


LAMPIRAN

1. Sertifikat keaslian material



NIPPON STEEL

NIPPON STEEL CORPORATION
 KAKAYAMA WORKS (KAKAYAMA AREA)
 260-100, FUNDO, KAKAYAMA, JAPAN

INSPECTION CERTIFICATE

CERTIFICATE NO. :BYYP6948 PAGE : 1/2 DATE :2020-02-14

CUSTOMER :
 ORDER NO. :
 SHIPPER :NIPPON STEEL TRADING CORPORATION 111 5253-ANJ9235 0-842-N3-5-3-H117-03
 COMMODITY :SEAMLESS HOT FINISHED CARBON STEEL LINE PIPE
 STANDARD :API 5L GR.1245 PSL 1(40TH ED., APR. 2018)
 API 5L GR.1245 PSL 1(40TH ED., APR. 2018)
 ASTM A106M-18 / ASME 2017 EDITION SA-106M GR.B
 ASTM A53M-18 / ASME 2017 EDITION SA-53M GR.B

SPECIFICATION :
 MILL WORK NO. :BYYP6948 O. D. :168.3mm W. T. :7.11mm LENGTH:11800mm QUANTITY:216pcs.
 MASS:238428kg

HEAT NO. :JOL1644 JOL1647 JOLC143
 PRODUCTS PCS. :611 103 2

HEAT TREATMENT :AS ROLLED

CHEMICAL COMPOSITION(%)

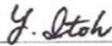
		*1	C S I Mn P S Cu Cr Ni Mo Ti V Nb B *E4 *VN *VI *CEQ																
			%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
SPEC. MIN.	R		-	10	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAX.	R		21	106	30	10	40	40	40	15	-	8	-	1	100	6	15	42	
HEAT NO.																			
JOL1644	L		18	29	100	22	4	1	5	2	1	9	0	10	0	9	1	2	36
	P		16	26	99	20	3	2	5	2	1	9	0	7	0	10	1	2	34
	P		16	27	98	20	3	2	6	2	1	9	0	7	0	11	1	2	34
	P		16	27	99	20	3	2	6	2	1	9	0	9	0	11	1	2	34
	P		16	26	99	19	3	2	5	2	1	9	0	8	0	10	1	2	34
	P		17	27	97	19	3	2	6	2	1	9	0	8	0	11	1	2	35
	P		17	27	97	20	3	2	6	2	1	8	0	7	0	11	1	2	35
	P		16	27	97	20	3	2	6	2	1	8	0	9	0	11	1	2	34
	P		16	27	97	20	3	2	6	2	1	8	0	7	0	11	1	2	34
JOL1647	L		18	30	100	14	4	1	4	2	1	9	0	11	0	8	1	2	36
	P		16	28	99	15	3	2	5	2	1	8	0	9	0	10	1	2	34
	P		16	28	99	15	3	2	6	2	1	8	0	10	0	11	1	2	34
JOLC143	L		18	28	97	15	4	2	5	3	1	8	0	10	0	11	1	2	36
	P		16	26	97	14	4	3	5	3	1	8	0	9	0	12	1	2	34
	P		16	26	96	14	4	3	5	3	1	8	0	8	0	12	1	2	34

*1 R:LADLE & PRODUCT ANALYSIS L:LADLE ANALYSIS P:PRODUCT ANALYSIS *2:X1000 OTHER:X100 *U1:Cu+Ni+Cr+Mo+V
 *VN:Nb+V *VI:Nb+V+Ti *CEQ:(C+Mn)/6+(Cr+Mo+Ti)/5+(Cu+Ni)/18

TENSILE TEST

		*1 *2		YS	TS	EL	
		#3	#3	#3	#3	%	
SPEC. MIN.	L B	M	M	290	M	415	24
MAX.	L B	M	M	-	M	-	-
HEAT NO.							
JOL1644	L B	M	M	350	M	510	36

WE HEREBY CERTIFY THAT THE MATERIAL SPECIFIED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE TERMS OF THIS CERTIFICATE



