

# Lampiran 1

<b>Kekuatan Tekan Non NaOH (MPa)</b>					
No. Spesimen	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	133,282	109,590	93,044	112,860	85,120
2	138,001	95,395	94,109	109,533	85,871
3	134,953	93,274	91,083	113,319	83,096
Rata-rata	135,412	99,420	92,745	111,904	84,696
Min	133,282	93,274	91,083	109,533	83,096
Max	138,001	109,590	94,109	113,319	85,871
SD	2,392	8,871	1,534	2,066	1,435

<b>Fmax (N)</b>					
NO	0% Serat	5% Serat	10 % Serat	15 % Serat	20% Serat
1	5864,443	4971,029	3907,856	4766,119	3575,05
2	5520,052	4197,391	4051,396	4830,417	3803,249
3	5533,078	3917,522	3643,34	4532,764	3323,862

<b>Luas penampang (A) mm</b>					
NO	0% serat	5% Serat	10 % Serat	15 % Serat	20% Serat
1	44	45,36	42	42,23	42
2	40	44	43,05	44,1	44,29
3	41	42	40	40	40

Contoh Perhitungan 0% serat :

$$\sigma = \frac{P}{A}$$

Keterangan :

$\sigma$  = tegangan tekan (MPa)

A = luas penampang (mm<sup>2</sup>)

P = beban tekan maksimum (N)

$$\sigma = \frac{5864,443 \text{ N}}{44 \text{ mm}^2} = 133,282 \text{ Mpa}$$

Regangan Tekan Non NaOH (mm/mm)					
No Spesimen	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	0,14	0,2	0,16	0,14	0,16
2	0,31	0,22	0,17	0,18	0,14
3	0,2	0,2	0,2	0,11	0,1
Rata-rata	0,216	0,206	0,176	0,143	0,133
Min	0,140	0,2	0,16	0,11	0,1
Max	0,31	0,22	0,2	0,18	0,16
SD	0,086	0,011	0,020	0,020	0,030

Perubahan Panjang $\Delta l$ (mm)					
NO	0% Serat	5% Serat	10 % Serat	15 % Serat	20% Serat
1	1,4	2	1,6	1,4	1,6
2	3,1	2,2	1,7	1,8	1,4
3	2	2	2	1,1	1

Contoh Perhitungan 0% serat :

$$\epsilon = \frac{\Delta l}{l_0}$$

Keterangan:  $\epsilon$  = regangan

$\Delta l$  = defleksi (mm)

$l_0$  = panjang awal (mm)

Panjang awal semua spesimen  $l_0 = 10 \text{ mm}$

$$\epsilon = \frac{1,4 \text{ mm}}{10 \text{ mm}} = 0,14 \text{ mm}$$

Modulus Elastisitas Tekan Non NaOH (MPa)					
No Spesimen	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	2017,625	1021,071	1190,476	1821,526	833,333
2	957,757	869,565	942,816	963,348	1161,177
3	1219,512	873,015	1330	2185,314	1254,761
Rata-Rata	1398,298	921,217	1154,430	1656,729	1083,090
Min	957,757	869,565	942,816	963,348	833,333
Max	2017,625	1021,071	1330	2185,314	1254,761
SD	552,090	86,493	196,092	627,430	221,299

No		1	2	3
Tanpa Serat	F1	2160 N	2726 N	3640 N
	F2	3900 N	5220 N	5040 N
	L1	0.56 mm	1.147 mm	1.1 mm
	L2	0.756 mm	1.798 mm	1.38 mm

$$1. E^c = \frac{(3900 - 2160) 10}{(0.756 - 0.56) 44} = 2017.625$$

$$2. E^c = \frac{(5220 - 2726) 10}{(1.798 - 1.147) 40} = 957.757$$

$$3. E^c E^c = \frac{(5040 - 3640) 10}{(1.38 - 1.1) 41} = 1219.512$$

NO		1	2	3
Serat 5 %	F1	1540 N	2024 N	680 N
	F2	3300 N	3960 N	2000 N
	L1	0.44 mm	0.814 mm	1.8 mm
	L2	0.82 mm	1.32 mm	3.65 mm

