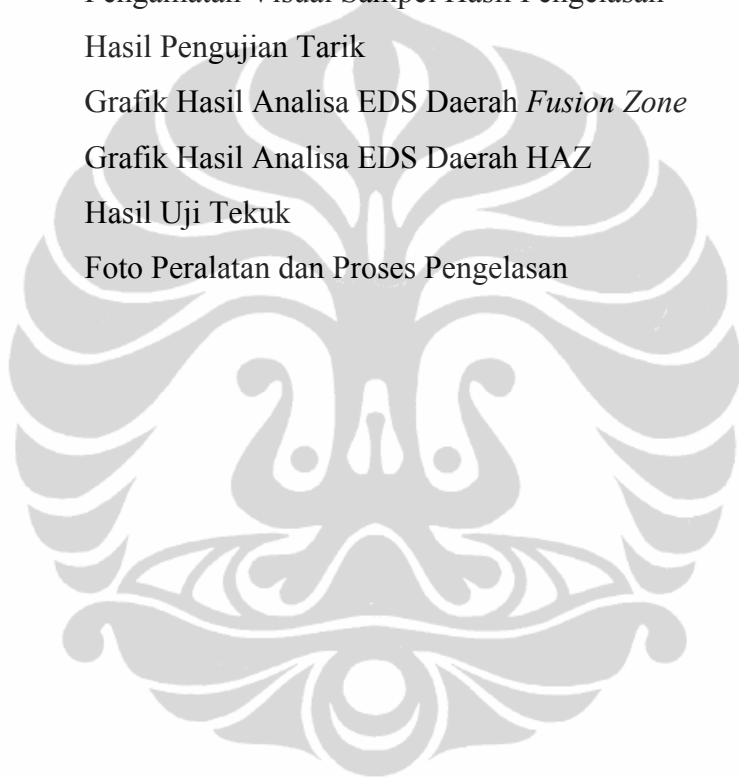


LAMPIRAN

Lampiran 1	Sertifikat Pabrik (<i>Mill Certificate</i>) dari Baja Lembaran
Lampiran 2	Sertifikat Pabrik (<i>Mill Certificate</i>) dari Kawat Las
Lampiran 3	Parameter Pengelasan
Lampiran 4	Pengamatan Visual Sampel Hasil Pengelasan
Lampiran 5	Hasil Pengujian Tarik
Lampiran 6	Grafik Hasil Analisa EDS Daerah <i>Fusion Zone</i>
Lampiran 7	Grafik Hasil Analisa EDS Daerah HAZ
Lampiran 8	Hasil Uji Tekuk
Lampiran 9	Foto Peralatan dan Proses Pengelasan





LAMPIRAN 1
Sertifikat Pabrik (*Mill Certificate*) dari Baja Lembaran

注 文 者
 SHIPPER
 注文者照合番号: E11 -009410468
 契約番号: 7-834-ML-5-Y-SAH8
 商品名: DURZINKLITE COIL
 規格: NIPPON STEEL STD. ZLEN: S D C H
 特記:
 NOTE
 ITEM No.: 03 SIZE: 0.8X835XC
 04 SIZE: 1.0X800XC

鋼材検査証明書 INSPECTION CERTIFICATE

需要家
 CUSTOMER
 需要家管理番号
 CUSTOMER'S CONTROL No.

新日本製鐵株式会社
 〒100-8071 東京都千代田区大手町二丁目6番3号
 本社
 HEAD OFFICE 2-6-3, OTEMACHI CHIYODAKU, TOKYO, 100-8071, JAPAN
 君津製鐵所 〒299-1141 千葉県君津市君津1番地
 KIMITSU WORKS 1, KIMITSU, KIMITSU-CITY, CHIBA-PREF., 299-1141 JAPAN
 証明書番号: 07ML100449 頁: 2E
 CERTIFICATE No. 07ML100449 PAGE 2E
 発行年月日: 2007-12-28
 DATE OF ISSUE 2007-12-28

COATING: S/20
 COATING: S/20

行番 ITEM No.	管理番号・CONTROL No.		(製鋼番号) コイル番号 (CAST No.) COIL No.	員数 QUAN- TITY	NET MASS ACT. KG	T. T (GL=50MM)			C. M B0T-3 G/M2	CAST ANALYSIS (%)				
	CASE No.	検査番号 INSPECTION No.				Y	P-LT	S-L		EL-L	C	SI	MN	P
						N/MM2	N/MM2	%	X100	X100	X100	X1000	X1000	
03	0005-0012	1521824- 1521831	(G79631) 711300900	8	28030	153	306	49	20	0.1	0	5	8	7
		SUB TOTAL		8	28030									
04	0001	1521804	(G79632) 711303800	1	3180	151	302	49	20	0.1	0	4	7	5
04	0002	1521806	(G79632) 711303800	1	3170	151	302	49	20	0.1	0	4	7	5
04	0004	1521808	(G79632) 711303800	1	3180	151	302	49	20	0.1	0	4	7	5
		SUB TOTAL		3	9530									
		** TOTAL **		26	83070									



注釈 NOTES
 ACT. : ACTUAL
 T. T : TENSILE TEST
 C. M : COATING MASS

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。
 WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN
 HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CON-
 TRACT.


 君津製鐵所鋼材管理グループリーダー
 GROUP MANAGER
 SHEET AND COIL QUALITY CONTROL DEPT.
 KIMITSU WORKS


用紙区分: 冷メ



LAMPIRAN 2
Sertifikat Pabrik (*Mill Certificate*) dari Kawat Las

WIRES MIG



AUTOCRAFT LW1-6

ALL POSITIONAL
WELDING APPLICATIONS



Autocraft LW1-6 is a high quality copper coated welding wire suitable for the all positional Gas Metal Arc Welding (GMAW) of mild and low alloy steels, used in general fabrication and structural work. The high quality copper coating ensures problem free feeding, smooth current pick-up and minimal contact tip wear. The higher silicon content of Autocraft LW1-6 ensures excellent operator appeal, improved fillet shape / side wall wash at weld toes and very low spatter levels important for welding light to medium gauge sheet and tubular steel sections. Fillet welds exhibit a mild to slightly convex profile with an even and smooth contour. The higher Manganese / Silicon levels give improved weld metal oxidation when welding steels with moderate amounts of rust or mill scale.

