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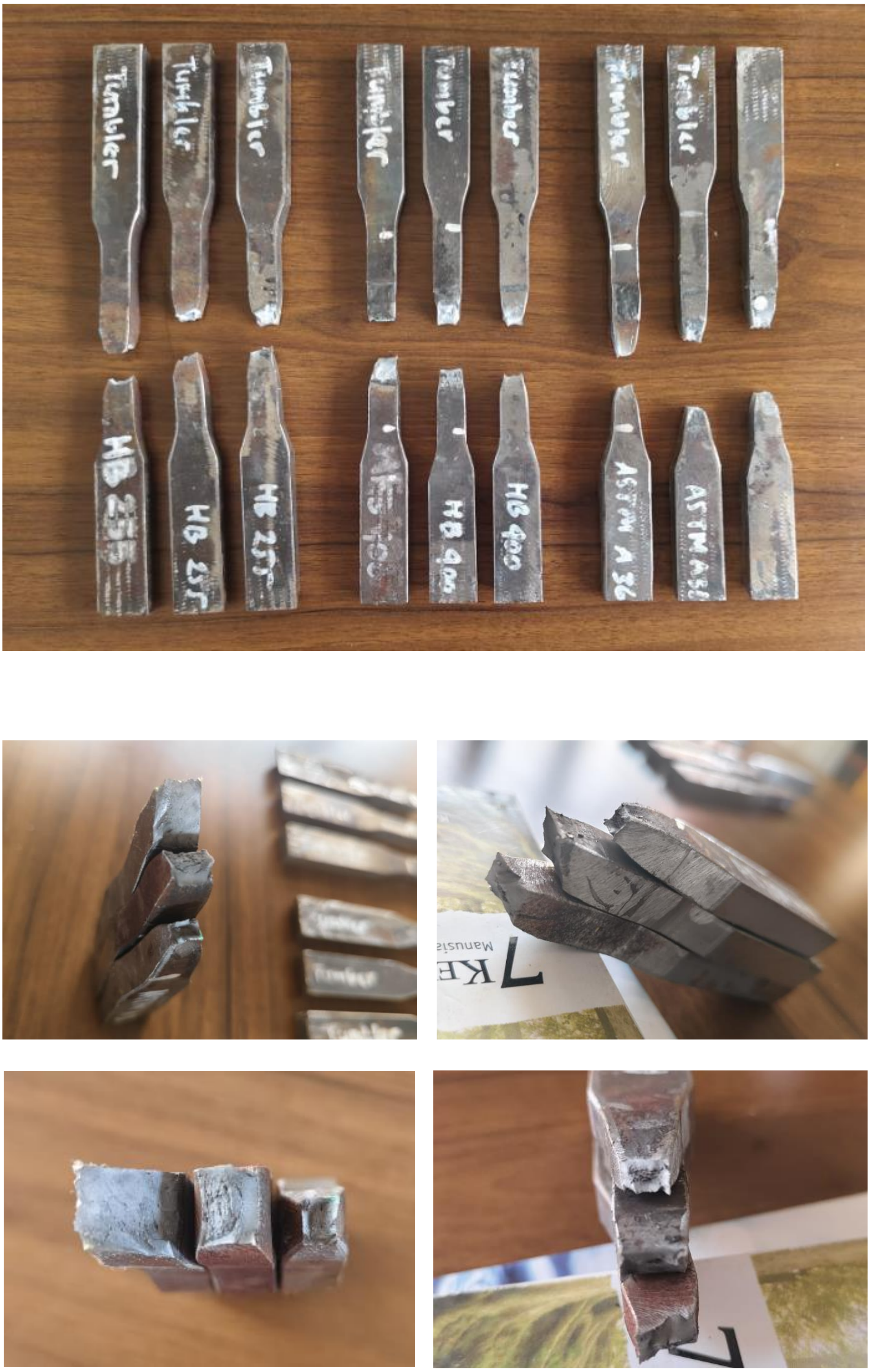
LAMPIRAN

