

LAMPIRAN 1

PERHITUNGAN FRAKSI VOLUME SERAT

KOMPOSIT HIBRIDA KENAF-*E* GLASS DENGAN Matriks *POLYPROPYLENE*

Sebelum melangkah pada proses fabrikasi spesimen komposit hibrida serat kenaf/e glass bermatrik polipropilen, maka perlu dilakukan perhitungan massa serat dan matrik. Perbandingan fraksi volume serat dan matrik menggunakan 3 variasi yaitu 70%:30%, 75%:25%, 80%:20%.

Berikut ini merupakan perhitungan yang digunakan untuk menentukan volume dan massa komposit:

Diketahui:

$$\text{Massa jenis serat kenaf} = 1.45 \text{ gr/cm}^3$$

$$\text{Massa jenis serat E-glass} = 2.42 \text{ gr/cm}^3$$

$$\text{Massa jenis polipropilen} = 0.92 \text{ gr/cm}^3$$

$$\text{Dimensi cetakan : panjang (p)} = 17 \text{ cm}$$

$$\text{lebar (l)} = 2 \text{ cm}$$

$$\text{tebal (t)} = 0.4 \text{ cm}$$

Perbandingan fraksi volume serat dan matrik 70% : 30%

Fraksi perbandingan volume serat kenaf/E Glass 75/25

$$\text{Volume cetakan, } V_c = p \times l \times t$$

$$= 17 \text{ cm} \times 2 \text{ cm} \times 0.4 \text{ cm}$$

$$= 13.6 \text{ cm}^3$$

$$\text{Volume matrik, } V_m = \frac{70\%}{100\%} \times 13.6 \text{ cm}^3$$

$$= 9.52 \text{ cm}^3$$

$$\begin{aligned}\text{Volume serat, } V_f &= \frac{30\%}{100\%} \times 13.6 \text{ cm}^3 \\ &= 4.08 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat kenaf, } V_{kenaf} &= \frac{75\%}{100\%} \times 4.08 \text{ cm}^3 \\ &= 3.06 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat E-glass, } V_{E-glass} &= \frac{25\%}{100\%} \times 4.08 \text{ cm}^3 \\ &= 1.02 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Massa matriks, } m_m &= V_m \times \rho_m \\ &= 9.52 \text{ cm}^3 \times 0.92 \text{ gr/cm}^3 \\ &= 8.758 \text{ gr}\end{aligned}$$

$$\begin{aligned}\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\ &= 3.06 \text{ cm}^3 \times 1.45 \text{ gr/cm}^3 \\ &= 4.437 \text{ gr}\end{aligned}$$

$$\begin{aligned}\text{Massa serat E-glass, } m_{E-glass} &= V_{E-glass} \times \rho_{E-glass} \\ &= 1.02 \text{ cm}^3 \times 2.42 \text{ gr/cm}^3\end{aligned}$$

$$= 2.468 \text{ gr}$$

Perbandingan fraksi volume serat dan matrik 75% : 25%

Fraksi perbandingan volume serat kenaf/E Glass 75/25

$$\begin{aligned} \text{Volume cetakan, } V_c &= p \times l \times t \\ &= 17 \text{ cm} \times 2 \text{ cm} \times 0.4 \text{ cm} \\ &= 13.6 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume matrik, } V_m &= \frac{75\%}{100\%} \times 13.6 \text{ cm}^3 \\ &= 10.2 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume serat, } V_f &= \frac{25\%}{100\%} \times 13.6 \text{ cm}^3 \\ &= 3.4 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume serat kenaf, } V_{kenaf} &= \frac{75\%}{100\%} \times 3.4 \text{ cm}^3 \\ &= 2.55 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned}\text{Volume serat E-glass, } V_{E\text{-glass}} &= \frac{25\%}{100\%} \times 3.4 \text{ cm}^3 \\ &= 0.85 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Massa matriks, } m_m &= V_m \times \rho_m \\ &= 10.2 \text{ cm}^3 \times 0.92 \text{ gr/cm}^3 \\ &= 9.384 \text{ gr}\end{aligned}$$

$$\begin{aligned}\text{Massa serat kenaf, } m_{kenaf} &= V_{kenaf} \times \rho_{kenaf} \\ &= 2.55 \text{ cm}^3 \times 1.45 \text{ gr/cm}^3 \\ &= 3.697 \text{ gr}\end{aligned}$$

$$\begin{aligned}\text{Massa serat E-glass, } m_{E\text{-glass}} &= V_{E\text{-glass}} \times \rho_{E\text{-glass}} \\ &= 0.85 \text{ cm}^3 \times 2.42 \text{ gr/cm}^3 \\ &= 2.057 \text{ gr}\end{aligned}$$

Perbandingan fraksi volume serat dan matrik 80% : 20%

Fraksi perbandingan volume serat kenaf/E Glass 75/25

$$\begin{aligned}\text{Volume cetakan, } V_c &= p \times l \times t \\ &= 17 \text{ cm} \times 2 \text{ cm} \times 0.4 \text{ cm} \\ &= 13.6 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume matrik, } V_m &= \frac{80 \%}{100 \%} \times 13.6 \text{ cm}^3 \\ &= 10.88 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat, } V_f &= \frac{20 \%}{100 \%} \times 13.6 \text{ cm}^3 \\ &= 2.72 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat kenaf, } V_{kenaf} &= \frac{75 \%}{100 \%} \times 2.72 \text{ cm}^3 \\ &= 2.07 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume serat E-glass, } V_{E-glass} &= \frac{25 \%}{100 \%} \times 2.72 \text{ cm}^3 \\ &= 0.68 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Massa matriks, } m_m &= V_m \times \rho_m \\ &= 10.88 \text{ cm}^3 \times 0.92 \text{ gr/cm}^3\end{aligned}$$

$$= 10.0096 \text{ gr}$$

Massa serat kenaf, m_{kenaf}

$$= V_{kenaf} \times \rho_{kenaf}$$

$$= 2.07 \text{ cm}^3 \times 1.45 \text{ gr/cm}^3$$

$$= 3.0015 \text{ gr}$$

Massa serat E-glass, $m_{E-glass}$

$$= V_{E-glass} \times \rho_{E-glass}$$

$$= 0.68 \text{ cm}^3 \times 2.42 \text{ gr/cm}^3$$

$$= 1.646 \text{ gr}$$

LAMPIRAN 2

HASIL PENGUJIAN SERAT TUNGGAL KENAF

| Kenaf | Diameter (μm) | | | Rata-rata | | Luas Area (mm^2) | F (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 |