Storage Recommendations:

When held under the recommended storage conditions unopened packs of Autocraft LW1-6 wire are expected to remain in 'Factory fresh' condition for at least 12 months.

For storage over 12 months or under adverse (damp or high humidity) climatic conditions the use of heated weather proof store rooms/cupboards/containers maintained at 10-15°C above ambient temperature (with a maximum of 40°C) and at a maximum humidity of 60% R.H. is recommended. Product should be stacked on racks or pallets clear of the floor and walls.

Classifications:

AS/NZS 2017.1: E50-G0M-W500AH
AWS/AISME-SFA A5.18: ER70S-6

Features:

A Higher Manganese / Silicon Wire for GMAW Welding of Mild to Low Alloy Steels. Designed for Use with CO₂ and Argon Based Shielding Gases. Wide Range of Minispool, Handispool and Autopak Packaging Options.

Packaging and Operating Data:

Wire Diameter (mm)	Voltage Range (Volts)	Wire Feed Speed (metres/min)	Current Range (amps)	Pack Type*	Pack Weight	Part No
0.6	12-14	Mini Spool Packs of	4 x 0.8kg	721104		
		Spool	15kg	720103	0.5kg	721108
		Mini Spool Packs of	4 x 0.8kg	721105		
0.8	14-22	Spool	20-180	Hand Spool	0.5kg	721109
		Spool	15kg	720114		
0.9	15-26	Spool	70-220	Spool	15kg	720090
		AutoPak	250kg	720122A		
1.0	16-29	Spool	100-280	Spool	15kg	720094
		AutoPak	250kg	720123A		
1.2	18-32	Spool	120-350	Spool	15kg	720096
		AutoPak	250kg	720124A		
1.6	18-34	Spool	160-380	Spool	15kg	720098
		AutoPak	250kg	720125A		

* Mini Spool (ø100mm); Handi Spool (ø200mm); Spool (ø100mm); AutoPak (ø110mm x H.770mm).

AUTOPAK® Parts List:

AUTOPAK accessories (Standard Types)

	Part No
1. Clear plastic AUTOPAK dome (510mm base diam. x 300mm height)	720001
2. AUTOPAK conduit assembly kit	720008

Approvals*

CO₂ is Argoshield Light to Universal;
Lloyd's Register of Shipping Grade 3S, 3YS
American Bureau of Shipping Grade 3SA, 3YSA
Det Norske Veritas Grade 111YMS

* Approvals do not include 0.6mm and 0.8mm Autocraft LW1-6 wires

Typical Wire Analysis:

C: 0.07% Mn: 1.52% Si: 0.64%
S: 0.012% P: 0.015%

Typical Diffusible Hydrogen Levels to AS3752:

1.0 - 2.0mls of hydrogen / 100gms of deposited weld metal

Typical All Weld Metal Mechanical Properties:

Argoshield Universal: Welding Grade CO₂;
Yield Stress 450 MPa 410 MPa
Tensile Strength 550 MPa 525 MPa
Elongation 29% 32%
CVN Impact Val. 120 J @ -20°C 110 J @ -20°C

Recommended Shielding Gas:

Argoshield Light or Ar + 10-15% CO₂ or equivalent
Argoshield Universal or Ar + 20-25% CO₂ or equiv
Welding Grade CO₂

Comparable CIGWELD Products:

Comsweld LW1-6 TIG rod

AWS/AISME-SFA A5.18: ER70S-6





LAMPIRAN 3
Parameter Pengelasan

Metode	I	V	Kecepatan Las	Heat Input	Keterangan
--------	---	---	---------------	------------	------------

	(Ampere)	(volt)	(cm/menit)	(J)	
GMAW (<i>Gas Metal Arc Welding</i>)	100	12	120	600	<ul style="list-style-type: none"> • <i>Shielding gas torch</i> : Argon murni (75%) dan CO₂ (25%). • <i>Filler</i> : AWS/ASME - SFA A5.18 : ER70S-6, diameter 1,2 mm.
GTAW (<i>Gas Tungsten Arc Welding</i>)	25 – 47	8 – 10	187	103,9	<ul style="list-style-type: none"> • <i>Shielding gas torch</i> : Argon murni (12,5 liter / menit). • <i>Backing gas</i>: Argon murni (10 liter / menit). • <i>Filler</i> : AWS/ASME - SFA A5.18 : ER70S-6, diameter 1,2 mm.
PAW (<i>Plasma Arc Welding</i>)	42	8	87	231,7	<ul style="list-style-type: none"> • <i>Shielding gas torch</i> : H₂ (1,5 liter / menit) dan Argon (1,5 liter / menit). • <i>Plasma</i>: (3 liter / menit). • <i>Backing gas</i>: Argon murni (10 liter / menit). • <i>Filler</i> : AWS/ASME - SFA A5.18 : ER70S-6, Ø 0,8 mm.