Lampiran 1 Dokumentasi Uji Tarik

Gambar 1. Specimen Uji Tarik



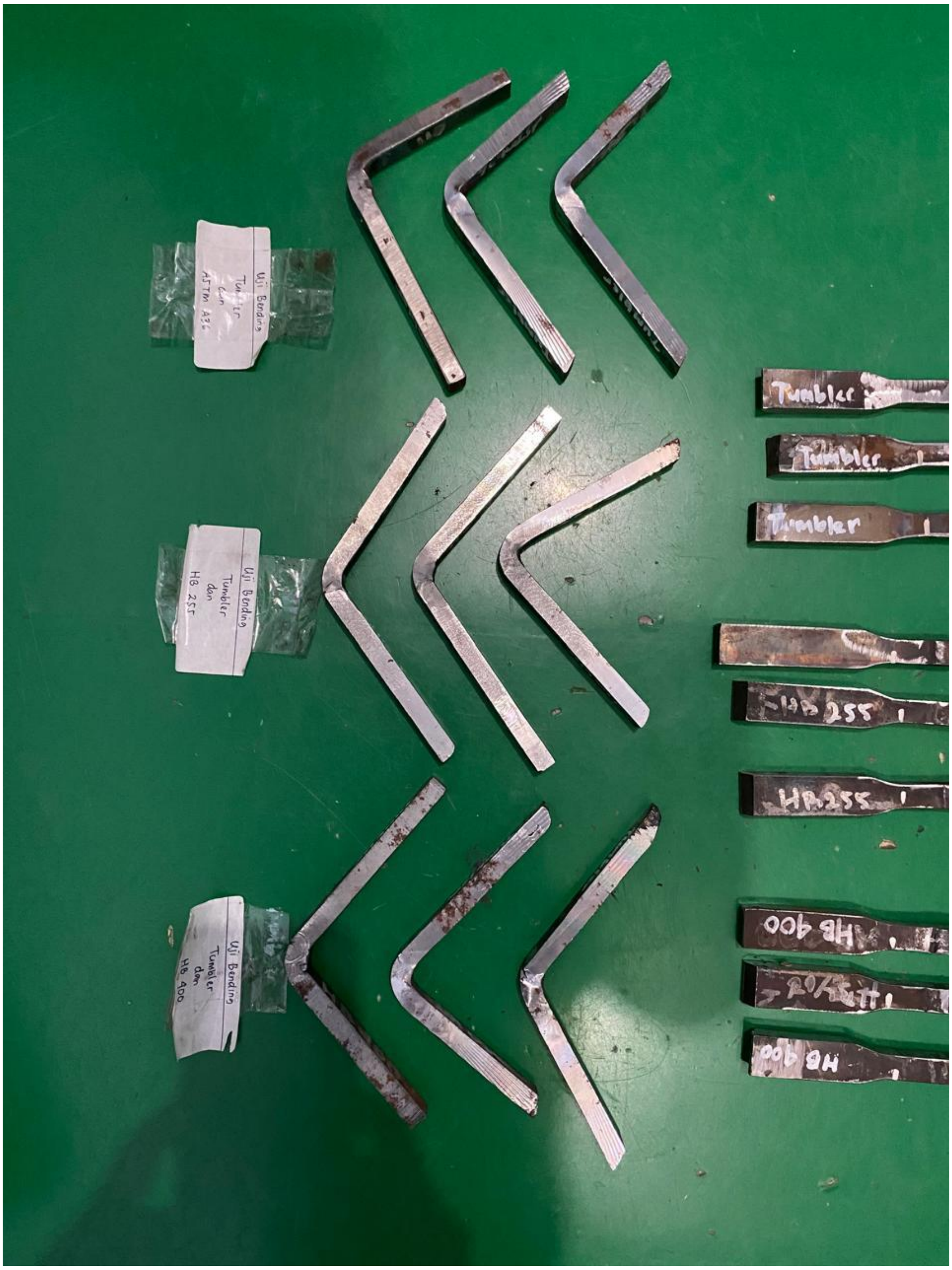
Gambar 2.Spesimen hasil uji Tarik (LAB.UGM Yogyakarta)

Gambar 3 Alat uji Tarik (Lab.UGM Yogyakarta

Gambar 4.Proses uji Tarik (Lab.UGM Yogyakarta)

Lampiran 2 Dokumentasi Uji Bending

Gambar 5 Proses Uji Bending (Lab.UGM Yogyakarta)



Gambar 6. Hasil uji bending (Lab UGM Yogyakarta)

Lampiran 3 Dokumentasi Uji kekerasan

Gambar 7.Alat ukur uji kekerasan (Lab.Ugm Yogyakartya)

