



# LAMPIRAN 1



**LABORATORIUM BAHAN KONSTRUKSI TEKNIK  
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN  
UNIVERSITAS ISLAM INDONESIA**

Jln. Kaliurang Km. 14,4 telp. (0274) 895707, 895042 Fax. (0274) 895330 Yogyakarta.

**DATA PEMERIKSAAN  
BERAT JENIS AGREGAT KASAR**

Jenis benda uji : Agregat Kasar Di periksa oleh :  
 Nama benda uji : Batu Bentonit 1. Nomida Setiadi  
 Asal : Nanggulan, Kulon Progo 2. Dani Purwo Prasetyo  
 Keperluan : Tugas Akhir Tanggal : 31 Juni 2004

**ALAT-ALAT**

1. Gelas ukur kap 1000 ml
2. Timbangan ketelitian 0,01 gram
3. Piring, sendok, lap dan lain-lain.

	BENDA UJI I		BENDA UJI II	
Berat Agregat (w)	400	Gram	400	Gram
Volume air ( $V_1$ )	500	Cc	500	Cc
Volume air + Agregat ( $V_2$ )	744	Cc	755	Cc
Berat Jenis (BJ)	$1,639$		$1,568$	
$\frac{w}{V_2 - V_1}$				
Berat jenis rata-rata	$1,6$			

Yogyakarta, 31 Juni 2004

Mengetahui

Laboratorium BKT FTSP UII,

LABORATORIUM *Danisman*  
 BAHAN KONSTRUKSI TEKNIK *panu s.*  
 FAKULTAS TEKNIK UII



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**DATA PEMERIKSAAN  
BERAT JENIS AGREGAT HALUS**

Jenis benda uji : Agregat Halus Di periksa oleh :  
 Nama benda uji : Pasir 1. Nomida Setiadi  
 Asal : Kaliurang 2. Dani Purwo Prasetyo  
 Keperluan : Tugas Akhir Tanggal : 31 Juni 2004

**ALAT-ALAT**

1. Gelas ukur kap 1000 ml
2. Timbangan ketelitian 0,01 gram
3. Piring, sendok, lap dan lain-lain.

	BENDA UJI I		BENDA UJI II	
Berat Agregat (w)	400	Gram	400	Gram
Volume air ( $V_1$ )	500	Cc	500	Cc
Volume air + Agregat ( $V_2$ )	654	Cc	651	Cc
Berat Jenis (BJ)	$2,659$		$2,649$	
$\frac{w}{V_2 - V_1}$				
Berat jenis rata-rata	$2,623$			

Yogyakarta, 31 Juni 2004

Mengetahui

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**BAHAN KONSTRUKSI TEKNIK**  
**FAKULTAS TEKNIK UII**

*Darusalam*



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Jln. Kaliurang Km. 14,4 telp. (0274) 895707, 895042 Fax. (0274) 895330 Yogyakarta.

**DATA PEMERIKSAAN**

**BERAT VOLUME AGREGAT HALUS "SSD"**

Jenis benda uji : Agregat Halus Di periksa oleh :  
 Nama benda uji : Pasir 1. Nomida Setiadi  
 Asal : Kaliurang 2. Dani Purwo Prasetyo  
 Keperluan : Tugas Akhir Tanggal : 31 Juni 2004

**ALAT-ALAT**

1. Tabung silinder (  $\varnothing$  15 x t 30 ) cm
2. Timbangan kap. 20 kg
3. Tongkat penumbuk  $\varnothing$  16 panjang 60 cm.
4. Serok / sekop, Lap dll.

	BENDA UJI I		BENDA UJI II	
Berat Tabung ( $W_1$ )	4,9	Kg	4,9	Kg
Berat tabung + Agregat ( $W_2$ )	12,6	Kg	12,2	Kg
Volume tabung $\frac{1}{4} \cdot \pi \cdot d^2 \cdot t$	$5,3 \cdot 10^{-3}$	$m^3$	$5,3 \cdot 10^{-3}$	$m^3$
Berat volume $\frac{W_2 - W_1}{V}$	1,452	$t/m^3$	1,377	$t/m^3$
Berat volume rata-rata	1,415 $t/m^3$			

Yogyakarta, 31 Juni 2004

Mengetahui

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**FAKULTAS TEKNIK UII Darus.**



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**DATA PEMERIKSAAN  
MODULUS HALUS BUTIR PASIR**

Jenis benda uji : Agregat Halus Di periksa oleh :  
 Nama benda uji : Pasir 1. Nomida Setiadi  
 Asal : Kaliurang 2. Dani Purwo Prasetyo  
 Keperluan : Tugas Akhir Tanggal : 02 Juli 2004

Saringan		Berat tertinggal gram		Berat tertinggal %		Berat kumulatif	
No	Ø lubang mm	I	II	I	II	I	II
1	40						
2	20						
3	10						
4	4,75	11	10.8	0.55	0.54	0.55	0.540
5	2,36	81.8	82.95	4.09	4.147	4.640	4.688
6	1,18	324.35	321.7	16.217	16.085	20.725	20.773
7	0,600	660.6	681.65	33.03	34.082	54.808	54.855
8	0,300	429.05	407.7	21.452	20.385	75.193	75.240
9	0,150	322.95	321.15	16.147	16.057	91.250	91.298
10	Pan	162.09	161.15	8.104	8.057	-	-
Jumlah						246.266	247.394

Jumlah rata-rata = 246.830

$$\text{MODULUS HALUS BUTIR} = \frac{246.830}{100} = 2.468$$

Yogyakarta, 02 Juli 2004

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**BAHAN KONSTRUKSI TEKNIK**

**FAKULTAS TEKNIK UII**

*Darus*



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**DATA PEMERIKSAAN  
MODULUS HALUS BUTIR KERIKIL**

Jenis benda uji : Agregat Kasar Di periksa oleh :  
 Nama benda uji : Batu Bentonit 1. Nomida Setiadi  
 Asal : Nanggulan, Kulon Progo 2. Dani Purwo Prasetyo  
 Keperluan : Tugas Akhir Tanggal : 02 Juli 2004

Saringan		Berat tertinggal gram		Berat tertinggal %		Berat komulatif	
No	Ø lubang mm	I	II	I	II	I	II
1	38						
2	19	1975.6	1964.8	98.78	98.24	98.78	98.24
3	9.5	23.3	33.7	1.165	1.685	99.945	99.925
4	4.75					99.945	99.925
5	2.36					99.945	99.925
6	1.18					99.945	99.925
7	0.600					99.945	99.925
8	0.300					99.945	99.925
9	0.150					99.945	99.925
10	Pan					-	-
Jumlah						797.392	797.715

Jumlah rata-rata = 797.553

$$\text{MODULUS HALUS BUTIR} = \frac{797.553}{100} = 7.975$$

Yogyakarta, 02 Juli 2004

Mengetahui

Laboratorium BKT FTSP UII,

**LABORATORIUM**

**BAHAN KONSTRUKSI TEKNIK**

**FAKULTAS TEKNIK UII**

*Nomida Setiadi*  
*Dani Purwo Prasetyo*



**PERHITUNGAN MIX DESIGN  
DENGAN METODE PERBANDINGAN VOLUME**

1. Data konstruksi :

Kuat tekan yang disyaratkan sebesar  $f'c = 20$  MPa,

Volume pekerjaan  $< 1000$  m<sup>3</sup> dengan mutu pekerjaan cukup,

Slump yang diinginkan 100 mm,

Jenis semen yang digunakan Jenis I, merk Nusantara,

Agregat kasar berupa batu bentonit dari Nanggulan Kulon Progo dengan  $D_{max}$

40 mm, FAS yang diambil sebesar = 0,5,

Berat jenis semen = 3,15

Berat jenis pasir = 2,623

Berat jenis batu bentonit = 1,6

2. Langkah-langkah pembuatan *mix-design* :

- a. Perhitungan *mix design* dengan menggunakan perbandingan volume yang dikonversi kedalam perbandingan berat satuan volume masing-masing bahan.

Berat satuan bahan :

Semen = 3,15

Pasir = 2,623

Batu Bentonit = 1,6

Perbandingan volume (semen : pasir : bentonit = 1 : 2 : 3)



Perbandingan berat bahan :

$$\text{Semen} = \frac{3,15}{3,15} \times 1 = 1$$

$$\text{Pasir} = \frac{2,623}{3,15} \times 2 = 1,6654$$

$$\text{Batu Bentonit} = \frac{1,6}{3,15} \times 3 = 1,5238$$

b. Taksiran berat 1 silinder beton (15 cm x 30 cm) adalah 10 kg.

Kebutuhan bahan untuk 1 silinder :

$$\text{Semen} = \frac{1}{1 + 1,6654 + 1,5238} \times 10 = 2,3871 \text{ kg}$$

$$\text{Pasir} = \frac{1,6654}{1 + 1,6654 + 1,5238} \times 10 = 3,9746 \text{ kg}$$

$$\text{Batu Bentonit} = \frac{1,5238}{1 + 1,6654 + 1,5238} \times 10 = 3,6374 \text{ kg}$$

Untuk kebutuhan 5 silinder :

$$\text{Semen} = 5 \times 2,387 = 11,935 \text{ kg} + (11,935 \times 20\%) = 14,323 \text{ kg}$$

$$\text{Pasir} = 5 \times 3,975 = 19,873 \text{ kg} + (19,873 \times 20\%) = 23,847 \text{ kg}$$

$$\text{Batu Bentonit} = 5 \times 3,637 = 18,185 \text{ kg} + (18,185 \times 20\%) = 21,824 \text{ kg}$$

c. Kebutuhan air yang dipakai untuk 1 silinder :

Total air yang dipakai =  $0,5 \times (W_{\text{semen}} + W_{\text{additive}})$

$$0\% = 0,5 \times (2387,1 + 0) = 1193,550 \text{ cc}$$

$$2,5\% = 0,5 \times (2387,1 + 59,678) = 1223,388 \text{ cc}$$

$$5\% = 0,5 \times (2387,1 + 119,355) = 1253,227 \text{ cc}$$

$$7,5\% = 0,5 \times (2387,1 + 179,033) = 1283,066 \text{ cc}$$

$$10\% = 0,5 \times (2387,1 + 238,71) = 1312,904 \text{ cc}$$

Kebutuhan air tiap variasi (5 silinder)

