

LAMPIRAN PENELITIAN



L1 Pohon Tanaman Sisal



L2. Pengambilan Serat Sisal



L3. Pengupasan Serat



L4. Pengeringan Serat



L5. Proses Penuangan Resin Kedalam Cekatakan



L6 Proses Peletakan Serat Kedalam Cetakan



L7. Proses Pembentukan Spesimen



L8. Spesimen Variasi Serat 2%



L9. Spesimen Variasi Serat 4%



L10. Spesimen Variasi Serat 6%



L11. Spesimen Variasi Serat 8%



L12. Spesimen Variasi Serat 10%



L13. Spesimen variasi 2% sesudah diuji tarik



L14. Spesimen variasi 4% sesudah diuji tarik



L15. Spesimen variasi 6% sesudah diuji tarik



L16. Spesimen variasi 8% sesudah diuji tarik



L17. Spesimen variasi 10% sesudah diuji tarik



L18. Pengamatan Struktur Makro Sebelum Pengujian Tarik



L19. Proses Pengujian Tarik



L20. Pengamatan Struktur Marko Setelah Pengujian Tarik



L21. Foto bersama pembimbing dilaboratorium BBPVP MAKASSAR



KEMENTERIAN KETENAGAKERJAAN RI
DIREKTORAT JENDERAL
PEMBINAAN PELATIHAN VOKASI DAN PRODUKTIVITAS
BBPVP Makassar
Jl. Tennoh Makam Pahlawan No. 4 Makassar, Telepon (0411) 442322 Faksimile 441558
Laman : <http://www.naker.go.id>

SURAT KETERANGAN

Nomor : B. 91/ WORKSHOP LAS/ BBPVP - MKS/ VIII/ 2025

Yang bertandatangan dibawah ini :

Nama : Haeruddin Hafid, ST.,MT

NIP : 19770201 200912 1 001

Dengan Ini menerangkan bahwa :

No	Nama Mahasiswa	Judul Tugas Akhir
1	Ones Siporus Toding / 220212105	Pengaruh Presentase Serat Sisal Terhadap Kekuatan Tarik dan Struktur Makro Komposit Serat Sisal Bermatriks Polyster
2	Ignasius Rolan / 1224212005	Dampak Panjang Serat Sisal Terhadap Kekuatan Bending dan Ketangguhan Komposit Serat Sisal Bermatriks Polyester
3	Yusdar Menta / 124212006	Pengaruh Panjang Serat Terhadap Kekuatan Tarik dan Struktur Makro Komposit Serat Sisal Bermatriks Polyester
4	Junaedy Tandepadang / 1224212019	Study Pengaruh Orientasi Sudut Serat Sisal Terhadap Kekuatan Tarik dan Struktur Makro Komposit Serat Sisal Bermatriks Polyester

5	Leonard Alvin / 1224212016	Pengaruh Orientasi Sudut Terhadap Kekuatan Bending dan Ketangguhan Komposit Serat Sisal Bermatriks Polyester
6	Desar Susanto / 1224212007	Pengaruh Lama Perendaman Serat Sisal Terhadap Kekuatan Tarik dan Struktur Makro Komposit Serat Sisal Bermatriks Polyester
7	Arclaus Denni Frissi / 220212107	Efektifitas Presentase Serat Sisal Terhadap Kekuatan Bending dan Ketangguhan Komposit Serat Sisal Bermatriks Polyester

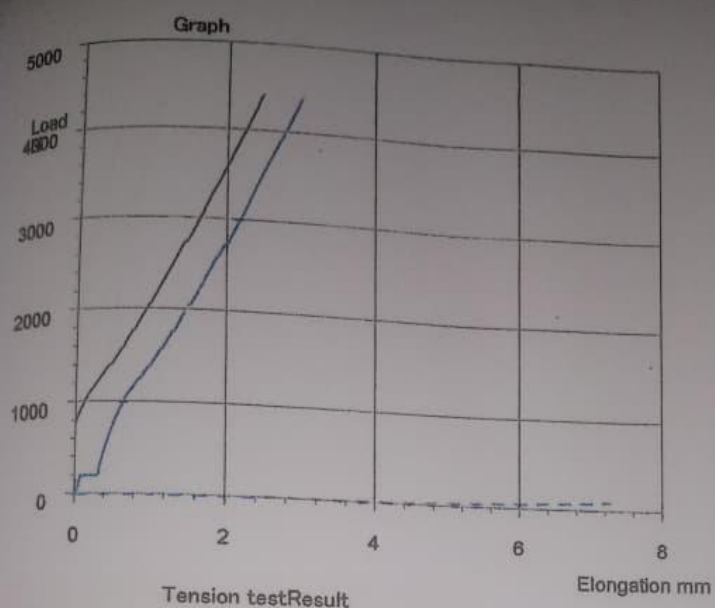
Bahwa benar telah melaksanakan Pengujian di Workshop Las Balai Besar Pelatihan Vokasi dan Produktivitas Makassar pada tanggal 12-13 Agustus 2025

Demikian surat keterangan ini kami berikan untuk dipergunakan sebagai mana mestinya.

Makassar, 13 Agustus 2025



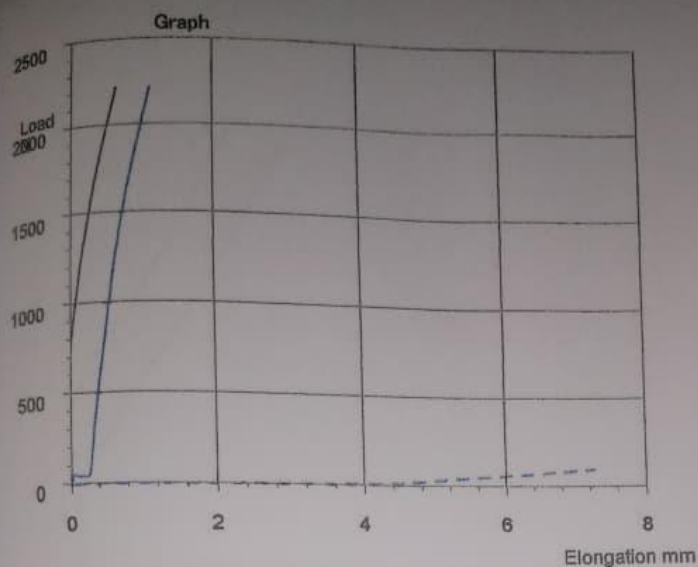
Haeruddin Hafid, ST, MT,
NIP. 19770201 200912 1 001



Machine name				Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
kN	0	0	0	mm	0	0	0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measuren	0.0005 kN		
Save SS curve	Yes						

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid.S.T.,M.T.	User	Ones Siporus Poding
Comment 1	Serat 2 %, Resin 98 %	Comment 2	A1

TestID=3820	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Stress	Load	N/mm2	N/mm2
1	20.000	10.000	200.00	4394.7	1.0003	*****	1651.0	1651.0

