LAMPIRAN 1

LAMPIRAN 1

Perhitungan Fraksi Volume Komposit

Perbandingan fraksi volume serat dan matriks 20% : 80% dengan variasi perbandingan fraksi volume serat kenaf/E-*glass* sebesar 70/30, 80/20 dan 90/10 adapun perhitungannya adalah sebagai berikut :

Diketahui :

Massa jenis serat kenaf = 1.45 gr/cm^3

Massa jenis serat E-*Glass* = 2.42 gr/cm^3

Massa jenis LDPE = 0.9 gr/cm^3

Dimensi cetakan : panjang (p) = 17 cm

lebar (l) = 2 cm

tebal (t) = 0.4 cm

Perbandingan fraksi volume serat dan matriks 20% : 80%

Fraksi volume serat kenaf/ E-*glass* 70/30

Volume cetakan, V_c = p x l x t

= 17 cm x 2 cm x 0.4cm

= 13.6 cm^3

Volume matriks, V_m = $\frac{80\ \%}{100\ \%}$ x 13.6 cm^3

= 10.88 cm^3

Volume serat, V_f = $\frac{20\ \%}{100\ \%}$ x 13.6 cm^3

= 2.72 cm^3

Volume serat kenaf, V_{kenaf} = $\frac{70\ \%}{100\ \%}$ x 2.72 cm^3

= 1.904 cm^3

Volume serat, $V_{E-Glass}$ = $\frac{30\ \%}{100\ \%}$ x 2.72 cm^3

= 0.816 cm^3

Massa matriks, m_m = V_m x ρ_m

= 10.88 cm^3 x 0.9 gr/cm^3

= 10.0096 gr

Massa serat kenaf, m_{Kenaf} = V_{Kenaf} x ρ_{Kenaf}

= 1.904 cm^3x 1.45 gr/cm^3

= 2.76 gr

Massa serat E-*glass*, $m_{E-glass}$ = $V_{E-glass}$ x $\rho_{E-glass}$

= 0.816 cm^3x 2.42 gr/cm^3

= 1.9474 gr

Fraksi volume serat kenaf/ E-*glass* 80/20

Volume cetakan, V_c = p x l x t

= 17 cm x 2 cm x 0.4cm

= 13.6 cm^3

Volume matriks, V_m = $\frac{80\ \%}{100\ \%}$ x 13.6 cm^3

= 10.88 cm^3

Volume serat, V_f = $\frac{20\ \%}{100\ \%}$ x 13.6 cm^3

= 2.72 cm^3

Volume serat kenaf, V_{kenaf} = $\frac{80\ \%}{100\ \%}$ x 2.72 cm^3

= 2.176 cm^3

Volume serat, $V_{E-Glass}$ = $\frac{20\ \%}{100\ \%}$ x 2.72 cm^3

= 0.544 cm^3

Massa matriks, m_m = V_m x ρ_m

= 10.88 cm^3 x 0.9 gr/cm^3

= 10.0096 gr

Massa serat kenaf, m_{Kenaf} = V_{Kenaf} x ρ_{Kenaf}

= 2.176 cm^3x 1.45 gr/cm^3

= 3.155 gr

Massa serat E-*glass*, $m_{E-glass}$ = $V_{E-glass}$ x $\rho_{E-glass}$

= 0.544 cm^3x 2.42 gr/cm^3

= 1.31 gr

Fraksi volume serat kenaf/ E-*glass* 90/10

Volume cetakan, V_c = p x l x t

= 17 cm x 2 cm x 0.4cm

= 13.6 cm^3

Volume matriks, V_m = $\frac{80\ \%}{100\ \%}$ x 13.6 cm^3

= 10.88 cm^3

Volume serat, V_f = $\frac{20\ \%}{100\ \%}$ x 13.6 cm^3

= 2.72 cm^3

Volume serat kenaf, V_{kenaf} = $\frac{90\ \%}{100\ \%}$ x 2.72 cm^3

= 2.448 cm^3

Volume serat, $V_{E-Glass}$ = $\frac{10\ \%}{100\ \%}$ x 2.72 cm^3

= 0.272 cm^3

Massa matriks, m_m = V_m x ρ_m

= 10.88 cm^3 x 0.9 gr/cm^3

= 10.0096 gr

Massa serat kenaf, m_{Kenaf} = V_{Kenaf} x ρ_{Kenaf}

= 2.448 cm^3x 1.45 gr/cm^3

= 3.55 gr

Massa serat E-*glass*, $m_{E-glass}$ = $V_{E-glass}$ x $\rho_{E-glass}$

= 0.272 cm^3x 2.42 gr/cm^3

= 0.65 gr

LAMPIRAN 2

LAMPIRAN 2

Hasil Pengujian Tarik Serat Tunggal

Kenaf	Diameter (µm)			Rata-rata		Luas Area (mm2)	Nilai Beban Pembacaan (Kgf)
	1	2	3	(µm)	(mm)		
1	88.12	88.12	99.13	91.79	0.0918	0.006618739	0.155
2	110.15	143.19	132.18	128.507	0.1285	0.012968691	0.234
4	143.19	88.12	154.21	128.507	0.1285	0.012968691	0.235
5	110.15	154.21	110.15	124.837	0.1248	0.012232608	0.254
7	121.16	132.18	99.13	117.49	0.1175	0.010843403	0.198
8	154.21	88.12	99.13	113.82	0.1138	0.010171252	0.235
9	132.18	88.12	143.19	121.163	0.1212	0.011537059	0.262
Rata - rata					0.118		
Standar Deviasi					0.0127887		
Coefficient of Variation (%)					10.84		

Kenaf	F	σ Tarik (Mpa)	(L) Standar ASTM (mm)	*Measurement travel end* /ΔL (mm)	ϵ (Tarik)	E
1	1.521	229.73	50.00	0.606	0.0121	18954.9587
2	2.296	177.01	50.00	0.616	0.0123	14367.3946
4	2.305	177.76	50.00	0.77	0.0154	11543.035
5	2.492	203.70	50.00	0.84	0.0168	12124.7946
7	1.942	179.13	50.00	0.67	0.0134	13367.9184
8	2.305	226.65	50.00	0.88	0.0176	12878.0408
9	2.570	222.78	50.00	0.74	0.0148	15052.6673
Rata - rata		202.39			0.0146	14041.26
Standar Deviasi		24.31			0.0021	2483.08
Coefficient of Variation (%)		12.01			14.58	17.68

LAMPIRAN 3

LAMPIRAN 3

- 12.04.2017

Serat Tunggal (serat kenaf)

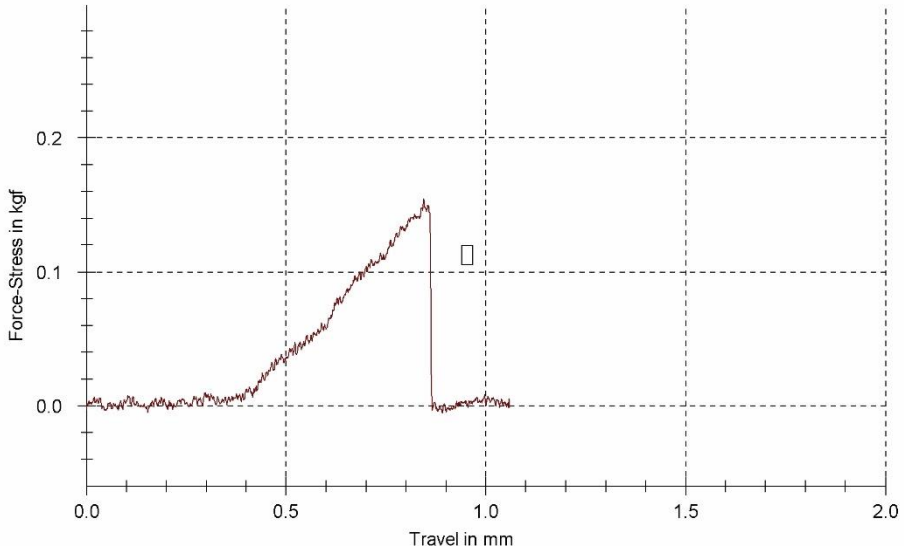
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	✞2	0.234	1.16
	✞3	0.139	1.17
	✞4	0.235	1.37
	✞5	0.254	1.29
	✞6	0.251	1.24
	✞7	0.198	1.17
	✞8	0.235	1.33
	✞9	0.262	1.14
	✞10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

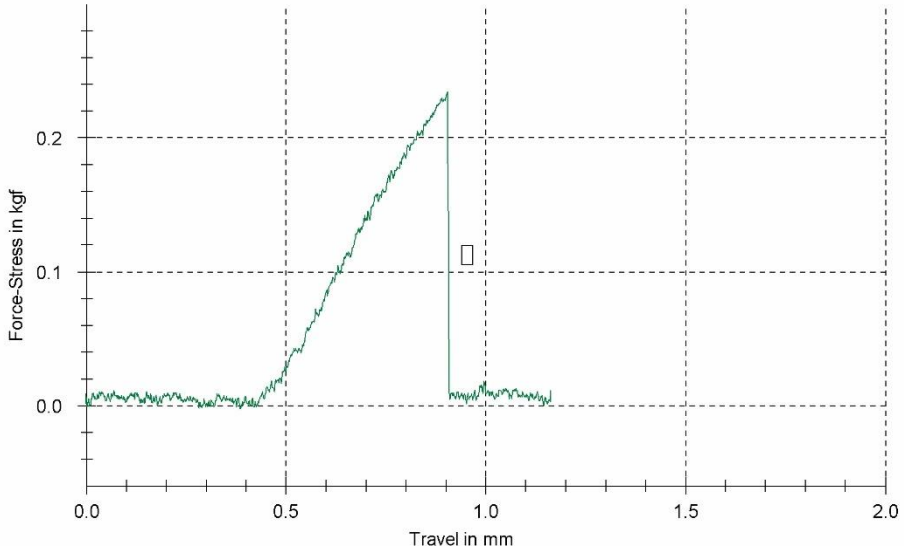
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