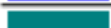






| F (N) | σ Tarik (Mpa) | (L) Standar ASTM (mm) | Measurement travel end /ΔL (mm) | ϵ (Tarik) | E (Mpa) |
|-------------------------------------|--|------------------------------|--|--------------------------------------|-----------------|
| 1.521 | 229.73 | 50.00 | 0.606 | 0.0121 | 18955 |
| 2.296 | 177.01 | 50.00 | 0.616 | 0.0123 | 14367.4 |
| 2.305 | 177.76 | 50.00 | 0.77 | 0.0154 | 11543 |
| 2.492 | 203.70 | 50.00 | 0.84 | 0.0168 | 12124.8 |
| 1.942 | 179.13 | 50.00 | 0.67 | 0.0134 | 13367.9 |
| 2.305 | 226.65 | 50.00 | 0.88 | 0.0176 | 12878 |
| 2.570 | 222.78 | 50.00 | 0.74 | 0.0148 | 15052.7 |
| 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 |

Serat Tunggal (serat kenaf)

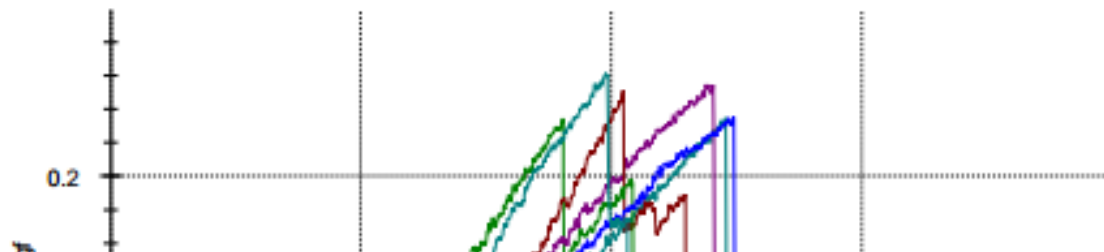
Parameter table:

| | | | |
|---------------|-------------------------------|-------------------|---------------------------|
| 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:



POLIMER MODULUS OF ELASTICITY (Callister, 2007)

| Material | Modulus of Elasticity | |
|---------------------------------------|------------------------------|--------------------------|
| | GPa | 10⁶psi |
| Polyethylene | | |
| • Low density (LDPE) | 0.172–0.282 | 0.025–0.041 |
| • High density (HDPE) | 1.08 | 0.157 |
| • Ultrahigh molecular weight (UHMWPE) | 0.69 | 0.100 |
| Poly(ethylene terephthalate) (PET) | 2.76–4.14 | 0.40–0.60 |
| Poly(methyl methacrylate) (PMMA) | 2.24–3.24 | 0.325–0.470 |
| Polypropylene (PP) | 1.14–1.55 | 0.165–0.225 |
| Polystyrene (PS) | 2.28–3.28 | 0.330–0.475 |
| Poly(tetrafluoroethylene) (PTFE) | 0.40–0.55 | 0.058–0.080 |
| Poly(vinyl chloride) (PVC) | 2.41–4.14 | 0.35–0.60 |

LAMPIRAN 3

LAMPIRAN 3

Data kuat tarik hasil pengujian

- 1. Perbandingan serat-matrik 20:80**

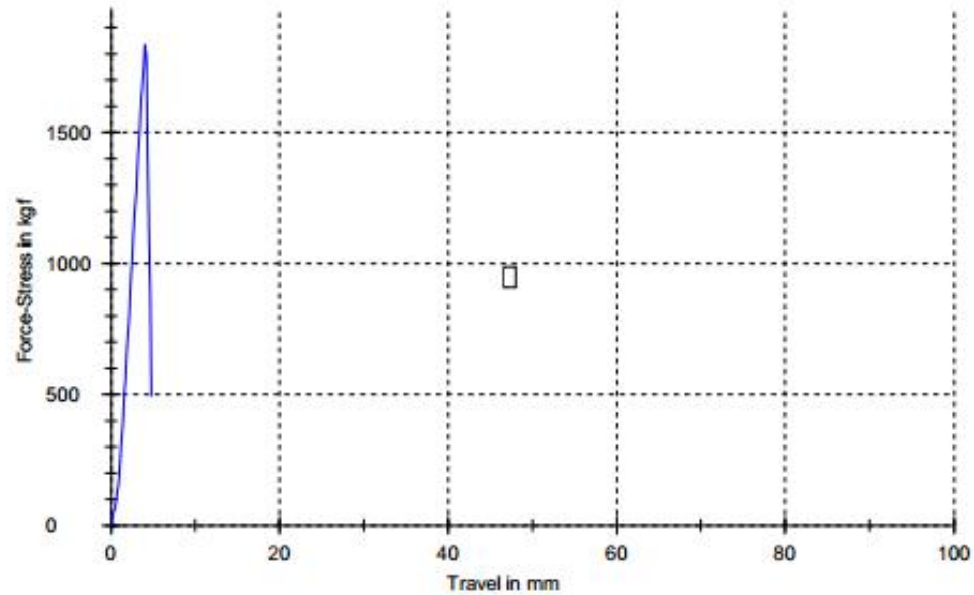
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1326-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 70-30 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 196.774 | 5.38 |
| | ϕ3 | 242.271 | 5.96 |
| | 4 | 187.028 | 4.79 |
| | ϕ5 | 196.623 | 6.13 |
| | ϕ6 | 174.350 | 5.46 |
| | ϕ7 | 160.444 | 4.46 |
| | ϕ8 | 204.025 | 5.38 |
| | ϕ9 | 157.157 | 4.79 |

Series graph:



Parameter table:

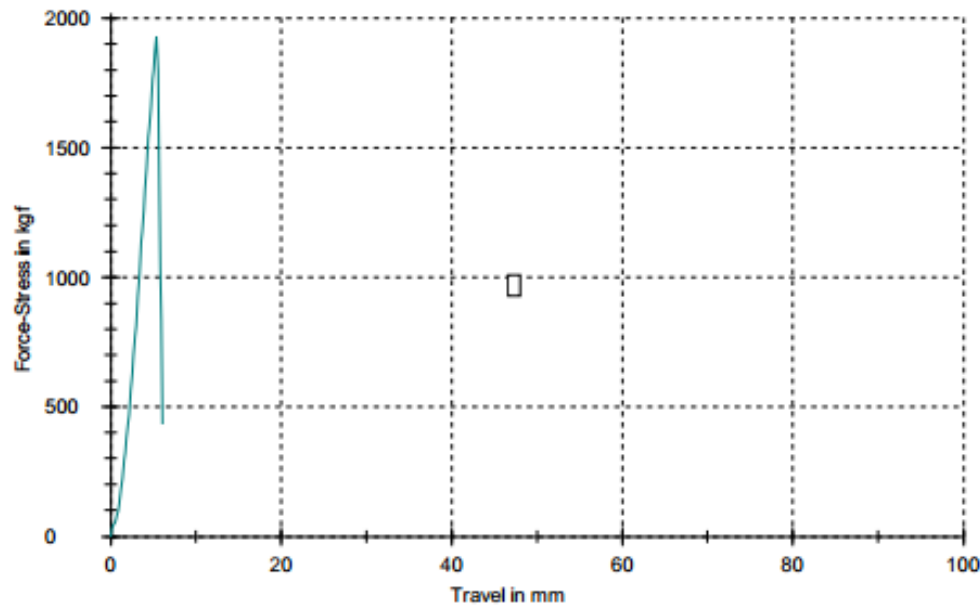
Headline : KUAT TARIK
Customer : 1326-1234567/III/17
Tester : YANKEISNA
Material : PP / KENAF E-GLASS 70-30
Test standard : ASTM D 638-02

Evaluat. method : M (Automatic A, B or C)
Specimen holders :
Extensometer :
Load cell :

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 196.774 | 5.38 |
| | ϕ3 | 242.271 | 5.96 |
| | ϕ4 | 187.028 | 4.79 |
| | 5 | 196.623 | 6.13 |
| | ϕ6 | 174.350 | 5.46 |
| | ϕ7 | 160.444 | 4.46 |
| | ϕ8 | 204.025 | 5.38 |
| | ϕ9 | 157.157 | 4.79 |

Series graph:



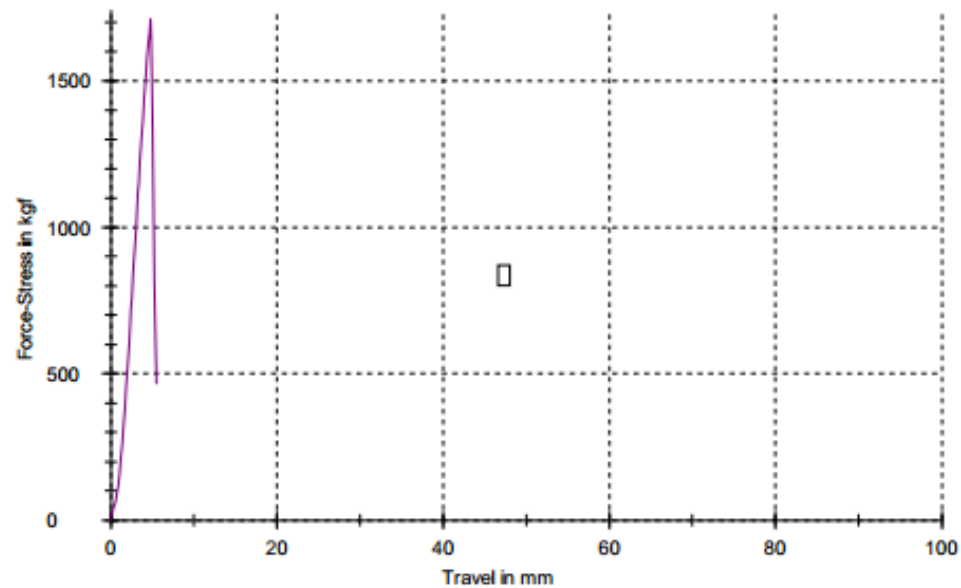
Parameter table:

| | | | |
|---------------|----------------------------|------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1326-1234567/III/17 | Specimen holders | : |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 70-30 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 196.774 | 5.38 |
| | ϕ3 | 242.271 | 5.96 |
| | ϕ4 | 187.028 | 4.79 |
| | ϕ5 | 196.623 | 6.13 |
| | 6 | 174.350 | 5.46 |
| | ϕ7 | 160.444 | 4.46 |
| | ϕ8 | 204.025 | 5.38 |
| | ϕ9 | 157.157 | 4.79 |

Series graph:



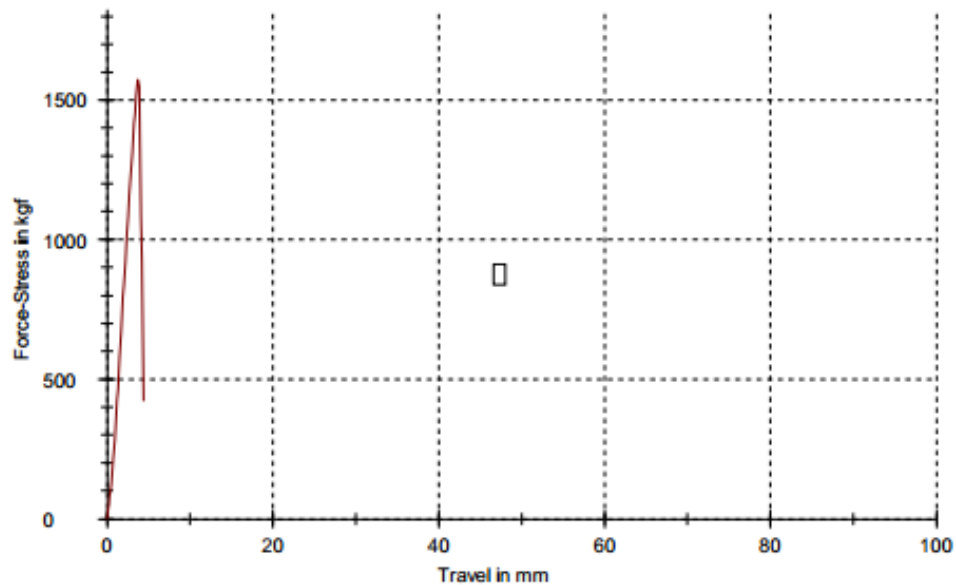
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1326-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 70-30 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 196.774 | 5.38 |
| | ϕ3 | 242.271 | 5.96 |
| | ϕ4 | 187.028 | 4.79 |
| | ϕ5 | 196.623 | 6.13 |
| | ϕ6 | 174.350 | 5.46 |
| | 7 | 160.444 | 4.46 |
| | ϕ8 | 204.025 | 5.38 |
| | ϕ9 | 157.157 | 4.79 |