Variasi (%)	0	2,5	5	7,5	10
Volume (lt)	5,968	6,117	6,267	6,415	6,565
Vol + 20 % (lt)	7,162	7,340	7,520	7,698	7,878

d. Kebutuhan Silica Fume untuk 5 silinder

Variasi (%)	2,5	5	7,5	10
Berat (kg)	0,358	0,717	1,076	1,435



# LAMPIRAN 3

DATA BENDA UJI SILINDER BETON I  
Beton Ringan dengan variasi silica fume (pra bakar)

Variasi (%)	No	D (cm)	H (cm)	W (kg)	Ao (cm <sup>2</sup> )	Volume (cm <sup>3</sup> )	P (KN)	P rata-rata (KN)	f <sub>b</sub> (MPa)	f <sub>cr</sub> (MPa)	s <sub>d</sub> (MPa)	f <sub>c</sub> (MPa)
0	SD1-1	15.050	30.100	10.100	177.804	5351.914	90		5.062			
	SD1-2	15.100	30.500	10.000	178.988	5459.129	115		6.425			
	SD1-3	15.025	30.050	10.150	177.214	5325.288	110		6.207			
	SD1-4	15.025	29.900	10.100	177.214	5298.706	120		6.771			
	SD1-5	15.050	30.000	9.800	177.804	5334.134	108	108.6	6.074	6.108	0.642	5.056
2,5	SD2-1	14.900	29.950	9.950	174.278	5219.622	109		6.254			
	SD2-2	14.950	30.000	10.000	175.449	5263.484	110		6.270			
	SD2-3	15.000	30.000	9.800	176.625	5298.750	106		6.001			
	SD2-4	14.900	29.950	10.000	174.278	5219.622	100		5.738			
	SD2-5	15.050	29.500	10.100	177.804	5245.232	96	104.2	5.399	5.933	0.369	5.328
5	SD3-1	15.050	30.000	10.050	177.804	5334.134	100		5.624			
	SD3-2	15.000	30.050	10.100	176.625	5307.581	114		6.454			
	SD3-3	15.100	29.800	9.900	178.988	5333.838	97		5.419			
	SD3-4	15.000	30.100	10.100	176.625	5316.413	110		6.228			
	SD3-5	15.100	30.200	10.100	178.988	5405.433	104	105	5.810	5.907	0.427	5.207
7,5	SD4-1	15.02	30	10.05	177.096	5312.889	96		5.421			
	SD4-2	14.95	29.98	10.09	175.449	5259.975	116		6.612			
	SD4-3	15	30.05	10.1	176.625	5307.581	100		5.662			
	SD4-4	15.05	29.9	10	177.804	5316.353	124		6.974			
	SD4-5	15.1	30	10.1	178.988	5369.636	106	108.4	5.922	6.118	0.654	5.046
10	SD5-1	15	30.1	10.25	176.625	5316.413	120		6.794			
	SD5-2	14.95	29.98	10.05	175.449	5259.975	109		6.213			
	SD5-3	15	30	10.02	176.625	5298.750	116		6.568			
	SD5-4	15.1	29.9	10	178.988	5351.737	130		7.263			
	SD5-5	14.85	30	10.05	173.110	5193.305	110	117	6.354	6.638	0.413	5.961

$$f_c = f_{cr} - 1,64 \cdot S_d$$

$$S_d = \sqrt{\frac{\sum_{i=1}^N (f'_b - f'_{cr})^2}{N-1}}$$

$$f_{cr} = \frac{\sum_{i=1}^N f'_b}{N}$$

f<sub>b</sub> = kuat desak beton dari masing-masing benda uji (MPa)

f<sub>cr</sub> = kekuatan desak beton rata-rata (MPa)

N = Jumlah benda uji yang diperiksa

S<sub>d</sub> = harga deviasi standar

DATA BENDA UJI SILINDER BETON II  
Beton Ringan dengan variasi silica fume (pasca bakar)

Variasi (%)	No	D (cm)	H (cm)	W (kg)	Ao (cm <sup>2</sup> )	Volume (cm <sup>3</sup> )	P (KN)	P rata-rata (KN)	f'b (MPa)	f'cr (MPa)	sd (MPa)	f'c (MPa)
0	SDB1-1	14.95	29.85	9.150	175.449	5237.166	86		4.902			
	SDB1-2	15.05	30.05	9.350	177.804	5343.024	80		4.499			
	SDB1-3	14.9	30.15	9.250	174.278	5254.477	70		4.017			
	SDB1-4	15.08	30.01	9.200	178.514	5357.206	75		4.201			
	SDB1-5	15.1	30.25	9.550	178.988	5414.382	76	77.4	4.246	4.373	0.342	3.812
2,5	SDB2-1	14.95	30.1	9.350	175.449	5281.029	80		4.560			
	SDB2-2	15	30.1	9.500	176.625	5316.413	73		4.133			
	SDB2-3	15	30	9.370	176.625	5298.750	92		5.209			
	SDB2-4	14.9	30	9.200	174.278	5228.336	75		4.303			
	SDB2-5	15.05	29.7	9.150	177.804	5280.793	70	78	3.937	4.428	0.493	3.621
5	SDB3-1	15	30	8.850	176.625	5298.750	80		4.529			
	SDB3-2	14.96	29.9	8.750	175.684	5252.959	73		4.155			
	SDB3-3	15.01	29.7	8.900	176.861	5252.759	75		4.241			
	SDB3-4	15.1	30	8.950	178.988	5369.636	83		4.637			
	SDB3-5	15	29.85	9.100	176.625	5272.256	85	79.2	4.812	4.475	0.274	4.026
7,5	SDB4-1	14.98	30.1	9.1	176.154	5302.245	87		4.939			
	SDB4-2	15.1	29.9	8.7	178.988	5351.737	76		4.246			
	SDB4-3	14.95	29.95	9	175.449	5254.711	77		4.389			
	SDB4-4	14.97	29.97	9.1	175.919	5272.299	85		4.832			
	SDB4-5	14.95	29.85	9.15	175.449	5237.166	87	82.4	4.959	4.673	0.332	4.129
10	SDB5-1	15.03	29.9	9.3	177.332	5302.233	95		5.357			
	SDB5-2	15.05	29.7	8.95	177.804	5280.793	88		4.949			
	SDB5-3	14.9	30.15	9	174.278	5254.477	75		4.303			
	SDB5-4	15.2	30.1	8.9	181.366	5459.129	70		3.860			
	SDB5-5	15.1	29.9	8.8	178.988	5351.737	90	83.6	5.028	4.700	0.605	3.707

DATA BENDA UJI SILINDER BETON NORMAL

Benda Uji	No	D (cm)	H (cm)	W (kg)	Ao (cm <sup>2</sup> )	Volume (cm <sup>3</sup> )	P (KN)	P rata-rata (KN)	f'b (MPa)	f'cr (MPa)	sd (MPa)	f'c (MPa)
1	SDN-1	14.9	30	12.4	174.278	5228.336	545		31.272			
2	SDN-2	15.05	29.8	12.5	177.804	5298.573	570		32.058			
3	SDN-3	15.1	29.8	12.2	178.988	5333.838	565		31.566			
4	SDN-4	14.9	29.9	12.2	174.278	5210.908	540		30.985			
5	SDN-5	15	29.8	12.3	176.625	5263.425	590	562	33.404	31.857	0.951	30.297

Pra Bakar

SD1-1

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.060	10 <sup>-3</sup> mm
Angka Koreksi	0.017	10 <sup>-3</sup> mm	$\epsilon_2$	0.136	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	18	5.733	0.060	0.076
20	2038.736	41	11.466	0.136	0.153
30	3058.104	72	17.199	0.239	0.256
40	4077.472	110	22.932	0.365	0.382
50	5096.840	172	28.665	0.571	0.588
60	6116.208	182	34.399	0.605	0.621
70	7135.576	210	40.132	0.698	0.714
80	8154.944	243	45.865	0.807	0.824
90	9174.312	297	51.598	0.987	1.003
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD1-2

Do	15.100	cm	$\sigma_1$	17.086	kg/cm <sup>2</sup>
Lo	30.500	cm	$\sigma_2$	22.781	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.226	10 <sup>-3</sup> mm
Angka Koreksi	-0.030	10 <sup>-3</sup> mm	$\epsilon_2$	0.292	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	29	5.695	0.095	0.066
20	2038.736	48	11.390	0.157	0.128
30	3058.104	69	17.086	0.226	0.197
40	4077.472	89	22.781	0.292	0.262
50	5096.840	115	28.476	0.377	0.348
60	6116.208	163	34.171	0.534	0.505
70	7135.576	182	39.866	0.597	0.567
80	8154.944	210	45.561	0.689	0.659
90	9174.312	245	51.257	0.803	0.774
100	10193.680	283	56.952	0.928	0.898
110	11213.048	330	62.647	1.082	1.052
120	12232.416	358	68.342	1.174	1.144
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SDI-3

Do	15.025	cm	$\sigma_1$	5.752	kg/cm <sup>2</sup>
Lo	30.050	cm	$\sigma_2$	11.504	kg/cm <sup>2</sup>
Ao	177.214	cm <sup>2</sup>	$\epsilon_1$	0.063	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.163	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	19	5.752	0.063	0.100
20	2038.736	49	11.504	0.163	0.200
30	3058.104	69	17.257	0.230	0.266
40	4077.472	87	23.009	0.290	0.326
50	5096.840	108	28.761	0.359	0.396
60	6116.208	150	34.513	0.499	0.536
70	7135.576	180	40.265	0.599	0.636
80	8154.944	210	46.017	0.699	0.735
90	9174.312	250	51.770	0.832	0.869
100	10193.680	290	57.522	0.965	1.002
110	11213.048	360	63.274	1.198	1.235
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SDI-4

Do	15.025	cm	$\sigma_1$	11.504	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	17.257	kg/cm <sup>2</sup>
Ao	177.214	cm <sup>2</sup>	$\epsilon_1$	0.151	10 <sup>-3</sup> mm
Angka Koreksi	-0.003	10 <sup>-3</sup> mm	$\epsilon_2$	0.224	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	29	5.752	0.097	0.094
20	2038.736	45	11.504	0.151	0.147
30	3058.104	67	17.257	0.224	0.221
40	4077.472	87	23.009	0.291	0.288
50	5096.840	115	28.761	0.385	0.381
60	6116.208	142	34.513	0.475	0.472
70	7135.576	181	40.265	0.605	0.602
80	8154.944	210	46.017	0.702	0.699
90	9174.312	233	51.770	0.779	0.776
100	10193.680	283	57.522	0.946	0.943
110	11213.048	352	63.274	1.177	1.174
120	12232.416	455	69.026	1.522	1.518
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Lampiran 3-5