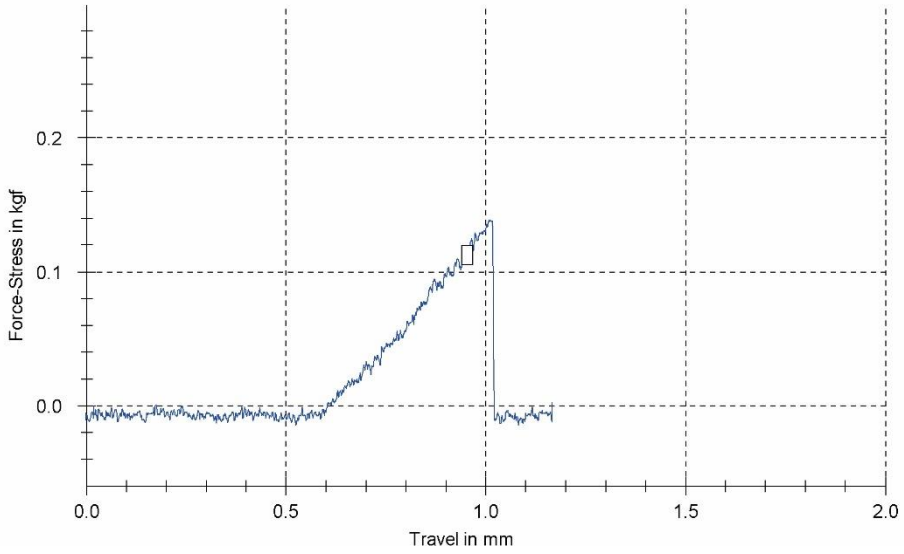
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
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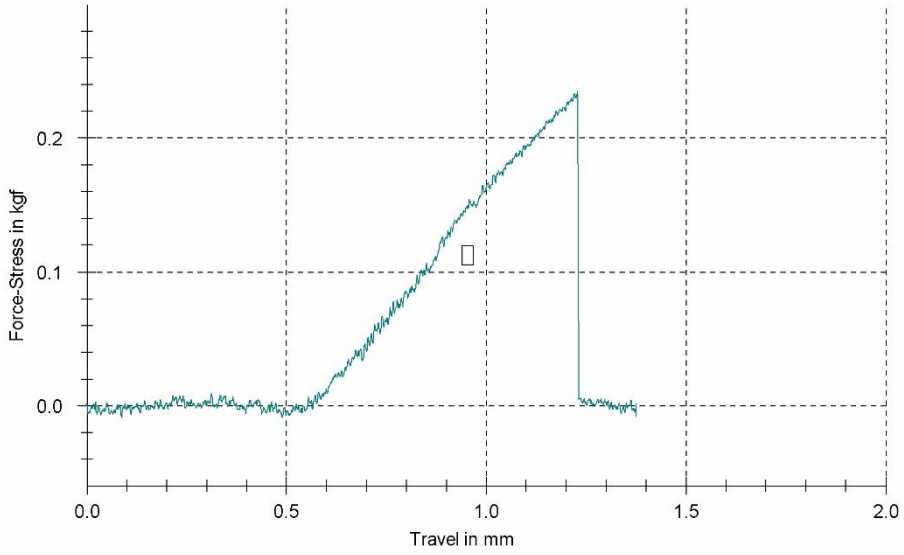
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
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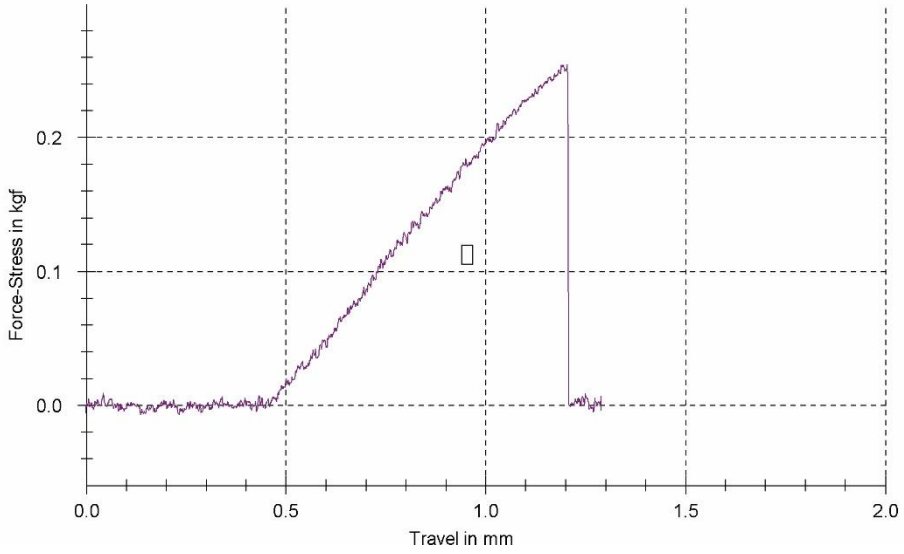
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
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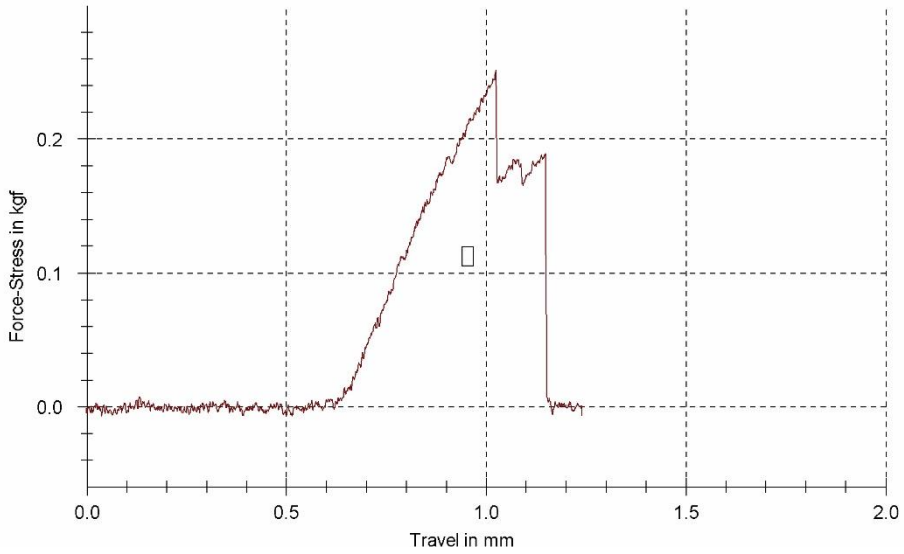
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
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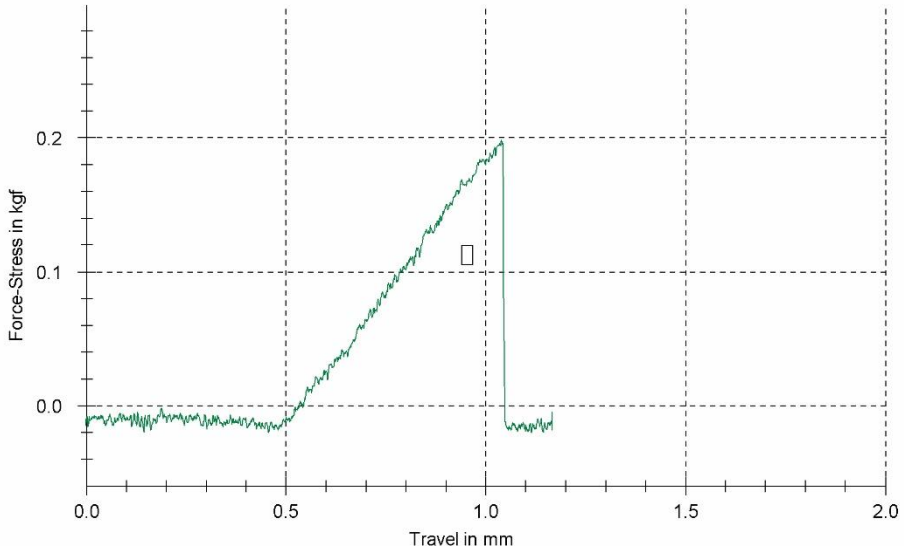
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

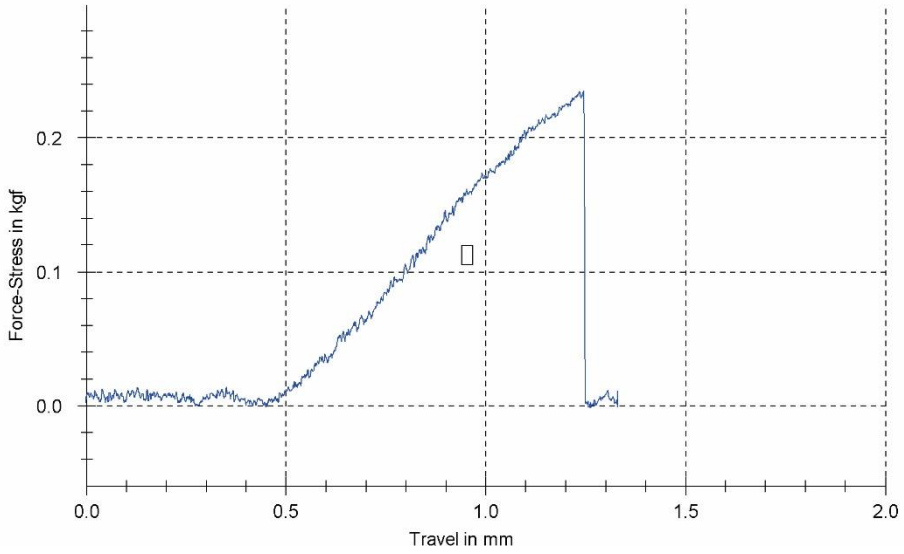
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