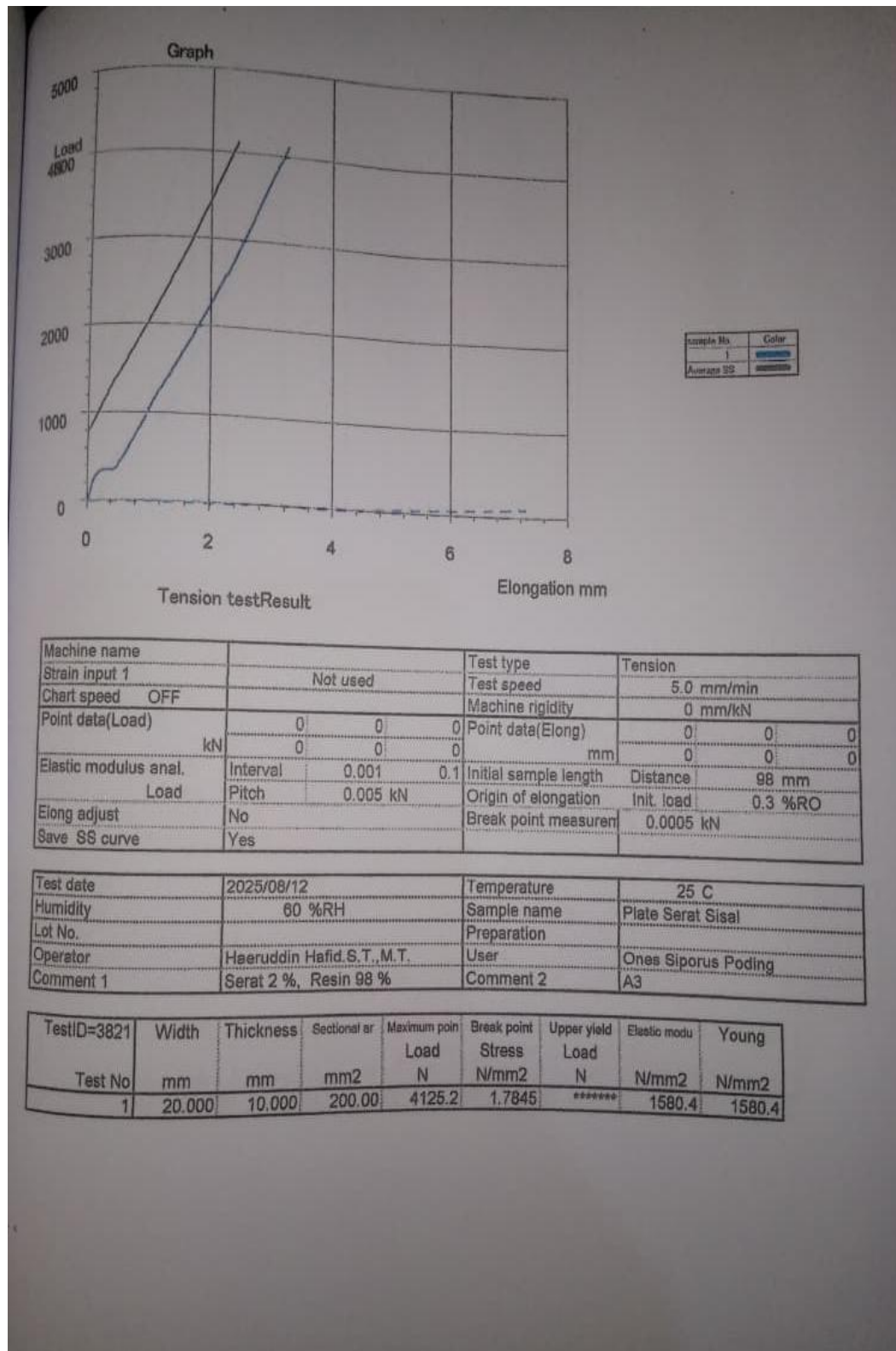


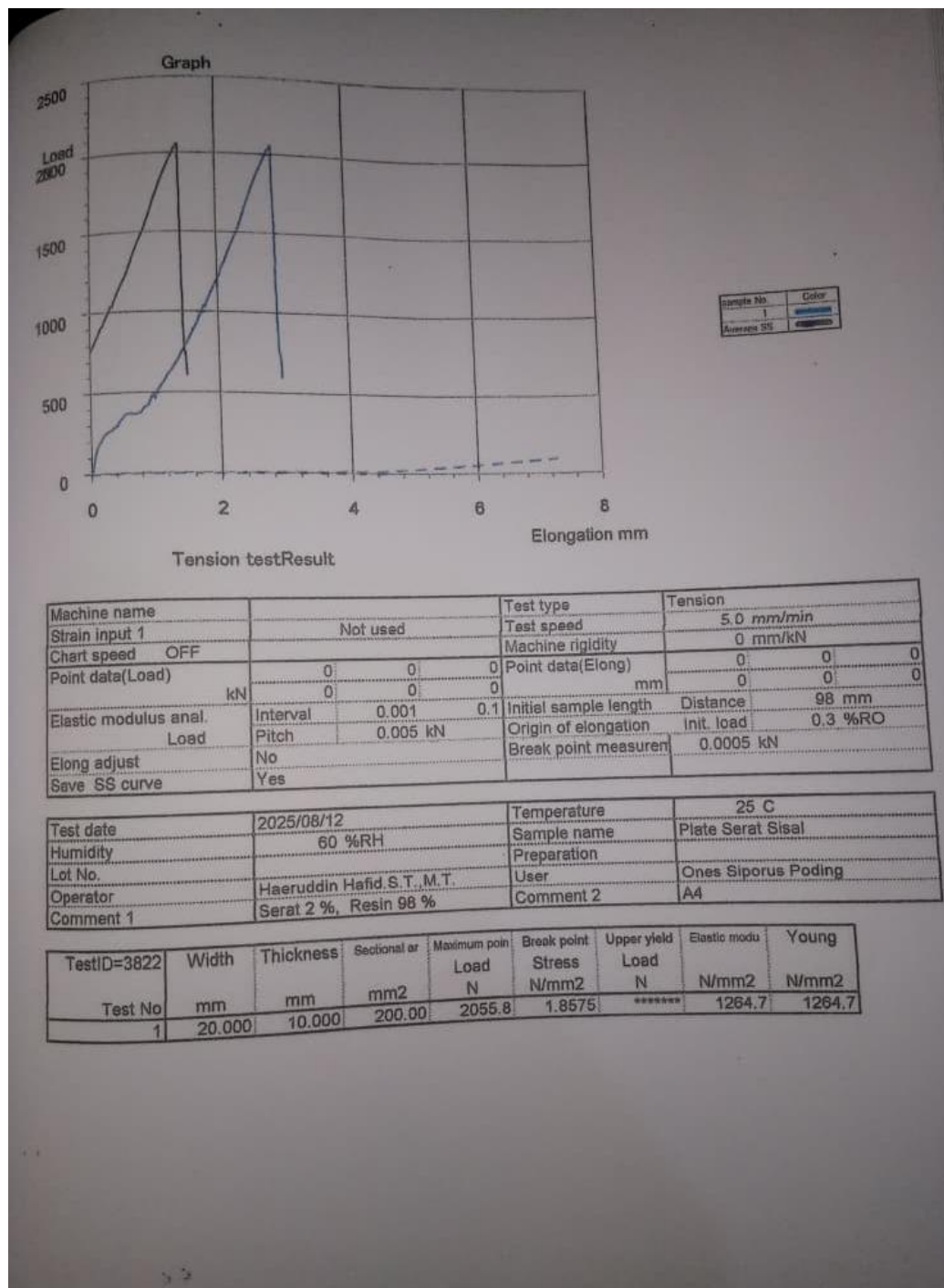
Sample No.	Color
1	Blue
Average SS	Black

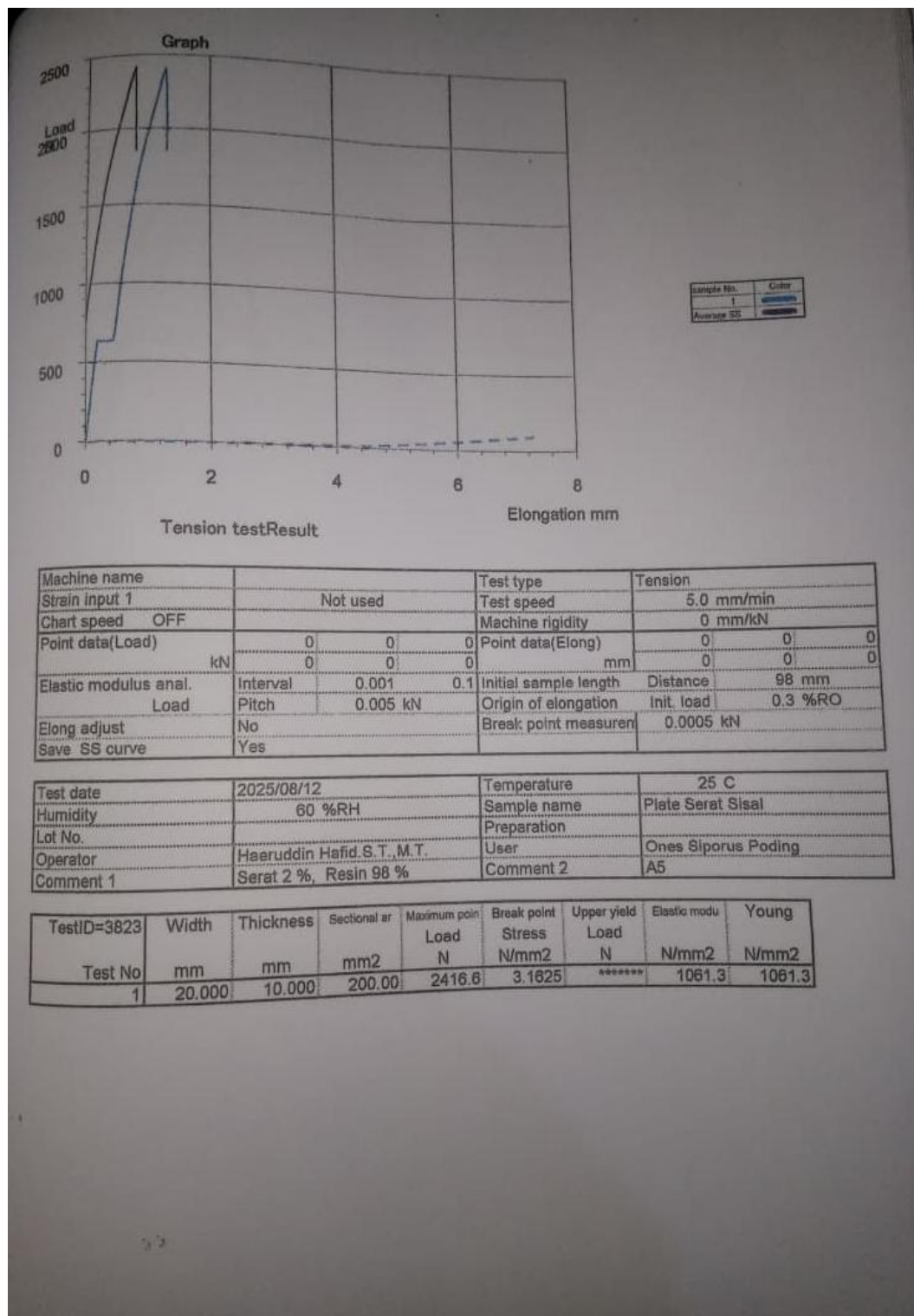
Machine name	Not used			Test type	Tension
Strain input 1	Not used			Test speed	5.0 mm/m/n
Chart speed	OFF			Machine rigidity	0 mm/kN
Point data(Load)	kN	0	0	Point data(Elong)	0
		0	0		0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance 98 mm
Load	Pitch	0.005 kN		Origin of elongation	Init. load 0.3 %RO
Elong adjust	No			Break point measurem	0.0005 kN
Save SS curve	Yes				