Pra Bakar  
SD1-5

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.063	10 <sup>-3</sup> mm
Angka Koreksi	0.020	10 <sup>-3</sup> mm	$\epsilon_2$	0.147	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_o$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	19	5.733	0.063	0.083
20	2038.736	44	11.466	0.147	0.167
30	3058.104	92	17.199	0.307	0.327
40	4077.472	95	22.932	0.317	0.337
50	5096.840	133	28.665	0.443	0.463
60	6116.208	163	34.399	0.543	0.563
70	7135.576	199	40.132	0.663	0.683
80	8154.944	228	45.865	0.760	0.780
90	9174.312	276	51.598	0.920	0.940
100	10193.680	290	57.331	0.967	0.987
110	11213.048	390	63.064	1.300	1.320
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar  
SD2-1

Do	14.900	cm	$\sigma_1$	11.698	kg/cm <sup>2</sup>
Lo	29.950	cm	$\sigma_2$	17.547	kg/cm <sup>2</sup>
Ao	174.278	cm <sup>2</sup>	$\epsilon_1$	0.174	10 <sup>-3</sup> mm
Angka Koreksi	0.027	10 <sup>-3</sup> mm	$\epsilon_2$	0.274	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_o$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	31	5.849	0.104	0.130
20	2038.736	52	11.698	0.174	0.200
30	3058.104	82	17.547	0.274	0.301
40	4077.472	112	23.396	0.374	0.401
50	5096.840	148	29.245	0.494	0.521
60	6116.208	181	35.095	0.604	0.631
70	7135.576	254	40.944	0.848	0.875
80	8154.944	299	46.793	0.998	1.025
90	9174.312	363	52.642	1.212	1.239
100	10193.680	433	58.491	1.446	1.472
110	11213.048	508	64.340	1.696	1.723
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				



Pra Bakar

SD2-2

Do	14.950	cm	$\sigma_1$	11.620	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	17.430	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.137	10 <sup>-3</sup> mm
Angka Koreksi	0.023	10 <sup>-3</sup> mm	$\epsilon_2$	0.217	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	30	5.810	0.100	0.123
20	2038.736	41	11.620	0.137	0.160
30	3058.104	65	17.430	0.217	0.240
40	4077.472	89	23.240	0.297	0.320
50	5096.840	117	29.050	0.390	0.413
60	6116.208	142	34.860	0.473	0.497
70	7135.576	183	40.670	0.610	0.633
80	8154.944	208	46.480	0.693	0.717
90	9174.312	258	52.290	0.860	0.883
100	10193.680	309	58.100	1.030	1.053
110	11213.048	340	63.910	1.133	1.157
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD2-3

Do	15.000	cm	$\sigma_1$	5.771	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	11.543	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.097	10 <sup>-3</sup> mm
Angka Koreksi	-0.013	10 <sup>-3</sup> mm	$\epsilon_2$	0.180	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	29	5.771	0.097	0.083
20	2038.736	54	11.543	0.180	0.167
30	3058.104	75	17.314	0.250	0.237
40	4077.472	101	23.085	0.337	0.323
50	5096.840	132	28.857	0.440	0.427
60	6116.208	181	34.628	0.603	0.590
70	7135.576	199	40.400	0.663	0.650
80	8154.944	233	46.171	0.777	0.763
90	9174.312	270	51.942	0.900	0.887
100	10193.680	329	57.714	1.097	1.083
110	11213.048	372	63.485	1.240	1.227
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD2-4

Do	14.900	cm	$\sigma_1$	5.849	kg/cm <sup>2</sup>
Lo	29.500	cm	$\sigma_2$	11.698	kg/cm <sup>2</sup>
Ao	174.278	cm <sup>2</sup>	$\epsilon_1$	0.085	10 <sup>-3</sup> mm
Angka Koreksi	-0.007	10 <sup>-3</sup> mm	$\epsilon_2$	0.163	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L / L_o$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	25	5.849	0.085	0.078
20	2038.736	48	11.698	0.163	0.156
30	3058.104	83	17.547	0.281	0.275
40	4077.472	122	23.396	0.414	0.407
50	5096.840	159	29.245	0.539	0.532
60	6116.208	204	35.095	0.692	0.685
70	7135.576	244	40.944	0.827	0.820
80	8154.944	286	46.793	0.969	0.963
90	9174.312	338	52.642	1.146	1.139
100	10193.680	439	58.491	1.488	1.481
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD2-5

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	29.500	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.102	10 <sup>-3</sup> mm
Angka Koreksi	-0.003	10 <sup>-3</sup> mm	$\epsilon_2$	0.200	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L / L_o$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	30	5.733	0.102	0.098
20	2038.736	59	11.466	0.200	0.197
30	3058.104	82	17.199	0.278	0.275
40	4077.472	112	22.932	0.380	0.376
50	5096.840	148	28.665	0.502	0.498
60	6116.208	182	34.399	0.617	0.614
70	7135.576	241	40.132	0.817	0.814
80	8154.944	332	45.865	1.125	1.122
90	9174.312	418	51.598	1.417	1.414
100	10193.680	466	57.331	1.580	1.576
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD3-1

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.140	10 <sup>-3</sup> mm
Angka Koreksi	-0.033	10 <sup>-3</sup> mm	$\epsilon_2$	0.247	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	42	5.733	0.140	0.107
20	2038.736	74	11.466	0.247	0.213
30	3058.104	99	17.199	0.330	0.297
40	4077.472	132	22.932	0.440	0.407
50	5096.840	168	28.665	0.560	0.527
60	6116.208	213	34.399	0.710	0.677
70	7135.576	253	40.132	0.843	0.810
80	8154.944	309	45.865	1.030	0.997
90	9174.312	370	51.598	1.233	1.200
100	10193.680	395	57.331	1.317	1.283
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD3-2

Do	15.000	cm	$\sigma_1$	17.314	kg/cm <sup>2</sup>
Lo	30.050	cm	$\sigma_2$	23.085	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.146	10 <sup>-3</sup> mm
Angka Koreksi	0.173	10 <sup>-3</sup> mm	$\epsilon_2$	0.253	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	15	5.771	0.050	0.223
20	2038.736	35	11.543	0.116	0.290
30	3058.104	44	17.314	0.146	0.319
40	4077.472	76	23.085	0.253	0.426
50	5096.840	98	28.857	0.326	0.499
60	6116.208	123	34.628	0.409	0.582
70	7135.576	182	40.400	0.606	0.779
80	8154.944	198	46.171	0.659	0.832
90	9174.312	212	51.942	0.705	0.879
100	10193.680	256	57.714	0.852	1.025
110	11213.048	324	63.485	1.078	1.251
120	12232.416	358	69.256	1.191	1.364
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar SD3-3	Do	15.100	cm	$\sigma_1$	11.390	kg/cm <sup>2</sup>
	Lo	29.800	cm	$\sigma_2$	17.086	kg/cm <sup>2</sup>
	Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.215	10 <sup>-3</sup> mm
	Angka Koreksi	0.020	10 <sup>-3</sup> mm	$\epsilon_2$	0.332	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	40	5.695	0.134	0.154
20	2038.736	64	11.390	0.215	0.235
30	3058.104	99	17.086	0.332	0.352
40	4077.472	134	22.781	0.450	0.470
50	5096.840	182	28.476	0.611	0.631
60	6116.208	223	34.171	0.748	0.768
70	7135.576	295	39.866	0.990	1.010
80	8154.944	328	45.561	1.101	1.121
90	9174.312	370	51.257	1.242	1.262
100	10193.680	422	56.952	1.416	1.436
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar SD3-4	Do	15.000	cm	$\sigma_1$	11.543	kg/cm <sup>2</sup>
	Lo	30.100	cm	$\sigma_2$	17.314	kg/cm <sup>2</sup>
	Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.143	10 <sup>-3</sup> mm
	Angka Koreksi	0.023	10 <sup>-3</sup> mm	$\epsilon_2$	0.226	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	21	5.771	0.070	0.093
20	2038.736	43	11.543	0.143	0.166
30	3058.104	68	17.314	0.226	0.249
40	4077.472	92	23.085	0.306	0.329
50	5096.840	119	28.857	0.395	0.419
60	6116.208	148	34.628	0.492	0.515
70	7135.576	181	40.400	0.601	0.625
80	8154.944	270	46.171	0.897	0.920
90	9174.312	340	51.942	1.130	1.153
100	10193.680	430	57.714	1.429	1.452
110	11213.048	530	63.485	1.761	1.784
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD3-5

Do	15.100	cm	$\sigma_1$	17.086	kg/cm <sup>2</sup>
Lo	30.200	cm	$\sigma_2$	22.781	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.242	10 <sup>-3</sup> mm
Angka Koreksi	0.007	10 <sup>-3</sup> mm	$\epsilon_2$	0.325	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	29	5.695	0.096	0.103
20	2038.736	42	11.390	0.139	0.146
30	3058.104	73	17.086	0.242	0.248
40	4077.472	98	22.781	0.325	0.331
50	5096.840	132	28.476	0.437	0.444
60	6116.208	158	34.171	0.523	0.530
70	7135.576	213	39.866	0.705	0.712
80	8154.944	254	45.561	0.841	0.848
90	9174.312	292	51.257	0.967	0.974
100	10193.680	351	56.952	1.162	1.169
110	11213.048	361	62.647	1.195	1.202
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD4-1

Do	15.020	cm	$\sigma_1$	11.512	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	17.268	kg/cm <sup>2</sup>
Ao	177.096	cm <sup>2</sup>	$\epsilon_1$	0.187	10 <sup>-3</sup> mm
Angka Koreksi	-0.047	10 <sup>-3</sup> mm	$\epsilon_2$	0.257	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	24	5.756	0.080	0.033
20	2038.736	56	11.512	0.187	0.140
30	3058.104	77	17.268	0.257	0.210
40	4077.472	104	23.024	0.347	0.300
50	5096.840	114	28.780	0.380	0.333
60	6116.208	133	34.536	0.443	0.397
70	7135.576	162	40.292	0.540	0.493
80	8154.944	193	46.048	0.643	0.597
90	9174.312	258	51.804	0.860	0.813
100	10193.680	286	57.560	0.953	0.907
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD4-2

