Sheet Welding Elektroda Impor 120 Ampere

RUN SHEET

WPS No. : 155 / 2 / Import
 TEST MATERIAL : Plate Pipe
 PQR No. : 155 / 2 / Import
 TEST POSITION :
 Specification : ASTM A36
 Diameter : -
 Heat No. : -
 Thickness : 10 MM
 Plate No. : -
 Dimension : 300 X 200 X 10 MM

Consumable	Process	Filler Metal	Size (mm)	Brand Name	Heat/Lot No.	Flux/Gas	Flux Lot
Root	SMAW	E 7016	4	Polysol			
Fill	SMAW	E 7016	4	Polysol			
Cap	SMAW	E 7016	4	Polysol			

WELDER

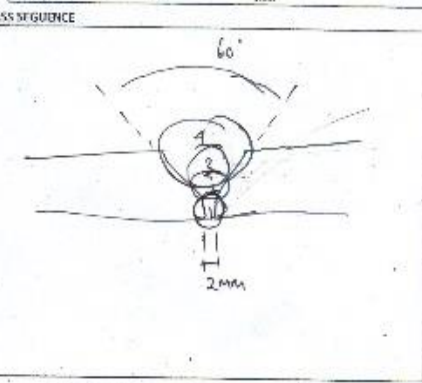
Task Weld	Welder Name	Welder Stamp
Root Pass	Marcus	
Fill Weld	Marcus	
Cap	Marcus	

JOINT

Joint Id	
Type	Butt weld
Groove Angle	60° Degree / Side
Root Gap	2 mm
Root Face	2 mm

HEAT TREATMENT

POST YES NO
 PREHEATING TEMPERATURE (MIN) : 30° Degree
 INTERPASS TEMPERATURE (MAX) : 400 Degree



GASES

Nozzle Size : -
 Tungsten Diameter : -
 Purge Gas Type : -
 Flow : -

OTHER

Test Date : -

Start Time	Side	Pass	Electrode		Polarity	Amperage (A)		Voltage (V)		Wire Feed Speed (mm/min)	Travel Speed (mm/min)	Average Heat Input (kJ/mm)	Interpass Temp (°C)	Finish Time
			Size (mm)	Type		Min	Max	Min	Max					
10.46	1	1	4	E7016	DCRP	157	157	107	149	02.07	191.93	0.73	109	10.52
11.10	2	1	4	E7016	DCRP	155	160	112	131	02.09	191.73	0.78	356	11.16
11.19	3	1	4	E7016	DCRP	155	166	140	136	02.10	130.93	0.91	235	11.31
13.50	4	1	4	E7016	DCRP	153	162	116	140	01.41	178.22	0.68	168	14.02

Recorded By : SANDY PERMANA

Gambar B.5 Run Sheet Welding Elektroda Impor 155 Ampere

Hasil Uji Impact Elektroda Impor dan Lokal						
No	Nama	Dimensi (pxlxt)(mm)	Takik (mm)	Suhu (°C)	Arus (A)	Energi (Joule)
1	Elektroda Lokal	65 x 11.25 x 9.48	7.79	-50	120	8.5
		65 x 9.45 x 9.45	7.83	-50	155	7.5
		63.64 x 8.81 x 9.7	7.1	-50	190	18
2	Elektroda Impor	65.51 x 9.99 x 9.47	7.93	-50	120	14.5
		65.9 x 9.71 x 9.61	7.32	-50	155	11
		61.57 x 10.34 x 10.07	8.96	-50	190	7.5
3	Elektroda Lokal	64.34 x 10.51 x 9.45	8.18	-20	120	140
		63.44 x 10.18 x 9.56	8.17	-20	155	30
		61.36 x 9.95 x 9.51	8.05	-20	190	120
4	Elektroda Impor	65.53 x 9.44 x 9.55	7.79	-20	120	53
		63.91 x 9.61 x 9.52	7.63	-20	155	18
		63.48 x 9.65 x 9.51	7.62	-20	190	22
5	Elektroda Lokal	64.45 x 10.41 x 9.55	7.83	-10	120	44
		64.16 x 10.44 x 9.51	7.26	-10	155	96
		61.41 x 10.24 x 9.48	8.05	-10	190	42
6	Elektroda Impor	65.36 x 10.35 x 9.36	7.89	-10	120	90
		64.6 x 8.96 x 9.53	8.33	-10	155	144
		63.48 x 8.81 x 9.38	8.05	-10	190	37
7	Elektroda Lokal	63.89 x 11.04 x 9.5	8.5	0	120	52
		64.02 x 10.26 x 9.48	7.58	0	155	53
		60.74 x 10.33 x 9.46	7.48	0	190	53
8	Elektroda Impor	65.18 x 9.39 x 9.34	7.11	0	120	103
		64.48 x 9.75 x 9.35	7.6	0	155	28
		63.39 x 9.55 x 9.46	7.04	0	190	146
9	Elektroda Lokal	64.10 x 10.97 x 9.44	7.02	20	120	120
		63.10 x 10.20 x 9.43	7.31	20	155	146
		61.09 x 10.18 x 9.45	7.15	20	190	123
10	Elektroda Impor	64.87 x 9.45 x 9.26	7.15	20	120	99
		63.57 x 9.42 x 9.33	7.33	20	155	105
		64.14 x 9.31 x 9.23	7.16	20	190	76

