

## LAMPIRAN

### KUAT GESER & KUAT TARIK

no.	waktu dan variasi (%)	kode	keliling penampang (pixel)	micron (µm)	keliling penampang (µm)	milimeter	keliling penampang (mm)	panjang serat tertanam (mm)	luas area (mm <sup>2</sup> )	P max saat tercabut (N)	tegangan (Mpa)		tegangan rata-rata	
											tarik	geser	tarik	geser
1	serat kecil, 2 jam, 0%	7	506,866	0,632	802,0031646	1000	0,802003165	3	2,406009494	13,97	272,7934	5,81	515,70	10,69
2		8	461,027	0,632	729,4731013	1000	0,729473101	3	2,188419304	23,51	554,9115	10,74		
3		9	465,602	0,632	736,7120253	1000	0,736712025	3	2,210136076	21,9	506,8019	9,91		
4		10	725,512	0,632	1147,962025	1000	1,147962025	3	3,443886076	56,19	535,5421	16,32		
5		11	468,944	0,632	742,000	1000	0,742	3	2,226	18,76	554,9115	8,43		
6		12	459,937	0,632	727,7484177	1000	0,727748418	3	2,183245253	28,22	669,2434	12,93		
7	serat besar, 2 jam, 0%	19	878,187	0,632	1389,536392	1000	1,389536392	5	6,947681962	10,57	68,75824	1,52	236,62	5,24
8		20	916,700	0,632	1450,474684	1000	1,450474684	5,5	7,977610759	83,81	500,3399	10,51		
9		21	953,951	0,632	1509,416139	1000	1,509416139	5,5	8,301788766	42,8	235,9475	5,16		
10		22	935,588	0,632	1480,360759	1000	1,480360759	5	7,401803797	43,79	250,9744	5,92		
11		23	930,185	0,632	1471,811709	1000	1,471811709	5	7,359058544	27,21	157,7661	3,70		
12		24	988,861	0,632	1564,653481	1000	1,564653481	5,5	8,605594146	40,14	205,9352	4,66		
13	serat kecil, 2 jam, 2,5%	43	574,817	0,632	909,5205696	1000	0,90952057	3	2,728561709	10,57	160,4869	3,87	115,27	2,84
14		44	619,395	0,632	980,0553797	1000	0,98005538	3	2,940166139	8,94	116,9031	3,04		
15		45	650,569	0,632	1029,381329	1000	1,029381329	3	3,088143987	5,91	70,05265	1,91		
16		46	496,741	0,632	785,9825949	1000	0,785982595	3	2,357947785		0	0,00		
17		47	697,853	0,632	1104,197785	1000	1,104197785	3	3,312593354	11,24	115,7876	3,39		
18		48	502,159	0,632	794,5553797	1000	0,79455538	3	2,383666139	11,48	228,3932	4,82		
19	serat besar, 2 jam, 2,5%	25	1.256,506	0,632	1988,142405	1000	1,988142405	5,5	10,93478323	10,47	33,26912	0,96	90,49	1,96
20		26	731,396	0,632	1157,272152	1000	1,157272152	5	5,786360759	15,79	148,0815	2,73		
21		27	839,493	0,632	1328,311709	1000	1,328311709	5	6,641558544	17,94	127,7062	2,70		
22		28	896,657	0,632	1418,761076	1000	1,418761076	5	7,09380538	8,77	54,7231	1,24		
23		29	1.060,466	0,632	1677,952532	1000	1,677952532	5,5	9,228738924	9,74	43,44995	1,06		