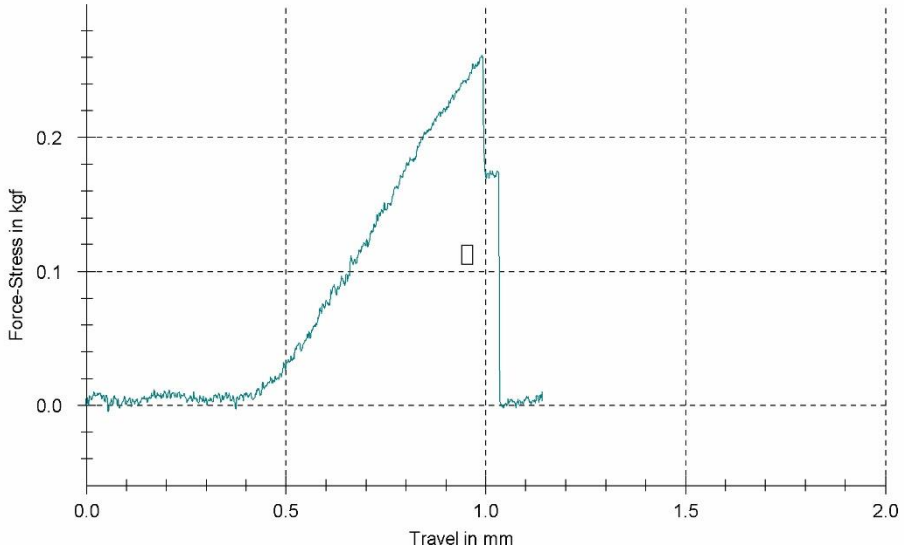
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

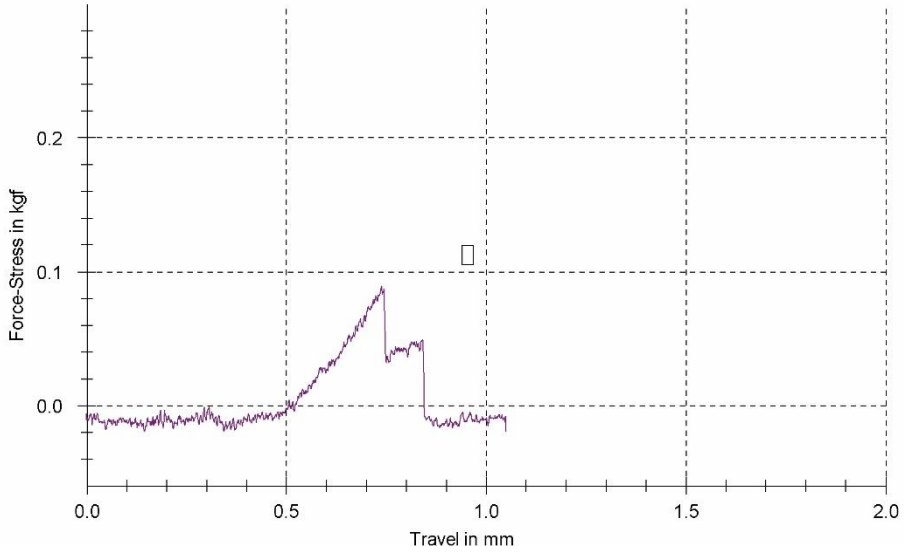
Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
	2	0.234	1.16
	3	0.139	1.17
	4	0.235	1.37
	5	0.254	1.29
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



Serat Tunggal (serat kenaf)

Parameter table:

Headline	: Serat Tunggal (serat kenaf)	Evaluat. method	: M (Automatic A, B or C)
Customer	: 923/LUPKKP-SERAT/IV/17	Specimen ID	: A1-A10
Tester	: Aprial	Specimen holders	:
Material	: Serat Tunggal	Extensometer	:
Test standard	: ASTM D 3379	Load cell	:

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	0.155	1.06
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	3	0.139	1.17
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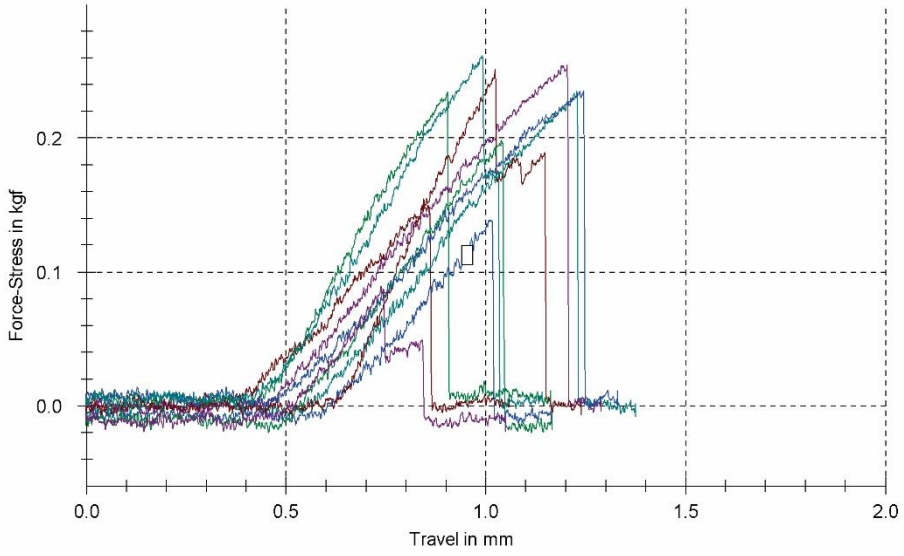
	6	0.251	1.24
	7	0.198	1.17
	8	0.235	1.33
	9	0.262	1.14
	10	0.089	1.05

Series graph:



LAMPIRAN 4

LAMPIRAN 4

Perhitungan Teoritis *Rule Of Mixture* (Persamaan Cox-Krenchel), dimana persamaan Cox-Krenchel berlaku untuk *randomly oriented discontinuous fiber composites*.

Keterangan perbandingan Kenaf/E glass 70/30

Perbandingan Kenaf/E *glass* 70/30			**Sumber**
Keterangan		**Satuan**	
Panjang serat kenaf, L_f	10	mm	Pengujian
Radius serat kenaf	0.059007143	mm	Pengujian
Radius serat E glass	0.014246736	mm	Pengujian
Radius serat hibrida	0.045579021	mm	Pengujian
Tensile strength kenaf	202.39	MPa	Pengujian
Tensile strength E *glass*	3450	MPa	Calliester (2014)
Tensile Strenght LDPE	31.4	MPa	Calliester (2014)
Modulus elastisitas serat kenaf	16363.99	MPa	
Modulus elastisitas serat E *glass*	72500	MPa	Calliester (2014)
Modulus elastisitas LDPE	282	MPa	Calliester (2014)
Poisson ratio LDPE	0.4		Calliester (2014)
Fraksi volume serat hibrida	0.2		
Fraksi volume matrik	0.8		
Fiber orientation	0.2		H. Krenchel (1964)
Fiber length factor	0.345701515		
Tensile strength komposit	41.39	MPa	
Modulus elastisitas komposit	684.76	MPa	
Regangan komposit	0.0604		

Perhitungan kuat tarik, modulus elastisitas tarik dan regangan tarik pada perbandingan serat kenaf/E *glass* 70/30.

Kuat tarik komposit, $\sigma_t = X_1 X_2 \sigma_f V_f + \sigma_m V_m$

Modulus elastisitas tarik, $E_t = X_1 X_2 E_f V_f + E_m V_m$

E_f = (0.7 x 16363.99 MPa) + (0.3 x 72500 MPa)

= 33204.793 MPa

$$\zeta = \frac{1}{r} \frac{E^m}{E_f(1-v)Ln\left(\frac{\pi}{4V_f}\right)^{\frac{1}{2}}}$$

$$\zeta = \frac{1}{0.045579021} \frac{282}{33204.793\ (1-0.4)Ln\left(\frac{\pi}{4x0.2}\right)^{\frac{1}{2}}} = 0.265527272$$

$$X_1 = 1 - \frac{tanh\frac{\zeta L_f}{2}}{\frac{\zeta L_f}{2}}$$

$$X_1 = 1 - \frac{tanh\frac{0.265527272 \text{ x } 10}{2}}{\frac{0.265527272 \text{ x } 10}{2}} = 0.345701515 \text{ (}\textit{fiber length factor}\text{)}$$

σ_t = 0.345701515 x 0.2 ((0.7 x 202.39 MPa + 0.3 x 3450 MPa) x 0.2) + (14.5 MPa x 0.8) = 41.39 (kuat tarik)

E_t = 0.345701515 x 0.2 ((0.7 x 16363.99 MPa) + (0.3 x 72500 MPa) x 0.2) + (282 MPa x 0.8) = 684.75 MPa (modulus elastitas tarik)

$\varepsilon_t = \frac{\sigma_t}{Et} = \frac{41.39 \text{ MPa}}{684.75 \text{ MPa}} = 0.0604$ (regangan tarik)

Keterangan perbandingan Kenaf/E *glass* 80/20

Perbandingan Kenaf/E *glass* 80/20			Sumber
Keterangan		Satuan	
Panjang serat kenaf, L_f	10	mm	Pengujian
Radius serat kenaf	0.059007143	mm	Pengujian
Radius serat E glass	0.014246736	mm	Pengujian
Radius serat hibrida	0.050055061	mm	Pengujian
Tensile strength kenaf	202.39	MPa	Pengujian
Tensile strength E *glass*	3450	MPa	Calliester (2014)
Tensile Strenght LDPE	31.4	MPa	Calliester (2014)
Modulus elastisitas serat kenaf	16363.99	MPa	Calliester (2014)
Modulus elastisitas serat E *glass*	72500	MPa	Calliester (2014)
Modulus elastisitas LDPE	282	MPa	Calliester (2014)
Poisson ratio LDPE	0.4		Calliester (2014)
Fraksi volume serat hibrida	0.2		
Fraksi volume matrik	0.8		
Fiber orientation	0.2		H. Krenchel (1964)
Fiber length factor	0.383691686		
Tensile strength komposit	38.19	MPa	
Modulus elastisitas komposit	649.06	MPa	
Regangan komposit	0.0588		

Perhitungan kuat tarik, modulus elastisitas tarik dan regangan tarik pada perbandingan serat kenaf/E *glass* 80/20.