Gambar 8. Proses uji kekerasan (Lab.UGM Yogyakarta)

Gambar 9. Alat ukuruji kekerasan (Lab.UGM Yogyakarta)

Lampiran 4 Dokumentasi informasi pengelasan

4778785

BADAN NASIONAL
SERTIFIKASI PROFESI
INDONESIAN PROFESSIONAL
CERTIFICATION AUTHORITY

SERTIFIKAT KOMPETENSI
CERTIFICATE OF COMPETENCE

No. 29860 7142 01 0008785 2022

Dengan ini menyatakan bahwa:
This is to certify that:

ENOS LULU BOROLANGI
No.Reg.LOG. 202.08785 2022

Telah kompeten pada bidang:
Is competent in the area of:

Pabrikasi
Fabrication

Dengan Kualifikasi / Kompetensi :
with Qualification/Competency:

Las SMAW/FCAW
(6G)

Sertifikat ini berlaku untuk : 3 (tiga) Tahun
This certificate is valid for : 3 (three) Years

Jakarta, 14 Januari 2022

Atas nama BNSP/ *On behalf of* BNSP
Indonesian Professional Certification Authority
Lembaga Sertifikasi Profesi LSP K3 OSHE Nusantara
K3 OSHE Nusantara Professional Certification Body

Parwito Wignyosumarto, M.Si
Ketua
(Chairman)

Scanned with MOBILE SCANNER

Gambar 10.Sertifikat kompetensi BNSP/LSP Welder

Daftar Unit Kompetensi

List of Units of Competency

No.	Kode Unit Kompetensi *Code of Competency Unit*	Judul Unt Kompetensi *Title of Competency Unit*
1.	LOG.OO.01.002.01	Menerapkan prinsip - prinsip keselamatan dan kesehatan kerja di lingkungan kerja Apply principles of OH & S in work environment
2.	LOG.OO.01.003.01	Menerapkan prosedur - prosedur mutu Apply quality procedures
3.	LOG.OO.02.005.01	Mengukur dengan menggunakan alat ukur Measure with graduated devices
4.	LOG.OO.09.001.01	Menggambar dan membaca sketsa Draw and interpret sketch
5.	LOG.OO.18.002.01	Menggunakan perkakas bertenaga/operasi digenggam Use power tools/ hand operations
6.	LOG.OO.05.016.01	Mengelas tingkat lanjutan dengan proses las busur metal secara manual Perform advanced welding using manual metal arc welding process Mengelas pipa sambungan tumpul V-Groove, posisi multiple 45°(6-G/H-LO45) Proses Las Busur, Manual SMAW/FCAW Terampil; Material pipa baja karbon Sch. 80 x 6" x Min. 125mm sudut bevel 30° Elektroda : E 7010 Ø 1,2 mm & E 71T Ø 1,2 mm Pengujian hasil las : Visual Test

ENOS LULU BOROLANGI
Tanda Tangan Pemilik
Signature of holder

Jakarta, 14 Januari 2022
LSP K3 OSHE Nusantara
K3 OSHE Nusantara Professional Certification Body

Sri Enggarwati, SE,MBA
Manager Sertifikasi
Certification Manager

Gambar 11.Nilai sertifikat kompetensi BNSP/LSP Welder

Gambar 12.Kartu sertifikat kompetensi welder

Lampiran 1 Hasil Uji Lab

LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN TARIK

No.	Variasi Spesimen	Tebal (mm)	Lebar (mm)	Pmax (KN)	ΔL (mm)	Tegangan (MPa)	Regangan (%)
1	TB_ASTM A36_1	9.85	12.10	58.73	9.84	492.76	19.68
2	TB_ASTM A36_2	10.75	11.75	58.00	10.40	459.18	20.80
3	TB_ASTM A36_3	10.23	11.61	55.73	10.25	469.23	20.50
4	TB_HB 255_1	9.95	12.03	94.93	6.68	793.08	13.36
5	TB_HB 255_2	10.25	11.95	74.78	6.81	610.51	13.62
6	TB_HB 255_3	10.20	12.26	76.71	6.95	613.42	13.90
7	TB_HB 400_1	10.08	12.32	89.25	7.69	718.68	15.38
8	TB_HB 400_2	9.74	12.12	79.51	9.17	673.54	18.34
9	TB_HB 400_3	9.70	11.88	84.01	5.74	729.03	11.48