Gambar B.7 Data Pengujian Impact

BRIN		KEDEPUTIAN BIDANG INFRASTRUKTUR RISET DAN INOVASI					TANGGAL :			
BADAN RISET DAN INOVASI NASIONAL		DIREKTORAT PENGELOLAAN LABORATORIUM, FASILITAS RISET, DAN KAWASAN SAINS TEKNOLOGI								
		LABORATORIUM KEKUATAN STRUKTUR								
		KAWASAN PUSPIPTEK Gd. 220 SETU - TANGERANG SELATAN 15314 BANTEN								
		Telp. 08159085404 Email : lab.iks@brin.go.id								
No.	NAMA BENDA UJI	DIMENSI			PANJANG AWAL Lo (mm)	PERUBAHAN PANJANG ΔL (mm)	GAYA YIELD Fy (kgf/N/kN)*	GAYA MAKSIMUM Fm (kgf/N/kN)*	KODE / MEREK	KETERANGAN
		1 (mm)	2 (mm)	3 (mm)						
1	E 6013	19,5	9,52					Taykai 2	155 A	
2	E 6013	18,55	9,67					Taykai 2	190 A	
3	E 6013	19,09	9,37					Taykai 2	120 A	
4	E 7016	18,94	9,43					KOBE	155 A	
5	E 7016	19,04	9,43					KOBE	120 A	
6	E 7016	18,95	9,36					KOBE	190 A	
7										
8										
9										
10										

*) Coret yang tidak perlu

PERALATAN UJI :	CUSTOMER :	SAKSI :
PELAKSANA :	NO. ID :	1.
1.	STANDAR :	2.
2.	TEMPERATUR :	3.

Hasil uji ini hanya representatif dari spesimen yang diuji, di luar spesimen tersebut...

Gambar B.8 Laporan Hasil Uji Tertulis BRIN

LAPORAN UJI TARIK STATIS
TENSION TEST REPORT

<u>Pemakai Jasa</u> : PT. TAYKAI ELEKTRONICS INDONESIA	<u>Objek</u> : Sambungan Las
<u>Customer</u> : Jalan Syeh Mubarak Kp. Bugel RT. 001 RW. 004 Kec. Tigaraksa, Tangerang	<u>Object</u>
<u>No. Kontrak</u> : KM-LUJK.89915/2023	<u>Material</u> : Baja
<u>Contract Nr</u>	<u>Material</u>
<u>No Laporan</u> : 0367.LTKS/K.89915/2023	<u>Standar</u> : SNI 8389:2017
<u>Report Nr</u>	<u>Standard</u>
<u>Tanggal</u> : 30 Agustus 2023	<u>Mesin Uji</u> : UPM 1000
<u>Date</u>	<u>Test Machine</u>

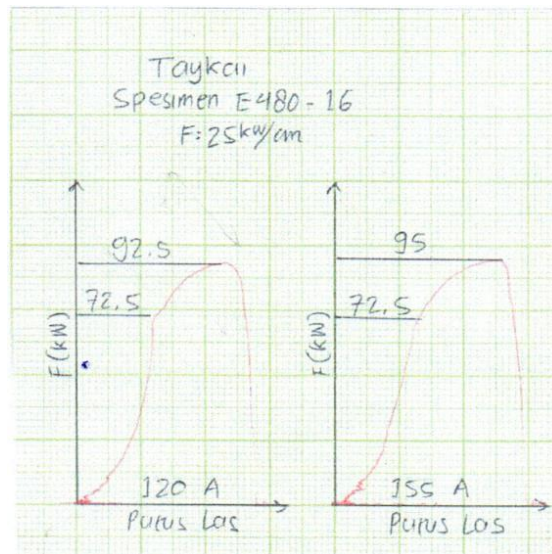
No	Dimensi (mm)		Ao (mm ²)	Fy (kN)	Fm (kN)	σ_y		σ_u		Kode	Keterangan
	Lebar	Tebal				(N/mm ²)	(kgf/cm ²)	(N/mm ²)	(kgf/cm ²)		
1	18,87	9,78	184,55	60,0	85,0	325	3314	461	4695	Sambungan las Pelat, E420-13 120A	Putus di lasan
2	19,62	9,24	181,29	72,5	90,0	400	4077	496	5061	Sambungan las Pelat, E420-13 190A	Putus di lasan
3	19,15	9,33	178,67	72,5	92,5	406	4136	518	5277	Sambungan las Pelat, E480-16 120A	Putus di lasan
4	19,40	9,23	179,06	72,5	95,0	405	4127	531	5408	Sambungan las Pelat, E480-16 155A	Putus di lasan