Kuat tarik komposit, $\sigma_t = X_1 X_2 \sigma_f V_f + \sigma_m V_m$

Modulus elastisitas tarik, $E_t = X_1 X_2 E_f V_f + E_m V_m$

E_f = (0.8 x 16363.99 MPa) + (0.2 x 72500 MPa)

= 27591.192MPa

$$\zeta = \frac{1}{r} \frac{E^m}{E_f(1-v)Ln\left(\frac{\pi}{4V_f}\right)^{\frac{1}{2}}}$$

$$\zeta = \frac{1}{0.050055061} \frac{282}{27591.192\ (1-0.4) Ln\left(\frac{\pi}{4x0.2}\right)^{\frac{1}{2}}} = 0.29097551$$

$$X_1 = 1 - \frac{tanh\frac{\zeta L_f}{2}}{\frac{\zeta L_f}{2}}$$

$$X_1 = 1 - \frac{tanh\frac{0.29097551 \text{ x } 10}{2}}{\frac{0.29097551 \text{ x } 10}{2}} = 0.383691686 \text{ (}\textit{fiber length factor}\text{)}$$

σ_t = 0.539884544 x 0.2 ((0.8 x 202.39 MPa + 0.2 x 3450 MPa) x 0.2) + (14.5 MPa x 0.8) = 38.19 MPa (kuat tarik)

E_t = 0.383691686 x 0.2 ((0.8 x 16363.99 MPa) + (0.2 x 72500 MPa) x 0.2) + (282 MPa x 0.8) = 649.06 MPa (modulus elastitas tarik)

$\varepsilon_t = \frac{\sigma_t}{Et} = \frac{38.19 \text{ MPa}}{649.06 \text{ MPa}}$ = 0.058846387 (regangan tarik)

Keterangan perbandingan Kenaf/E *glass* 90/10

Perbandingan Kenaf/E *glass* 90/10			Sumber
Keterangan		Satuan	
Panjang serat kenaf, L_f	10	mm	Pengujian
Radius serat kenaf	0.059007143	mm	Pengujian
Radius serat E glass	0.014246736	mm	Pengujian
Radius serat hibrida, r	0.054531102	mm	Pengujian
Tensile strength kenaf	202.39	MPa	Pengujian
Tensile strength E *glass*	3450	MPa	Calliester (2014)
Tensile Strenght LDPE	31.4	MPa	Calliester (2014)
Modulus elastisitas serat kenaf	16363.99	MPa	Calliester (2014)
Modulus elastisitas serat E *glass*	72500	MPa	Calliester (2014)
Modulus elastisitas LDPE	282	MPa	Calliester (2014)
Poisson ratio LDPE	0.4		Calliester (2014)
Fraksi volume serat hibrida	0.2		
Fraksi volume matrik	0.8		
Fiber orientation	0.2		H. Krenchel (1964)
Fiber length factor	0.443854474		
Tensile strength komposit	34.48	MPa	
Modulus elastisitas komposit	615.79	MPa	
Regangan komposit	0.0560		

Perhitungan kuat tarik, modulus elastisitas tarik dan regangan tarik pada perbandingan serat kenaf/E *glass* 80/20.

Kuat tarik komposit, $\sigma_t = X_1 X_2 \sigma_f V_f + \sigma_m V_m$

Modulus elastisitas tarik, $E_t = X_1 X_2 E_f V_f + E_m V_m$

E_f = (0.9 x 16363.99 MPa) + (0.1 x 72500 MPa)

= 21977.59 MPa

$$\zeta = \frac{1}{r} \frac{E^m}{E_f(1-v)Ln\left(\frac{\pi}{4V_f}\right)^{\frac{1}{2}}}$$

$\zeta = \frac{1}{0.054531102} \frac{282}{21977.591\,(1-0.4)Ln\left(\frac{\pi}{4x0.2}\right)^{\frac{1}{2}}} = 0.335313113$

$X_1 = 1 - \frac{tanh\frac{\zeta L_f}{2}}{\frac{\zeta L_f}{2}}$

$X_1 = 1 - \frac{tanh\frac{0.335313113 \text{ x } 10}{2}}{\frac{0.335313113 \text{ x } 10}{2}} = 0.443854474$ (*fiber length factor*)

σ_t = 0.443854474 x 0.2 ((0.9 x 202.39 MPa + 0.1 x 3450 MPa) x 0.2) + (14.5 MPa x 0.8) = 34.48 MPa (kuat tarik)

E_t = 0.443854474 x 0.2 ((0.9 x 16363.99 MPa) + (0.1 x 72500 MPa) x 0.2) + (282 MPa x 0.8) = 776.20 MPa (modulus elastitas tarik)

$\varepsilon_t = \frac{\sigma_t}{Et} = \frac{34.48 \text{ MPa}}{615.79 \text{ MPa}} = 0.055991336$

LAMPIRAN 5

LAMPIRAN 5

Tabel hasil pengujian spesimen komposit

Fraksi Volume Matrik & Serat 80% / 20 %	Spesimen	Lebar rata-rata (mm)	Tebal rata-rata (mm)	(L) Standar ASTM D 638-02 (mm)	(ΔL) *Measurement travel end* (mm)	Nilai beban pembacaan (Kgf)	Nilai beban sebenarnya (Kgf)	G	F (N)	σ (MPa)	ϵ	E (MPa)
Kenaf-E *glass* 70/30	2	13.76	3.87	57.00	9.29	100.92	98.37	9.81	965.03	18.14	0.1630	1648.774464
	4	13.81	3.65	57.00	10.46	96.02	93.52	9.81	917.46	18.18	0.1835	1767.851928
	5	14	3.8	57.00	11.71	99.04	96.52	9.81	946.81	17.80	0.2054	1637.945856
	6	13.92	3.5	57.00	12.13	97.79	95.28	9.81	934.68	19.21	0.2128	1885.209316
	7	14.44	3.74	57.00	11.04	105.42	102.83	9.81	1008.74	18.67	0.1937	1694.336791
Rata-rata ($\bar{x}$)		13.99	3.71		10.93	99.84	97.30		954.55	18.40	0.1917	1726.82
Standar deviasi										0.55	0.0196	102.24
Coefficient of Variation (%)										2.98	10.20	5.92
Kenaf-E *glass* 80/20	1	13.91	3.76	57.00	10.54	115.53	112.84	9.81	1106.97	21.67	0.1850	1910.737671
	2	13.62	3.8	57.00	10.79	112.04	109.38	9.81	1073.03	21.26	0.1890	2029.444129
	3	14.1	3.88	57.00	9.21	107.19	104.58	9.81	1025.91	19.24	0.1620	1935.517447
	4	13.99	3.58	57.00	13.71	104.62	102.03	9.81	1000.96	20.49	0.2410	1758.876621
	6	14.35	3.71	57.00	10.79	101.96	99.41	9.81	975.19	18.80	0.1890	1892.899429
Rata-rata ($\bar{x}$)		13.99	3.75		11.01	108.27	105.65		1036.41	20.29	0.1932	1905.495059
Standar deviasi										1.25	0.0290	97.40
Coefficient of Variation (%)										6.14	15.00	5.11
Kenaf-E *glass* 90/10	1	13.75	3.6	57.00	9.54	107.70	105.09	9.81	1030.95	21.37	0.1700	2497.560049
	2	13.78	4.25	57.00	9.63	104.24	101.67	9.81	997.34	17.49	0.1700	1726.76
	4	13.81	3.45	57.00	9.46	102.96	100.40	9.81	984.88	21.20	0.1700	2152.508254
	5	13.91	3.65	57.00	10.46	114.47	111.80	9.81	1096.71	22.10	0.1800	2062.146542
	6	14.19	3.8	57.00	10.79	123.01	120.25	9.81	1179.65	22.40	0.1900	1788.978116
Rata-rata ($\bar{x}$)		13.89	3.75		9.98	110.48	107.84		1057.91	20.91	0.1760	2045.590487
Standar deviasi										1.98	0.0089	309.63
Coefficient of Variation										9.45	5.08	15.14

LAMPIRAN 6

LAMPIRAN 6

Data kuat tarik hasil pengujian

1. Perbandingan serat kenaf – E *glass* (70/30)

\- 23.03.2017

KUAT TARIK

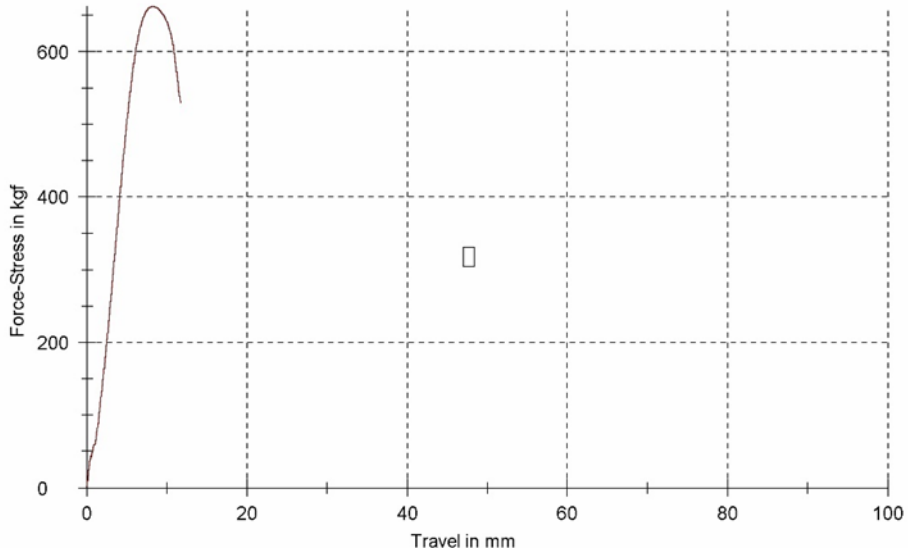
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/II/17	Specimen holders	:
Tester	: L TRIYONO	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	67.526	11.68
	⇳2	100.917	9.29