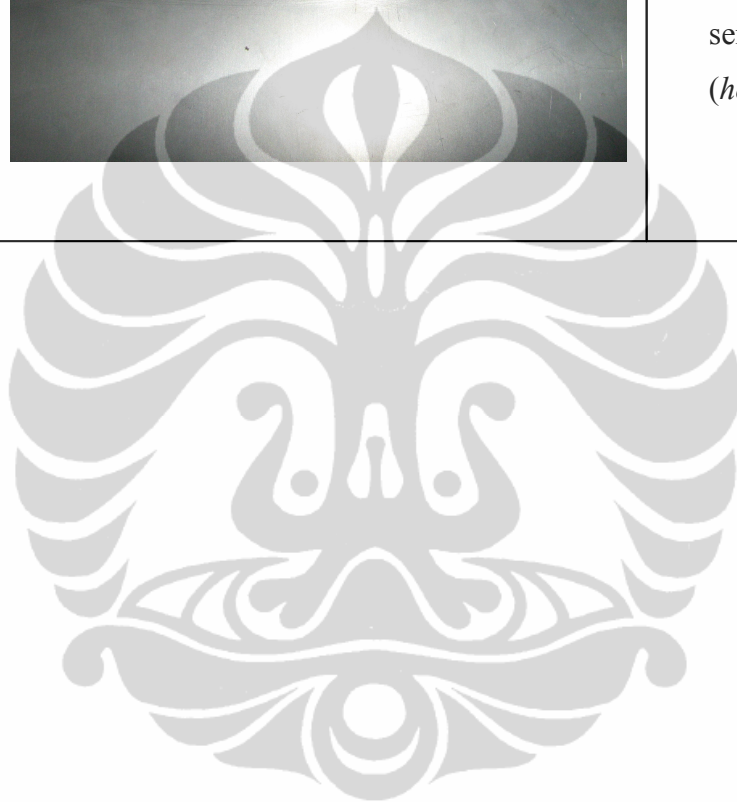
LAMPIRAN 4
Pengamatan Visual Sampel Hasil Pengelasan

Metode	Foto	Keterangan
<p>GMAW (<i>Gas Metal Arc Welding</i>)</p>		<ul style="list-style-type: none"> • Foto bagian atas sampel (berlapis seng) • Sampel tidak terjadi lengkungan • Daerah HAZ (<i>heat affected zone</i>) terlihat berwarna kehitaman
<p>GTAW (<i>Gas Tungsten Arc Welding</i>)</p>		<ul style="list-style-type: none"> • Foto bagian atas sampel (berlapis seng) • Sampel tidak terjadi lengkungan • Daerah HAZ terlihat berwarna kehitaman • Terlihat daerah batas lapisan seng yang menguap di sekitar HAZ

PAW
(*Plasma Arc
Welding*)



- Foto bagian atas sampel (berlapis seng)
- Sampel tidak terjadi lengkungan
- Foto bagian atas sampel (berlapis seng) daerah HAZ (*heat affected zone*)







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LABORATORIUM UJI MATERIAL
 Kampus Baru UI – Depok 16424 – Indonesia
 Phone : 021 – 788 49045, 786 3510 Fax : 021 – 787 2350
 E-mail : cmpfa@metal.ui.ac.id

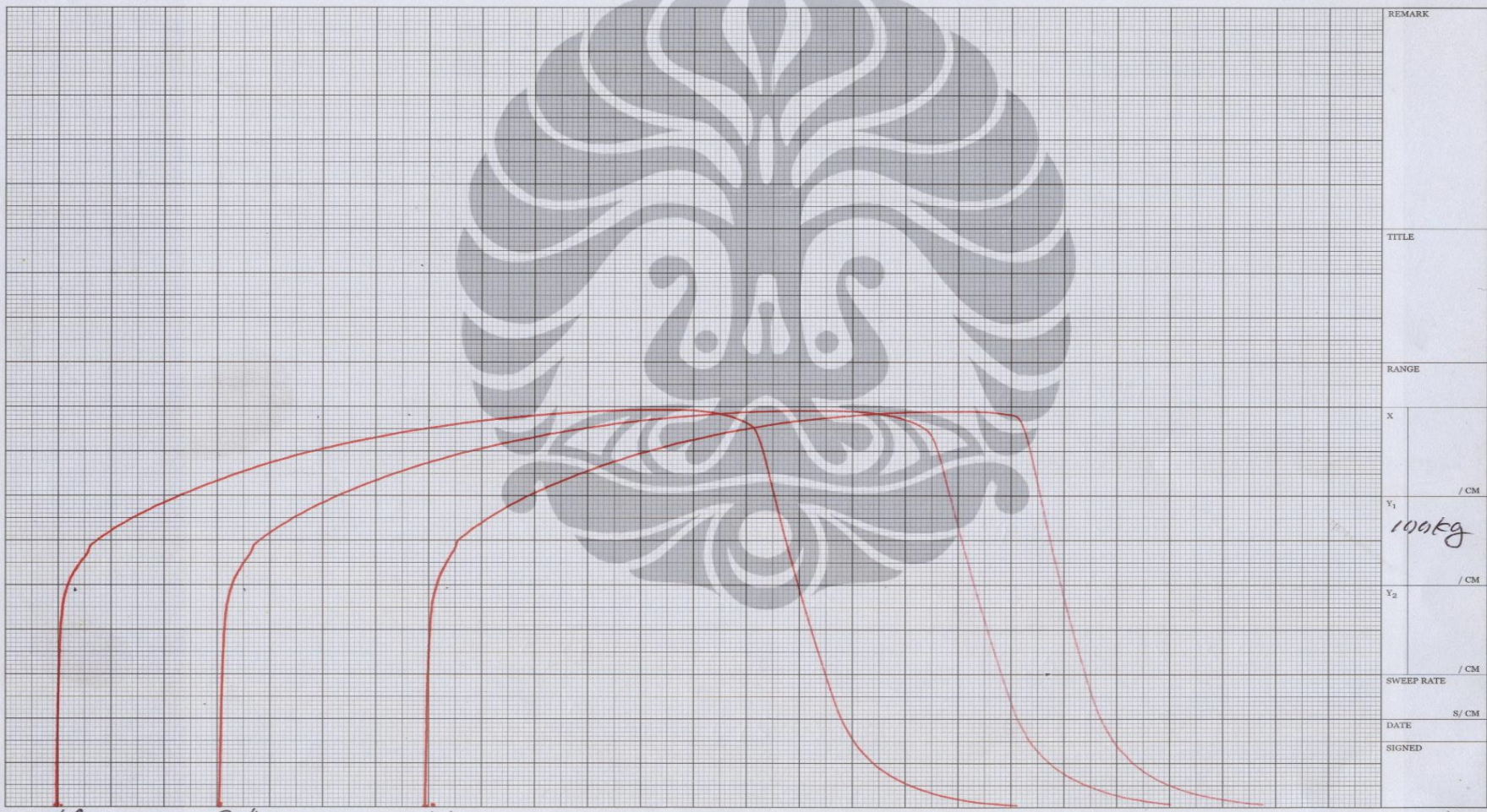
Lembar Data Pengujian Tarik
(Tensile Testing Data Sheet)