24		30	898,683	0,632	1421,966772	1000	1,421966772	5	7,109833861	21,85	135,7257	3,07		
25	serat kecil, 2 jam, 5%	61	457,459	0,632	723,8275316	1000	0,723827532	3	2,171482595	33,52	803,5695	15,44	248,68	4,84
26		62	434,683	0,632	687,789557	1000	0,687789557	3	2,063368671	14,01	371,9775	6,79		
27		63	482,839	0,632	763,9857595	1000	0,763985759	3	2,291957278	7,05	151,7079	3,08		
28		64	540,834	0,632	855,75	1000	0,85575	3	2,56725	9,61	164,8235	3,74		
29		65	429,779	0,632	680,0300633	1000	0,680030063	3	2,04009019		0	0,00		
30		66	559,182	0,632	884,7816456	1000	0,884781646	3	2,654344937		0	0,00		
31		serat besar, 2 jam, 5%	55	824,485	0,632	1304,564873	1000	1,304564873	4,5	5,87054193	9,6	70,84831	1,64	99,53
32	56		747,583	0,632	1182,884494	1000	1,182884494	5,5	6,505864715	14,01	125,7602	2,15		
33	57		937,442	0,632	1483,294304	1000	1,483294304	5,5	8,158118671	5,99	34,19494	0,73		
34	58		781,437	0,632	1236,450949	1000	1,236450949	5	6,182254747	5,31	43,62449	0,86		
35	59		776,965	0,632	1229,375	1000	1,229375	5,5	6,7615625	27,21	226,1254	4,02		
36	60		811,439	0,632	1283,922468	1000	1,283922468	4	5,135689873	12,68	96,61205	2,47		
37	serat kecil, 2 jam, 7,5%	91	716,660	0,632	1133,955696	1000	1,133955696	3	3,401867089	25,29	247,0281	7,43	145,76	3,68
38		92	614,391	0,632	972,1376582	1000	0,972137658	3	2,916412975		0	0,00		
39		93	442,325	0,632	699,8813291	1000	0,699881329	3	2,099643987	14,07	360,7737	6,70		
40		94	615,208	0,632	973,4303797	1000	0,97343038	3	2,920291139		0	0,00		
41		95	708,753	0,632	1121,44462	1000	1,12144462	3	3,364333861	26,71	266,7521	7,94		
42		96	500,366	0,632	791,7183544	1000	0,791718354	3	2,375155063		0	0,00		
43	serat besar, 2 jam, 7,5%	79	944,531	0,632	1494,511076	1000	1,494511076	5,5	8,219810918	25,98	146,0934	3,160657	191,94	3,56
44		80	700,082	0,632	1107,724684	1000	1,107724684	5,5	6,092485759	39,67	406,0581	6,5113		
45		81	772,198	0,632	1221,832278	1000	1,221832278	3	3,665496835	24,88	209,3229	6,78762		
46		82	981,443	0,632	1552,916139	1000	1,552916139	5,5	8,541038766	17,83	92,86348	2,087568		
47		83	777,577	0,632	1230,343354	1000	1,230343354	5	6,151716772	19,99	165,8631	3,249499		
48		84	749,987	0,632	1186,688291	1000	1,186688291	5	5,933441456	14,74	131,4661	2,484224		
49	serat kecil, 5%, 4 jam	115	581,353	0,632	919,8623418	1000	0,919862342	2,5	2,299655854	20,8	308,7502	9,04	236,90	5,52
50		116	539,818	0,632	854,1424051	1000	0,854142405	3	2,562427215	6,9	118,7895	2,69		
51		117	856,500	0,632	1355,221519	1000	1,355221519	3	4,065664557	12,57	85,96157	3,09		
52		118	515,701	0,632	815,9825949	1000	0,815982595	3	2,447947785	20,67	389,9135	8,44		
53		119	407,336	0,632	644,5189873	1000	0,644518987	3	1,933556962	12,03	363,7339	6,22		
54		120	561,935	0,632	889,1376582	1000	0,889137658	3	2,667412975	9,71	154,2662	3,64		