YUJIN ITO
 HEAD OF DEPARTMENT
 QUALITY ASSURANCE DEPARTMENT

(An Important Message To Our Customers) NO.182168X20
 This certification is intended only for products listed. Modification to or unauthorized use of this certification
 is strictly prohibited. Offences may be regarded as forgery of documents and be subject to criminal prosecution.
 If you have any questions on this certification, you can contact us by facsimile or e-mail as shown below.
 Fax. No. : +81-3-6667-8926 E-mail:pipe-ipp@jp.nipponsteel.com

2. Lampiran Dokumen Bukti Pengujian



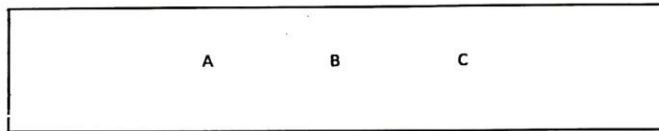
LABORATORIUM MATERIAL TEKNIK
FAKULTAS TEKNIK MESIN
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA



Nama Mahasiswa : Fahad. Purnawan, Nawang MF
NBI : 1721800080 1721800125
Tanggal Pengujian : 22 April 2022

DATA HASIL PENGUJIAN KEKERASAN ROCKWELL

Material : Baja karbon ASTM A102
Metode : Rockwell
Indentor : Diamond Cone
Jumlah Beban : 150 kg



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Temple CoS	A	150 kg	Diamond Cone	56.5	56.5
	B			56.5	
	C			56.5	

Surabaya, 22 April 2022
Aslab Material



LAB. KOGAM
UNTAG 45
SURABAYA

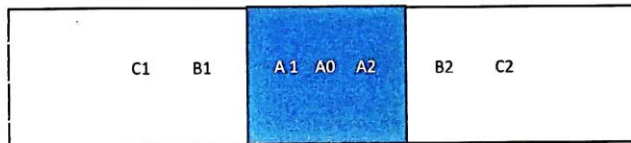
[Handwritten signature]
mulyadi



Nama Mahasiswa : Fahad Fauzan . Noman NF
NPM : 1911800080 141800125
Tanggal Pengujian : 22 April 2022

DATA HASIL PENGUJIAN KEKERASAN ROCKWELL

Material : Baja karbon ASTM A106
Metode : Rockwell
Indentor : Diamond cone
Jumlah Beban : 50 kg



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 1 15 A	C1	50 kg	Diamond cone	58	56,7
	B1			59	
	A1			57	
	A0			56,5	
	A2			53	
	B2			57	
	C2			56,5	

Surabaya,



Aslab Material

LAB. LOGAM
UNTAG 45
SURABAYA



LABORATORIUM MATERIAL TEKNIK
FAKULTAS TEKNIK MESIN
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 2 15 A	C ₁	150 kg	Diamond Cone	57	57
	B ₁			60	
	A ₁			57,5	
	A ₀			57	
	A ₂			5A	
	B ₂			58	
	C ₂			55,5	

Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 3 15 A	C ₁	150 kg	Diamond Cone	57,5	57
	B ₁			60	
	A ₁			55	
	A ₀			57,5	
	A ₂			58	
	B ₂			57,5	
	C ₂			57,5	

Surabaya,

Acilah Material



LAB. LOG
UNTAG 1945
SURABAYA



LABORATORIUM MATERIAL TEKNIK
FAKULTAS TEKNIK MESIN
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 1 20 A	C ₁	150 kg	Diamond Cone	59,5	59,9
	B ₁			60	
	A ₁			60,5	
	A ₀			59	
	A ₂			60	
	B ₂			58	
	C ₂			59	

Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 2 20 B	C ₁	150 kg	Diamond Cone	58,5	59
	B ₁			60	
	A ₁			59	
	A ₀			58	
	A ₂			58	
	B ₂			59,5	
	C ₂			60	

Surabaya,

Aslab Material



LAB. LOGAM
UNTAG 45
SURABAYA

[Handwritten Signature]
Mulyadi



LABORATORIUM MATERIAL TEKNIK
FAKULTAS TEKNIK MESIN
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 3 10A	C ₁	150 kg	Diamond cone	61	57,2
	B ₁			57	
	A ₁			56	
	A ₀			56	
	A ₂			55,5	
	B ₂			55,5	
	C ₂			59,5	

Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 1 25 A	C ₁	150 kg	Diamond cone	60	60,6
	B ₁			62,5	
	A ₁			61	
	A ₀			61	
	A ₂			58	
	B ₂			62	
	C ₂			60	

Surabaya,

Asiab Material



LAB 1



LABORATORIUM MATERIAL TEKNIK
FAKULTAS TEKNIK MESIN
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA



Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 2 25 A	C ₁	150 kg	Diamond Cone	57	57,9
	B ₁			58,5	
	A ₁			57	
	A ₀			58	
	A ₂			56,5	
	B ₂			58,5	
	C ₂			60	

Spesimen	Titik	Beban (kg)	Indentor	Kekerasan (HRC)	Rata-Rata (HRC)
Spesimen 3 25 A	C ₁	150 kg	Diamond Cone	58	59,4
	B ₁			59	
	A ₁			59	
	A ₀			59,5	
	A ₂			60,5	
	B ₂			61,5	
	C ₂			58,5	

Surabaya,

Aslab Material



LAB. LOGAM
UNTAG 15
SURABAYA

Tanya lar



LABORATORIUM MATERIAL TEKNIK
TEKNIK MESIN UNTAG'45- SURABAYA
DATA UJI TARIK



NAMA	: Fahad Karadahan, Hanang NP
Tanggal Pengujian	: 22-04-2022
NBI	: K2180080, K2180085

DATA HASIL PENGUJIAN TARIK

BENDA UJI	ASTM A105		
Diameter Awal D_0 (mm)			
Luas Penampang A_0 (mm)	152 mm		
Panjang Ukur			
. Awal, L_0 (mm)	60 mm		
. Akhir, L_f (mm)	75 mm		
. ΔL Max (Pertambahan Panjang)	15 mm		
Beban Luluh (Kg)	7243,2		
Beban Masimum (Kg)	8375		
Beban Putus (Kg)	7545		
Tegangan Luluh (kg/mm ²)	47,65		
Tegangan Max (Kg/mm ²)	55,1		
Diameter Setelah Patah	36 mm		

Tegangan putus (kg/mm²) 49,63

Surabaya, 22 April 2022

AS. Lab. Material Teknik

LAB. UN
STIP

15



LABORATORIUM MATERIAL TEKNIK
TEKNIK MESIN UNTAG '45- SURABAYA
DATA UJI TARIK



NAMA : Fahad Lamadhan, Nanang N.F
 Tanggal Pengujian :
 NBI : 1421800080, 1421800125

DATA HASIL PENGUJIAN TARIK

BENDA UJI	15-7-13	15-7-13	15-7-13
Diameter Awal D_0 (mm)			
Luas Penampang A_0 (mm)	152	152	152
Panjang Ukur			
. Awal, L_0 (mm)	60 mm	60	60
. Akhir, L_f (mm)	70 mm	68	70
. ΔL Max (Pertambahan Panjang)	10 mm	8	10
Beban Luluh (Kg)	6472,36	5979,2	6000
Beban Masimum (Kg)	7225 kg	7175 kg	7275 kg
Beban Putus (Kg)	6622,88	6577,12	6750
Tegangan Luluh (kg/mm ²)	42,58	39,33	39,47
Tegangan Max (Kg/mm ²)	47,53	47,20	47,86
Diameter Setelah Patah <small>(Luas Penampang Awal A_0)</small>	52	65	52