Keterangan :

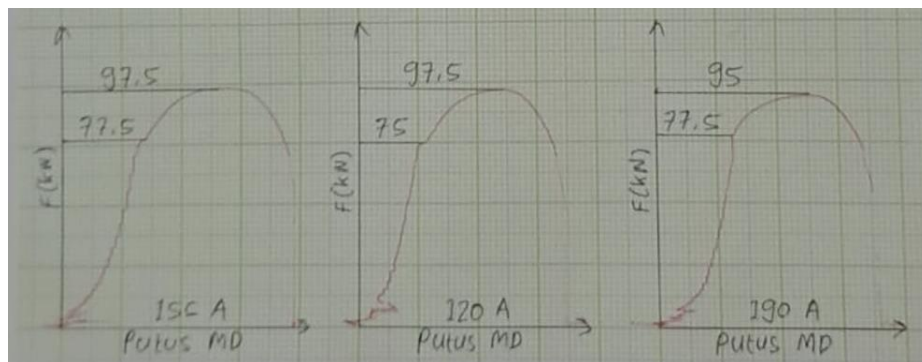
Ao = Luas penampang	Fm = Beban tarik	σ_y = Kuat luluh
Fy = Beban luluh		σ_u = Kuat tarik

- Kode yang tercantum berasal dari Customer.
- Hasil uji hanya representatif batang uji yang diuji, di luar batang uji tersebut bukan tanggung jawab Laboratorium Teknologi Kekuatan Struktur (Lab. TKS) BRIN.

Gambar B.9 Laporan Hasil Uji Statis BRIN



Gambar B.10 Grafik Uji Tarik Pada Elektroda Lokal



Gambar B.11 Grafik Uji Tarik Pada Elektroda impor



(a)



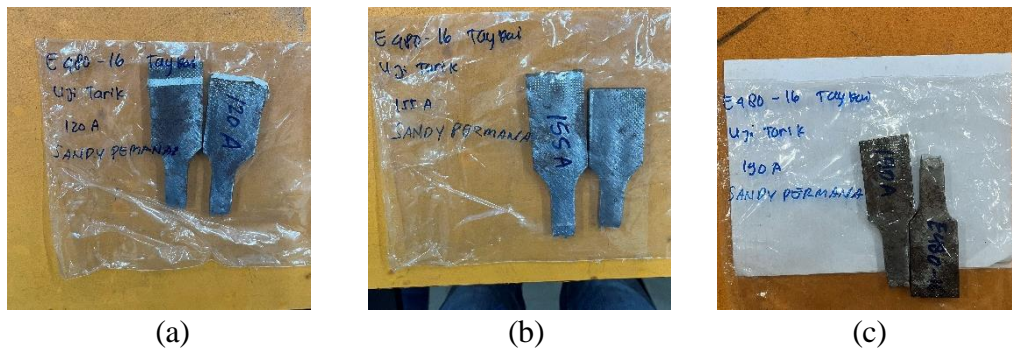
(b)



(c)

Gambar B.12 Hasil Karakterisasi Uji Tarik Elektroda Lokal

(a) 120 A (b) 155 A (c) 190A



Gambar B.13 Hasil Karakterisasi Uji Tarik Elektroda Impor
(a) 120 A (b) 155 A (c) 190A

BADAN RISET DAN INOVASI NASIONAL
 DIREKTORAT PENGELOLAAN LABORATORIUM, FASILITAS RISET,
 DAN KAWASAN SAINS TEKNOLOGI
 LABORATORIUM TEKNOLOGI KEKUATAN STRUKTUR
 KAWASAN PUSPIPEK Gd. 220 SETU - TANGERANG SELATAN 15314 BANTEN

FORMULIR PENGUJIAN TEKUK
TANGGAL :