Series graph:



Parameter table:

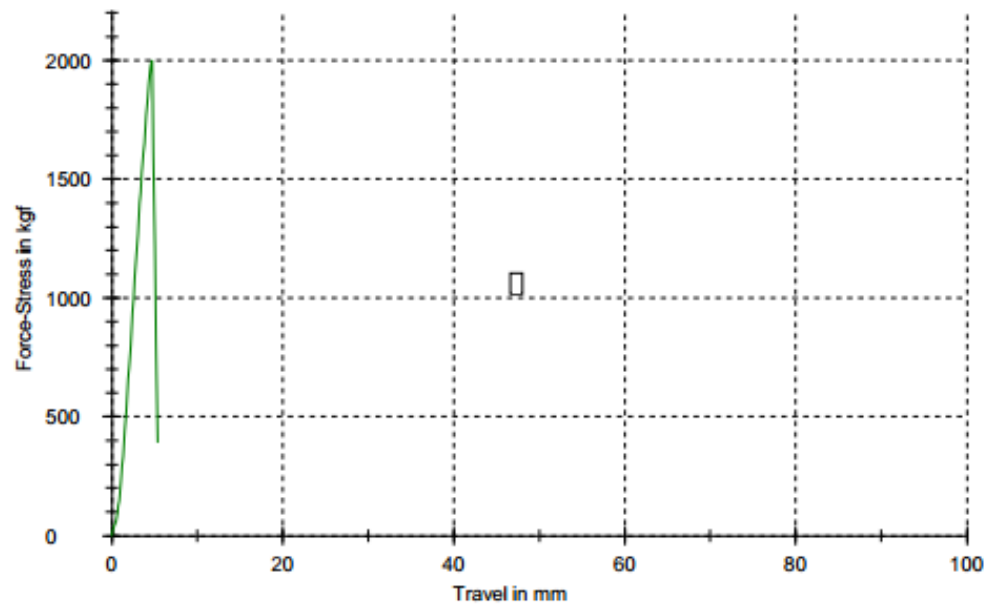
mm
5.38

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1326-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 70-30 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 196.774 | 5.38 |
| | ϕ3 | 242.271 | 5.96 |
| | ϕ4 | 187.028 | 4.79 |
| | ϕ5 | 196.623 | 6.13 |
| | ϕ6 | 174.350 | 5.46 |
| | ϕ7 | 160.444 | 4.46 |
| | 8 | 204.025 | 5.38 |
| | ϕ9 | 157.157 | 4.79 |

Series graph:



Data kuat tarik hasil pengujian

2. Perbandingan serat-matrik 25:75

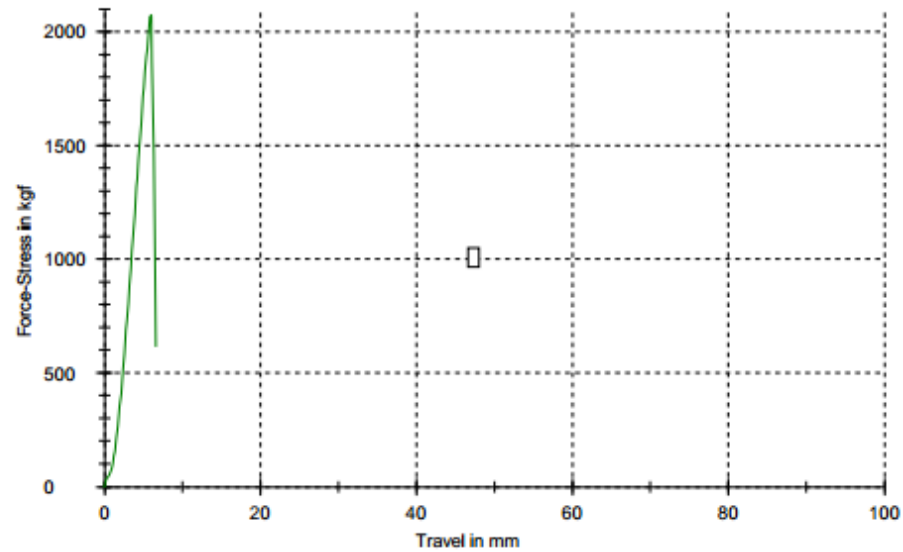
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1325-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 75-25 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|-----|----------------|------------------------------|
| | ϕ1 | 159.527 | 8.46 |
| | 6 | 211.456 | 6.63 |
| | ϕ7 | 225.267 | 8.54 |
| | ϕ10 | 193.995 | 5.04 |
| | ϕ11 | 168.808 | 8.54 |
| | ϕ14 | 185.727 | 4.79 |
| | ϕ15 | 191.623 | 7.79 |

Series graph:



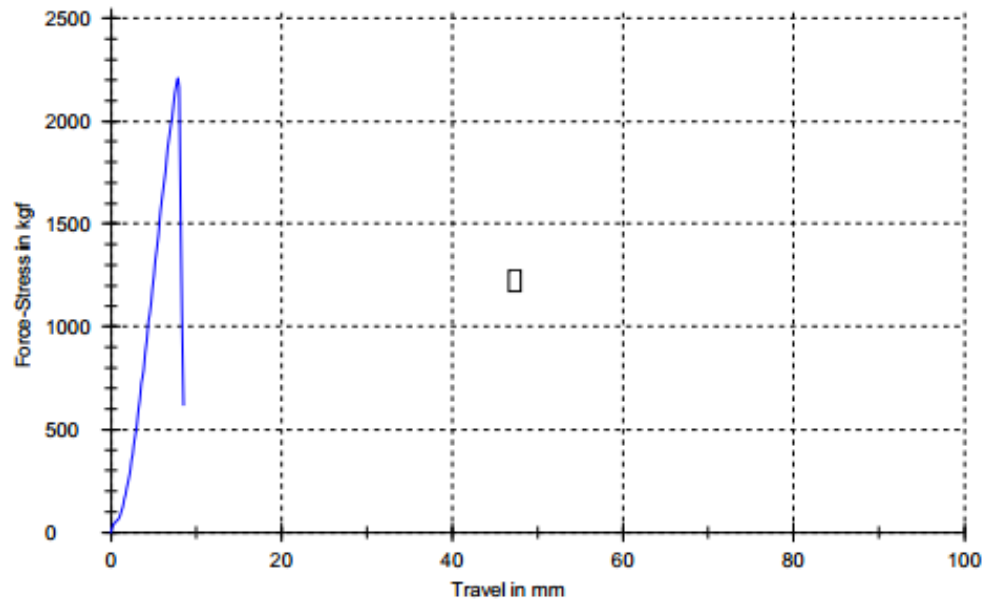
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1325-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 75-25 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|-----|----------------|------------------------------|
| | ϕ1 | 159.527 | 8.46 |
| | ϕ6 | 211.456 | 6.63 |
| | 7 | 225.267 | 8.54 |
| | ϕ10 | 193.995 | 5.04 |
| | ϕ11 | 168.808 | 8.54 |
| | ϕ14 | 185.727 | 4.79 |
| | ϕ15 | 191.623 | 7.79 |