55	serat besar, 5%, 4 jam	103	902,874	0,632	1428,598101	1000	1,428598101	5,5	7,857289557	6,45	39,6944	0,82	179,87	3,58
56		104	788,544	0,632	1247,696203	1000	1,247696203	5,5	6,862329114	27,48	221,7117	4,00		
57		105	943,950	0,632	1493,591772	1000	1,493591772	5,5	8,214754747	67,24	378,5764	8,19		
58		106	693,458	0,632	1097,243671	1000	1,097243671	5,5	6,03484019	25,23	263,209	4,18		
59		107	1.034,777	0,632	1637,30538	1000	1,63730538	5,5	9,005179589	13,84	64,84349	1,54		
60		108	981,134	0,632	1552,427215	1000	1,552427215	5	7,762136076	21,34	111,2145	2,75		
61	serat kecil, 5%, 6 jam	139	608,854	0,632	963,3765823	1000	0,963376582	3	2,890129747	39,32	532,1217	13,60	287,60	7,66
62		140	528,989	0,632	837,0079114	1000	0,837007911	3	2,511023734	4,3	77,09016	1,71		
63		141	563,961	0,632	892,3433544	1000	0,892343354	3	2,677030063	12,01	189,4387	4,49		
64		142	482,150	0,632	762,8955696	1000	0,76289557	3	2,288686709	23,55	508,2184	10,29		
65		143	582,076	0,632	921,0063291	1000	0,921006329	3	2,763018987	8,66	128,2278	3,13		
66		144	694,611	0,632	1099,068038	1000	1,099068038	2	2,198136076	27,94	290,5139	12,71		
67	serat besar, 5%, 6 jam	121	882,162	0,632	1395,825949	1000	1,395825949	5,5	7,677042722	1,52	9,79875	0,20	49,33	1,23
68		122	1.106,284	0,632	1750,449367	1000	1,750449367	5	8,752246835	37,86	155,1926	4,33		
69		123	839,863	0,632	1328,897152	1000	1,328897152	5,5	7,308934335	7,46	53,05737	1,02		
70		124	1.038,758	0,632	1643,60443	1000	1,64360443	5,5	9,039824367	5,35	24,87418	0,59		
71		125	1.140,267	0,632	1804,219937	1000	1,804219937	5,5	9,923209652	8,6	33,1825	0,87		
72		126	877,661	0,632	1388,704114	1000	1,388704114	5,5	7,637872627	3,05	19,86415	0,40		
73	serat kecil, tanpa perlakuan	151	363,265	0,632	574,7863924	1000	0,574786392	3	1,724359177	30,81	1171,301	17,87	575,81	12,34
74		152	523,340	0,632	828,0696203	1000	0,82806962	3	2,484208861	29,12	533,393	11,72		
75		153	514,139	0,632	813,5110759	1000	0,813511076	3	2,440533228	28,54	541,6474	11,69		
76		154	577,567	0,632	913,8718354	1000	0,913871835	3	2,741615506	22,2	333,8659	8,10		
77		155	675,249	0,632	1068,431962	1000	1,068431962	3	3,205295886	37,24	409,7374	11,62		
78		156	667,091	0,632	1055,523734	1000	1,055523734	3	3,166571203	41,24	464,9136	13,02		
79	serat besar, tana perlakuan	157	638,665	0,632	1010,545886	1000	1,010545886	5,5	5,558002373	32,84	403,9064	5,91	283,45	5,07
80		158	991,102	0,632	1568,199367	1000	1,568199367	5,5	8,625096519	33,05	168,7946	3,83		
81		159	677,647	0,632	1072,226266	1000	1,072226266	5,5	5,897244462	36,12	394,6067	6,12		
82		160	932,356	0,632	1475,246835	1000	1,475246835	5,5	8,113857595	29,76	171,7486	3,67		
83		161	818,626	0,632	1295,294304	1000	1,295294304	5,5	7,124118671	32,86	245,9916	4,61		
84		162	865,666	0,632	1369,724684	1000	1,369724684	5,5	7,533485759	47,15	315,6493	6,26		

LAMPIRAN

TABEL 1

Variasi Konsentrasi Alkali (NaOH) dengan Waktu Perendaman 2 jam

variabel serat	no. serat	keliling (mm)	serat tertanam (mm)	P max (N)	keterangan	kuat geser (Mpa)	kuat tarik (Mpa)
<b>konsentrasi NaOH 0%</b>							
serat kecil	8	0,7295	3	23,51	tercabut	10,74	
	9	0,7367	3	21,9	tercabut	9,91	
	11	0,7420	3	18,76	tercabut	8,43	
	12	0,7277	3	28,22	tercabut	12,93	
<b>Rata-rata</b>		<b>0,73</b>		<b>23,0975</b>		<b>10,50</b>	
serat besar	21	1,509416139	5,5	42,8	tercabut	5,155515421	
	22	1,480360759	5	43,79	tercabut	5,916125474	
	23	1,471811709	5	27,21	tercabut	3,697483834	
	24	1,564653481	5,5	40,14	tercabut	4,664407747	
<b>Rata-rata</b>		<b>1,51</b>		<b>38,485</b>		<b>4,86</b>	
<b>konsentrasi NaOH 2,5%</b>							
serat kecil	43	0,90952057	3	10,57	tercabut	3,873835789	
	44	0,98005538	3	8,94	tercabut	3,0406445	
	47	1,104197785	3	11,24	tercabut	3,393111921	
	48	0,79455538	3	11,48	tercabut	4,816110701	
<b>Rata-rata</b>		<b>0,95</b>		<b>10,5575</b>		<b>3,78</b>	
serat besar	26	1,157272152	5	15,79	tercabut	2,728830893	
	27	1,328311709	5	17,94	tercabut	2,701173208	
	30	1,421966772	5	21,85	tercabut	3,073208239	
<b>Rata-rata</b>		<b>1,30</b>		<b>18,52667</b>		<b>2,83</b>	
<b>konsentrasi NaOH 5%</b>							
serat kecil	62	0,687789557	3	14,01	tercabut	6,789867559	
	63	0,763985759	3	7,05	tercabut	3,075973565	
	64	0,85575	3	9,61	tercabut	3,743305093	
<b>Rata-rata</b>		<b>0,77</b>		<b>10,22333</b>		<b>4,54</b>	
serat besar	56	1,182884494	5,5	14,01	tercabut	2,153441643	
	59	1,229375	5,5	27,21	tercabut	4,024217775	
	60	1,283922468	4	12,68	tercabut	2,468996437	
<b>Rata-rata</b>		<b>1,23</b>		<b>17,96667</b>		<b>2,88</b>	
<b>konsentrasi NaOH 7,5%</b>							
serat kecil	91	1,133955696	3	25,29	tercabut	7,434152876	
	93	0,699881329	3	14,07	putus		360,77374
	95	1,12144462	3	26,71	tercabut	7,939164514	
<b>Rata-rata</b>		<b>0,99</b>		<b>22,02333</b>		<b>7,69</b>	<b>360,774</b>
erat besar	79	1,494511076	5,5	25,98	tercabut	4,14	
	80	1,107724684	5,5	39,67	tercabut	4,36	
	81	1,221832278	3	24,88	terputus		209,32294
	82	1,552916139	5,5	17,83	tercabut	3,51	
	83	1,230343354	5	19,99	terputus		165,8631
	84	1,186688291	5	14,74	tercabut	3,39	
<b>Rata-rata</b>		<b>1,30</b>		<b>23,84833</b>		<b>3,85</b>	<b>187,59302</b>