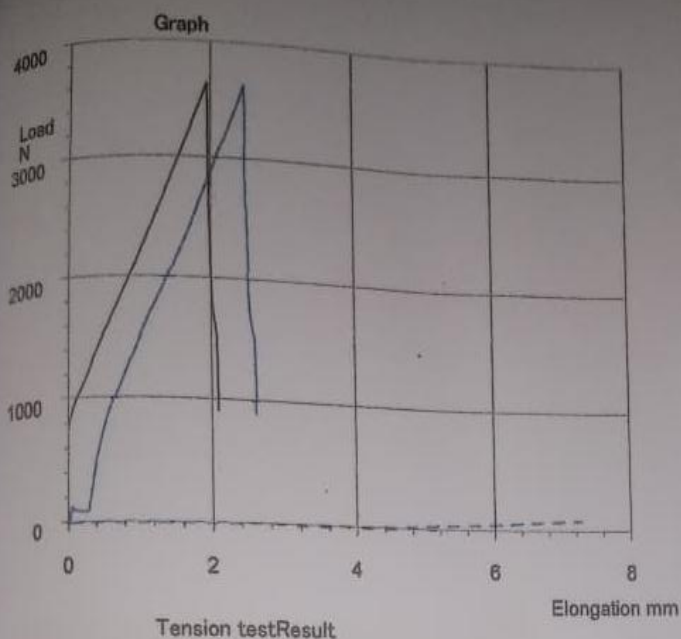
Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid, S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 2 %, Resin 98 %	Comment 2	A2

TestID=3819	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Stress	Load	N/mm2	N/mm2
				N	N/mm2	N		
1	20.000	10.000	200.00	2212.2	0.2584	*****	109.09	109.09







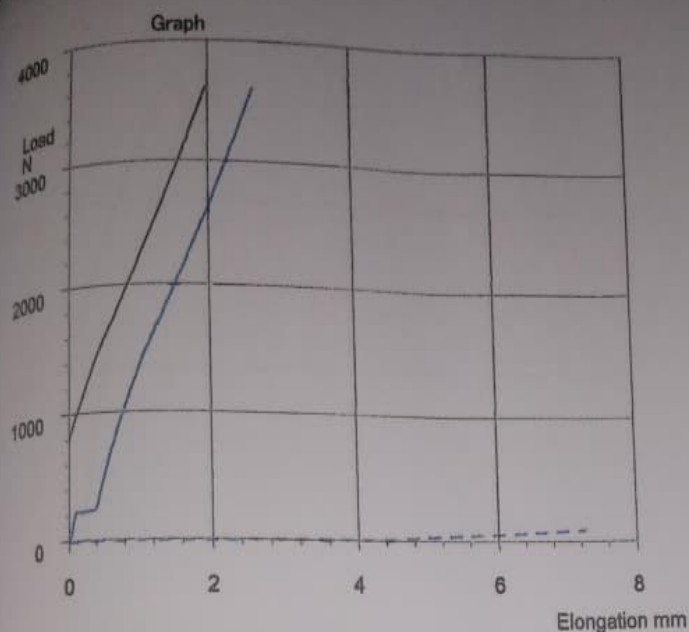


Sample No.	Color
1	Blue
Average SS	Red

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
kN	0 0 0	mm	0 0 0
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measure	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 4 %, Resin 96 %	Comment 2	B1

TestID=3824	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	3627.9	0.5660	3627.9	1660.1	1660.1



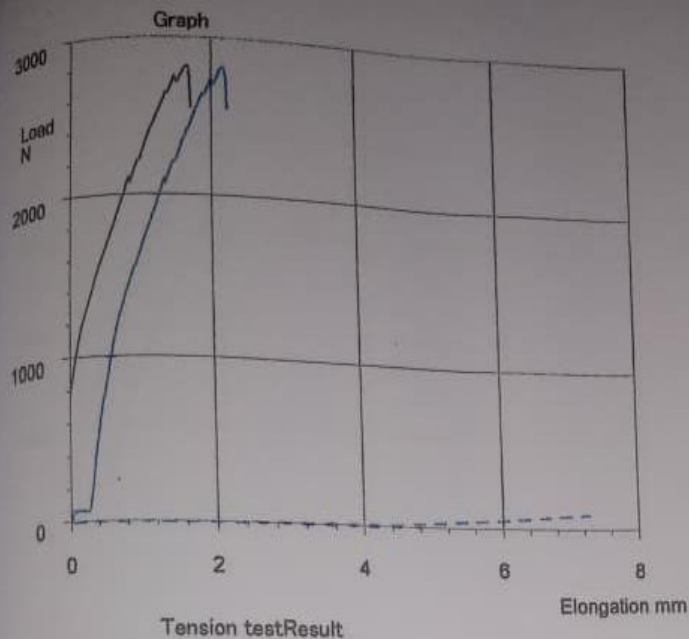
sample No.	Color
1	Blue
Averaged SS	Black

Tension testResult

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN	mm	
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measure	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid.S.T.,M.T.	User	Ones Siporus Poding
Comment 1	Serat 4 %, Resin 96 %	Comment 2	B2

TestID=3825	Width	Thickness	Sectional ar	Maximum point	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	3604.6	1.1466	*****	1414.7	1414.7

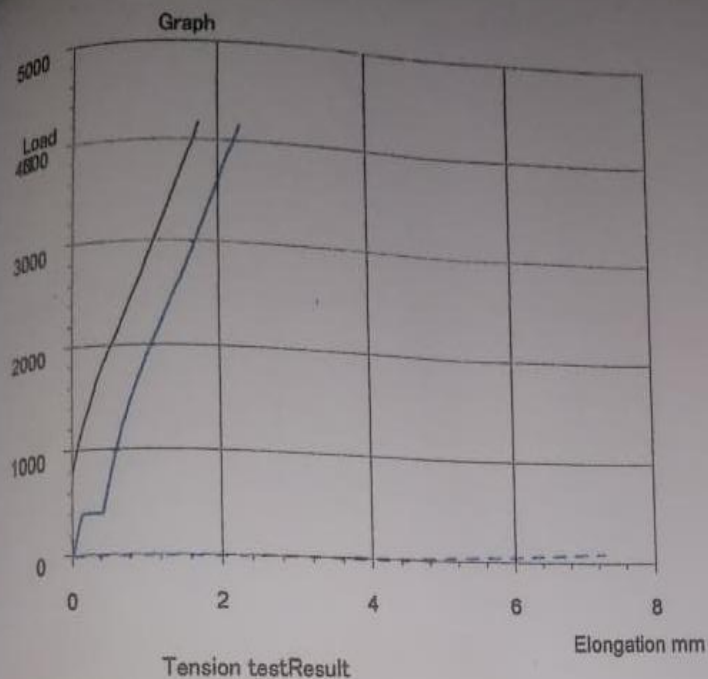


Sample No.	Color
1	—
Average SS	---

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN	mm	
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measurem	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 4 %, Resin 96 %	Comment 2	B3