Do	14.950	cm	$\sigma_1$	5.810	kg/cm <sup>2</sup>
Lo	29.980	cm	$\sigma_2$	11.620	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.060	10 <sup>-3</sup> mm
Angka Koreksi	0.017	10 <sup>-3</sup> mm	$\epsilon_2$	0.137	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	18	5.810	0.060	0.077
20	2038.736	41	11.620	0.137	0.153
30	3058.104	68	17.430	0.227	0.243
40	4077.472	93	23.240	0.310	0.327
50	5096.840	114	29.050	0.380	0.397
60	6116.208	143	34.860	0.477	0.494
70	7135.576	184	40.670	0.614	0.630
80	8154.944	212	46.480	0.707	0.724
90	9174.312	243	52.290	0.811	0.827
100	10193.680	282	58.100	0.941	0.957
110	11213.048	315	63.910	1.051	1.067
120	12232.416	358	69.720	1.194	1.211
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD4-3

Do	15.000	cm	$\sigma_1$	0.000	kg/cm <sup>2</sup>
Lo	30.050	cm	$\sigma_2$	5.771	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.000	10 <sup>-3</sup> mm
Angka Koreksi	0.000	10 <sup>-3</sup> mm	$\epsilon_2$	0.070	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	21	5.771	0.070	0.070
20	2038.736	49	11.543	0.163	0.163
30	3058.104	67	17.314	0.223	0.223
40	4077.472	92	23.085	0.306	0.306
50	5096.840	114	28.857	0.379	0.379
60	6116.208	151	34.628	0.502	0.502
70	7135.576	180	40.400	0.599	0.599
80	8154.944	220	46.171	0.732	0.732
90	9174.312	390	51.942	1.298	1.298
100	10193.680	452	57.714	1.504	1.504
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar  
SD4-4

Do	15.050	cm	$\sigma_1$	17.199	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	22.932	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.161	10 <sup>-3</sup> mm
Angka Koreksi	0.080	10 <sup>-3</sup> mm	$\epsilon_2$	0.241	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	13	5.733	0.043	0.124
20	2038.736	31	11.466	0.104	0.184
30	3058.104	48	17.199	0.161	0.241
40	4077.472	72	22.932	0.241	0.321
50	5096.840	94	28.665	0.314	0.395
60	6116.208	115	34.399	0.385	0.465
70	7135.576	142	40.132	0.475	0.555
80	8154.944	168	45.865	0.562	0.642
90	9174.312	208	51.598	0.696	0.776
100	10193.680	241	57.331	0.806	0.886
110	11213.048	276	63.064	0.923	1.003
120	12232.416	312	68.797	1.043	1.124
130	13251.784	361	74.530	1.207	1.288
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar  
SD4-5

Do	15.100	cm	$\sigma_1$	5.695	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	11.390	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.063	10 <sup>-3</sup> mm
Angka Koreksi	0.017	10 <sup>-3</sup> mm	$\epsilon_2$	0.143	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	19	5.695	0.063	0.080
20	2038.736	43	11.390	0.143	0.160
30	3058.104	72	17.086	0.240	0.257
40	4077.472	108	22.781	0.360	0.377
50	5096.840	113	28.476	0.377	0.393
60	6116.208	161	34.171	0.537	0.553
70	7135.576	199	39.866	0.663	0.680
80	8154.944	231	45.561	0.770	0.787
90	9174.312	331	51.257	1.103	1.120
100	10193.680	431	56.952	1.437	1.453
110	11213.048	522	62.647	1.740	1.757
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD5-1

Do	15.000	cm	$\sigma_1$	11.543	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	17.314	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.103	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.173	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	9	5.771	0.030	0.066
20	2038.736	31	11.543	0.103	0.140
30	3058.104	52	17.314	0.173	0.209
40	4077.472	71	23.085	0.236	0.272
50	5096.840	90	28.857	0.299	0.336
60	6116.208	111	34.628	0.369	0.405
70	7135.576	132	40.400	0.439	0.475
80	8154.944	158	46.171	0.525	0.561
90	9174.312	233	51.942	0.774	0.811
100	10193.680	278	57.714	0.924	0.960
110	11213.048	349	63.485	1.159	1.196
120	12232.416	413	69.256	1.372	1.409
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD5-2

Do	14.950	cm	$\sigma_1$	11.620	kg/cm <sup>2</sup>
Lo	29.980	cm	$\sigma_2$	17.430	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.110	10 <sup>-3</sup> mm
Angka Koreksi	0.130	10 <sup>-3</sup> mm	$\epsilon_2$	0.230	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	19	5.810	0.063	0.193
20	2038.736	33	11.620	0.110	0.240
30	3058.104	69	17.430	0.230	0.360
40	4077.472	113	23.240	0.377	0.507
50	5096.840	156	29.050	0.520	0.650
60	6116.208	205	34.860	0.684	0.814
70	7135.576	254	40.670	0.847	0.977
80	8154.944	312	46.480	1.041	1.171
90	9174.312	376	52.290	1.254	1.384
100	10193.680	402	58.100	1.341	1.471
110	11213.048	456	63.910	1.521	1.651
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				



Pra Bakar

SD5-3

Do	15.000	cm	$\sigma_1$	0.000	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	5.771	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.000	10 <sup>-3</sup> mm
Angka Koreksi	0.000	10 <sup>-3</sup> mm	$\epsilon_2$	0.060	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	18	5.771	0.060	0.060
20	2038.736	34	11.543	0.113	0.113
30	3058.104	61	17.314	0.203	0.203
40	4077.472	89	23.085	0.297	0.297
50	5096.840	104	28.857	0.347	0.347
60	6116.208	123	34.628	0.410	0.410
70	7135.576	157	40.400	0.523	0.523
80	8154.944	183	46.171	0.610	0.610
90	9174.312	215	51.942	0.717	0.717
100	10193.680	253	57.714	0.843	0.843
110	11213.048	314	63.485	1.047	1.047
120	12232.416	368	69.256	1.227	1.227
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD5-4

Do	15.100	cm	$\sigma_1$	11.390	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	17.086	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.114	10 <sup>-3</sup> mm
Angka Koreksi	0.033	10 <sup>-3</sup> mm	$\epsilon_2$	0.187	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	13	5.695	0.043	0.077
20	2038.736	34	11.390	0.114	0.147
30	3058.104	56	17.086	0.187	0.221
40	4077.472	74	22.781	0.247	0.281
50	5096.840	94	28.476	0.314	0.348
60	6116.208	114	34.171	0.381	0.415
70	7135.576	144	39.866	0.482	0.515
80	8154.944	173	45.561	0.579	0.612
90	9174.312	209	51.257	0.699	0.732
100	10193.680	245	56.952	0.819	0.853
110	11213.048	298	62.647	0.997	1.030
120	12232.416	335	68.342	1.120	1.154
130	13251.784	413	74.037	1.381	1.415
140	14271.152				
150	15290.520				
160	16309.888				

Pra Bakar

SD5-5

Do	14.850	cm	$\sigma_1$	11.777	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	17.666	kg/cm <sup>2</sup>
Ao	173.110	cm <sup>2</sup>	$\epsilon_1$	0.130	10 <sup>-3</sup> mm
Angka Koreksi	0.063	10 <sup>-3</sup> mm	$\epsilon_2$	0.227	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	13	5.889	0.043	0.107
20	2038.736	39	11.777	0.130	0.193
30	3058.104	68	17.666	0.227	0.290
40	4077.472	81	23.554	0.270	0.333
50	5096.840	103	29.443	0.343	0.407
60	6116.208	123	35.331	0.410	0.473
70	7135.576	208	41.220	0.693	0.757
80	8154.944	270	47.108	0.900	0.963
90	9174.312	390	52.997	1.300	1.363
100	10193.680	475	58.886	1.583	1.647
110	11213.048	660	64.774	2.200	2.263
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				



Pasca Bakar

SDB1-1

Do	14.950	cm	$\sigma_1$	5.810	kg/cm <sup>2</sup>
Lo	29.850	cm	$\sigma_2$	11.620	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.147	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.332	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	44	5.810	0.147	0.184
20	2038.736	99	11.620	0.332	0.369
30	3058.104	177	17.430	0.593	0.630
40	4077.472	261	23.240	0.874	0.911
50	5096.840	272	29.050	0.911	0.948
60	6116.208	315	34.860	1.055	1.092
70	7135.576	465	40.670	1.558	1.595
80	8154.944	685	46.480	2.295	2.332
90	9174.312	780	52.290	2.613	2.650
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar

SDB1-2

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	30.050	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.150	10 <sup>-3</sup> mm
Angka Koreksi	0.017	10 <sup>-3</sup> mm	$\epsilon_2$	0.316	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	45	5.733	0.150	0.166
20	2038.736	95	11.466	0.316	0.333
30	3058.104	162	17.199	0.539	0.556
40	4077.472	215	22.932	0.715	0.732
50	5096.840	280	28.665	0.932	0.948
60	6116.208	374	34.399	1.245	1.261
70	7135.576	409	40.132	1.361	1.378
80	8154.944	515	45.865	1.714	1.730
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar

SDB1-3

Do	14.900	cm	$\sigma_1$	0.000	kg/cm <sup>2</sup>
Lo	30.150	cm	$\sigma_2$	5.849	kg/cm <sup>2</sup>
Ao	174.278	cm <sup>2</sup>	$\epsilon_1$	0.000	10 <sup>-3</sup> mm
Angka Koreksi	0.000	10 <sup>-3</sup> mm	$\epsilon_2$	0.176	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	53	5.849	0.176	0.176
20	2038.736	122	11.698	0.405	0.405
30	3058.104	189	17.547	0.627	0.627
40	4077.472	267	23.396	0.886	0.886
50	5096.840	293	29.245	0.972	0.972
60	6116.208	492	35.095	1.632	1.632
70	7135.576	574	40.944	1.904	1.904
80	8154.944				
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar

SDB1-4

Do	15.080	cm	$\sigma_1$	5.710	kg/cm <sup>2</sup>
Lo	30.010	cm	$\sigma_2$	11.421	kg/cm <sup>2</sup>
Ao	178.514	cm <sup>2</sup>	$\epsilon_1$	0.137	10 <sup>-3</sup> mm
Angka Koreksi	0.123	10 <sup>-3</sup> mm	$\epsilon_2$	0.267	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	41	5.710	0.137	0.260
20	2038.736	80	11.421	0.267	0.390
30	3058.104	112	17.131	0.373	0.497
40	4077.472	186	22.841	0.620	0.743
50	5096.840	274	28.551	0.913	1.036
60	6116.208	409	34.262	1.363	1.486
70	7135.576	440	39.972	1.466	1.589
80	8154.944	609	45.682	2.029	2.153
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar

SDB1-5

Do	15.100	cm	$\sigma_1$	5.695	kg/cm <sup>2</sup>
Lo	30.250	cm	$\sigma_2$	11.390	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.225	10 <sup>-3</sup> mm
Angka Koreksi	0.093	10 <sup>-3</sup> mm	$\epsilon_2$	0.542	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	68	5.695	0.225	0.317
20	2038.736	164	11.390	0.542	0.635
30	3058.104	289	17.086	0.955	1.048
40	4077.472	388	22.781	1.283	1.375
50	5096.840	445	28.476	1.471	1.564
60	6116.208	589	34.171	1.947	2.040
70	7135.576	674	39.866	2.228	2.321
80	8154.944	850	45.561	2.810	2.902
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar

SDB2-1

Do	14.950	cm	$\sigma_1$	11.620	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	17.430	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.272	10 <sup>-3</sup> mm
Angka Koreksi	0.073	10 <sup>-3</sup> mm	$\epsilon_2$	0.445	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	41	5.810	0.136	0.209
20	2038.736	82	11.620	0.272	0.346
30	3058.104	134	17.430	0.445	0.518
40	4077.472	244	23.240	0.811	0.884
50	5096.840	345	29.050	1.146	1.219
60	6116.208	471	34.860	1.565	1.638
70	7135.576	705	40.670	2.342	2.415
80	8154.944	780	46.480	2.591	2.664
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB2-2

Do	15.000	cm	$\sigma_1$	11.543	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	17.314	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.113	10 <sup>-3</sup> mm
Angka Koreksi	0.206	10 <sup>-3</sup> mm	$\epsilon_2$	0.272	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	23	5.771	0.076	0.282
20	2038.736	34	11.543	0.113	0.319
30	3058.104	82	17.314	0.272	0.478
40	4077.472	174	23.085	0.578	0.784
50	5096.840	205	28.857	0.681	0.887
60	6116.208	261	34.628	0.867	1.073
70	7135.576	331	40.400	1.100	1.306
80	8154.944	385	46.171	1.279	1.485
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB2-3

Do	15.000	cm	$\sigma_1$	17.314	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	23.085	kg/cm <sup>2</sup>
Ao	176.625	cm <sup>2</sup>	$\epsilon_1$	0.450	10 <sup>-3</sup> mm
Angka Koreksi	0.020	10 <sup>-3</sup> mm	$\epsilon_2$	0.607	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	34	5.771	0.113	0.133
20	2038.736	82	11.543	0.273	0.293
30	3058.104	135	17.314	0.450	0.470
40	4077.472	182	23.085	0.607	0.627
50	5096.840	233	28.857	0.777	0.797
60	6116.208	298	34.628	0.993	1.013
70	7135.576	372	40.400	1.240	1.260
80	8154.944	462	46.171	1.540	1.560
90	9174.312	790	51.942	2.633	2.653
100	10193.680	830	57.714	2.767	2.787
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB2-4

Do	14.900	cm	$\sigma_1$	11.698	kg/cm <sup>2</sup>
Lo	30.000	cm	$\sigma_2$	17.547	kg/cm <sup>2</sup>
Ao	174.278	cm <sup>2</sup>	$\epsilon_1$	0.253	10 <sup>-3</sup> mm
Angka Koreksi	0.053	10 <sup>-3</sup> mm	$\epsilon_2$	0.407	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	38	5.849	0.127	0.180
20	2038.736	76	11.698	0.253	0.307
30	3058.104	122	17.547	0.407	0.460
40	4077.472	164	23.396	0.547	0.600
50	5096.840	275	29.245	0.917	0.970
60	6116.208	568	35.095	1.893	1.947
70	7135.576	790	40.944	2.633	2.687
80	8154.944	850	46.793	2.833	2.887
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB2-5

Do	15.050	cm	$\sigma_1$	5.733	kg/cm <sup>2</sup>
Lo	29.700	cm	$\sigma_2$	11.466	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.165	10 <sup>-3</sup> mm
Angka Koreksi	0.000	10 <sup>-3</sup> mm	$\epsilon_2$	0.330	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	49	5.733	0.165	0.165
20	2038.736	98	11.466	0.330	0.330
30	3058.104	134	17.199	0.451	0.451
40	4077.472	191	22.932	0.643	0.643
50	5096.840	245	28.665	0.825	0.825
60	6116.208	573	34.399	1.929	1.929
70	7135.576	620	40.132	2.088	2.088
80	8154.944				
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

## Lampiran 3-21

Pasca Bakar  
SDB3-1

Do	15.000	$\sigma_1$	5.771	kg/cm <sup>2</sup>
Lo	30.000	$\sigma_2$	11.543	kg/cm <sup>2</sup>
Ao	176.625	$\epsilon_1$	0.213	10 <sup>-3</sup> mm
Angka Koreksi	0.013	$\epsilon_2$	0.440	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	64	5.771	0.213	0.227
20	2038.736	132	11.543	0.440	0.453
30	3058.104	196	17.314	0.653	0.667
40	4077.472	205	23.085	0.683	0.697
50	5096.840	294	28.857	0.980	0.993
60	6116.208	596	34.628	1.987	2.000
70	7135.576	680	40.400	2.267	2.280
80	8154.944	755	46.171	2.517	2.530
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB3-2

Do	14.960	$\sigma_1$	11.605	kg/cm <sup>2</sup>
Lo	29.900	$\sigma_2$	17.407	kg/cm <sup>2</sup>
Ao	175.684	$\epsilon_1$	0.505	10 <sup>-3</sup> mm
Angka Koreksi	-0.050	$\epsilon_2$	0.732	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	74	5.802	0.247	0.197
20	2038.736	151	11.605	0.505	0.455
30	3058.104	219	17.407	0.732	0.682
40	4077.472	246	23.209	0.823	0.773
50	5096.840	346	29.011	1.157	1.107
60	6116.208	480	34.814	1.605	1.555
70	7135.576	540	40.616	1.806	1.756
80	8154.944	615	46.418	2.057	2.007
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				



Pasca Bakar  
SDB3-3

Do	15.010	$\sigma_1$	11.527	kg/cm <sup>2</sup>
Lo	29.700	$\sigma_2$	17.291	kg/cm <sup>2</sup>
Ao	176.861	$\epsilon_1$	0.316	10 <sup>-3</sup> mm
Angka Koreksi	0.067	$\epsilon_2$	0.508	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	48	5.764	0.162	0.229
20	2038.736	94	11.527	0.316	0.384
30	3058.104	151	17.291	0.508	0.576
40	4077.472	252	23.055	0.848	0.916
50	5096.840	390	28.818	1.313	1.380
60	6116.208	430	34.582	1.448	1.515
70	7135.576	675	40.346	2.273	2.340
80	8154.944	720	46.109	2.424	2.492
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB3-4

Do	15.100	$\sigma_1$	5.695	kg/cm <sup>2</sup>
Lo	30.000	$\sigma_2$	11.390	kg/cm <sup>2</sup>
Ao	178.988	$\epsilon_1$	0.013	10 <sup>-3</sup> mm
Angka Koreksi	0.113	$\epsilon_2$	0.140	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	4	5.695	0.013	0.127
20	2038.736	42	11.390	0.140	0.253
30	3058.104	109	17.086	0.363	0.477
40	4077.472	178	22.781	0.593	0.707
50	5096.840	258	28.476	0.860	0.973
60	6116.208	345	34.171	1.150	1.263
70	7135.576	406	39.866	1.353	1.467
80	8154.944	627	45.561	2.090	2.203
90	9174.312	685	51.257	2.283	2.397
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB3-5

Do	15.000	$\sigma_1$	17.314	kg/cm <sup>2</sup>
Lo	29.850	$\sigma_2$	23.085	kg/cm <sup>2</sup>
Ao	176.625	$\epsilon_1$	0.412	10 <sup>-3</sup> mm
Angka Koreksi	0.492	$\epsilon_2$	0.714	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	31	5.771	0.104	0.596
20	2038.736	75	11.543	0.251	0.744
30	3058.104	123	17.314	0.412	0.905
40	4077.472	213	23.085	0.714	1.206
50	5096.840	297	28.857	0.995	1.487
60	6116.208	402	34.628	1.347	1.839
70	7135.576	493	40.400	1.652	2.144
80	8154.944	567	46.171	1.899	2.392
90	9174.312	697	51.942	2.335	2.827
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB4-1

Do	14.980	cm	$\sigma_1$	5.787	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	11.574	kg/cm <sup>2</sup>
Ao	176.154	cm <sup>2</sup>	$\epsilon_1$	0.106	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.249	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	32	5.787	0.106	0.143
20	2038.736	75	11.574	0.249	0.286
30	3058.104	138	17.360	0.458	0.495
40	4077.472	182	23.147	0.605	0.641
50	5096.840	211	28.934	0.701	0.738
60	6116.208	280	34.721	0.930	0.967
70	7135.576	323	40.508	1.073	1.110
80	8154.944	456	46.294	1.515	1.551
90	9174.312	510	52.081	1.694	1.731
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB4-2

Do	15.100	cm	$\sigma_1$	17.086	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	22.781	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.237	10 <sup>-3</sup> mm
Angka Koreksi	0.274	10 <sup>-3</sup> mm	$\epsilon_2$	0.408	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	0	5.695	0.000	0.274
20	2038.736	36	11.390	0.120	0.395
30	3058.104	71	17.086	0.237	0.512
40	4077.472	122	22.781	0.408	0.682
50	5096.840	309	28.476	1.033	1.308
60	6116.208	384	34.171	1.284	1.559
70	7135.576	482	39.866	1.612	1.886
80	8154.944	664	45.561	2.221	2.495
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB4-3

Do	14.950	cm	$\sigma_1$	5.810	kg/cm <sup>2</sup>
Lo	29.950	cm	$\sigma_2$	11.620	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.140	10 <sup>-3</sup> mm
Angka Koreksi	0.030	10 <sup>-3</sup> mm	$\epsilon_2$	0.311	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	42	5.810	0.140	0.170
20	2038.736	93	11.620	0.311	0.341
30	3058.104	144	17.430	0.481	0.511
40	4077.472	186	23.240	0.621	0.651
50	5096.840	253	29.050	0.845	0.875
60	6116.208	330	34.860	1.102	1.132
70	7135.576	690	40.670	2.304	2.334
80	8154.944	770	46.480	2.571	2.601
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB4-4

Do	14.970	cm	$\sigma_1$	5.795	kg/cm <sup>2</sup>
Lo	29.970	cm	$\sigma_2$	11.589	kg/cm <sup>2</sup>
Ao	175.919	cm <sup>2</sup>	$\epsilon_1$	0.180	10 <sup>-3</sup> mm
Angka Koreksi	-0.050	10 <sup>-3</sup> mm	$\epsilon_2$	0.310	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	54	5.795	0.180	0.130
20	2038.736	93	11.589	0.310	0.260
30	3058.104	145	17.384	0.484	0.434
40	4077.472	199	23.178	0.664	0.614
50	5096.840	244	28.973	0.814	0.764
60	6116.208	268	34.767	0.894	0.844
70	7135.576	362	40.562	1.208	1.158
80	8154.944	446	46.356	1.488	1.438
90	9174.312	510	52.151	1.702	1.652
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB4-5