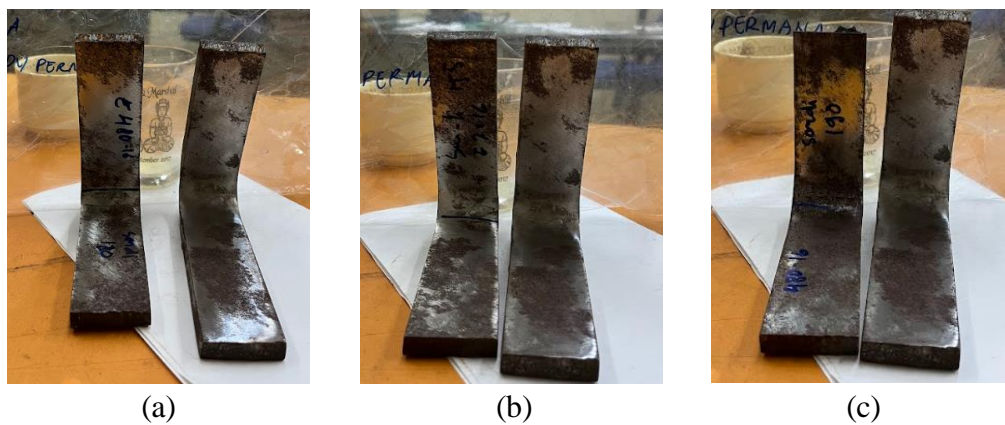
No.	NAMA BENDA UJI	DIMENSI (mm)	DIAMETER PELENGKUNG (mm)	SUDUT TEKUK (°)	KODE / MEREK	PENAMPILAN	KETERANGAN
1	E 480 - 16 / 120A	38.96 / 9.48		120	tay kei	Tidak Retak	Sancti Permana
2	190 A	38.75 / 9.43		"	"	Tdk Retak	"
3	155 A	37.36 / 9.48		"	"	Tdk Retak	"
4	E 7016 / 190A	37.73 / 9.54		"	"	Tdk Retak	"
5	120 A	39.39 / 9.50		"	"	Tdk Retak	"
6	155 A	38.31 / 9.40		"	"	Tdk Retak	"
7	E 6013 155A	38.69 / 9.73		"	" 2	Tdk Retak	"
8	190A	38.80 / 9.83		"	Kobe 10	Retak !	"
9							
10							

PERALATAN UJI :
 PELAKSANA :
 1.

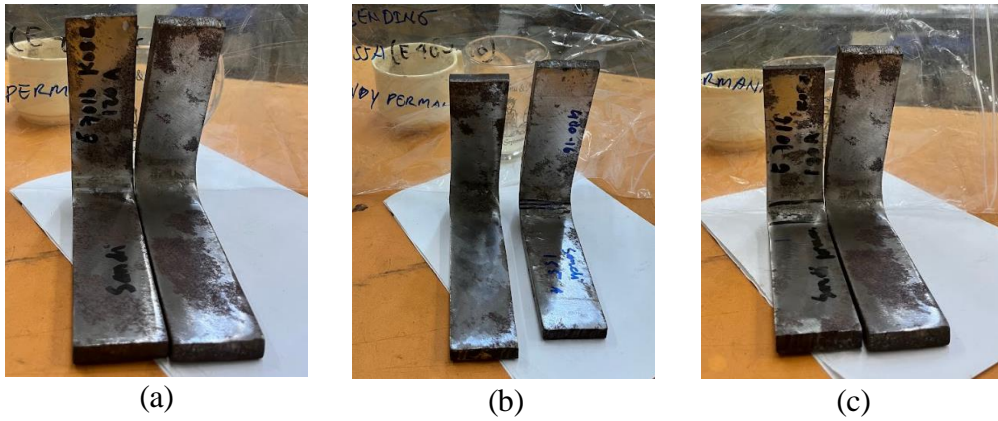
CUSTOMER :
 NO. ID :
 STANDAR :
 TEMPERATUR :

SAKSI :
 1.
 2.
 3.

Gambar B. 14 Hasil Pengujian *Bending* Tertulis BRIN



Gambar B.15 Hasil Karakterisasi *Bending* Elektroda Lokal (a) 120 A (b) 155 A (c) 190A



Gambar B.16 Hasil Karakterisasi *Bending* Elektroda Impor (a) 120 A (b) 155 A (c) 190A

LAMPIRAN C
GAMBAR ALAT DAN BAHAN



Gambar C.1 Alat Uji XRF



Gambar C.2 Alat Uji *Bending*



Gambar C.3 Alat Uji *Impact*



Gambar C.4 Alat Uji OM



Gambar C.5 Alat Uji Tarik



Gambar C.6 Mesin Las SMAW



Gambar C.7 Tang Ampere



Gambar C.8 Mesin Gerindra



Gambar C.9 Palu



Gambar C.10 Mesin Las *Cutting*



Gambar C.11 *Welding Gauge*



Gambar C.12 Meja Las



Gambar C.13 Sarung Tangan



Gambar C.14 Kacamata Las



Gambar C.15 Apron Las



Gambar C.16 Kertas Amplas



Gambar C.17 Pelat ASTM A36



Gambar C.18 Elektroda Lokal



Gambar C.19 Elektroda Impor



Gambar C.20 Pasta Alumina