$$1. E^c = \frac{(3300 - 1540) 10}{(0.82 - 0.44) 45.36} = 1021.071$$

$$2. E^c = \frac{(3960 - 2024) 10}{(1.32 - 0.814) 44} = 869.565$$

$$3. E^c = \frac{(2000 - 680) 10}{(3.65 - 1.8) 42} = 873.015$$

NO		1	2	3
Serat 10%	F1	1040 N	990 N	2052 N
	F2	1680 N	2025 N	2584 N
	L1	0.416 mm	0.357 mm	0.72 mm
	L2	0.544 mm	0.612 mm	0.82 mm

$$1. E^c = \frac{(1680-1040)10}{(0.544-0.416)42} = 1190.476$$

$$2. E^c = \frac{(2025-990)10}{(0.612-0.357)43.05} = 942.816$$

$$3. E^c = \frac{(2584-2052)10}{(0.82-0.72)40} = 1330$$

NO		1	2	3
Serat 15%	F1	2400 N	1050 N	1100 N
	F2	3800 N	2350 N	2350 N
	L1	0.518 mm	0.288 mm	0.22 mm
	L2	0.7 mm	0.594 mm	0.363 mm

$$1. E^c = \frac{(3800 - 2400)10}{(0.7 - 0.518)42.23} = 1821.526$$

$$2. E^c = \frac{(2350 - 1050)10}{(0.594 - 0.288)44.1} = 963.348$$

$$3. E^c = \frac{(2350 - 1100)10}{(0.363 - 0.22)40} = 2185.314$$

NO		1	2	3
Serat 20%	F1	800 N	1280 N	306 N
	F2	1680 N	2000 N	1360 N
	L1	0.32 mm	0.336 mm	0.08 mm
	L2	0.56 mm	0.476 mm	0.29 mm

$$1. E^c = \frac{(1640-800)10}{(0.56-0.32)42} = 833.333$$

$$2. E^c = \frac{(2000-1280)10}{(0.476-0.336)44.29} = 1161.177$$

$$3. E^c = \frac{(1360-306)10}{(0.29-0.08)40} = 1254.761$$

# Lampiran 2

<b>Kekuatan Tekan NaOH (MPa)</b>					
No. Spesimen	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	133,282	122,310	115,784	101,636	98,173
2	138,001	121,345	117,494	100,944	100,456
3	134,953	124,465	117,202	102,587	97,015
Rata-Rata	135,412	122,707	116,827	101,722	98,548
Min	133,282	121,345	115,784	100,944	97,015
Max	138,001	124,465	117,494	102,587	100,456
SD	2,392	1,597	0,914	0,824	1,750

<b>Fmax (N)</b>					
NO	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	5864,443	5008,922	4862,943	4309,4	3905,332
2	5520,052	5096,503	4793,784	4320,413	3761,074
3	5533,078	5384,379	4688,103	4267,641	3589,578

<b>Luas penampang (A)</b>					
NO	0%	5% Serat	10% Serat	15% Serat	20% Serat
1	44	40,95	42	42,4	39,78
2	40	42	40,8	42,8	37,44
3	41	43,26	40	41,6	37

Contoh Perhitungan 0% serat :

$$\sigma = \frac{P}{A}$$

Keterangan :

$\sigma$  = tegangan tekan (MPa)

A = luas penampang (mm<sup>2</sup>)

P = beban tekan maksimum (N)

$$\sigma = \frac{5864,443 \text{ N}}{44 \text{ mm}^2} = 133,282 \text{ MPa}$$

Regangan Tekan NaOH (mm/mm)					
No	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	0,14	0,2	0,2	0,15	0,14
2	0,31	0,27	0,12	0,1	0,16
3	0,2	0,09	0,11	0,04	0,08
Rata-Rata	0,216	0,186	0,143	0,096	0,126
Min	0,140	0,09	0,11	0,04	0,08
Max	0,31	0,27	0,2	0,15	0,16
SD	0,086	0,090	0,049	0,055	0,041

Perubahan Panjang $\Delta l$ (mm)					
NO	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	1,4	2	2	1,5	1,4
2	3,1	2,7	1,2	1	1,6
3	2	0,9	1,1	0,4	0,8