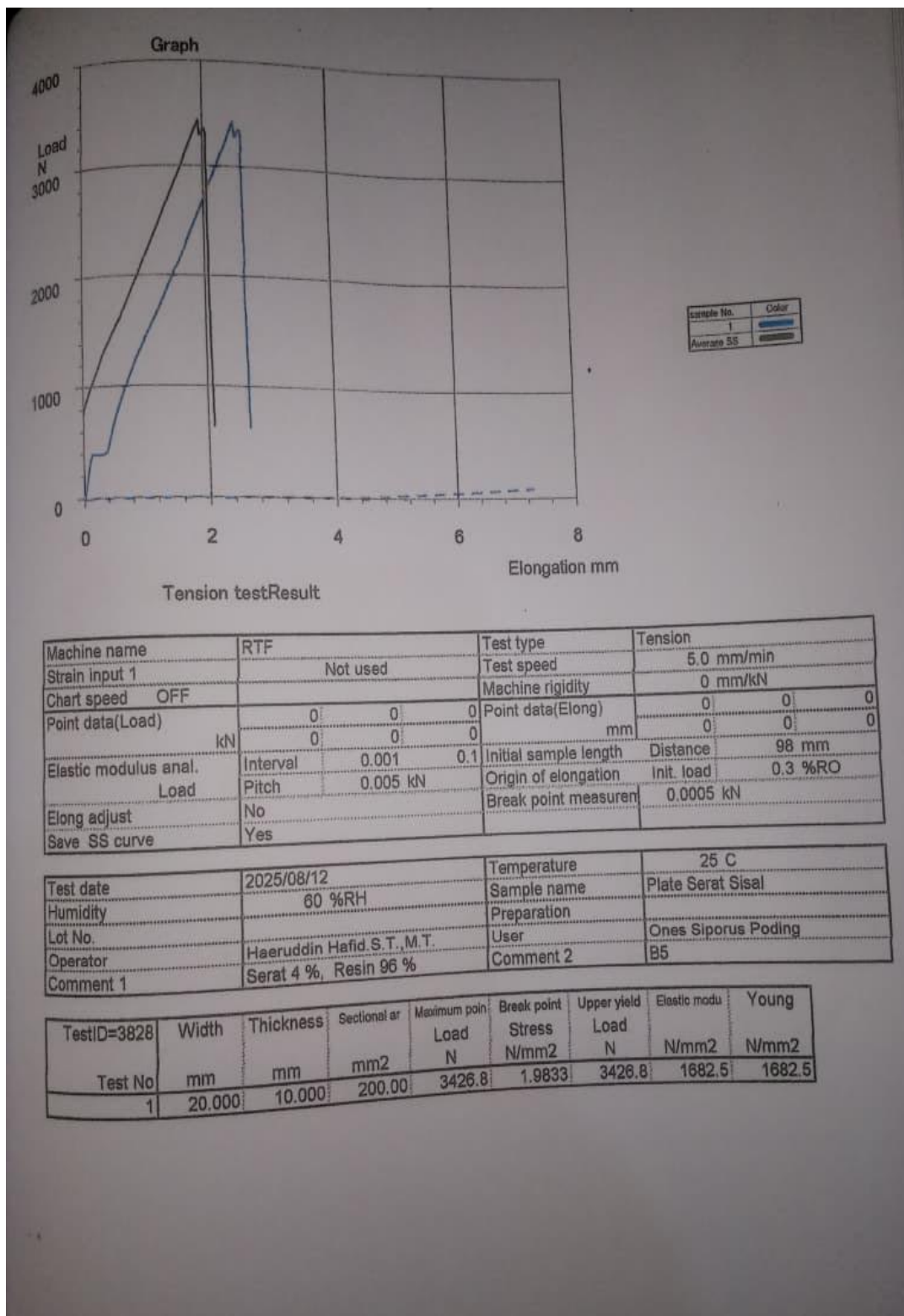
TestID=3826	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm ²	Load N	Stress N/mm ²	Load N	N/mm ²	N/mm ²
1	20.000	10.000	200.00	2815.4	0.3402	*****	162.06	162.66

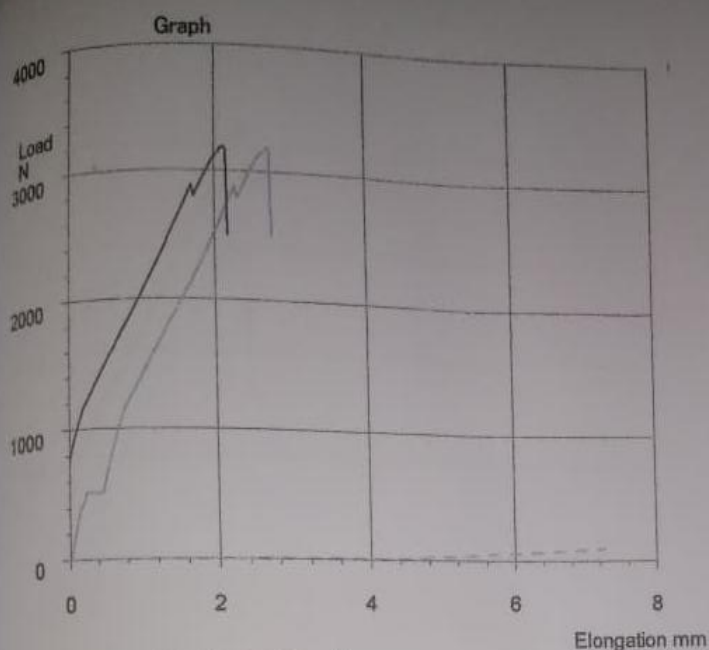


Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN		mm
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measure	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid.S.T.,M.T.	User	Ones Siporus Poding
Comment 1	Serat 4 %, Resin 96 %	Comment 2	B4

TestID=3827	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	4168.2	2.0341	*****	1876.8	1876.8