Keterangan:
1. Pengujian dilakukan tanggal 6 Agustus 2024
2. Pengujian menggunakan Universal Testing Machine
3. Standar spesimen menggunakan ASTM E8

Identitas Penguji :

Nama : Muhammad Ihsan Nugroho
NPM : 6420600083
Institusi : Teknik Mesin Universitas Pancasakti Tegal

Yogyakarta, 6 Agustus 2024
Staf Laboratorium Bahan Teknik

Pengujian & Analisa Material

Dr. Lilik Dwi Setyana, S.T., M.T
NIP. 197703312002121002

Lembar asli, tidak untuk digandakan

Kampus : Jl. Grafika 2A Yogyakarta 55281

Gambar 13.Hasil pengujian Tarik (Lab UGM Yogyakarta)

LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN BENDING

No.	Variasi Spesimen	Tebal (mm)	Lebar (mm)	Pmax (KN)	Defleksi (mm)	Tegangan Bending (MPa)
1	TB_ASTM A36_1	11.12	11.26	12.68	16.06	683.02
2	TB_ASTM A36_2	11.43	11.68	14.25	14.69	700.39
3	TB_ASTM A36_3	11.97	12.56	14.53	15.84	605.55
4	TB_HB 255_1	10.98	12.30	19.06	19.01	963.99
5	TB_HB 255_2	11.43	11.82	17.08	18.35	829.54
6	TB_HB 255_3	11.53	12.34	14.92	15.61	682.11
7	TB_HB 400_1	11.21	12.51	18.04	12.87	860.66
8	TB_HB 400_2	10.90	12.00	17.66	22.60	929.00
9	TB_HB 400_3	12.30	11.64	18.49	20.71	787.47

Keterangan:
1. Pengujian dilakukan tanggal 6 Agustus 2024
2. Pengujian menggunakan Universal Testing Machine
3. Standar spesimen menggunakan ASTM E290

Identitas Penguji :
Nama : Muhammad Ihsan Nugroho
NPM : 6420600083
Institusi : Teknik Mesin Universitas Pancasakti Tegal

Yogyakarta, 6 Agustus 2024
Staf Laboratorium Bahan Teknik

Dr. Lilik Dwi Setyana, S.T., M.T
NIP. 197703312002121002

Kampus : Jl. Grafika 2A Yogyakarta 55281

Gambar 14.Hasil uji bending (LAB UGM Yogyakarta)

LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

PENGUJIAN KEKERASAN BRINNEL

No	Variasi Spesimen	Titik Uji	Diameter (mm)	Kekerasan Brinnel (BHN)	Kekerasan Rata-rata (BHN)
1	Las TB_ASTM A36	1	0.61	210.7	213.13
		2	0.61	210.7	
		3	0.60	217.9	
2	HAZ TB	1	0.65	185.2	185.56
		2	0.67	174.1	
		3	0.63	197.4	
3	HAZ ASTM A36	1	0.65	185.2	179.78
		2	0.68	168.9	
		3	0.65	185.2	
4	Las TB_HB 255	1	0.60	217.9	215.53
		2	0.60	217.9	
		3	0.61	210.7	
5	HAZ TB	1	0.60	217.9	200.17
		2	0.63	197.4	
		3	0.65	185.2	
6	HAZ HB 255	1	0.53	280.2	277.14
		2	0.52	291.2	
		3	0.55	260.0	
7	Las TB_HB 400	1	0.60	217.9	217.93
		2	0.60	217.9	
		3	0.60	217.9	
8	HAZ TB	1	0.65	185.2	189.26
		2	0.65	185.2	
		3	0.63	197.4	
9	HAZ HB 400	1	0.68	168.9	164.05
		2	0.70	159.2	
		3	0.69	164.0	

Lembar asli, tidak untuk digandakan

Keterangan:
1. Pengujian dilakukan tanggal 6 Agustus 2024
2. Menggunakan metode Brinnel
3. Menggunakan standart ASTM E10

Pengujian & Analisa Material
Lab. Bahan Teknik Departemen Teknik Mesin Sekolah Vokasi UGM