Nama customer	No. Kontrak :	Tanggal Uji :
Mesin Uji	Servopulser Shimadzu Kapasitas 20 ton	Teknisi Penguji :
Bahan	Standar/Metode Uji :	Tanggal bahan diterima :
Identitas Bahan		

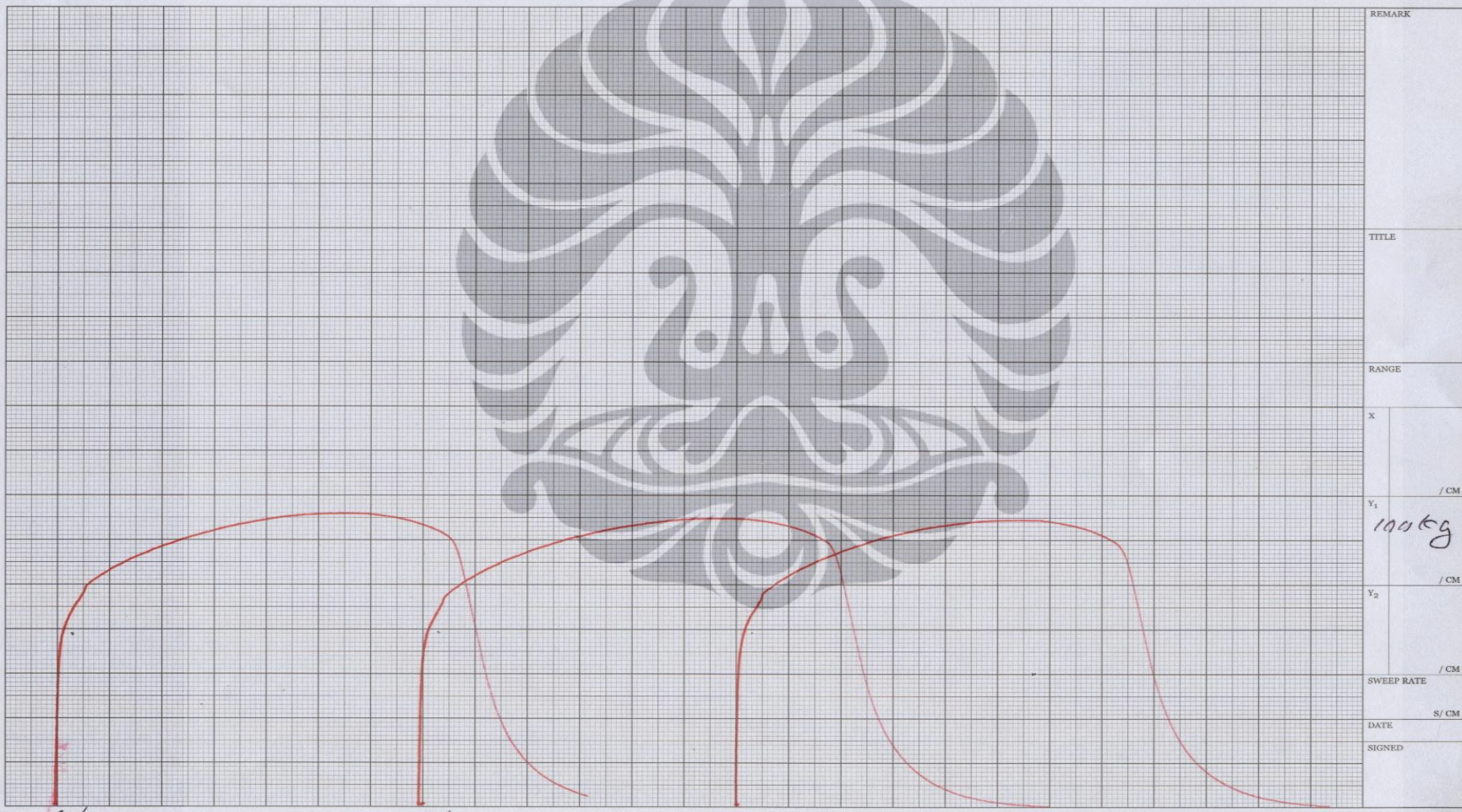
No	Kode Sampel	Beentuk Sampel	Dimensi Sampel (mm)	Luas penampang (mm ²)	Panjang ukur (mm)	Pu (kg)	Py (kg)	ΔL (mm)	σu (kg/mm ²)	σy (kg/mm ²)	e (%)	Ket.
1	A	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,49$ $w = 25,55$	25,55	50	890	490	-	34,83	19,17	-	PUTUS DI BAHAN
2	A	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,41$ $w = 25,40$	25,40	50	890	490	18,70	35,03	19,29	37,40	- " -
3	A	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,49$ $w = 25,45$	25,45	50	890	490	13,45	34,97	19,25	26,90	PUTUS DI BAHAN
4	B	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,40$ $w = 24,70$	24,70	50	660	390	11,55	26,72	15,78	23,10	PUTUS DI BAHAN
5	B	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,40$ $w = 24,65$	24,65	50	650	390	12,70	26,36	15,85	25,40	- " -
6	B	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t = 1,40$ $w = 24,60$	24,60	50	645	390	13,10	26,21	15,85	26,20	- " -
		<input type="checkbox"/> Rod/Tube										
		<input type="checkbox"/> Pelat										