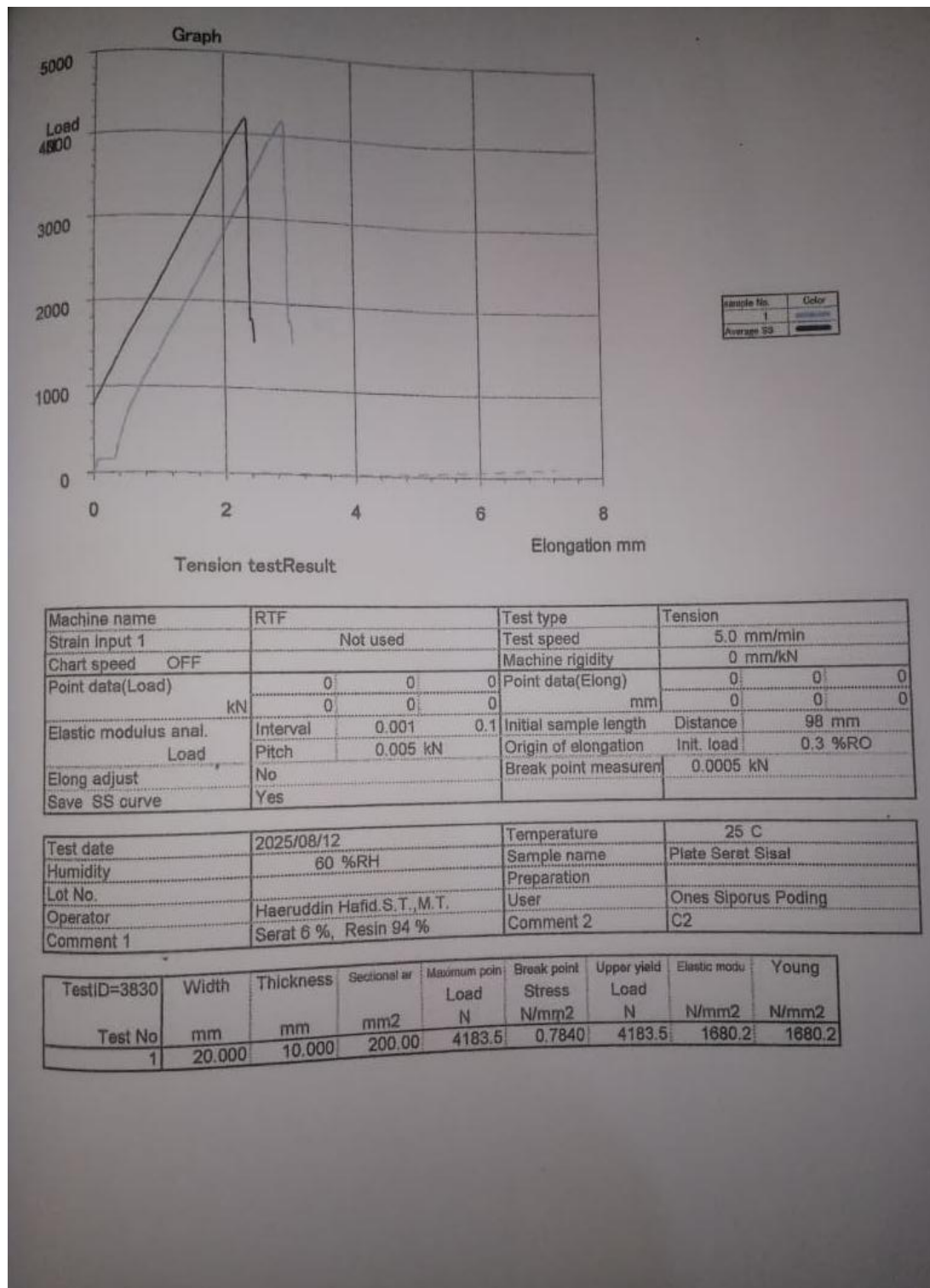


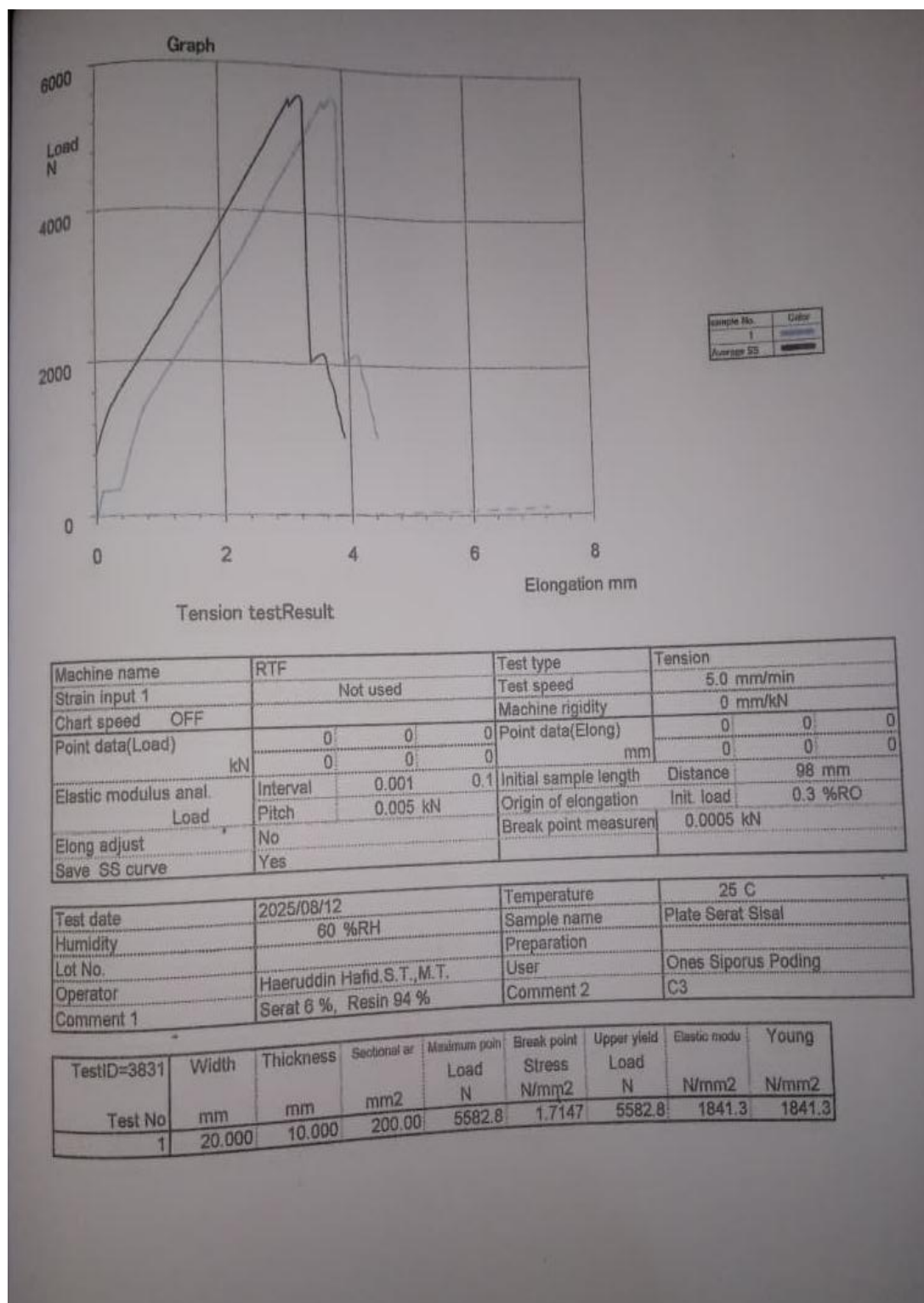


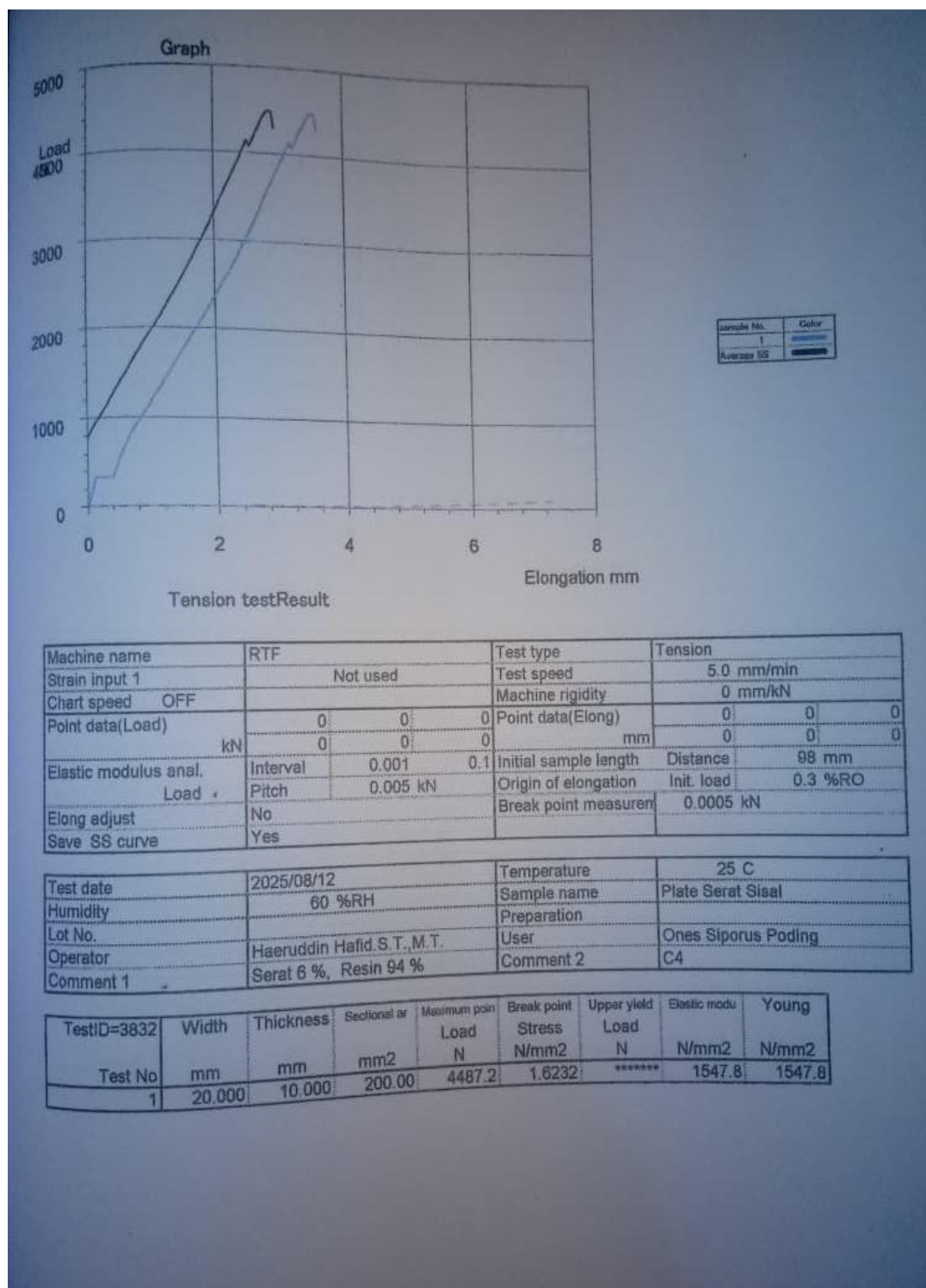
Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN	mm	0 0 0
Elastic modulus anal.	Interval 0.001	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measurement	0.0005 kN
Save SS curve	Yes		