Series graph:



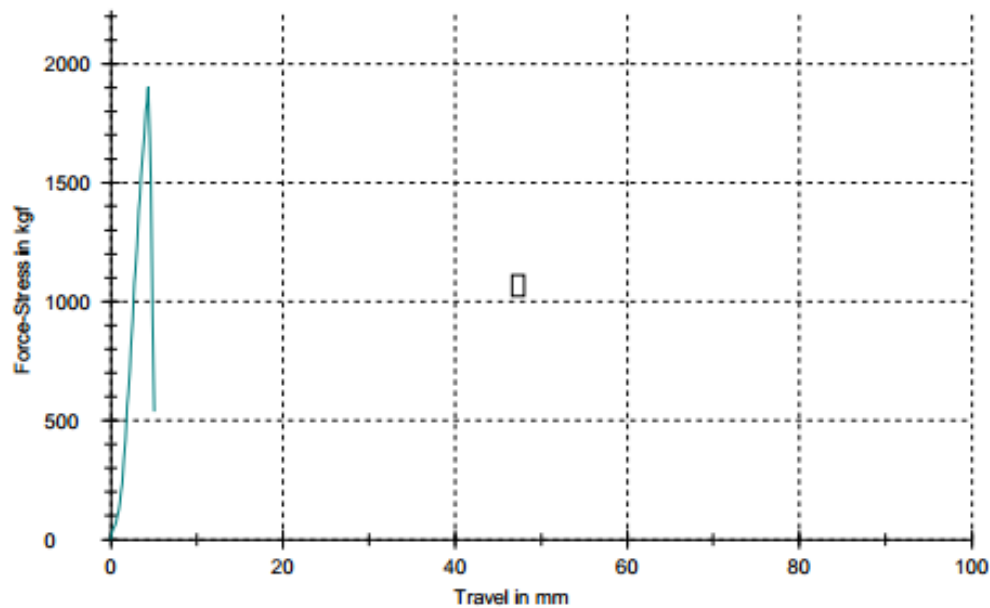
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1325-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 75-25 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|-----|----------------|------------------------------|
| | ϕ1 | 159.527 | 8.46 |
| | ϕ6 | 211.456 | 6.63 |
| | ϕ7 | 225.267 | 8.54 |
| | 10 | 193.995 | 5.04 |
| | ϕ11 | 168.808 | 8.54 |
| | ϕ14 | 185.727 | 4.79 |
| | ϕ15 | 191.623 | 7.79 |

Series graph:



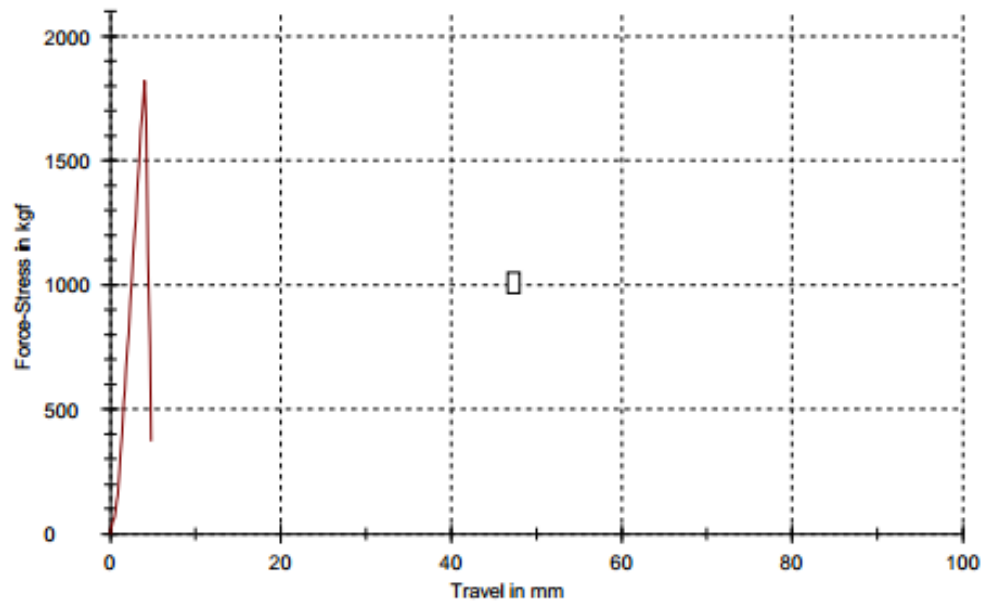
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1325-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 75-25 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|-----|----------------|------------------------------|
| | ϕ1 | 159.527 | 8.46 |
| | ϕ6 | 211.456 | 6.63 |
| | ϕ7 | 225.267 | 8.54 |
| | ϕ10 | 193.995 | 5.04 |
| | ϕ11 | 168.808 | 8.54 |
| | 14 | 185.727 | 4.79 |
| | ϕ15 | 191.623 | 7.79 |

Series graph:



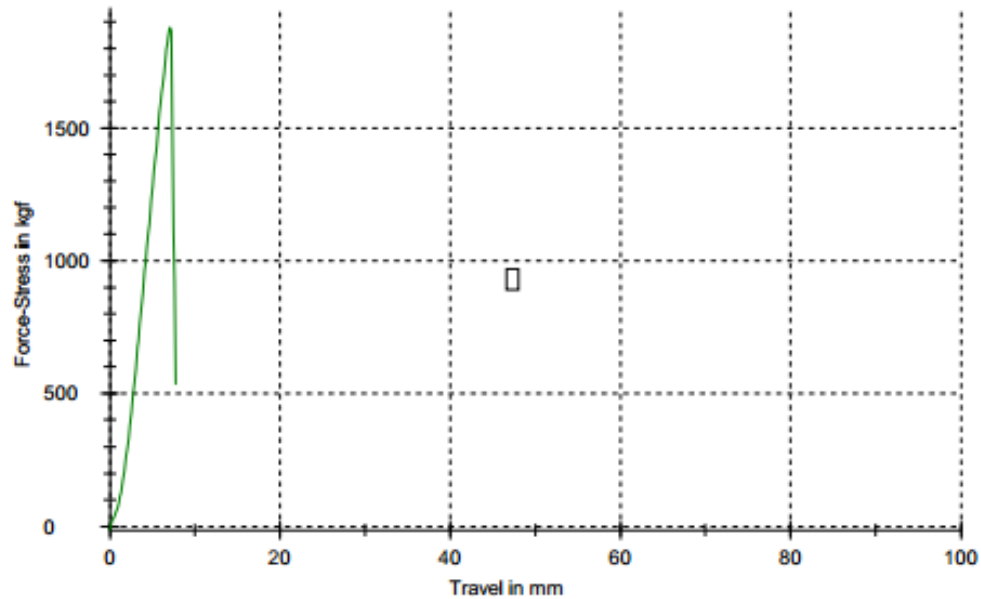
Parameter table:

| | | | |
|---------------|----------------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1325-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS 75-25 | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|-----|----------------|------------------------------|
| | ϕ1 | 159.527 | 8.46 |
| | ϕ6 | 211.456 | 6.63 |
| | ϕ7 | 225.267 | 8.54 |
| | ϕ10 | 193.995 | 5.04 |
| | ϕ11 | 168.808 | 8.54 |
| | ϕ14 | 185.727 | 4.79 |
| | 15 | 191.623 | 7.79 |

Series graph:



Data kuat tarik hasil pengujian

3. Perbandingan serat-matrik 20:80

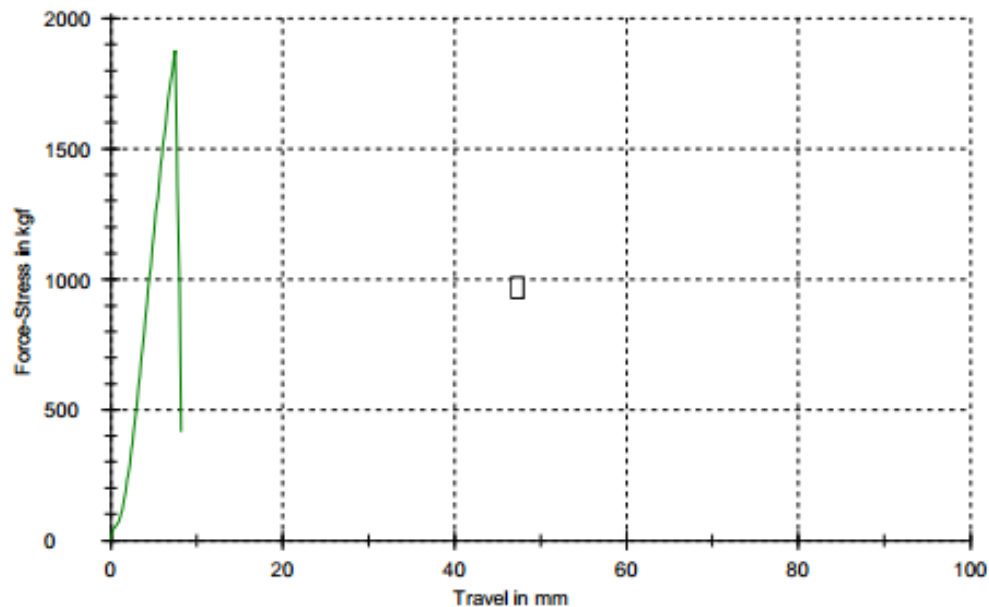
Parameter table:

| | | | |
|---------------|-----------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1324-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 139.900 | 6.87 |
| | 2 | 191.519 | 8.21 |
| | ϕ3 | 202.039 | 7.88 |
| | ϕ4 | 229.467 | 8.38 |
| | ϕ5 | 210.809 | 8.13 |
| | ϕ6 | 189.296 | 7.71 |
| | ϕ7 | 169.472 | 8.54 |
| | ϕ8 | 205.119 | 8.21 |

Series graph:



Parameter table:

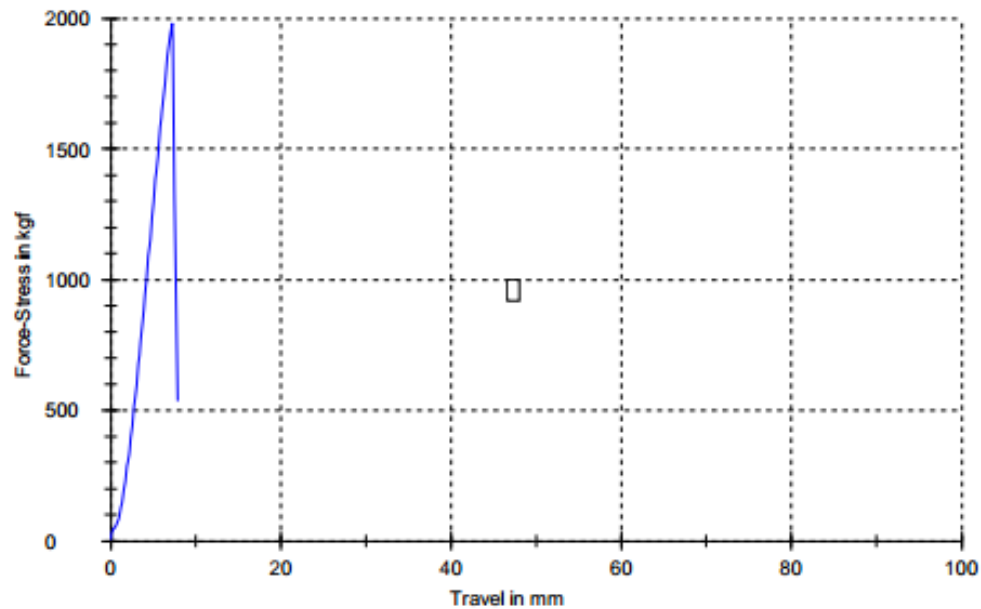
Headline : KUAT TARIK
Customer : 1324-1234567/III/17
Tester : YANKEISNA
Material : PP / KENAF E-GLASS
Test standard : ASTM D 638-02