Series graph:



KUAT TARIK

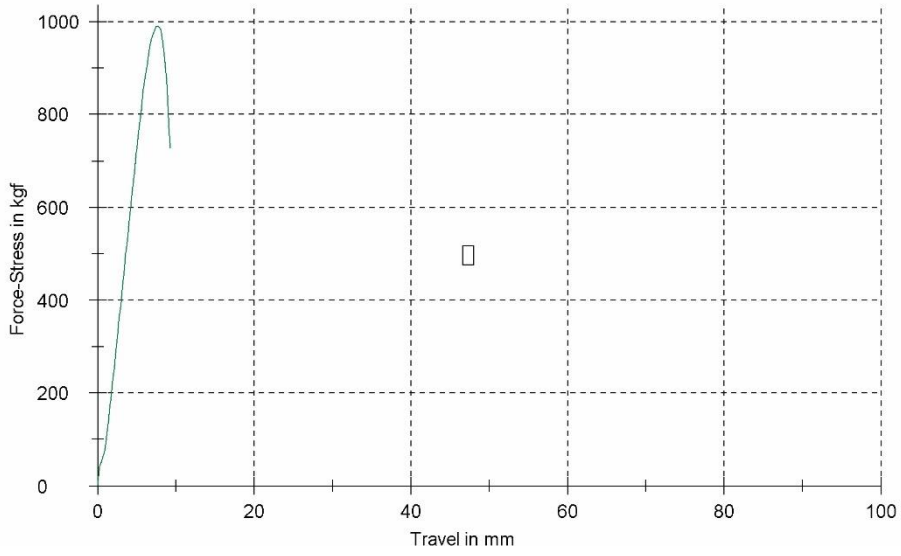
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/II/17	Specimen holders	:
Tester	: L TRIYONO	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	67.526	11.68
	2	100.917	9.29

Series graph:



KUAT TARIK

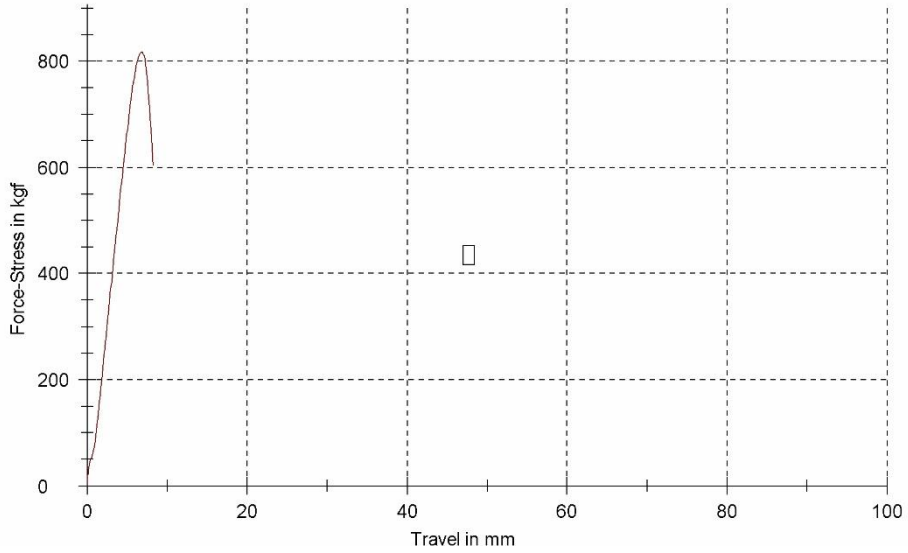
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	3	83.337	8.29
	4	96.019	10.46

Series graph:



KUAT TARIK

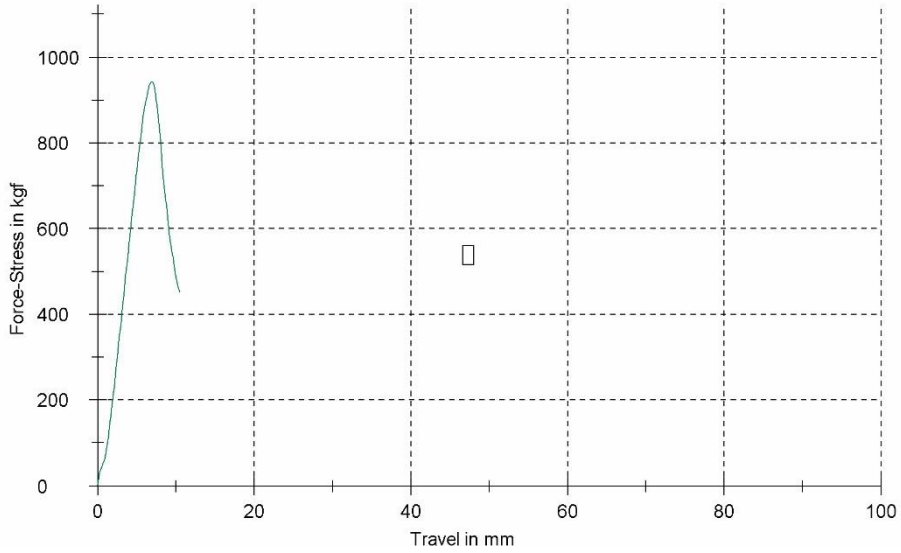
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	3	83.337	8.29
	4	96.019	10.46

Series graph:



KUAT TARIK

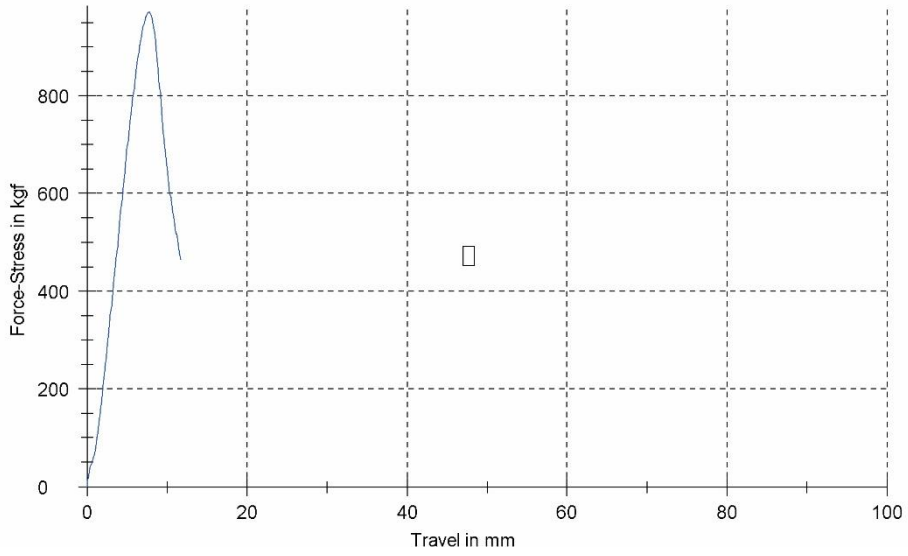
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	✞3	83.337	8.29
	✞4	96.019	10.46
	5	99.041	11.71
	✞6	97.792	12.13
	✞7	105.417	11.04

Series graph:



KUAT TARIK

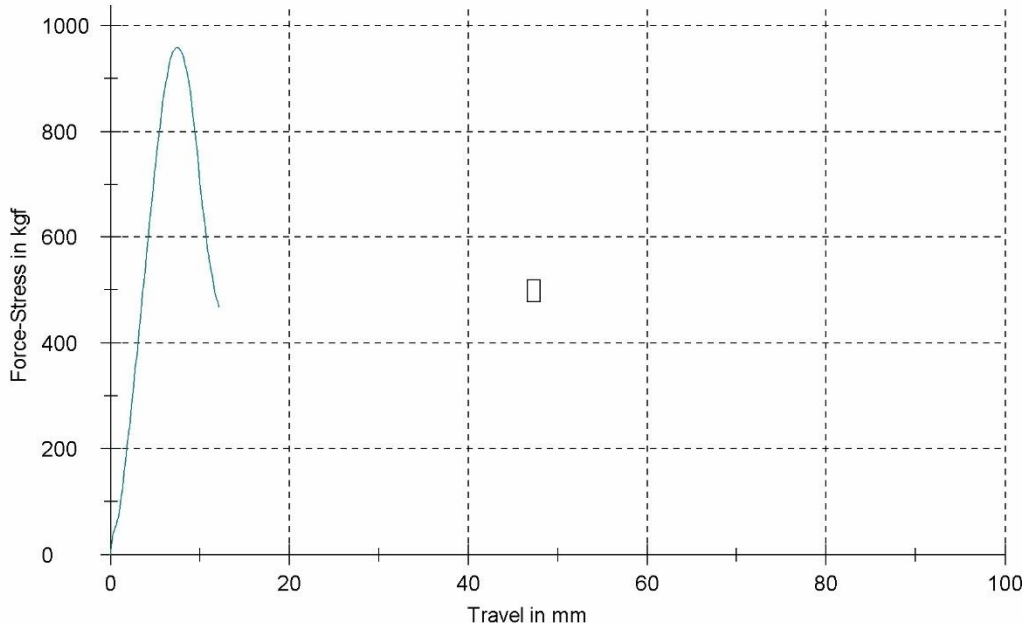
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	3	83.337	8.29
	4	96.019	10.46
	5	99.041	11.71
	6	97.792	12.13
	7	105.417	11.04

Series graph:



KUAT TARIK

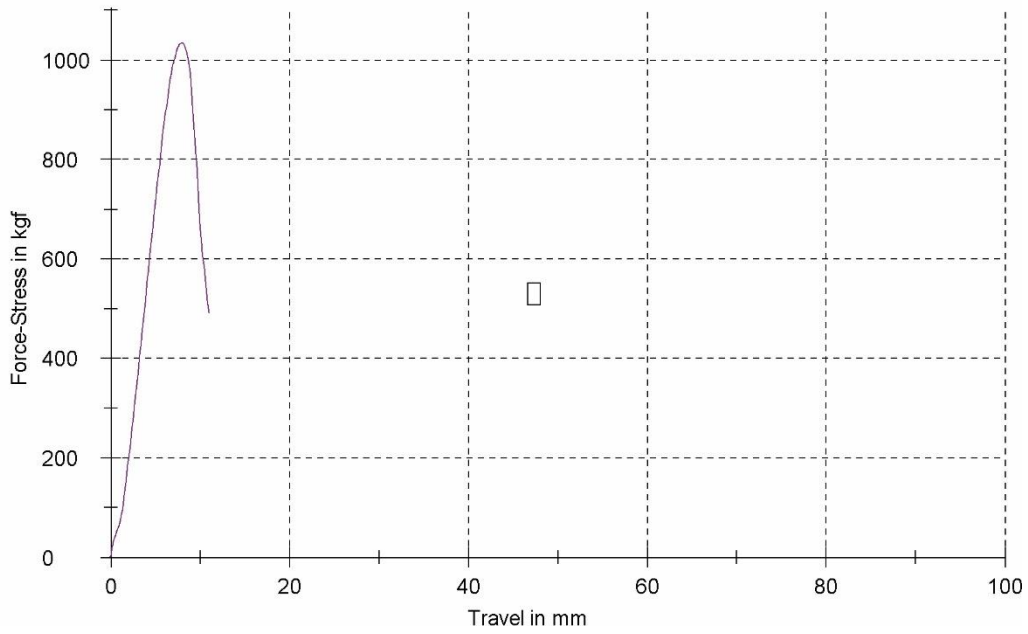
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 694/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF E GLASS 70 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	3	83.337	8.29
	4	96.019	10.46
	5	99.041	11.71
	6	97.792	12.13
	7	105.417	11.04

Series graph:



2. Perbandingan Serat Kenaf - E *glass* 80/20

- **23.03.2017**

KUAT TARIK

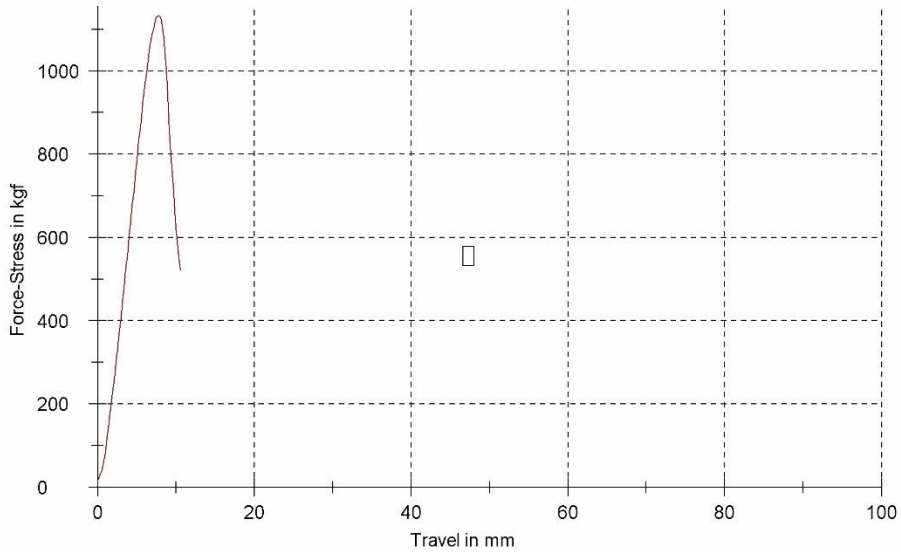
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF E GLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

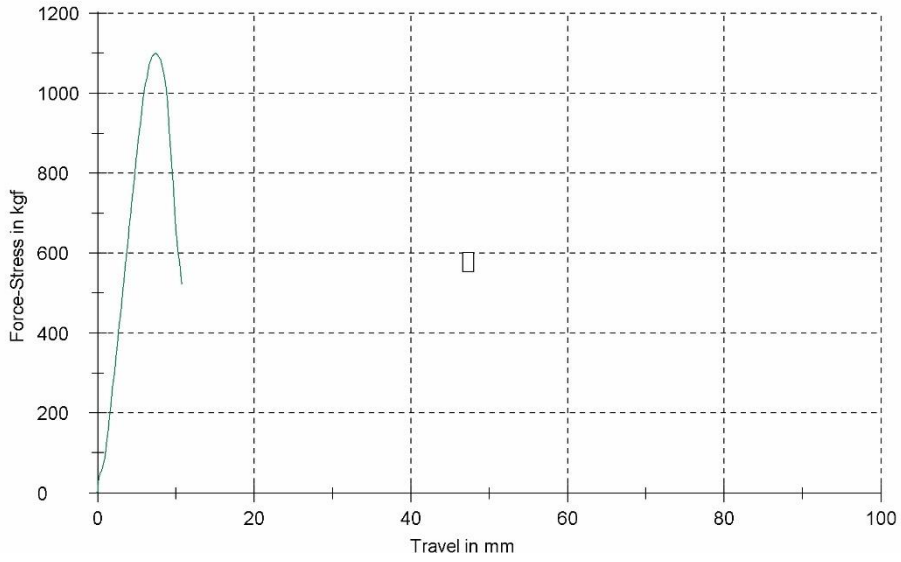
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

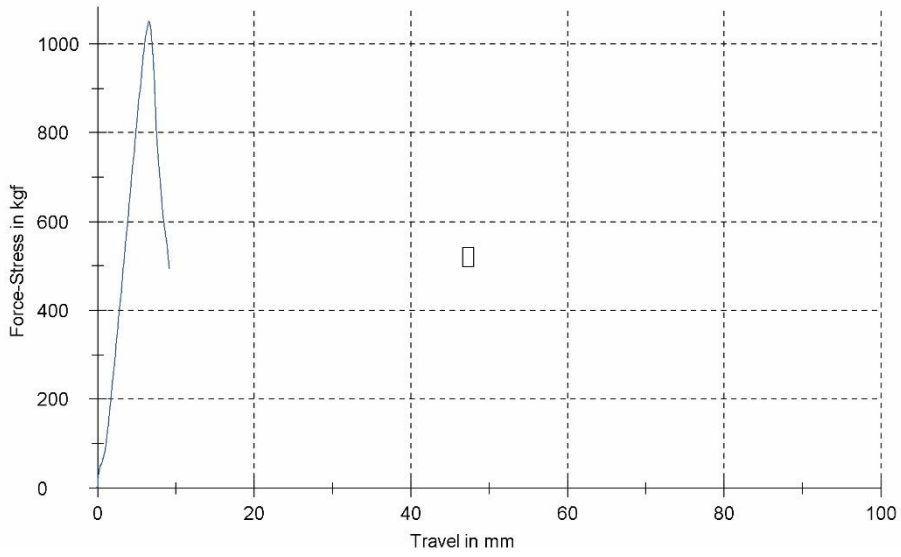
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

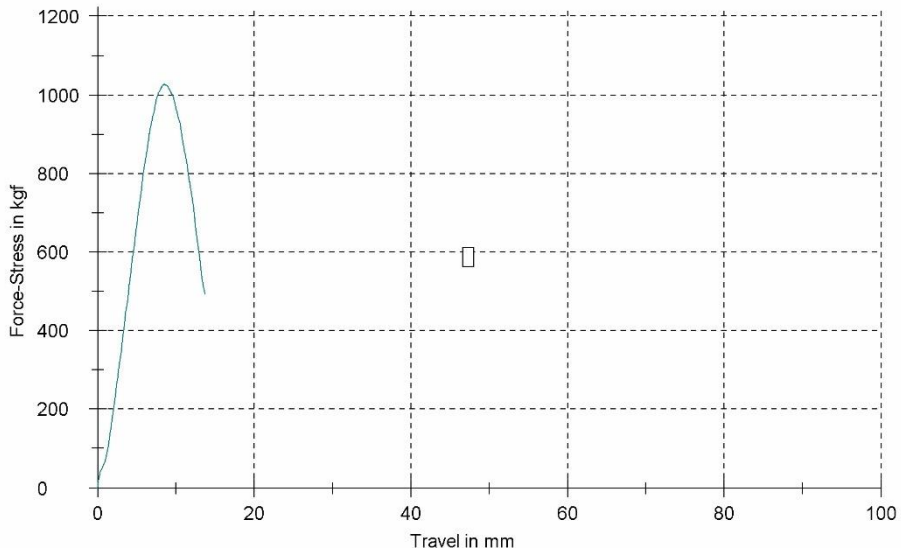
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

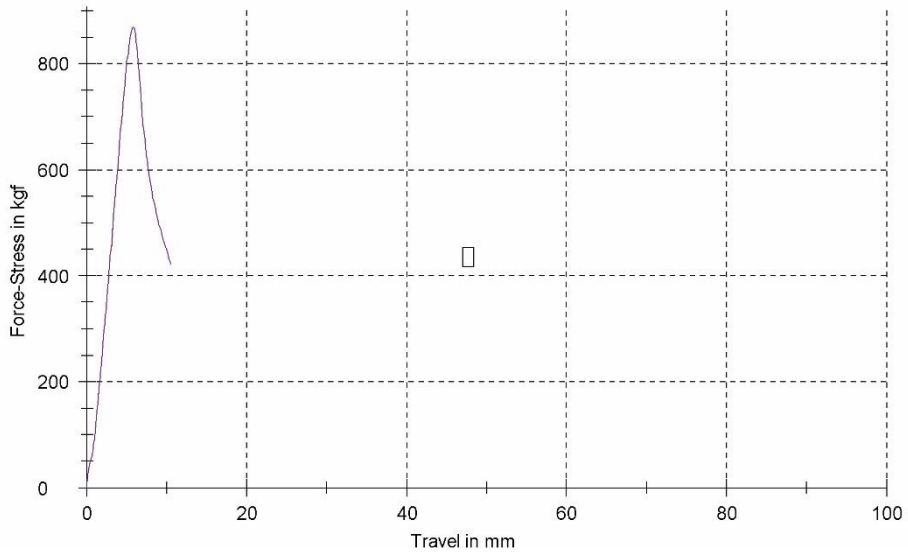
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