Formulir : FF-32/Met-UI Rev : 0

* Coret Yang Tidak Perlu



DEPARTMENT OF METALLURGY AND MATERIALS
 FACULTY OF ENGINEERING UNIVERSITY OF INDONESIA



REMARK
TITLE
RANGE
X
Y ₁ / CM
100 kg
Y ₂ / CM
SWEEP RATE / CM
S / CM
DATE
SIGNED

4/B

5/B

6/B

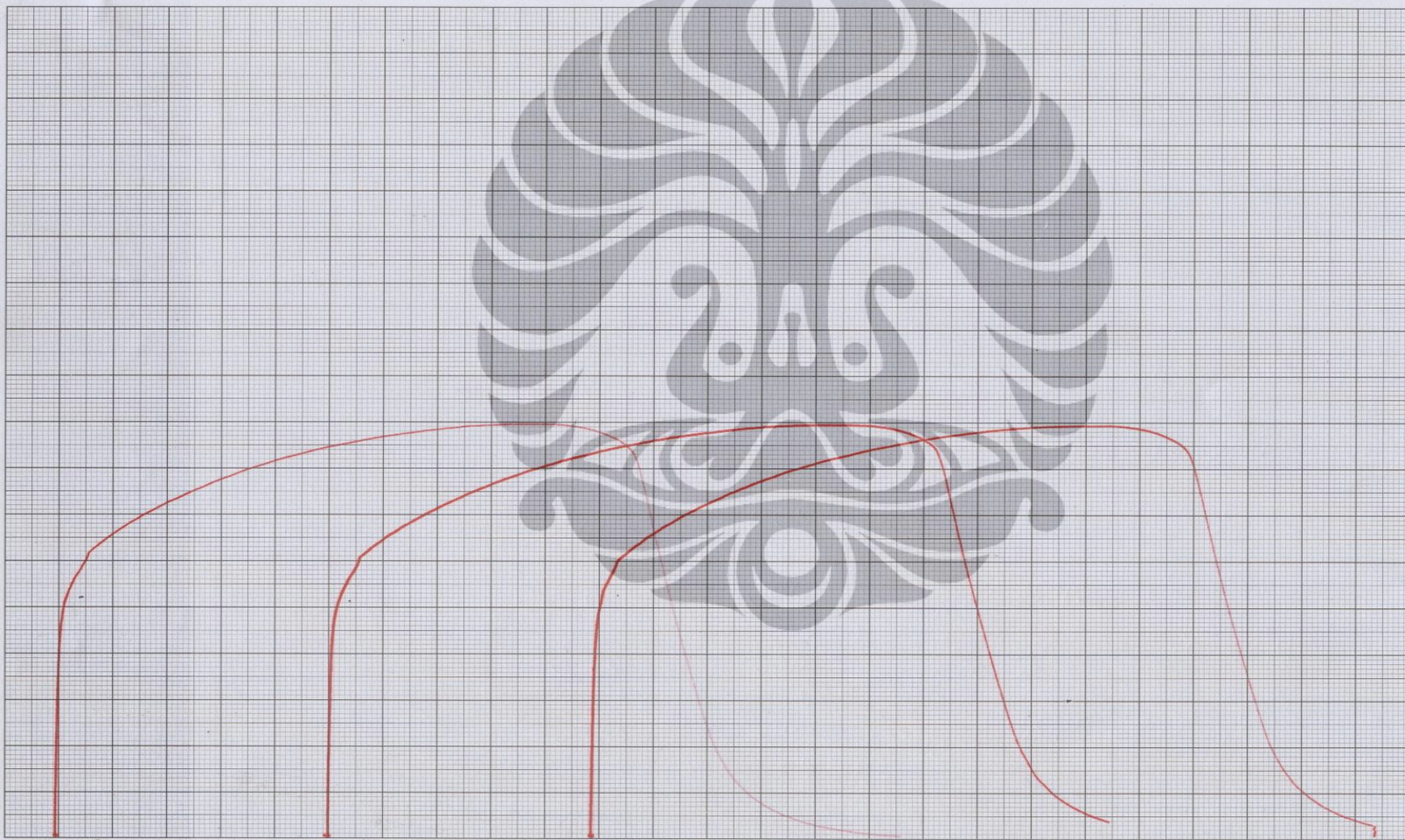


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 E-mail : cmpfa@metal.ui.ac.id