Rok

Tegangan putus (kg/mm²) : 43,57 : 43,27 : 44,40

Surabaya, 22 April 2022
 AS. Lab. Material Teknik



LAB. LOGAM
 UNTAG 45
 SURABAYA

[Handwritten Signature]
 Mulyono

20



LABORATORIUM MATERIAL TEKNIK
TEKNIK MESIN UNTAG'45- SURABAYA
DATA UJI TARIK

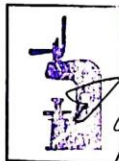


NAMA : _____
 Tanggal Pengujian : _____
 NBI : _____

DATA HASIL PENGUJIAN TARIK

BENDA UJI	ASTM A106 A	ASTM A106 B	ASTM A106 C
Diameter Awal D_0 (mm)			
Luas Penampang A_0 (mm)	152	152	152
Panjang Ukur			
. Awal, L_0 (mm)	60	60	60
. Akhir, L_f (mm)	70	68	66
. ΔL Max (Pertambahan Panjang)	10	8	6
Beban Luluh (Kg)	6127,2	5702,25	5605
Beban Masimum (Kg)	7200 Kgf.	7375 Kgf.	5775 Kgf.
Beban Putus (Kg)	6586,74	7222,85	3773
Tegangan Luluh (kg/mm ²)	40,31	37,51	32,93
Tegangan Max (Kg/mm ²)	47,37	48,52	37,99
Diameter Setelah Patah	52	56	80
Tegangan putus (kg/mm ²)	43,33	47,52	24,82

Surabaya, 22 April 2022
 AS. Lab. Material Teknik



LAB. LOGAM
 UNTAG '45
 SURABAYA

[Handwritten Signature]

25.