Identitas Penguji :
Nama : Muhammad Ihsan Nugroho
NPM : 6420600083
Institusi : Teknik Mesin Universitas Pancasakti Tegal

Kampus : Jl. Grafika 2A Yogyakarta 55281

Gambar 15.Hasil uji kekerasan (Lab.UGM Yogyakaryta)

LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

Yogyakarta, 6 Agustus 2024
Staf Laboratorium Bahan Teknik

Pengujian & Analisa Material

Dr. Lilik Dwi Setyana, S.T., M.T
NIP. 197703312002121002

Lembar asli, tidak untuk digandakan

Kampus : Jl. Grafika 2A Yogyakarta 55281

Gambar 16.Hasil uji lembar pengesahan (UGM Yogyakarta)

PT TIRA AUSTENITE Tbk

MATERIAL CERTIFICATE

According to DIN 50049 / EN 10204 3.1

TIRA STEEL

First Choice For Solution

Customer	Cerificate. No	Mark
BUKIT MAKMUR MANDIRI UTAMA, PT SOUTH QUARTER TOWER A LANTAI PENTHOUSE UNIT A-1 JL. R.A KARTINI KAV. 8 CILANDAK BARAT JAKARTA 12430	0080.1/QA/TIRA-CERT/2024 PO No. BP. No	TWRS | 690 QL TIRA

Tira Steel Product	Grade / Standard	Technology	Condition
TWRS 690QL	EN 10025-6 S 690 QL	EAF (Electric Arc Furnace)	Hardened (Quench & Tempered)

No	Heat Number	>Dimension (mm)	>Quantity (Pcs)	>Weight (Kg)
1	8C11521	FLAT 12 X 2500 X 6000	1	1440.0
2				
3				
4				
5				

Chemical Composition

NO	Standar	C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	N	Other
	Min Max	0.20	0.80	1.70	0.02	0.01	1.50		0.70		0.50			B 0.005
1	8C11521	0.16	0.39	1.15	0.015	0.003	0.02	0.01	0.01		0.01			B 0.0019
2														
3														
4														
5														

Mechanical Properties

No	Standar	Rp 0,2 (N/mm)	Rm (N/mm)	A (%)	Z (%)	Impact V (J)	Hardness (HB)	Grain Size	Ultrasonic Test
	Min Max	690	770 940	14		30			
1	8C11521	819	868	22					
2									
3									
4									
5									

Notes	Issued	Signature
Surface condition EN 10163-2 Class A3, Dimension tolerance EN 10029 Class A	Jakarta, 04 Apr 2024 09.41 am	QUALITY ASSURANCE PT TIRA AUSTENITE Tbk HAMONANGAN PASARIBU (QUALITY ASSURANCE)

Gambar 17.Sertifikat material komposisi cemical plat HB 255

PT TIRA AUSTENITE Tbk	MATERIAL CERTIFICATE According to DIN 50049 / EN 10204 3.1	TIRA STEEL First Choice For Solution

Customer	Cerificate. No	Mark
BUKIT MAKMUR MANDIRI UTAMA, PT SOUTH QUARTER TOWER A LANTAI PENTHOUSE UNIT A-1 JL. R.A KARTINI KAV. 8 CILANDAK BARAT JAKARTA 12430	0078.1/QA/TIRA-CERT/2024 PO No. BP. No	TRS 400 TIRA

Tira Steel Product	Grade / Standard	Technology	Condition
TRS 400	Water Quench 400 BHN	EAF (Electric Arc Furnace)	HARDENED (WATER QUENCH)

No	Heat Number	>Dimension (mm)	>Quantity (Pcs)	>Weight (Kg)
1	27531718	FLAT 20 X 2500 X 6000	1	2400.0
2				
3				
4				
5				

Chemical Composition

NO	Standar	C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	N	Other
	Min													
	Max	0.25	0.70	1.70	0.025	0.015	1.50	0.70	0.50					B 0.005
1	27531718	0.16	0.37	1.14	0.013	0.002	0.02	0.01	0.01		0.01			
2														
3														
4														
5														

Mechanical Properties

No	Standar	Rp 0,2 (N/mm)	Rm (N/mm)	A (%)	Z (%)	Impact V (J)	Hardness (HB)	Grain Size	Ultrasonic Test
	Min Max	1000	1250	8		20	360 450		
1	27531718	1036	1304	22			388		
2									
3									
4									
5									