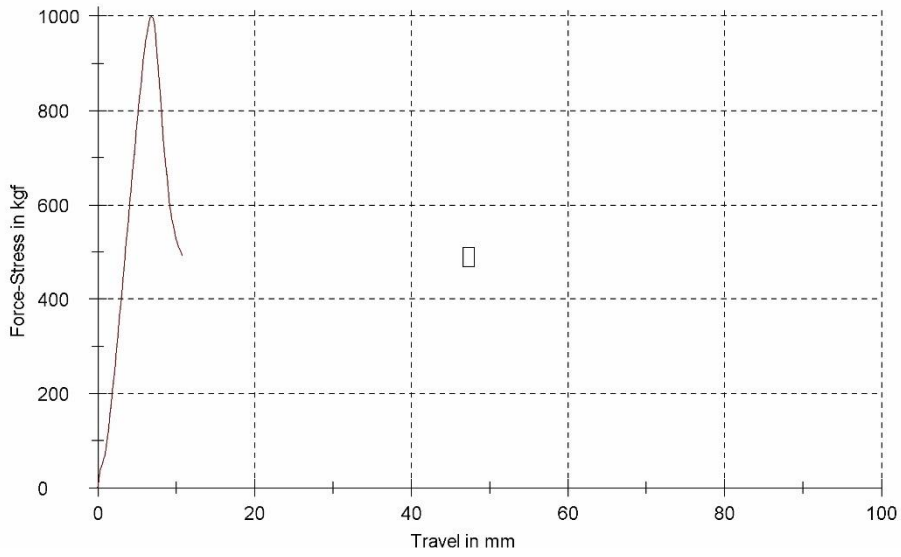
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

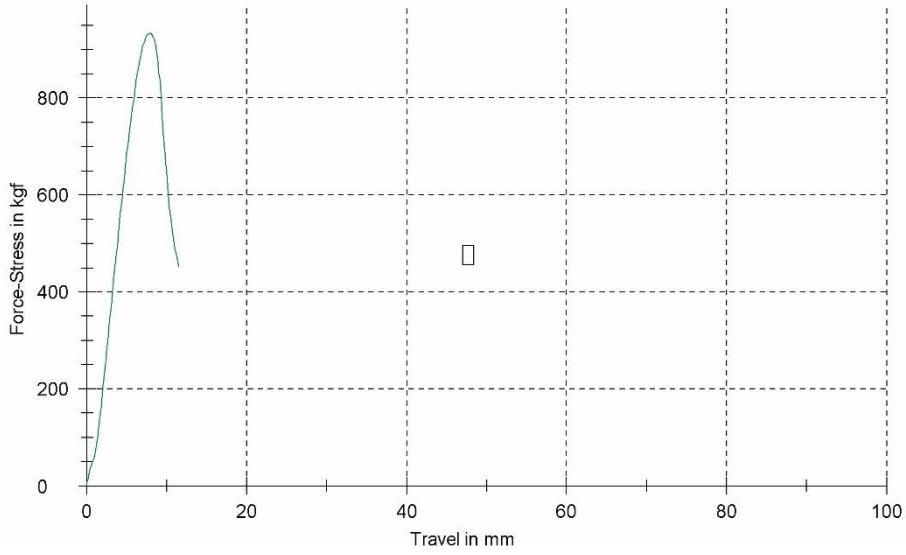
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	✞1	115.530	10.54
	✞2	112.036	10.79
	✞3	107.185	9.21
	✞4	104.616	13.71
	✞5	88.584	10.46
	✞6	101.963	10.79
	7	95.158	11.54

Series graph:



KUAT TARIK

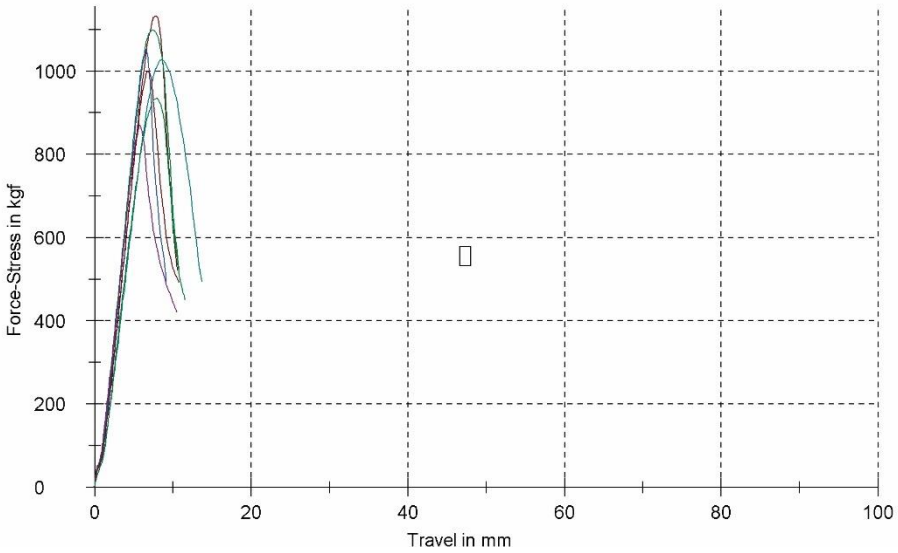
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 695/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 80 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	115.530	10.54
	2	112.036	10.79
	3	107.185	9.21
	4	104.616	13.71
	5	88.584	10.46
	6	101.963	10.79
	7	95.158	11.54

Series graph:



3. Perbandingan serat kenaf-E glass 90/10.

- **23.03.2017**

KUAT TARIK

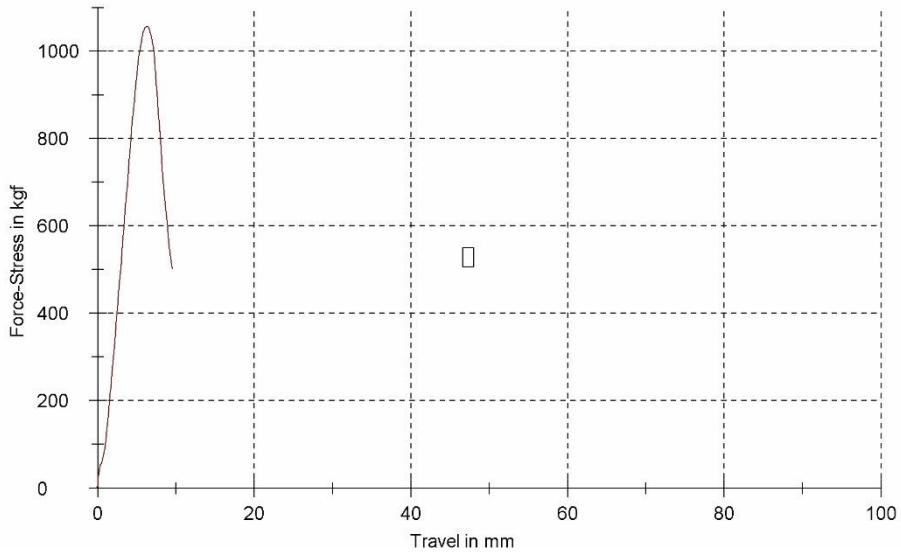
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 696/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 90 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	107.703	9.54
	2	104.243	9.63
	3	93.872	10.88
	4	102.960	9.46
	5	114.474	10.46
	6	123.013	10.79
	7	93.018	10.79

Series graph:



KUAT TARIK

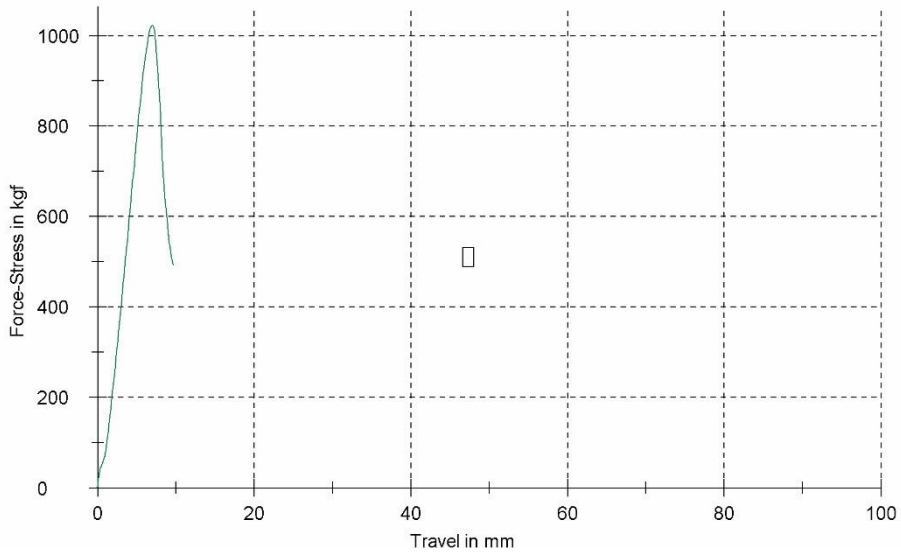
Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 696/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 90 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	107.703	9.54
	2	104.243	9.63
	3	93.872	10.88
	4	102.960	9.46
	5	114.474	10.46
	6	123.013	10.79
	7	93.018	10.79

Series graph:



KUAT TARIK

Parameter table:

Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
Customer	: 696/III/17	Specimen holders	:
Tester	: L Triyono	Extensometer	:
Material	: KENAF EGLASS 90 %	Load cell	:
Test standard	: ASTM D 638		