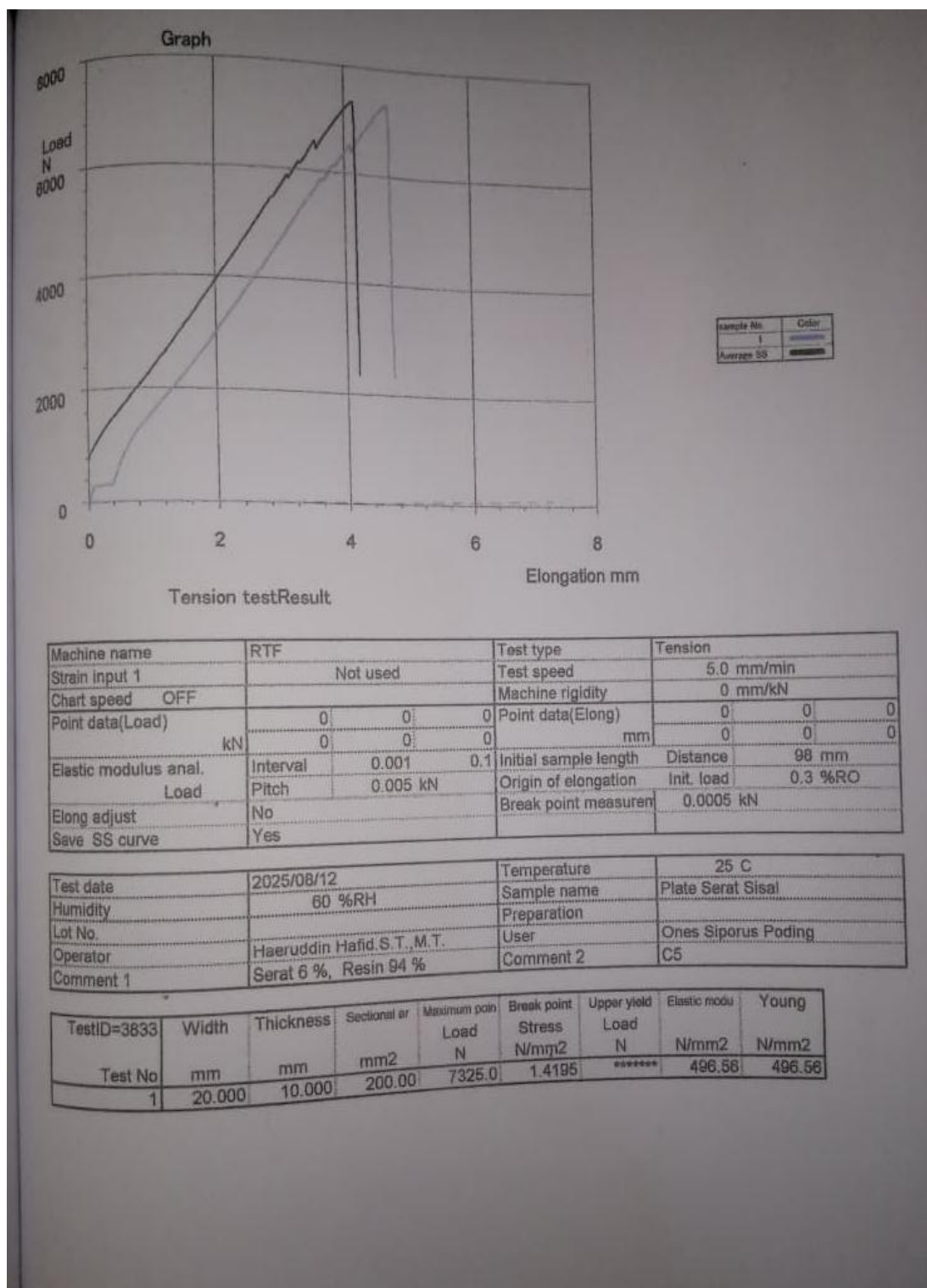
Test date	2025/06/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T	User	Ones Siporus Poding
Comment 1	Serat 6 %, Resin 94 %	Comment 2	C1

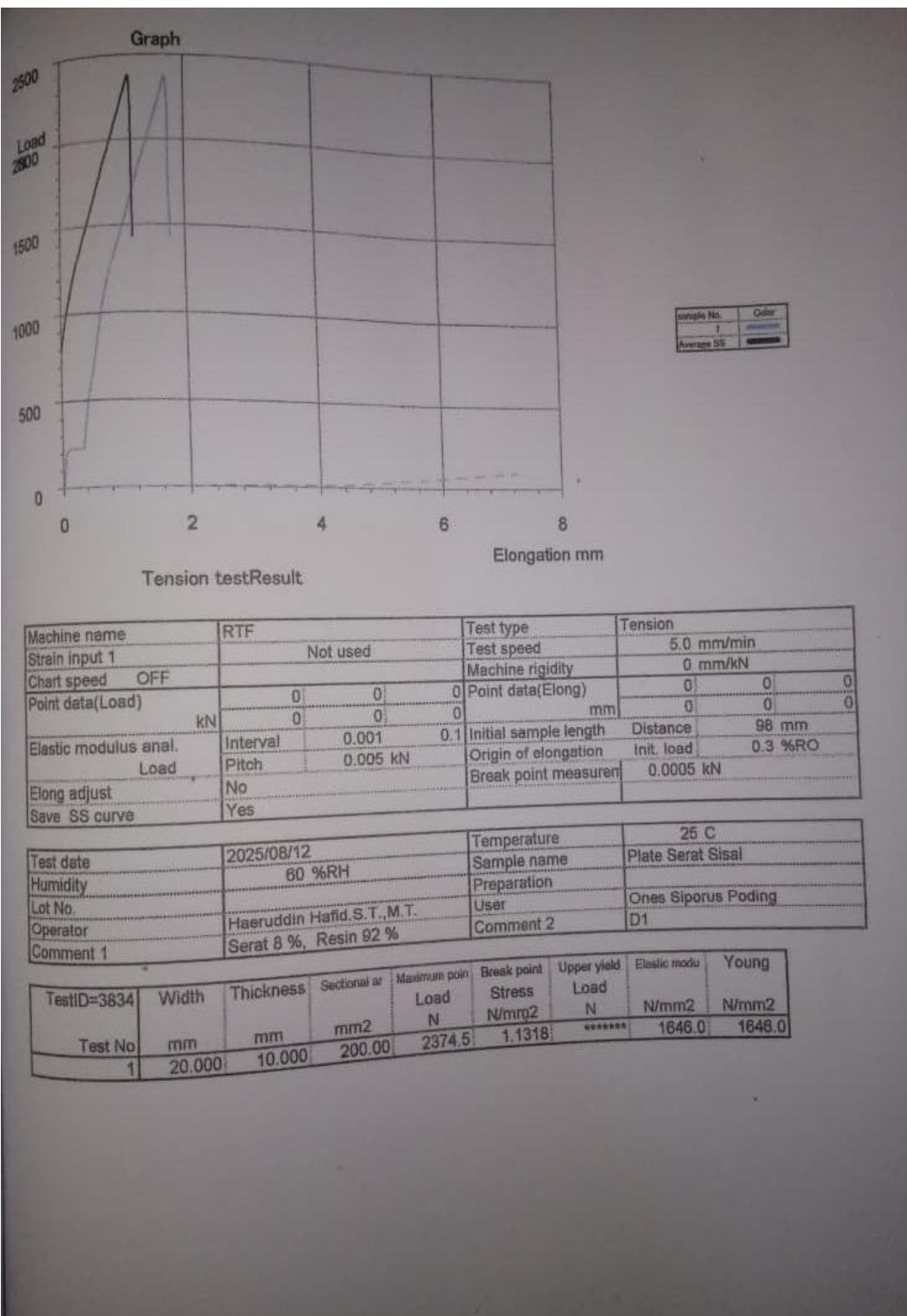
TestID=3829	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	3185.5	2.5761	2877.4	1473.0	1473.0