Evaluat. method : M (Automatic A, B or C)
Specimen holders:
Extensometer :
Load cell :

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 139.900 | 6.87 |
| | ϕ2 | 191.519 | 8.21 |
| | 3 | 202.039 | 7.88 |
| | ϕ4 | 229.467 | 8.38 |
| | ϕ5 | 210.809 | 8.13 |
| | ϕ6 | 189.296 | 7.71 |
| | ϕ7 | 169.472 | 8.54 |
| | ϕ8 | 205.119 | 8.21 |

Series graph:



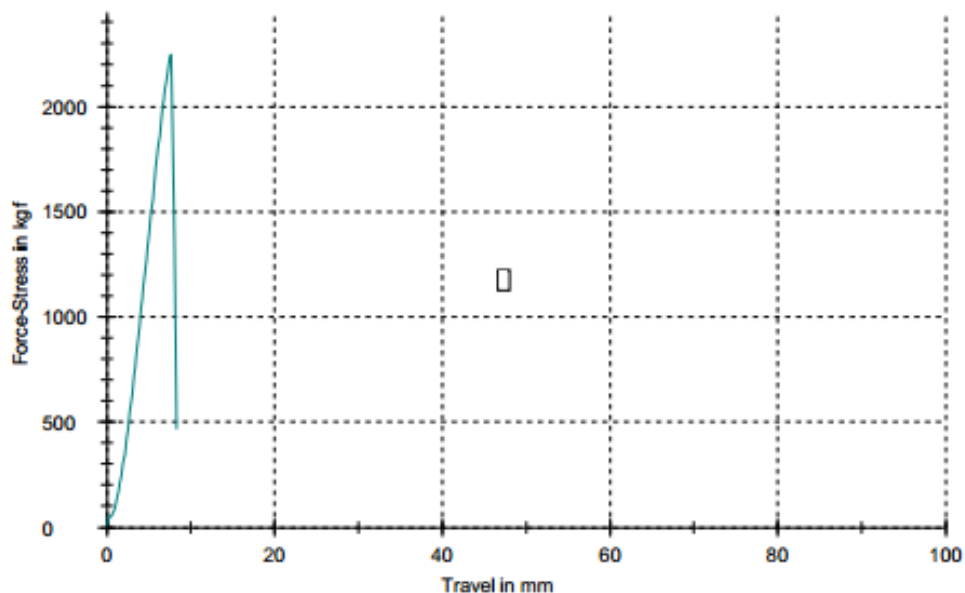
Parameter table:

| | | | |
|---------------|-----------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1324-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
| Material | : PP / KENAF E-GLASS | Load cell | : |
| Test standard | : ASTM D 638-02 | | |

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 139.900 | 6.87 |
| | ϕ2 | 191.519 | 8.21 |
| | ϕ3 | 202.039 | 7.88 |
| | 4 | 229.467 | 8.38 |
| | ϕ5 | 210.809 | 8.13 |
| | ϕ6 | 189.296 | 7.71 |
| | ϕ7 | 169.472 | 8.54 |
| | ϕ8 | 205.119 | 8.21 |

Series graph:



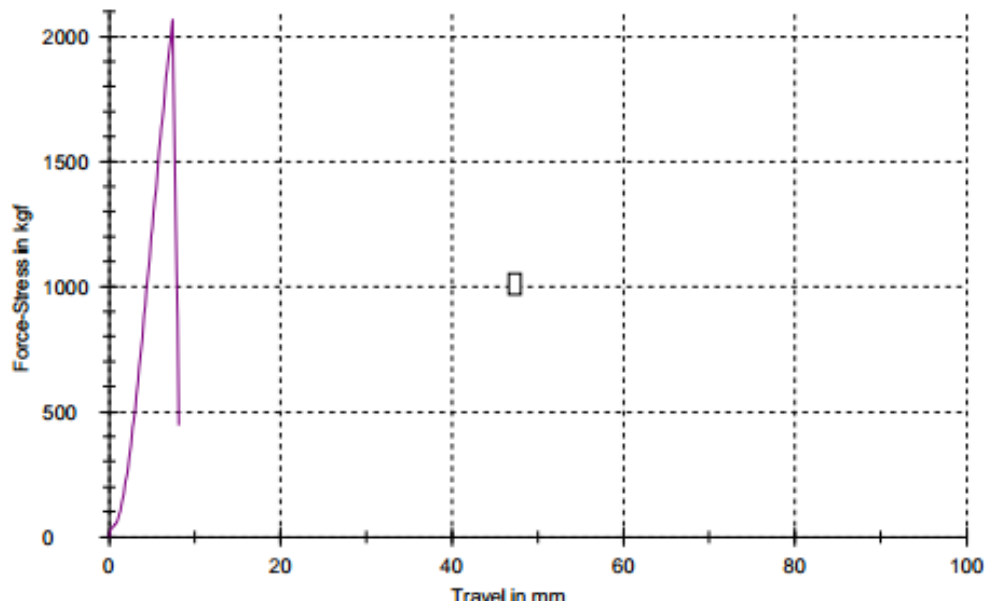
Parameter table:

Headline : KUAT TARIK Evaluat. method : M (Automatic A, B or C)
Customer : 1324-1234567/III/17 Specimen holders:
Tester : YANKEISNA Extensometer :
Material : PP / KENAF E-GLASS Load cell :
Test standard : ASTM D 638-02

Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 139.900 | 6.87 |
| | ϕ2 | 191.519 | 8.21 |
| | ϕ3 | 202.039 | 7.88 |
| | ϕ4 | 229.467 | 8.38 |
| | 5 | 210.809 | 8.13 |
| | ϕ6 | 189.296 | 7.71 |
| | ϕ7 | 169.472 | 8.54 |
| | ϕ8 | 205.119 | 8.21 |

Series graph:



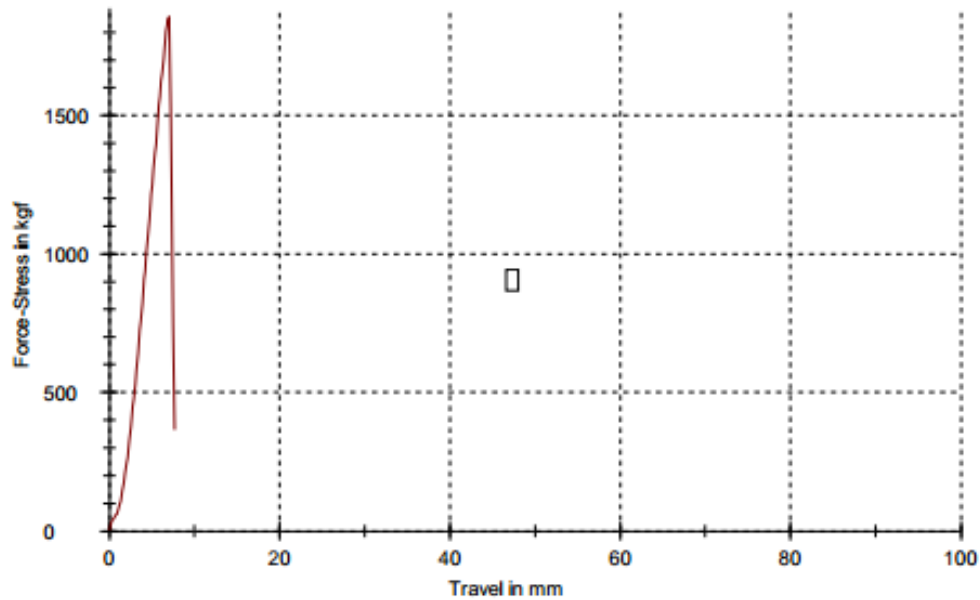
Parameter table:

| | | | |
|---------------|-----------------------|-------------------|---------------------------|
| Headline | : KUAT TARIK | Evaluat. method | : M (Automatic A, B or C) |
| Customer | : 1324-1234567/III/17 | Specimen holders: | |
| Tester | : YANKEISNA | Extensometer | : |
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Results:

| Legends | Nr | Fmax Lm kgf | Measurement travel end mm |
|---------|----|----------------|------------------------------|
| | ϕ1 | 139.900 | 6.87 |
| | ϕ2 | 191.519 | 8.21 |
| | ϕ3 | 202.039 | 7.88 |
| | ϕ4 | 229.467 | 8.38 |
| | ϕ5 | 210.809 | 8.13 |
| | 6 | 189.296 | 7.71 |
| | ϕ7 | 169.472 | 8.54 |
| | ϕ8 | 205.119 | 8.21 |

Series graph:



**TABEL HASIL PERHITUNGAN PENGUJIAN TARIK KOMPOSIT HIBRIDA KENAF/E-GLASS DENGAN
Matriks POLYPROPYLENE**

| Perbandingan Fraksi Volume Serat dan | Nama Spesimen | Lebar (mm) | Tebal (mm) | Luas Penampakan g (mm ²) | g | (L) Standar ASTM D638-02 (mm) | ΔL (mm) | Beban yang Diterima (%) | Kekuatan Tarik σ (MPa) |
|--------------------------------------|------------------|------------|------------|--------------------------------------|------|-------------------------------|-----------------|-------------------------|-------------------------------|
| 30% Serat Kenaf/E-Glass 70% PP | KF/GF30-PP70/02 | 15.03 | 3.32 | 49.900 | 9.81 | 57 | 4.79 | 187.03 | 36.769 |
| | KF/GF30-PP70/03 | 15.15 | 3.59 | 54.389 | 9.81 | 57 | 6.13 | 196.62 | 35.465 |
| | KF/GF30-PP70/04 | 15.11 | 3.20 | 48.352 | 9.81 | 57 | 5.46 | 174.35 | 35.373 |
| | KF/GF30-PP70/05 | 14.54 | 3.13 | 45.510 | 9.81 | 57 | 4.46 | 160.44 | 34.585 |
| | KF/GF30-PP70/06 | 14.53 | 3.89 | 56.522 | 9.81 | 57 | 5.38 | 204.03 | 35.411 |
| Rata - rata (\bar{x}) | | | 3.426 | 50.934 | | | 5.46 | 186.00 | 35.869 |
| Standar Deviasi | | | | | | | | | 0.786 |
| <i>Coefesiensi of faration (%)</i> | | | | | | | | | 2.191 |
| 25% Serat Kenaf/E-Glass 75% PP | KF/GF25-PP75/02 | 14.32 | 3.57 | 51.122 | 9.81 | 57 | 6.63 | 211.46 | 40.577 |
| | KF/GF25-PP75/03 | 14.37 | 3.58 | 51.445 | 9.81 | 57 | 8.54 | 225.27 | 42.956 |
| | KF/GF25-PP75/04 | 14.80 | 3.57 | 52.836 | 9.81 | 57 | 5.04 | 194.00 | 36.019 |
| | KF/GF25-PP75/06 | 14.12 | 3.91 | 55.209 | 9.81 | 57 | 4.79 | 185.73 | 33.001 |
| | KF/GF25-PP75/07 | 14.16 | 3.81 | 53.950 | 9.81 | 57 | 7.79 | 191.62 | 34.844 |
| Rata - rata (\bar{x}) | | | 3.688 | | | | | | 37.479 |
| Standar Deviasi | | | | | | | | | 4.145 |
| <i>Coefesiensi of faration (%)</i> | | | | | | | | | 11.059 |
| 20% Serat Kenaf/E-Glass 80% PP | KF/GF200-PP80/01 | 14.96 | 3.36 | 50.266 | 9.81 | 57 | 8.21 | 191.52 | 37.377 |
| | KF/GF200-PP80/02 | 14.97 | 3.56 | 53.293 | 9.81 | 57 | 7.88 | 202.04 | 37.191 |
| | KF/GF200-PP80/03 | 14.85 | 3.93 | 58.361 | 9.81 | 57 | 8.38 | 229.47 | 38.572 |
| | KF/GF200-PP80/04 | 14.96 | 3.58 | 53.557 | 9.81 | 57 | 8.13 | 210.81 | 38.614 |
| | KF/GF200-PP80/05 | 15.23 | 3.36 | 51.173 | 9.81 | 57 | 7.71 | 189.30 | 36.289 |
| Rata - rata (\bar{x}) | | | | | | | | | 37.608 |
| Standar Deviasi | | | | | | | | | 0.989 |
| <i>Coefesiensi of faration (%)</i> | | | | | | | | | 2.628 |