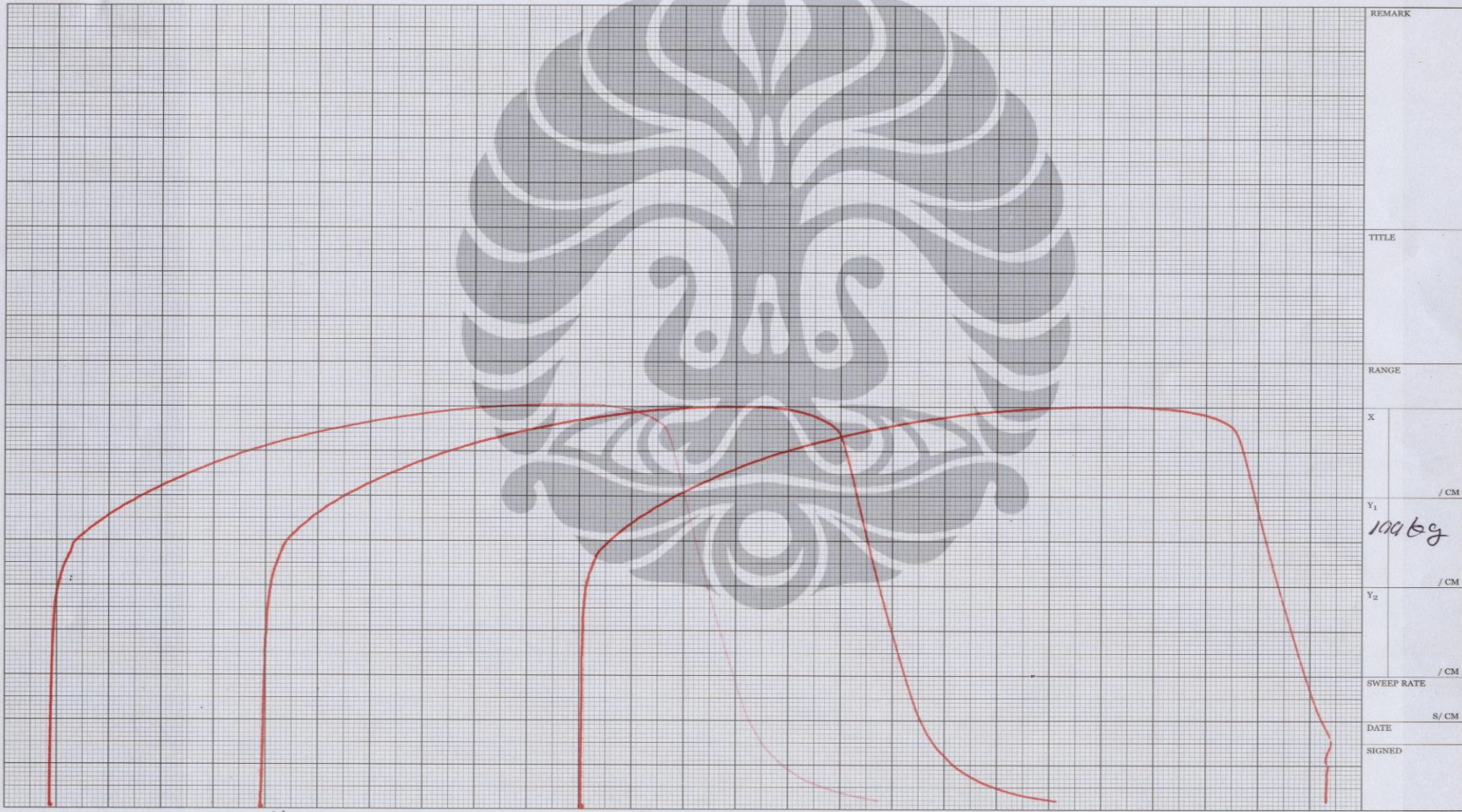
Lembar Data Pengujian Tarik
(Tensile Testing Data Sheet)

Nama customer	No. Kontrak :	Tanggal Uji :
Mesin Uji	Servopulser Shimadzu Kapasitas 20 ton	Teknisi Penguji :
Bahan	Standar/Metode Uji :	Tanggal bahan diterima :
Identitas Bahan		

No	Kode Sampel	Bentuk Sampel	Dimensi Sampel (mm)	Luas penampang (mm ²)	Panjang ukur (mm)	Pu (kg)	Py (kg)	ΔL (mm)	σu (kg/mm ²)	σy (kg/mm ²)	e (%)	Ket.
7	C	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,45	25,45	50	990	520	14,75	35,36	20,43	25,50	PUTUS DI BAHAN
8	C	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,10	25,80	50	980	515	16,70	35,29	20,19	33,40	- " -
9	C	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,40	25,40	50	895	530	16,15	35,23	20,86	32,30	- " -
10	D	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,80	25,10	50	905	520	16,85	35,49	20,39	33,70	- " -
11	D	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,55	25,55	50	900	520	16,25	35,22	20,35	32,50	- " -
12	D	<input type="checkbox"/> Rod/Tube										
		<input checked="" type="checkbox"/> Pelat	t = 1,00 w = 25,60	25,60	50	900	520	19,25	35,15	20,31	38,80	- " -
		<input type="checkbox"/> Rod/Tube										
		<input type="checkbox"/> Pelat										