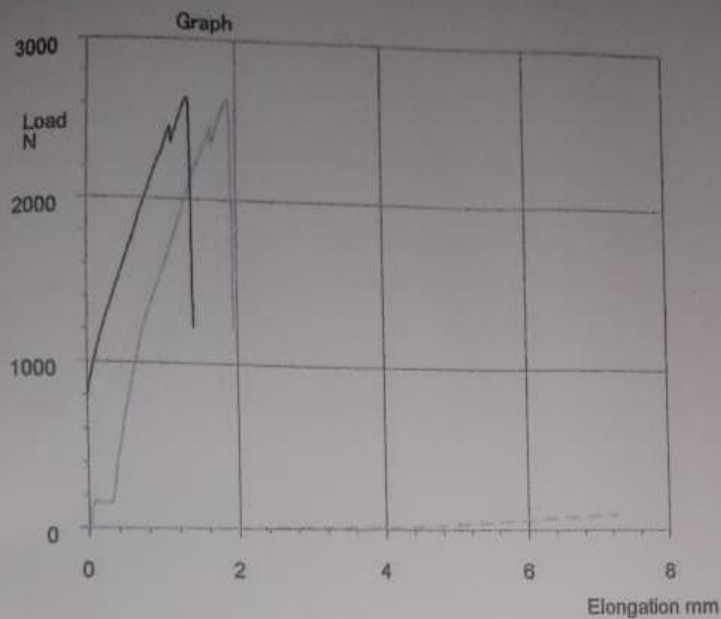








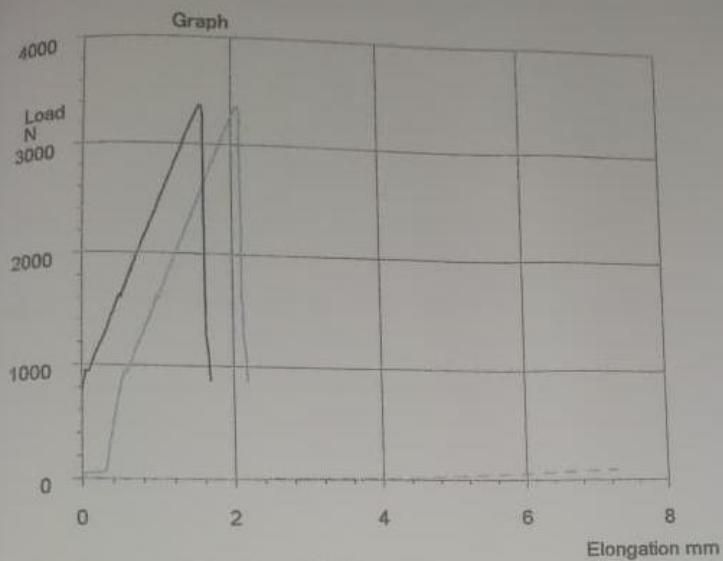




Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed OFF				Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
	kN	0	0		mm	0	0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measurem	0.0005 kN		
Save SS curve	Yes						

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid.S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 8 %, Resin 92 %	Comment 2	D2

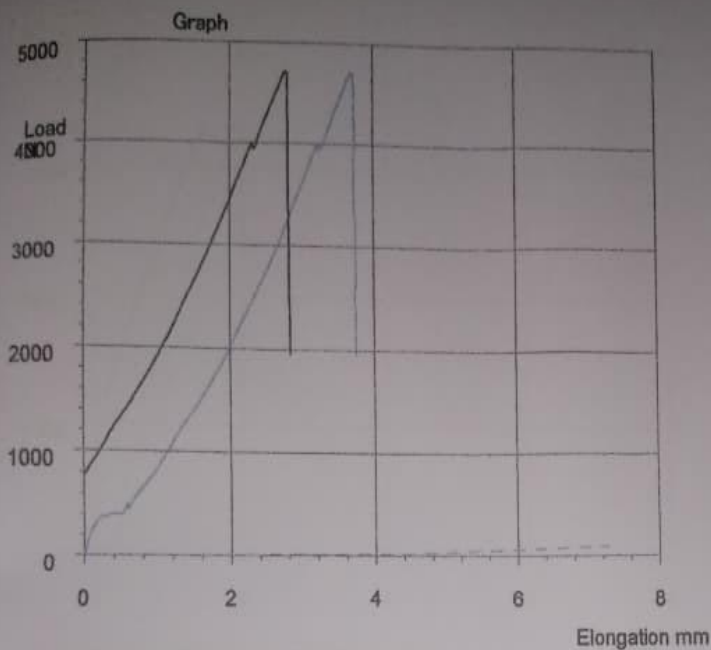
TestID=3835	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Stress	Load	N/mm2	N/mm2
				N	N/mm2	N		
1	20.000	10.000	200.00	2632.3	0.8101	*****	1675.7	1675.7



Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	0 0 0		0 0 0
Elastic modulus anal.	Interval 0.001	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measuren	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 8 %, Resin 92 %	Comment 2	D3

TestID=3836	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Stress	Load	N/mm2	N/mm2
				N	N/mm2	N		
1	20.000	10.000	200.00	3361.1	0.2739	3361.1	47.369	47.369



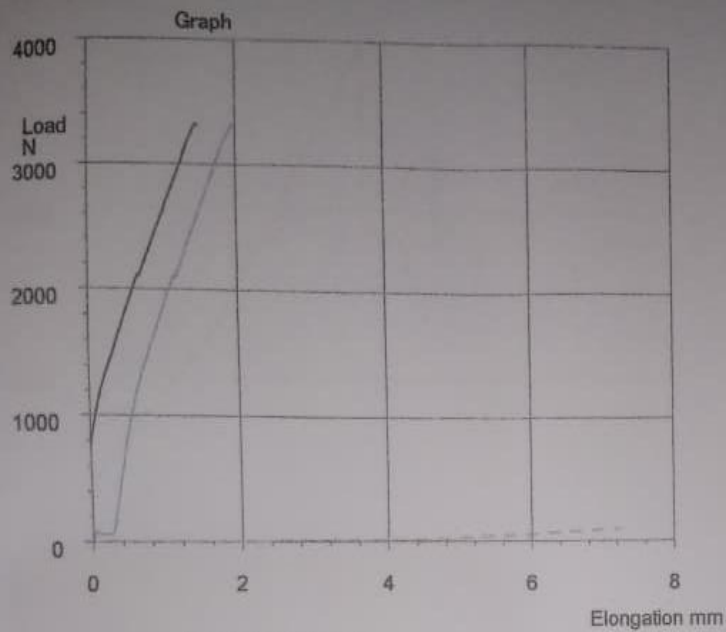
Sample No.	Color
1	Blue
Average SS	Black

Tension testResult

Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed OFF				Machine rigidity	0 mm/kN		
Point deta(Load)	0	0	0	Point data(Elong)	0	0	0
	kN	0	0		mm	0	0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measure	0.0005 kN		
Save SS curve	Yes						

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 8 %, Resin 92 %	Comment 2	D4

TestID=3837	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Stress	Load	N/mm2	N/mm2
1	20.000	10.000	200.00	4706.6	1.9975	*****	1725.7	1725.7

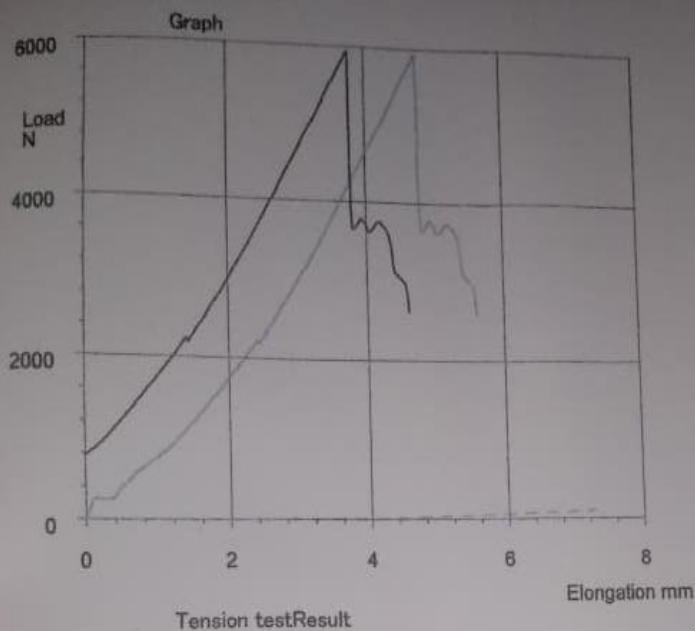


Sample No.	Color
1	Blue
Average SS	Black

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	0 0 0		0 0 0
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measurem	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 8 %, Resin 92 %	Comment 2	D5

TestID=3838	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	3321.7	0.3876	*****	1797.8	1797.8

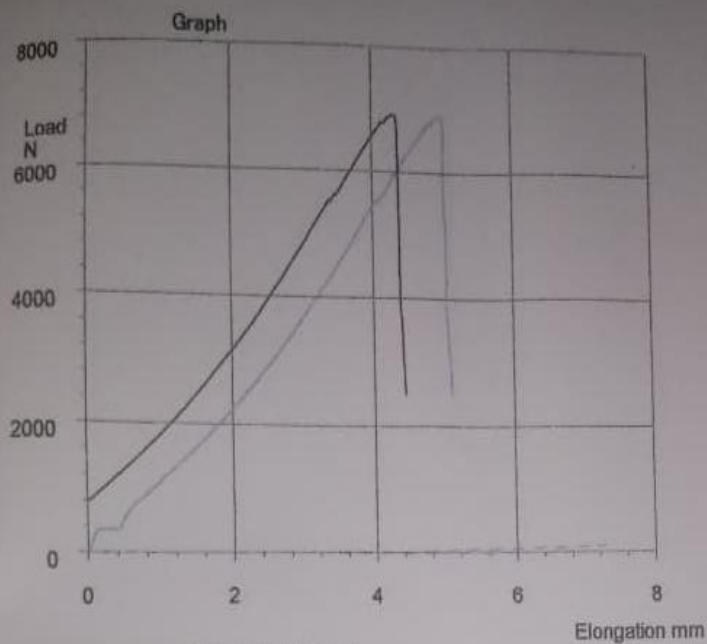


Sample No.	01
Average SS	1508.5

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN	mm	
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measure	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 10 %, Resin 90 %	Comment 2	E1