Contoh Perhitungan 0% serat :

$$\epsilon = \frac{\Delta l}{l_0}$$

Keterangan:  $\epsilon$  = regangan

$\Delta l$  = defleksi (mm)

$l_0$  = panjang awal (mm)

Panjang awal semua spesimen  $l_0 = 10$  mm

$$\epsilon = \frac{1,4 \text{ mm}}{10 \text{ mm}} = 0,14 \text{ mm}$$



Modulus Elastisitas Tekan NaOH (MPa)					
No Spesimen	0% Serat	5% Serat	10% Serat	15% Serat	20% Serat
1	2017,625	1318,681	1016,865	1173,418	1447,694
2	957,757	1024,691	1685,049	1985,981	1546,333
3	1219,512	2311,604	2392,344	5200,628	4209,459
Rata-Rata	1398,298	1551,658	1698,086	2786,675	2401,162
Min	957,757	1024,691	1016,865	1173,418	1447,694
Max	2017,625	2311,604	2392,344	5200,628	4209,459
SD	552,090	674,347	687,832	2129,657	1566,807

Luas penampang (A)					
NO	0%	5% Serat	10% Serat	15% Serat	20% Serat
1	44	40,95	42	42,4	39,78
2	40	42	40,8	42,8	37,44
3	41	43,26	40	41,6	37

Rumus Perhitungannya :

$$E^c = \frac{\Delta\sigma}{\Delta\varepsilon} = \frac{(F_2 - F_1)l_0}{(L_2 - L_1) A}$$

Keterangan :  $l_0$  = panjang awal (mm)

$A$  = luas penampang (mm<sup>2</sup>)

NO		1	2	3
Serat 5%	F1	2808 N	2536 N	1320 N
	F2	4752 N	4860 N	3120 N
	L1	0,76 mm	0,972 mm	0,234 mm
	L2	1,12 mm	1,512 mm	0,414 mm

$$1. E^c = \frac{(4752 - 2808)10}{(1,12 - 0,76)40,95} = 1318,681$$

$$2. E^c = \frac{(4860 - 2536)10}{(1,512 - 0,972)42} = 1024,691$$

$$3. E^c = \frac{(3120 - 1320) - 10}{(0,414 - 0,234)43,26} = 2311,604$$

NO		1	2	3
10%	F1	850 N	950 N	2000 N
	F2	2900 N	2600 N	4000 N
	L1	0,34 mm	0,192 mm	0,363 mm
	L2	0,82 mm	0,432 mm	0,572 mm

$$1. E^c = \frac{(2900 - 850)10}{(0,82 - 0,34)42} = 1016,865$$

$$2. E^c = \frac{(2600 - 950)10}{(0,432 - 0,192)40,8} = 1685,049$$

$$3. E^c = \frac{(4000 - 2000)10}{(0,572 - 0,363)40} = 2392,344$$

NO		1	2	3
15%	F1	990 N	2250 N	1710 N
	F2	2700 N	3780 N	3960 N
	L1	0,33 mm	0,42 mm	0,18 mm
	L2	0,675 mm	0,6 mm	0,284 mm

$$1. E^c = \frac{(2700 - 990)10}{(0,675 - 0,33)42,4} = 1173,418$$

$$2. E^c = \frac{(3780 - 2250)10}{(0,6 - 0,42)42,8} = 1985,981$$

$$3. E^c = \frac{(3960 - 1710)10}{(0,284 - 0,18)41,6} = 5200,628$$

NO		1	2	3
20%	F1	1215 N	1040 N	1634 N
	F2	3150 N	2800 N	2280 N
	L1	0,42 mm	0,496 mm	0,264 mm
	L2	0,756 mm	0,8 mm	0,344 mm

$$1. E^c = \frac{(3150 - 1215)10}{(0,756 - 0,42)39,78} = 1447,694$$

$$2. E^c = \frac{(2800 - 1040)10}{(0,8 - 0,496)37,44} = 1546,333$$

$$3. E^c = \frac{(2280 - 1634)10}{(0,344 - 0,264)37} = 4209,459$$