REMARK
TITLE
RANGE
X
Y ₁ / CM
1000g
Y ₂ / CM
SWEEP RATE / CM
S / CM
DATE
SIGNED



REMARK
TITLE
RANGE
X
/ CM
Y ₁
100 by
/ CM
Y ₂
/ CM
SWEEP RATE
S/ CM
DATE
SIGNED

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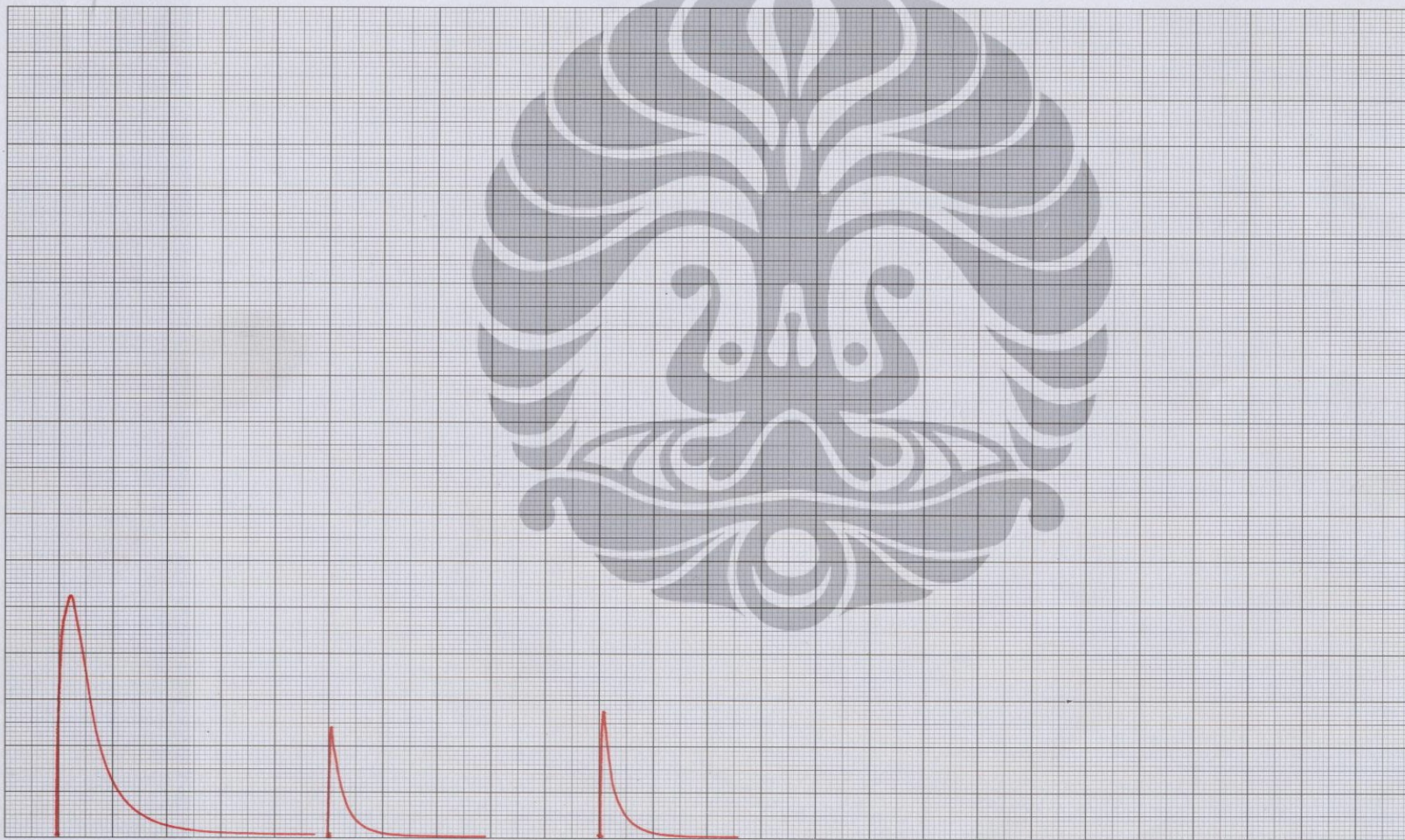
Lembar Data Pengujian Tarik
 (Tensile Testing Data Sheet)

Nama customer	No. Kontrak :	Tanggal Uji :
Mesin Uji	Servopulser Shimadzu Kapasitas 20 ton	Teknisi Penguji :
Bahan	Standar/Metode Uji :	Tanggal bahan diterima :
Identitas Bahan		


No	Kode Sampel	Bentuk Sampel	Dimensi Sampel (mm)	Luas penampang (mm ²)	Panjang ukur (mm)	Pu (kg)	Py (kg)	ΔL (mm)	σu (kg/mm ²)	σy (kg/mm ²)	e (%)	Ket.
13	E	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t=1,00$ $w=24,60$	24,60	50	525	-	2,65	21,34	-	3,30	PUTUS DILAS
14	E	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t=1,00$ $w=24,60$	24,60	50	240	-	1,45	9,75	-	2,90	— " —
15	E	<input type="checkbox"/> Rod/Tube <input checked="" type="checkbox"/> Pelat	$t=1,00$ $w=24,50$	24,50	50	275	-	1,35	11,22	-	2,70	— " —
		<input type="checkbox"/> Rod/Tube										
		<input type="checkbox"/> Pelat										
		<input type="checkbox"/> Rod/Tube										
		<input type="checkbox"/> Pelat										
		<input type="checkbox"/> Rod/Tube										
		<input type="checkbox"/> Pelat										

Formulir : FF-32/Met-UI Rev : 0

* Coret Yang Tidak Perlu



REMARK
TITLE
RANGE
X
/ CM
y_1
<i>100kg</i>
/ CM
y_2
/ CM
SWEEP RATE
S/ CM
DATE
SIGNED


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LAMPIRAN 6
Grafik Analisa *Scanning Electron Microscope*
Daerah *Fusion Zone*



LAMPIRAN 7
Grafik Analisa *Scanning Electron Microscope*
Daerah HAZ



LAMPIRAN 8
Hasil Uji Tekuk



Mesin Las GMAW (*Gas Metal Arc Welding*)



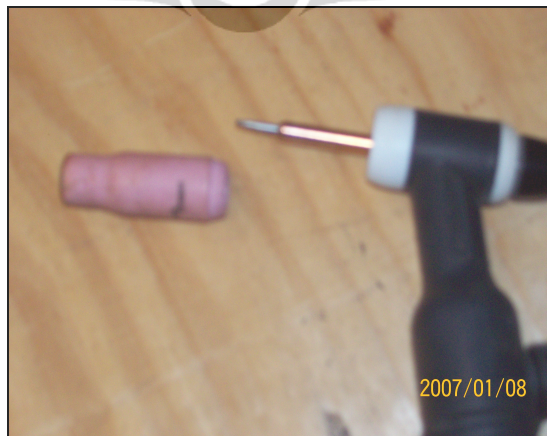
Proses Pengelasan GMAW (*Gas Metal Arc Welding*)