Do	14.950	cm	$\sigma_1$	5.810	kg/cm <sup>2</sup>
Lo	29.850	cm	$\sigma_2$	11.620	kg/cm <sup>2</sup>
Ao	175.449	cm <sup>2</sup>	$\epsilon_1$	0.124	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.285	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	37	5.810	0.124	0.161
20	2038.736	85	11.620	0.285	0.322
30	3058.104	124	17.430	0.415	0.452
40	4077.472	310	23.240	1.039	1.075
50	5096.840	374	29.050	1.253	1.290
60	6116.208	493	34.860	1.652	1.688
70	7135.576	592	40.670	1.983	2.020
80	8154.944	680	46.480	2.278	2.315
90	9174.312	705	52.290	2.362	2.399
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB5-1

Do	15.030	cm	$\sigma_1$	5.748	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	11.497	kg/cm <sup>2</sup>
Ao	177.332	cm <sup>2</sup>	$\epsilon_1$	0.107	10 <sup>-3</sup> mm
Angka Koreksi	0.037	10 <sup>-3</sup> mm	$\epsilon_2$	0.251	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	32	5.748	0.107	0.144
20	2038.736	75	11.497	0.251	0.288
30	3058.104	126	17.245	0.421	0.458
40	4077.472	176	22.993	0.589	0.625
50	5096.840	211	28.742	0.706	0.742
60	6116.208	280	34.490	0.936	0.973
70	7135.576	313	40.238	1.047	1.084
80	8154.944	403	45.987	1.348	1.385
90	9174.312	523	51.735	1.749	1.786
100	10193.680	675	57.484	2.258	2.294
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB5-2

Do	15.050	cm	$\sigma_1$	11.466	kg/cm <sup>2</sup>
Lo	29.700	cm	$\sigma_2$	17.199	kg/cm <sup>2</sup>
Ao	177.804	cm <sup>2</sup>	$\epsilon_1$	0.374	10 <sup>-3</sup> mm
Angka Koreksi	-0.057	10 <sup>-3</sup> mm	$\epsilon_2$	0.532	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	59	5.733	0.199	0.141
20	2038.736	111	11.466	0.374	0.316
30	3058.104	158	17.199	0.532	0.475
40	4077.472	224	22.932	0.754	0.697
50	5096.840	276	28.665	0.929	0.872
60	6116.208	349	34.399	1.175	1.118
70	7135.576	382	40.132	1.286	1.229
80	8154.944	596	45.865	2.007	1.949
90	9174.312	730	51.598	2.458	2.401
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB5-3

Do	14.900	cm	$\sigma_1$	5.849	kg/cm <sup>2</sup>
Lo	30.150	cm	$\sigma_2$	11.698	kg/cm <sup>2</sup>
Ao	174.278	cm <sup>2</sup>	$\epsilon_1$	0.106	10 <sup>-3</sup> mm
Angka Koreksi	0.066	10 <sup>-3</sup> mm	$\epsilon_2$	0.279	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	32	5.849	0.106	0.172
20	2038.736	84	11.698	0.279	0.345
30	3058.104	115	17.547	0.381	0.448
40	4077.472	185	23.396	0.614	0.680
50	5096.840	256	29.245	0.849	0.915
60	6116.208	264	35.095	0.876	0.942
70	7135.576	314	40.944	1.041	1.108
80	8154.944	430	46.793	1.426	1.493
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB5-4

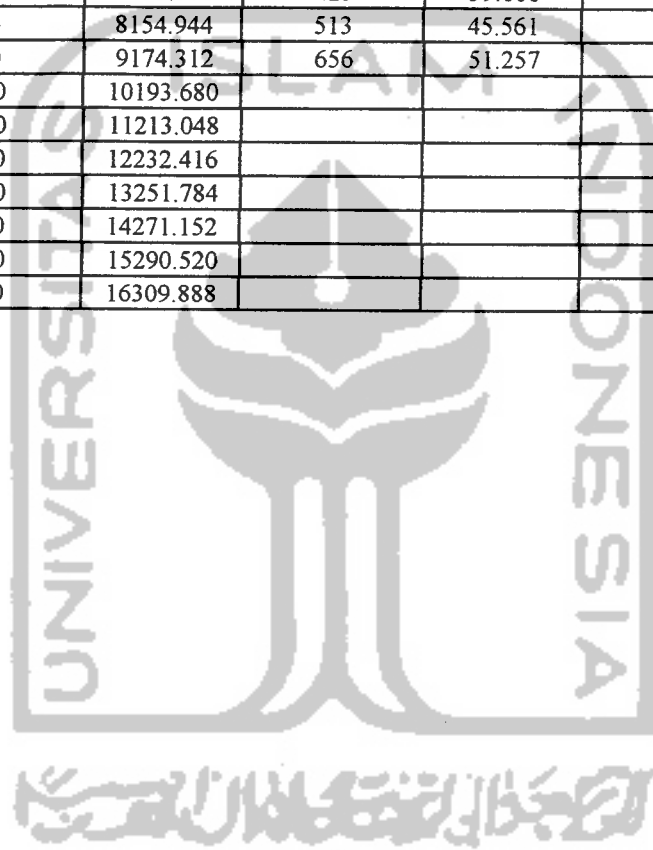
Do	15.200	cm	$\sigma_1$	5.620	kg/cm <sup>2</sup>
Lo	30.100	cm	$\sigma_2$	11.241	kg/cm <sup>2</sup>
Ao	181.366	cm <sup>2</sup>	$\epsilon_1$	0.140	10 <sup>-3</sup> mm
Angka Koreksi	0.033	10 <sup>-3</sup> mm	$\epsilon_2$	0.312	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	42	5.620	0.140	0.173
20	2038.736	94	11.241	0.312	0.346
30	3058.104	173	16.861	0.575	0.608
40	4077.472	224	22.482	0.744	0.777
50	5096.840	283	28.102	0.940	0.973
60	6116.208	568	33.723	1.887	1.920
70	7135.576	630	39.343	2.093	2.126
80	8154.944				
90	9174.312				
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				

Pasca Bakar  
SDB5-5

Do	15.100	cm	$\sigma_1$	5.70	kg/cm <sup>2</sup>
Lo	29.900	cm	$\sigma_2$	11.39	kg/cm <sup>2</sup>
Ao	178.988	cm <sup>2</sup>	$\epsilon_1$	0.10	10 <sup>-3</sup> mm
Angka Koreksi	0.060	10 <sup>-3</sup> mm	$\epsilon_2$	0.25	10 <sup>-3</sup> mm

Beban (KN)	Beban (Kg)	$\Delta L$ (10 <sup>-3</sup> mm)	$\sigma$ (kg/cm <sup>2</sup> )	$\epsilon = \Delta L/L_0$ (10 <sup>-3</sup> mm)	$\epsilon$ koreksi
0	0.000	0	0.000	0.000	0.000
10	1019.368	29	5.695	0.097	0.157
20	2038.736	76	11.390	0.254	0.314
30	3058.104	146	17.086	0.488	0.548
40	4077.472	227	22.781	0.759	0.819
50	5096.840	251	28.476	0.839	0.900
60	6116.208	346	34.171	1.157	1.217
70	7135.576	423	39.866	1.415	1.475
80	8154.944	513	45.561	1.716	1.776
90	9174.312	656	51.257	2.194	2.254
100	10193.680				
110	11213.048				
120	12232.416				
130	13251.784				
140	14271.152				
150	15290.520				
160	16309.888				



DATA BERAT VOLUME BENDA UJI SILINDER BETON I  
 Beton Ringan dengan variasi silica fume (pra bakar)