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
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	2	104.243	9.63
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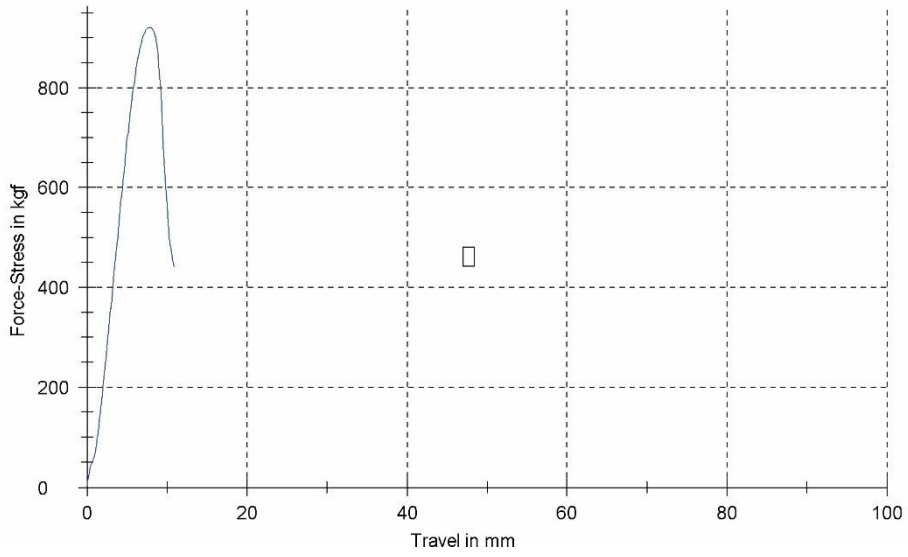
Series graph:



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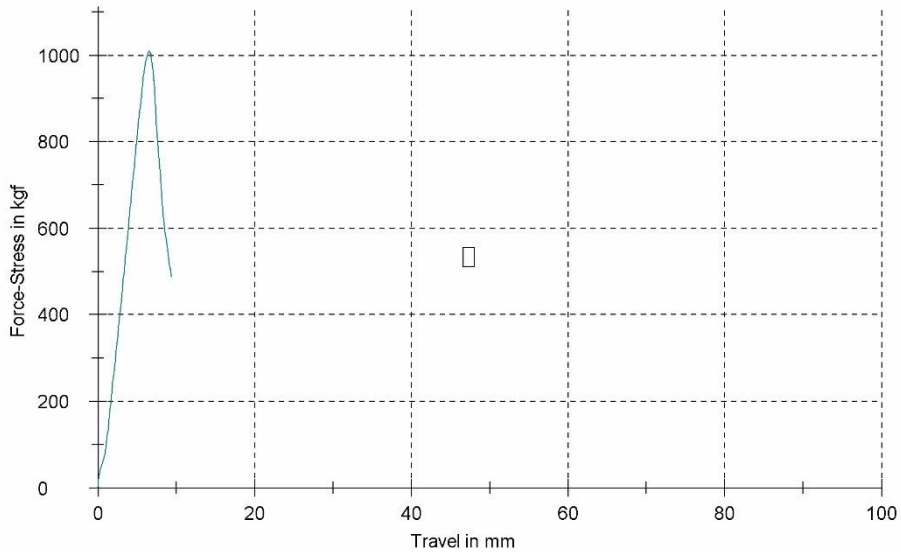
Series graph:



KUAT TARIK

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Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
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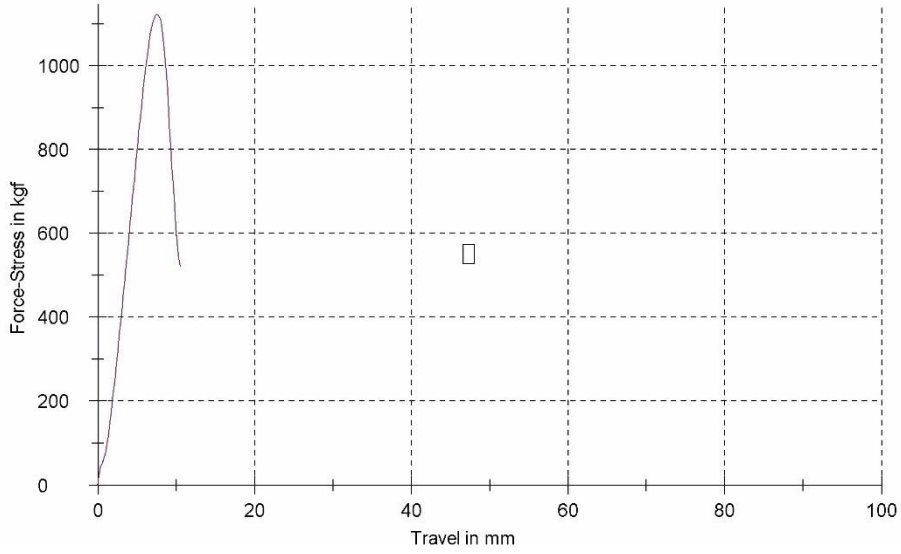
	5	114.474	10.46
	✞6	123.013	10.79
	✞7	93.018	10.79

Series graph:



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Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
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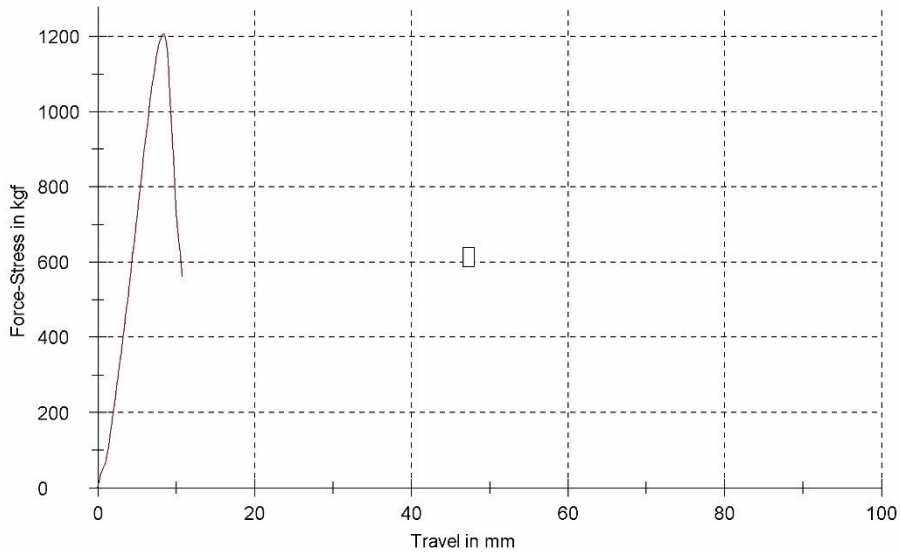
Series graph:



KUAT TARIK

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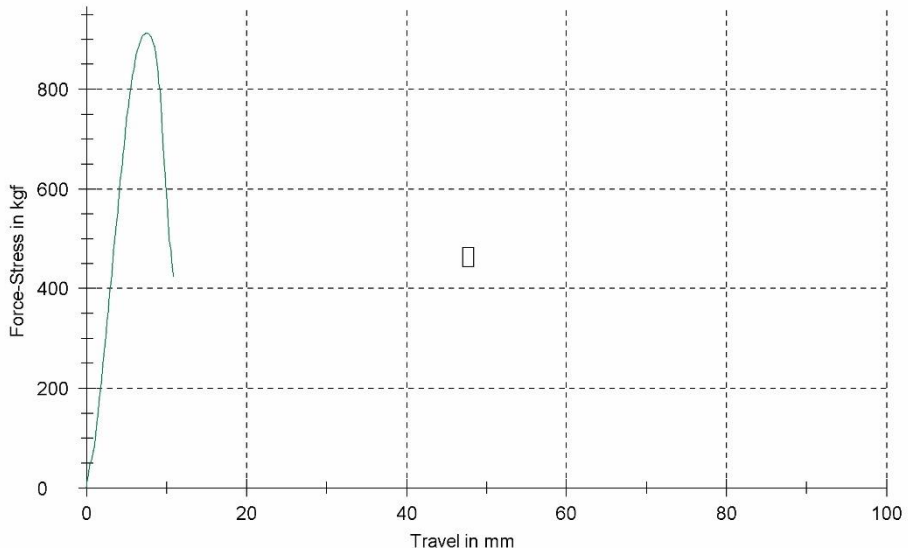

KUAT TARIK

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Headline	: KUAT TARIK	Evaluat. method	: M (Automatic A, B or C)
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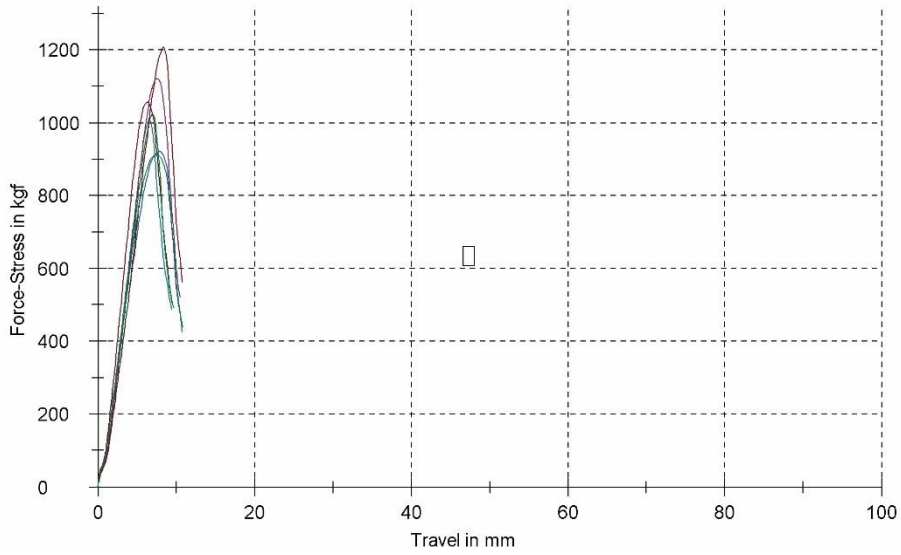

LAMPIRAN 7