Notes	Issued	Signature
Guaranted typical value : YS 1000 Mpa, UTS 1250 Mpa, El 8 %, KCV long 20 J (-40Â°C) Surface condition EN 10163-2 Class A3, Dimension tolerance EN 10029 Class A	Jakarta, 04 Apr 2024 09.37 am	QUALITY ASSURANCE PT TIRA AUSTENITE HAMONANGAN DASARIBU (QUALITY ASSURANCE)

Gambar 18.Sertifikat material komposisi cemical plat HB 400

SHAPING TOMORROW

PT GUNUNG RAJA PAKSI Tbk

Plate & Steckel Mill

MILL TEST CERTIFICATE

Acc to EN 10204 2004 - 3.1

Purchaser	PT TIGA JAYA	Head Office & Factory	Jl. Perjuangan No. 8, Kp. Tangsi RT 004/006 Sukadanau, Cikarang Barat, Bekasi 17530, West Java, INDONESIA
Material	Hot Rolled Steel Plates	Certificate Number	GRP-QA-MTC/7310B/X/2022
Specification	JIS G 3101 SS 400 - 2015	Certificate Date	October 3, 2022
Dimensional Tolerance	JIS G 3193 - 2008	Contract No	1400001866
Supply Condition	As Rolled	Sales Order No	2100006340
Deoxidation Practice	Killed	Customer Reference	GRP/SC-0430/VIII/2022
		Delivery Order No	5100026171

BATCH ID	HEAT NO	DIMENSIONS T (mm)	W (mm)	L (mm)	WEIGHT (MT)	QTY (PCS)	CHEMICAL LADLE ANALYSIS (%) C	Si	Mn	P	S	Nb	Cu	Cr	Ni	Mo	V	Al	Ti	N	B	CE		TENSILE TEST (TR Dir) YS N/mm²	TS N/mm²	EL [%] on 200 mm	BENDING TEST 180°/ 1.5 X T	IMPACT VALUE (JOULE) (°C) T > 10 mm : 10 X 10; T > 7.5 ≤ 10 mm : 7.5 X 10; T > 5 ≤ 7.5 mm : 5 X 10; I II III AVG
19H2214BAD	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAE	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAK	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAL	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAM	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAN	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAQ	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAS	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAT	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BAU	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214BBI	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		322	464	27	GOOD	
19H2214BBK	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		322	464	27	GOOD	
19H2214BBM	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		322	464	27	GOOD	
19H2214BBP	19H2214B	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		322	464	27	GOOD	
19H2214CBF	19H2214C	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.08	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214CBH	19H2214C	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	
19H2214CBJ	19H2214C	19.70	1200	2400	0.445	1	0.18	0.176	0.64	0.012	0.0062	0.002	0.14	0.10	0.06	0.016	0.005	0.029	0.002	0.0070	0.0003	0.33		303	463	27	GOOD	

Remarks

We hereby certify that the material described herein has been made & satisfactorily tested in accordance with above specification