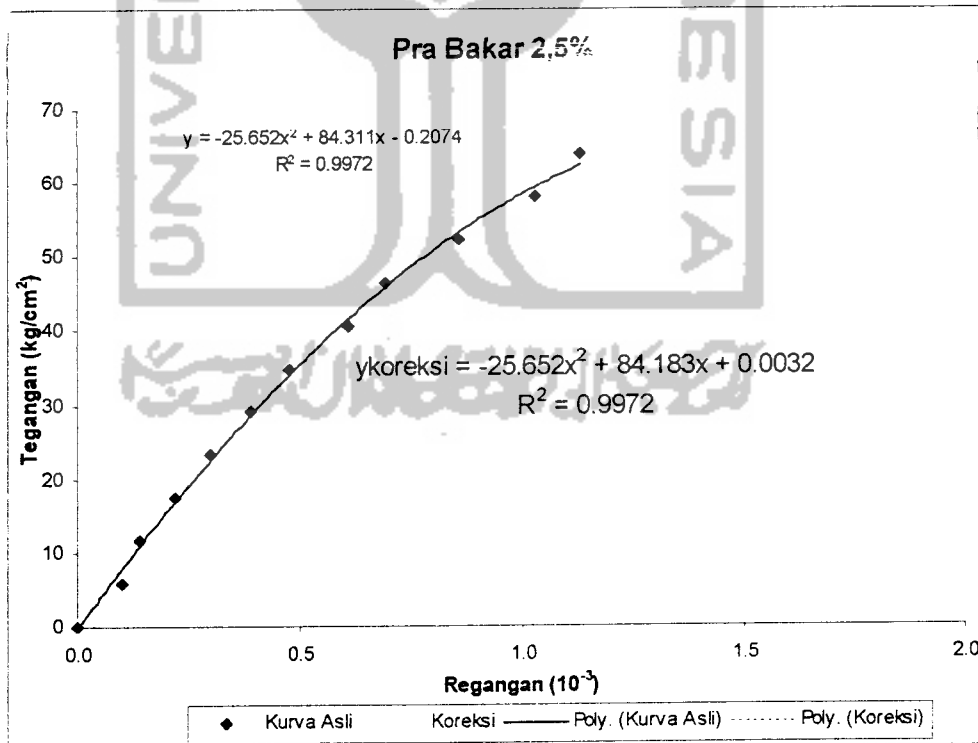
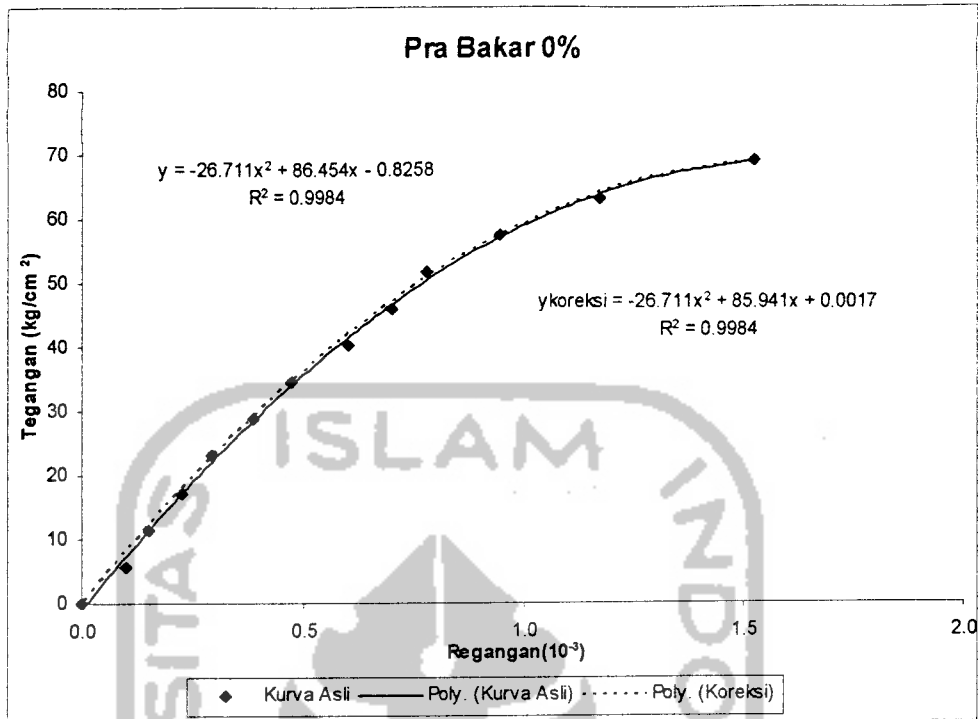
No	D (cm)	H (cm)	W (kg)	Ao (cm <sup>2</sup> )	Vbr (cm <sup>3</sup> )	Bv (kg/m <sup>3</sup> )	Bvr (kg/m <sup>3</sup> )
SD1-1	15.050	30.100	10.100	177.804	5351.914	1887.1752	1873.6639
SD1-2	15.100	30.500	10.000	178.988	5459.129	1831.7939	
SD1-3	15.025	30.050	10.150	177.214	5325.288	1906.0002	
SD1-4	15.025	29.900	10.100	177.214	5298.706	1906.1258	
SD1-5	15.050	30.000	9.800	177.804	5334.134	1837.2242	
SD2-1	14.900	29.950	9.950	174.278	5219.622	1906.2685	1897.5034
SD2-2	14.950	30.000	10.000	175.449	5263.484	1899.8823	
SD2-3	15.000	30.000	9.800	176.625	5298.750	1849.4928	
SD2-4	14.900	29.950	10	174.278	5219.622	1915.8477	
SD2-5	15.050	29.500	10.050	177.804	5245.232	1916.026	
SD3-1	15.050	30.000	10.00	177.804	5334.134	1874.7186	1878.5189
SD3-2	15.000	30.050	10.10	176.625	5307.581	1902.9384	
SD3-3	15.100	29.800	9.90	178.988	5333.838	1856.0744	
SD3-4	15.000	30.100	10	176.625	5316.413	1890.3725	
SD3-5	15.100	30.200	10.10	178.988	5405.433	1868.4904	
SD4-1	15.02	30	10.05	177.096	5312.889	1891.626	1893.1084
SD4-2	14.95	29.98	10.09	175.449	5259.975	1918.2601	
SD4-3	15	30.05	10.1	176.625	5307.581	1902.9384	
SD4-4	15.05	29.9	10.05	177.804	5316.353	1890.3935	
SD4-5	15.1	30	10	178.988	5369.636	1862.3238	
SD5-1	15	30.1	10	176.625	5316.413	1880.9677	1894.6322
SD5-2	14.95	29.98	10.05	175.449	5259.975	1910.6555	
SD5-3	15	30	9.95	176.625	5298.750	1877.8014	
SD5-4	15.1	29.9	10	178.988	5351.737	1868.5523	
SD5-5	14.85	30	10.05	173.110	5193.305	1935.1839	

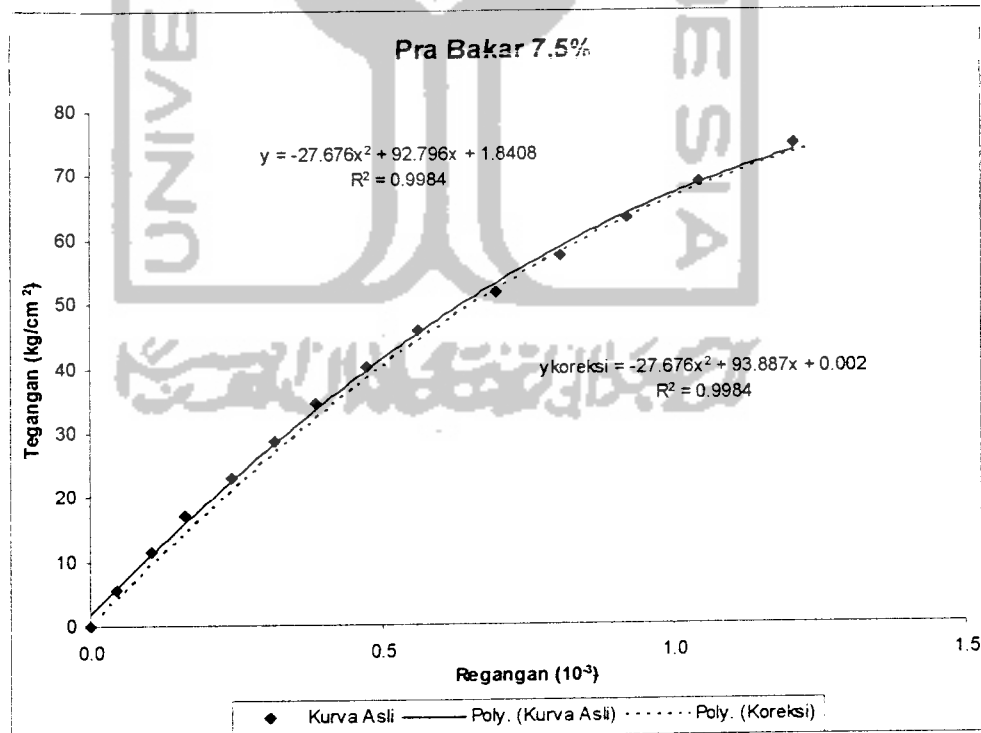
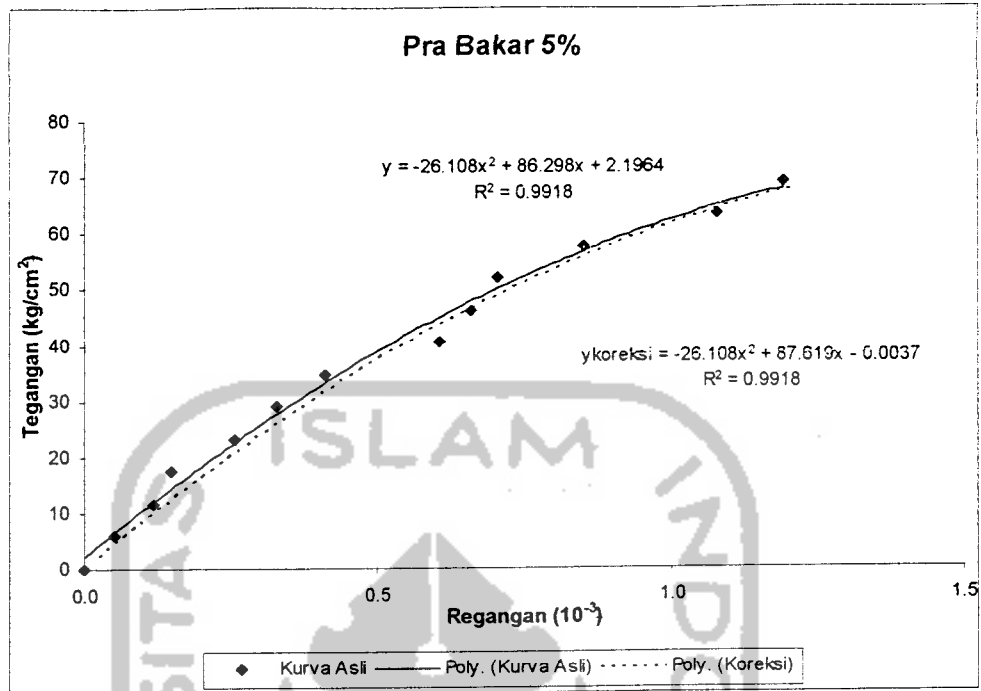