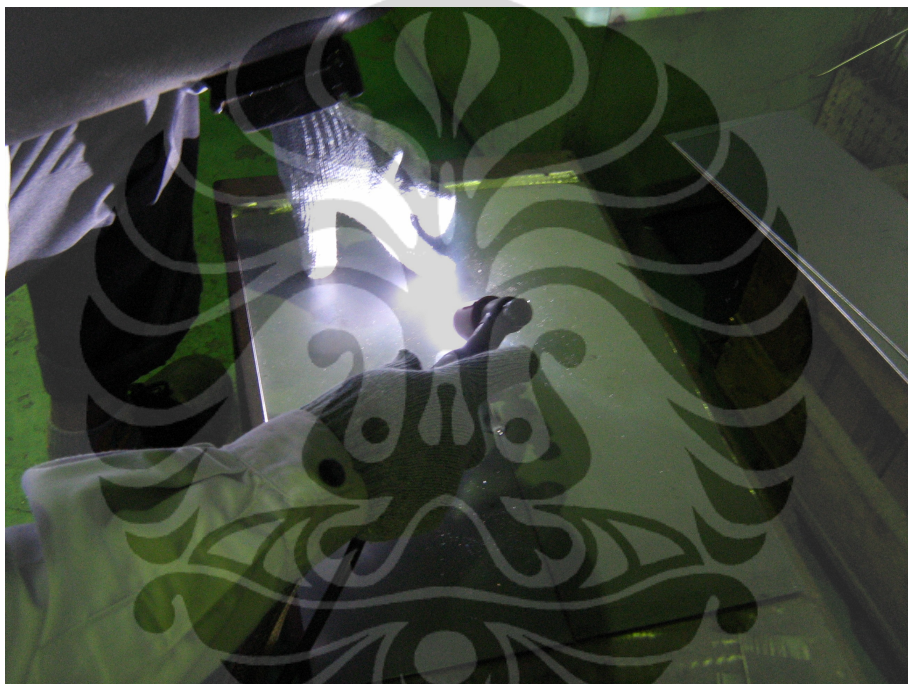
Mesin Las GTAW (*Gas Tungsten Arc Welding*)



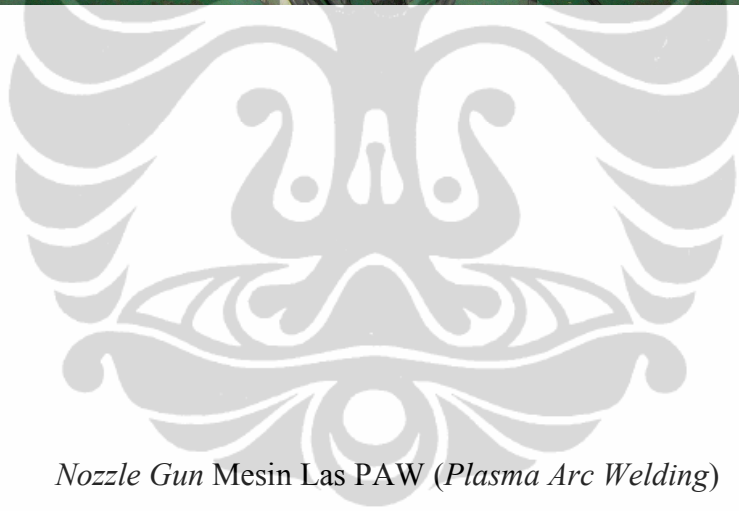
Nozzle Gun Mesin Las GTAW (Gas Tungsten Arc Welding)



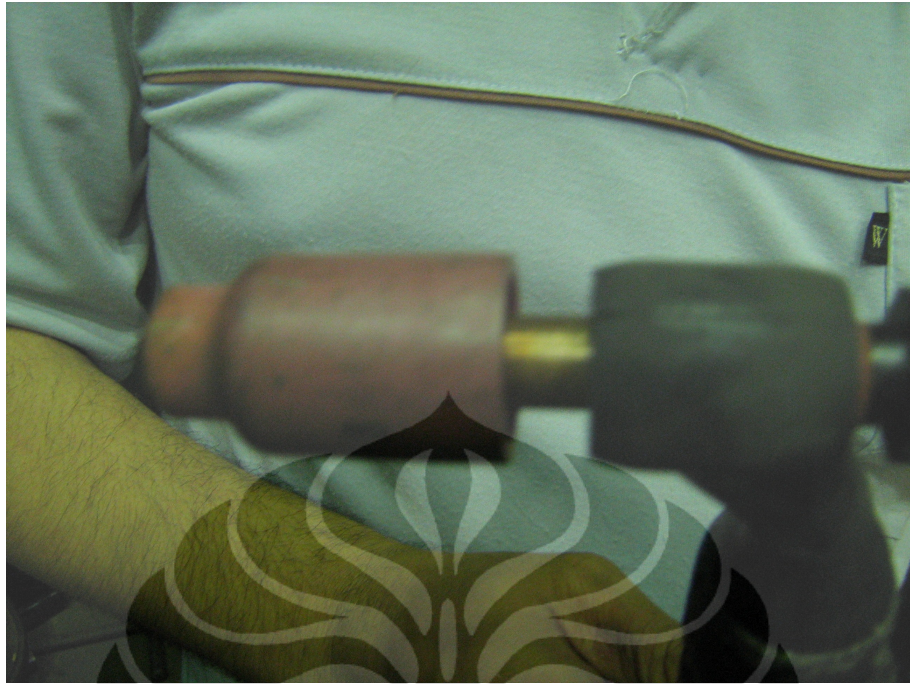
Proses Pengelasan GTAW (*Gas Tungsten Arc Welding*)



Mesin las PAW (*Plasma Arc Welding*)



Nozzle Gun Mesin Las PAW (Plasma Arc Welding)



Proses Pengelasan PAW (*Plasma Arc Welding*)