LABORATORIUM MATERIAL TEKNIK
TEKNIK MESIN UNTAG'45- SURABAYA
DATA UJI TARIK



NAMA : _____
 Tanggal Pengujian : _____
 NBI : _____

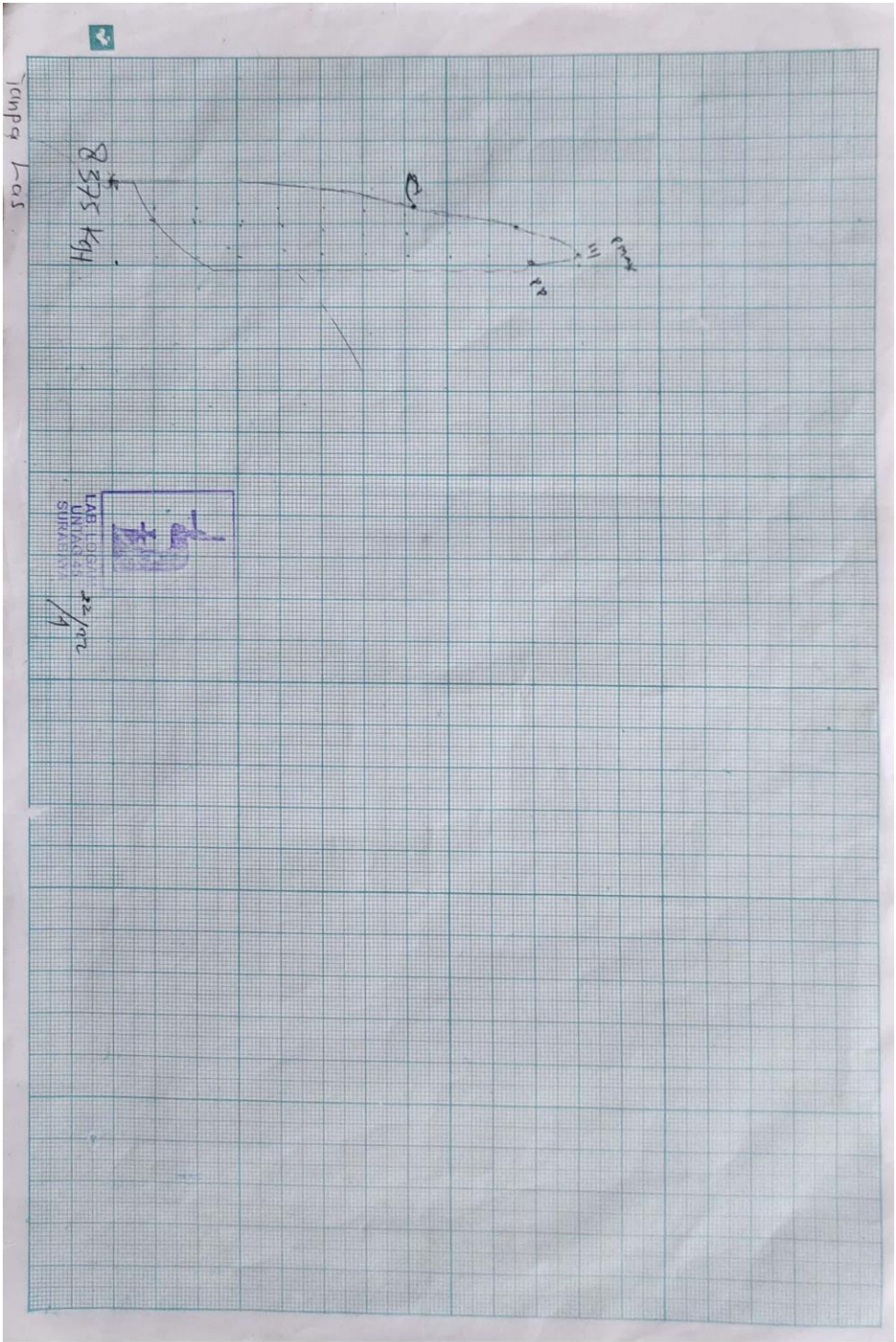
DATA HASIL PENGUJIAN TARIK

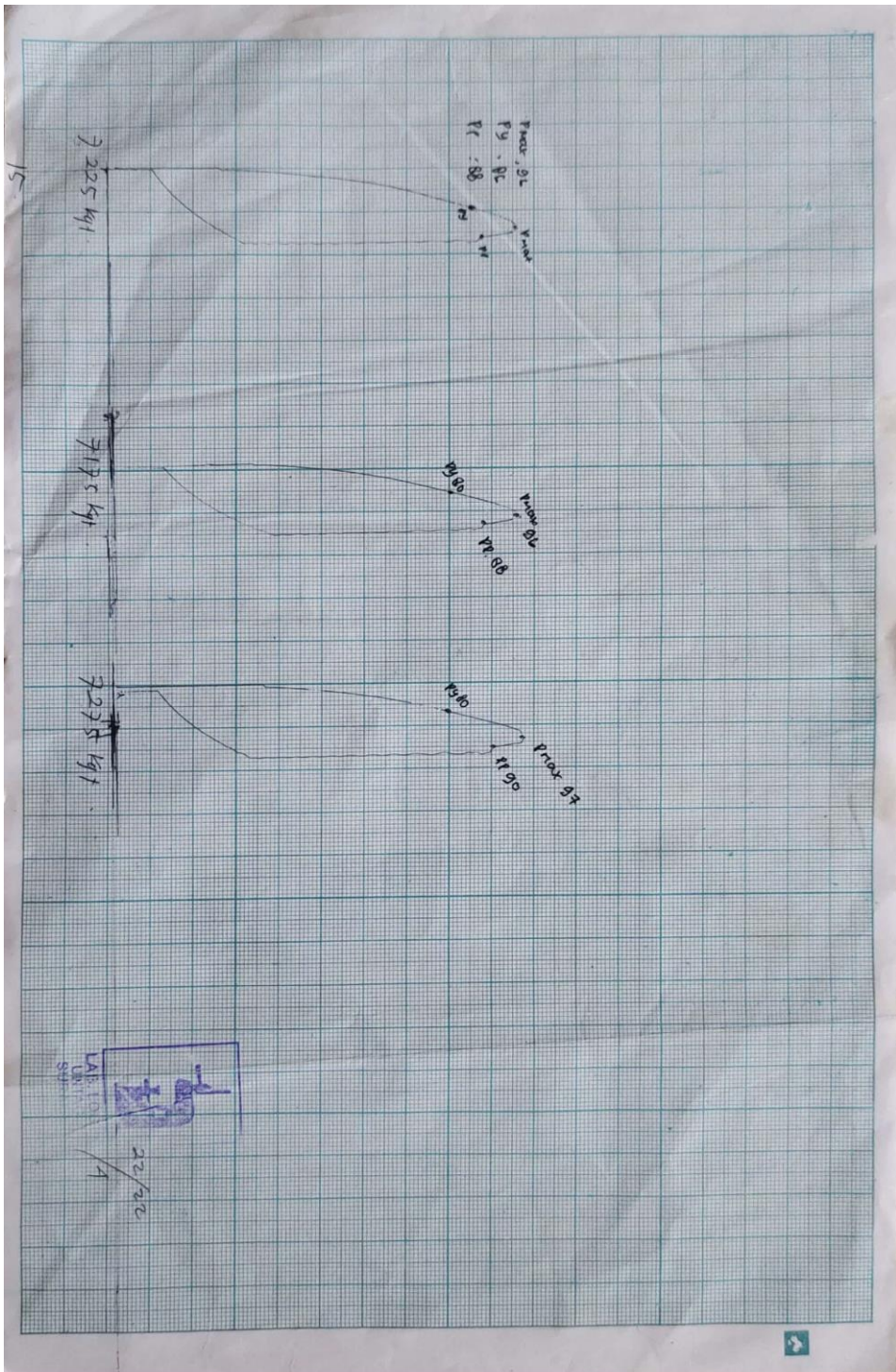
BENDA UJI	ASTM A106 A	ASTM A106 B	ASTM A106 C
Diameter Awal D_0 (mm)			
Luas Penampang A_0 (mm)	152	152	152
Panjang Ukur			
. Awal, L_0 (mm)	60	60	60
. Akhir, L_f (mm)	67	65	68
. ΔL Max (Pertambahan Panjang)	7	5	8
Beban Luluh (Kg)	6109,6	5011,5	6890
Beban Masimum (Kg)	6950 kgf	6415 kgf	7600 kgf
Beban Putus (Kg)	5809,12	5479,1	7220
Tegangan Luluh (kg/mm ²)	40,19	32,97	45
Tegangan Max (Kg/mm ²)	45,72	42,60	50
Diameter Setelah Patah A_1	80	85	70
Tegangan putus (kg/mm ²)	38,19	36,01	47,5