**Tabel 2**

**Variasi Waktu perendaman dengan Konsentrasi Alkali (NaOH) 5%**

waktu perendaman	no. serat	keliling (mm)	serat tertanam (mm)	P max (N)	keterangan	kuat geser (Mpa)	kuat tarik (Mpa)
<b>waktu perendaman 0 jam</b>							
serat kecil	151	0,574786392	3	30,81	terputus		1171,3006
	152	0,82806962	3	29,12	tercabut	11,72204176	
	153	0,813511076	3	28,54	tercabut	11,69416572	
	154	0,913871835	3	22,2	tercabut	8,097415538	
	155	1,068431962	3	37,24	tercabut	11,61827217	
	156	1,055523734	3	41,24	terputus		464,91364
<b>Rata-rata</b>		<b>0,88</b>		<b>31,525</b>		<b>10,78</b>	
<b>waktu perendaman 4 jam</b>							
serat besar, tanpa perlakuan	157	1,010545886	5,5	32,84	tercabut	5,908597693	
	158	1,568199367	5,5	33,05	tercabut	3,831841177	
	159	1,072226266	5,5	36,12	tercabut	6,124894471	
	160	1,475246835	5,5	29,76	terputus		171,74859
	161	1,295294304	5,5	32,86	tercabut	4,612500369	
	162	1,369724684	5,5	47,15	tercabut	6,258722921	
<b>Rata-rata</b>		<b>1,33</b>		<b>40,005</b>		<b>5,44</b>	
<b>waktu perendaman 4 jam</b>							
serat kecil	115	0,919862342	2,5	20,8	tercabut	9,04	
	118	0,815982595	3	20,67	tercabut	8,443807555	
	119	0,644518987	3	12,03	tercabut	6,221694130	
<b>Rata-rata</b>		<b>0,79</b>		<b>17,83333</b>		<b>7,90</b>	
<b>waktu perendaman 6 jam</b>							
serat besar	104	1,247696203	5,5	27,48	terputus	4,00	
	105	1,493591772	5,5	67,24	tercabut	8,185271755	180,022
	106	1,097243671	5,5	25,23	terputus	4,18	
	108	1,552427215	5	21,34	tercabut	2,749243223	307,250
<b>Rata-rata</b>		<b>1,35</b>		<b>35,3225</b>		<b>4,78</b>	<b>243,636</b>
<b>waktu perendaman 6 jam</b>							
serat kecil	139	0,963376582	3	39,32	tercabut	13,60492554	
	142	0,76289557	3	23,55	tercabut	10,28974386	
	144	1,099068038	2	27,94	tercabut	12,71076905	
<b>Rata-rata</b>		<b>0,94</b>		<b>30,27</b>		<b>12,20</b>	
<b>waktu perendaman 6 jam</b>							
serat besar	122	1,750449367	5	37,86	tercabut	4,325746373	
	123	1,328897152	5,5	7,46	tercabut	1,020668631	
	124	1,64360443	5,5	5,35	tercabut	0,591825658	
	125	1,804219937	5,5	8,6	tercabut	0,866655074	
<b>Rata-rata</b>		<b>1,63</b>		<b>14,8175</b>		<b>1,70</b>	