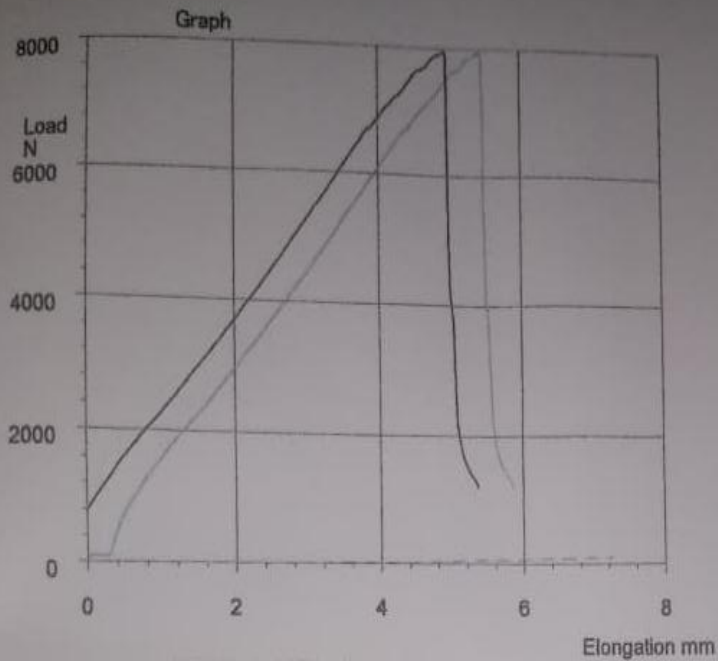
TestID=3839	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	5932.9	1.2413	5932.9	1508.5	1508.5



Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN	mm	
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measurement	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 10 %, Resin 90 %	Comment 2	E2

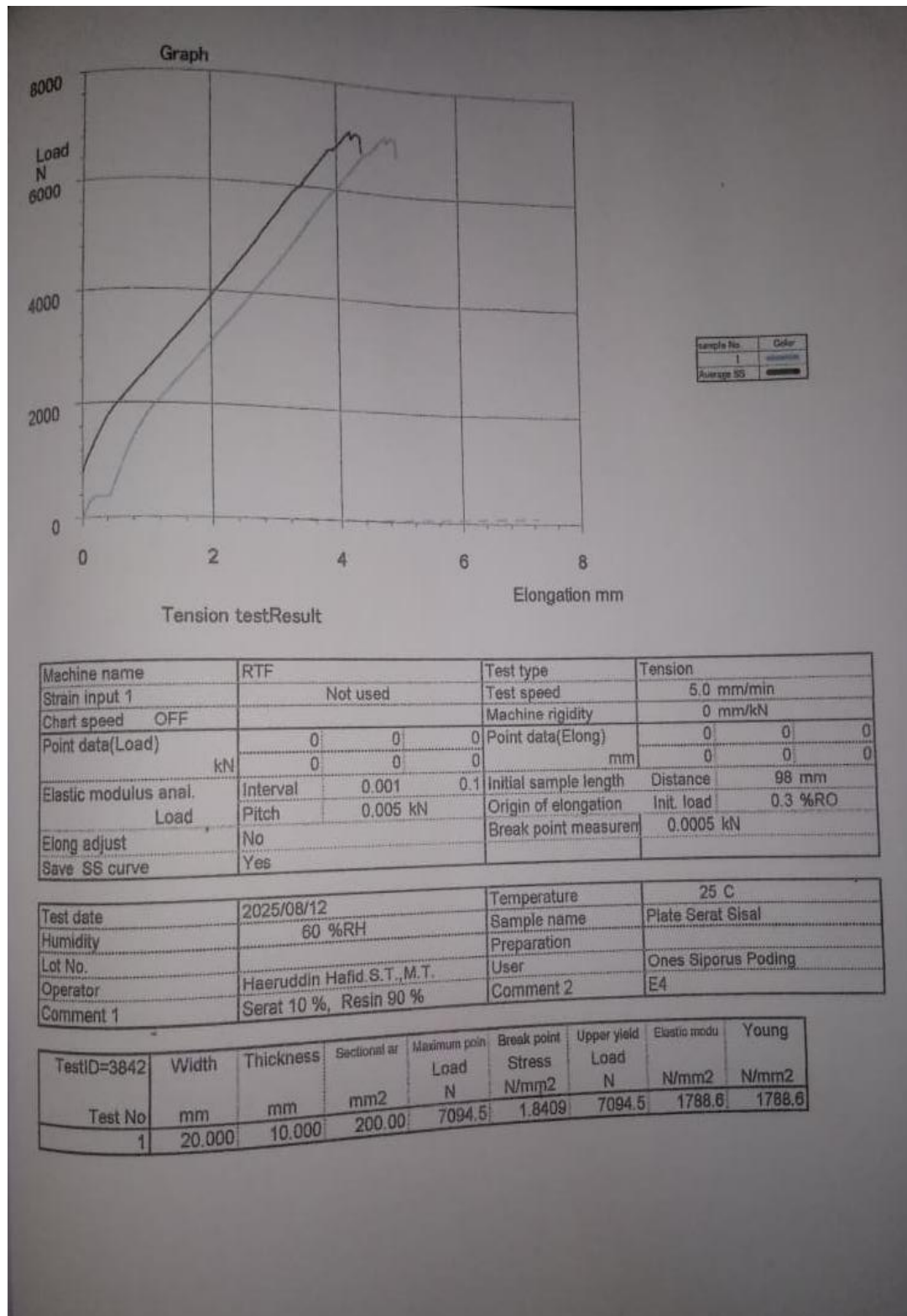
TestID=3840	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm ²	Load N	Stress N/mm ²	Load N	N/mm ²	N/mm ²
1	20.000	10.000	200.00	6906.9	1.7136	6906.9	570.35	570.35

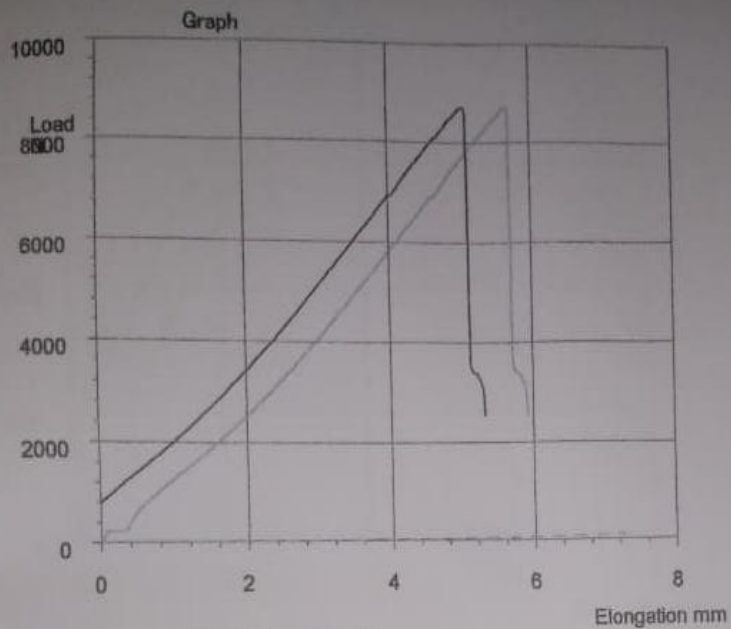


Machine name	RTF			Test type	Tension		
Strain Input 1	Not used			Test speed	5.0 mm/mln		
Chart speed OFF				Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
	kN	0	0		mm	0	0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measure	0.0005 kN		
Save SS curve	Yes						

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 10 %, Resin 90 %	Comment 2	E3

TestID=3841	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	7951.5	0.5041	7951.5	1836.1	1836.1





Tension testResult

Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed	OFF	Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
kN	0 0 0	mm	0 0 0
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measure	0.0005 kN
Save SS curve	Yes		

Test date	2025/08/12	Temperature	25 C
Humidity	60 %RH	Sample name	Plate Serat Sisal
Lot No.		Preparation	
Operator	Haeruddin Hafid.S.T., M.T.	User	Ones Siporus Poding
Comment 1	Serat 10 %, Resin 90 %	Comment 2	E5

TestID=3843	Width	Thickness	Sectional ar	Maximum point	Break point	Upper yield	Elastic modu	Young
Test No	mm	mm	mm2	Load N	Stress N/mm2	Load N	N/mm2	N/mm2
1	20.000	10.000	200.00	8707.0	1.1475	8707.0	1626.5	1626.5