Surabaya, 22 April 2022
AS. Lab. Material Teknik

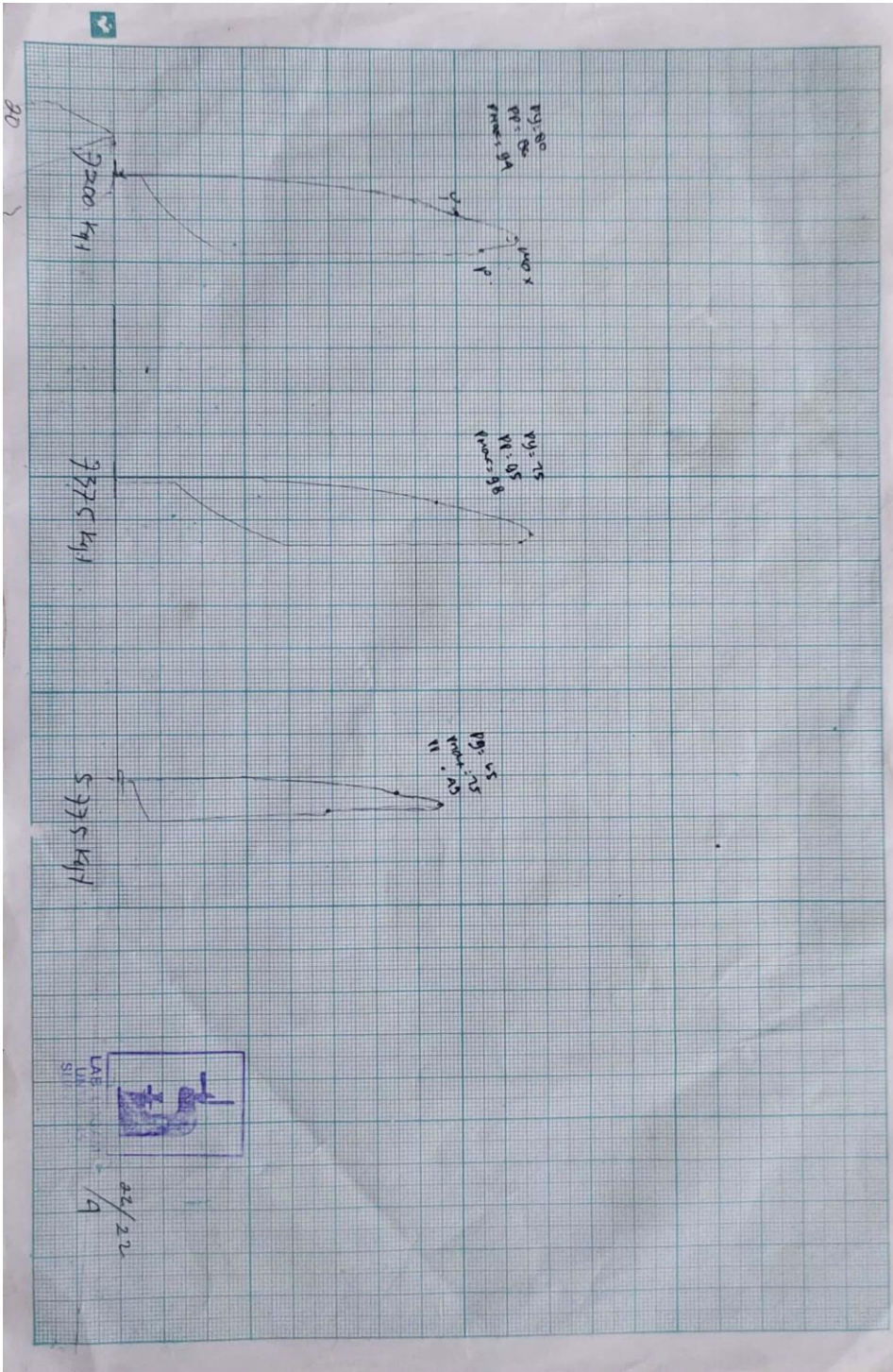


LAB. LOGAM
UNTAG 45
SURABAYA






 22/22
 22/22
 22/22



25

6950 kgf

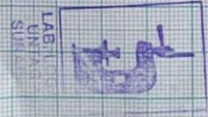
$P_1 = 46$
 $P_2 = 10$
 $P_{max} = 81$

6975 kgf

$P_1 = 70$
 $P_2 = 55$
 $P_{max} = 84$

7600 kgf

$P_1 = 55$
 $P_2 = 90$
 $P_{max} = 100$



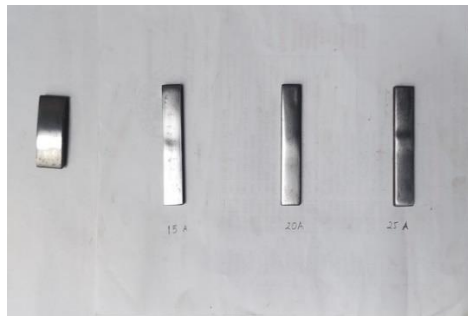
22/2/20
A

3. material dan specimen

A



B



C



D



keterangan : **A.** Material baja karbon ASTM A106. **B.** Spesimen untuk pengujian mikro. **C.** Spesimen untuk pengujian tarik. **D.** Spesimen untuk pengujian kekerasan

4. Proses Pengelasan Metal Inert Gas (MIG)

A



B



C



Keterangan : A. Mesin Las MIG 350C. B. Kawat filler ER70S-6. C. Proses Pengelasan

5. Proses Pengujian Tarik

A



B



Keterangan : A. Mesin Pengujian Tarik. B. Proses Pengujian Tarik

5. Proses Pengujian Kekerasan

A



B



C



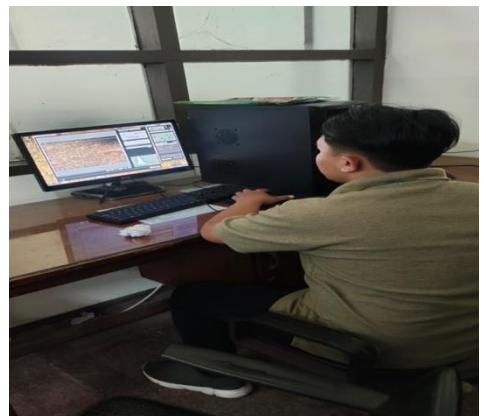
Keterangan : A. Mesin uji kekerasan metode rockwell. B. Beban dan Indentor diamond cone. C. Proses pengujian kekerasan metode rockwell

6. Proses Pengujian Struktur Mikro

A



B



Keterangan : A. Larutan Pembersih dan larutan Nitric Acid. B. Proses pengujian struktur mikro.