Prepared by

Susi MS

Acknowledged by

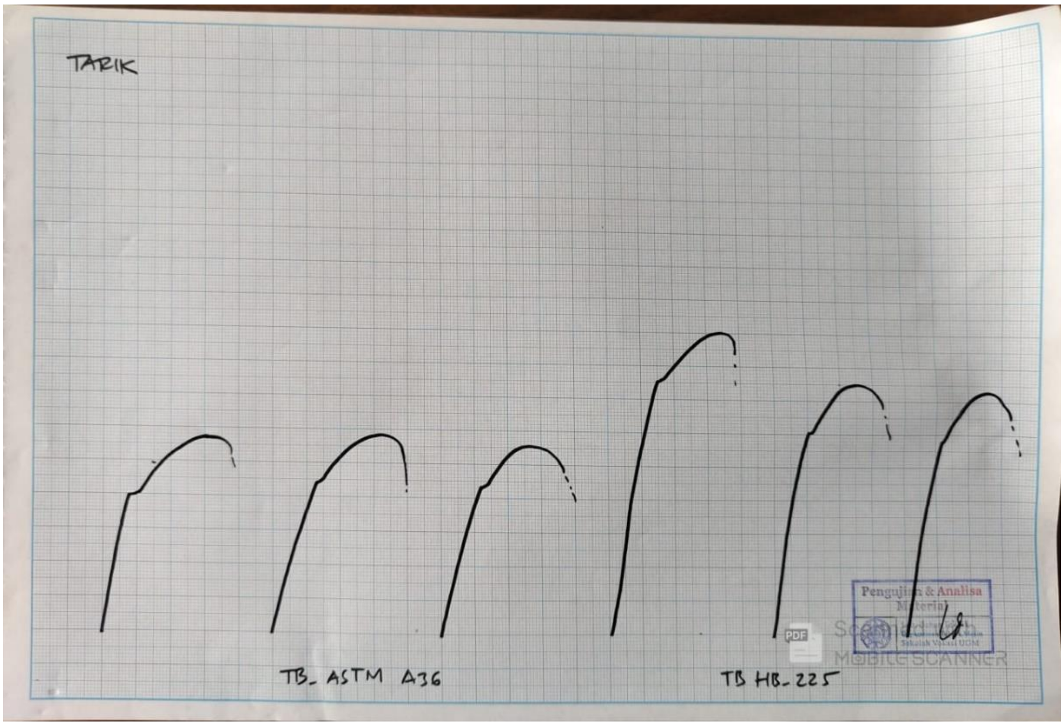
PT GUNUNG RAJA PAKSI Tbk BEKASI INDONESIA

Edwin ... Noer
Quality Assurance

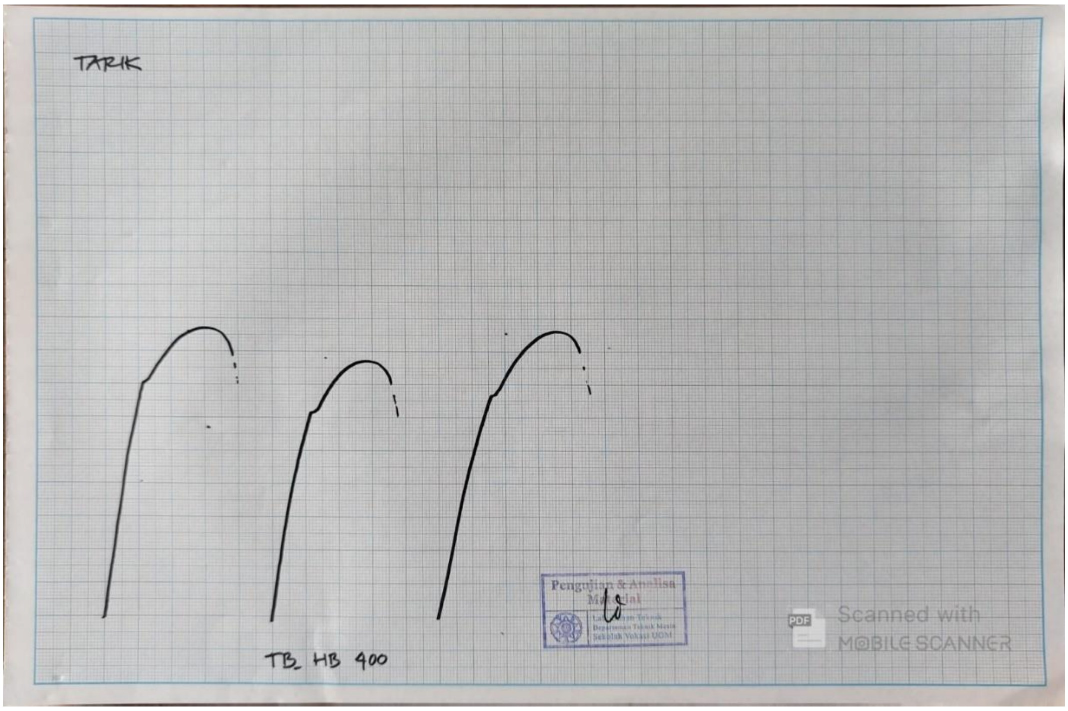
GRP FM QA 12 Rev 01

PAGE 4 OF 6

Gambar 19.Sertifikat material komposisi cemical plat ASTM A36/HB 111



Gambar 20.Grafik kekuatan Tarik material uji (LAB. UGM Yogyakarta)



Gambar 21.Grafik kekuatan Tarik material uji (LAB. UGM Yogyakarta)