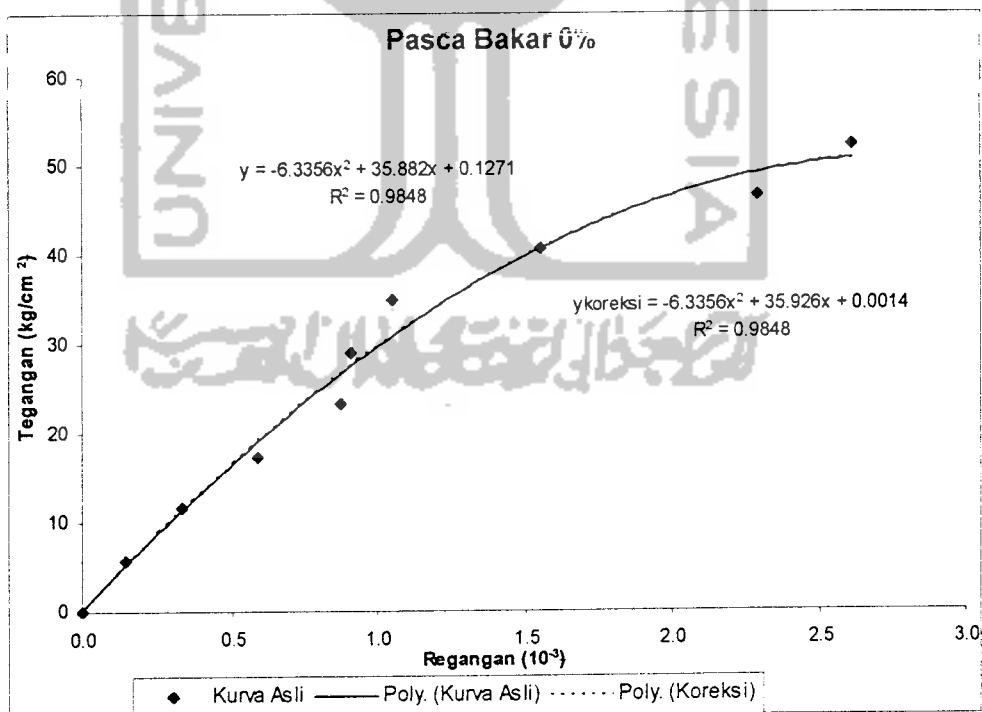
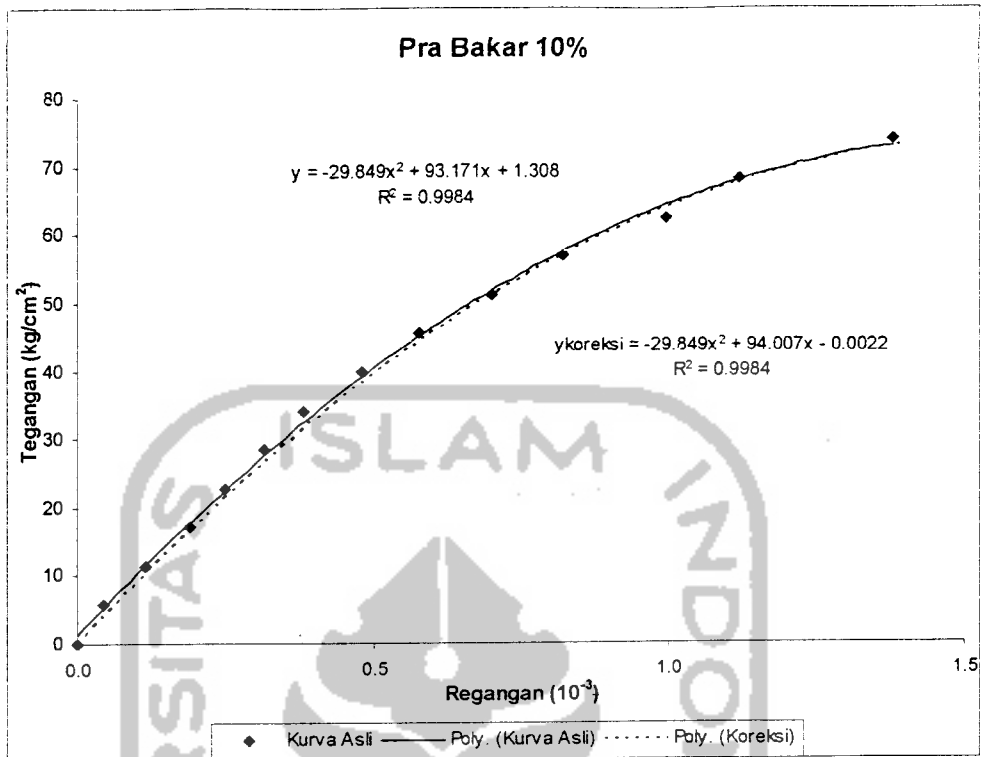
DATA BERAT VOLUME BENDA UJI SILINDER BETON II  
Beton Ringan dengan variasi silica fume (pasca bakar)

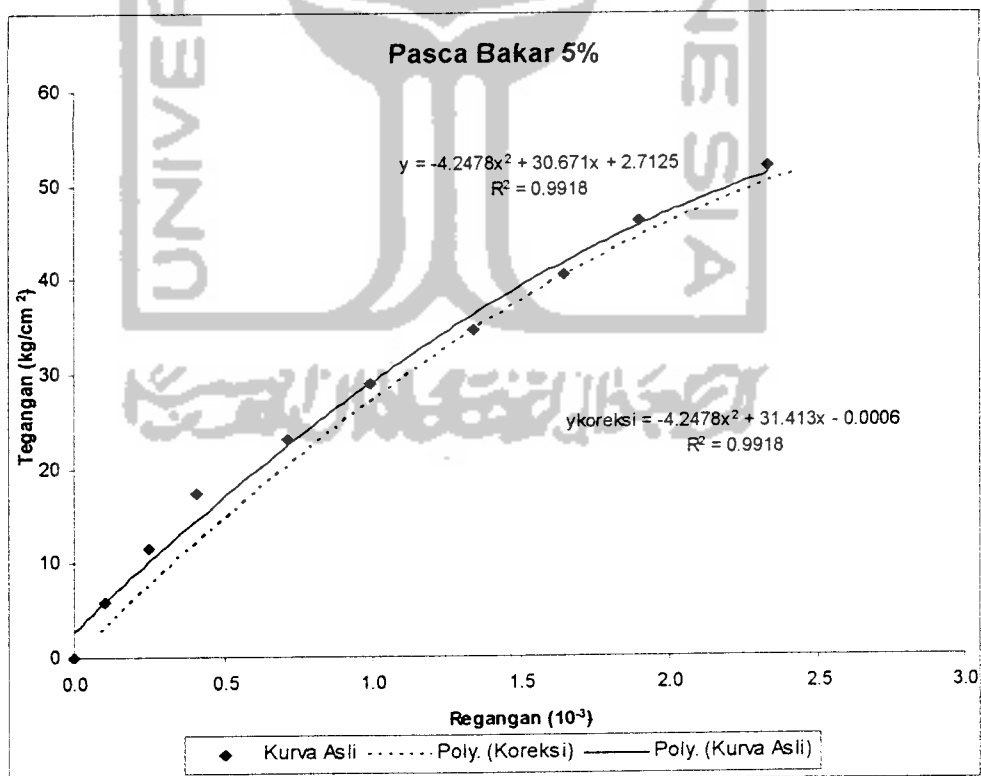
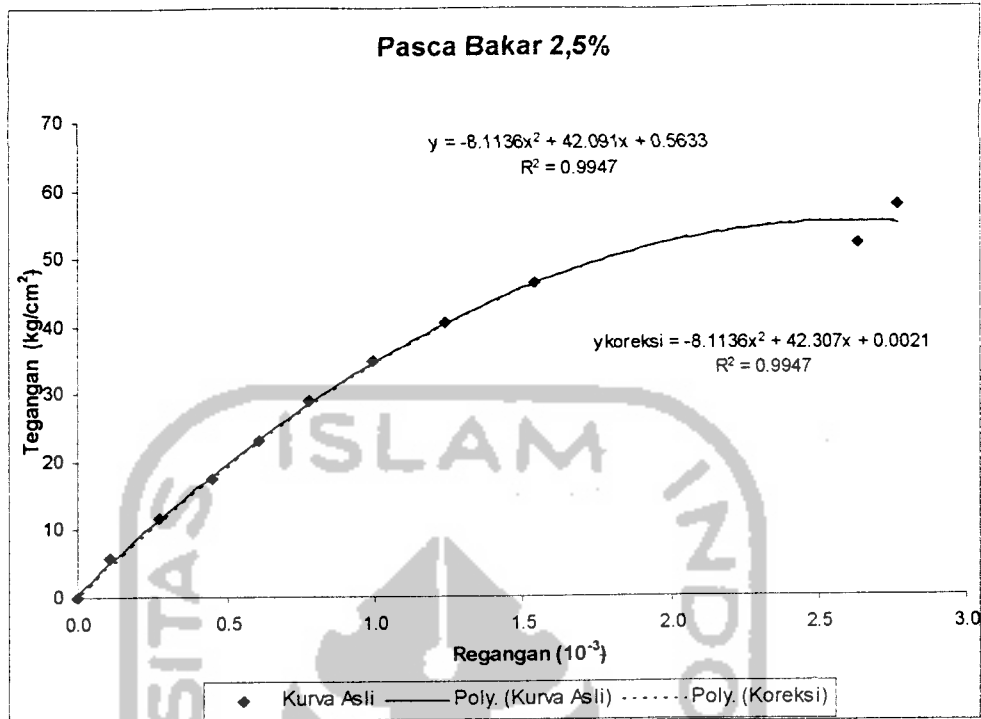
No	D (cm)	H (cm)	W (kg)	Ao (cm <sup>2</sup> )	Volume (cm <sup>3</sup> )	Bv (kg/m <sup>3</sup> )	Bvr (kg/m <sup>3</sup> )
SDB1-1	14.95	29.85	9.150	175.449	5237.166	1747.128	1747.7221
SDB1-2	15.05	30.05	9.350	177.804	5343.024	1749.9453	
SDB1-3	14.9	30.15	9.250	174.278	5254.477	1760.4035	
SDB1-4	15.08	30.01	9.200	178.514	5357.206	1717.3131	
SDB1-5	15.1	30.25	9.550	178.988	5414.382	1763.8207	
SDB2-1	14.95	30.1	9.350	175.449	5281.029	1770.4883	1763.6172
SDB2-2	15	30.1	9.500	176.625	5316.413	1786.9193	
SDB2-3	15	30	9.370	176.625	5298.750	1768.3416	
SDB2-4	14.9	30	9.200	174.278	5228.336	1759.6422	
SDB2-5	15.05	29.7	9.150	177.804	5280.793	1732.6945	
SDB3-1	15	30	8.850	176.625	5298.750	1670.2052	1684.6153
SDB3-2	14.96	29.9	8.750	175.684	5252.959	1665.7278	
SDB3-3	15.01	29.7	8.900	176.861	5252.759	1694.3476	
SDB3-4	15.1	30	8.950	178.988	5369.636	1666.7798	
SDB3-5	15	29.85	9.100	176.625	5272.256	1726.0163	
SDB4-1	14.98	30.1	9.1	176.154	5302.245	1716.2542	1705.5547
SDB4-2	15.1	29.9	8.7	178.988	5351.737	1625.6405	
SDB4-3	14.95	29.95	9	175.449	5254.711	1712.7487	
SDB4-4	14.97	29.97	9.1	175.919	5272.299	1726.0024	
SDB4-5	14.95	29.85	9.15	175.449	5237.166	1747.128	
SDB5-1	15.03	29.9	9.3	177.332	5302.233	1753.978	1687.2494
SDB5-2	15.05	29.7	8.95	177.804	5280.793	1694.8214	
SDB5-3	14.9	30.15	9	174.278	5254.477	1712.825	
SDB5-4	15.2	30.1	8.9	181.366	5459.129	1630.2968	
SDB5-5	15.1	29.9	8.8	178.988	5351.737	1644.326	

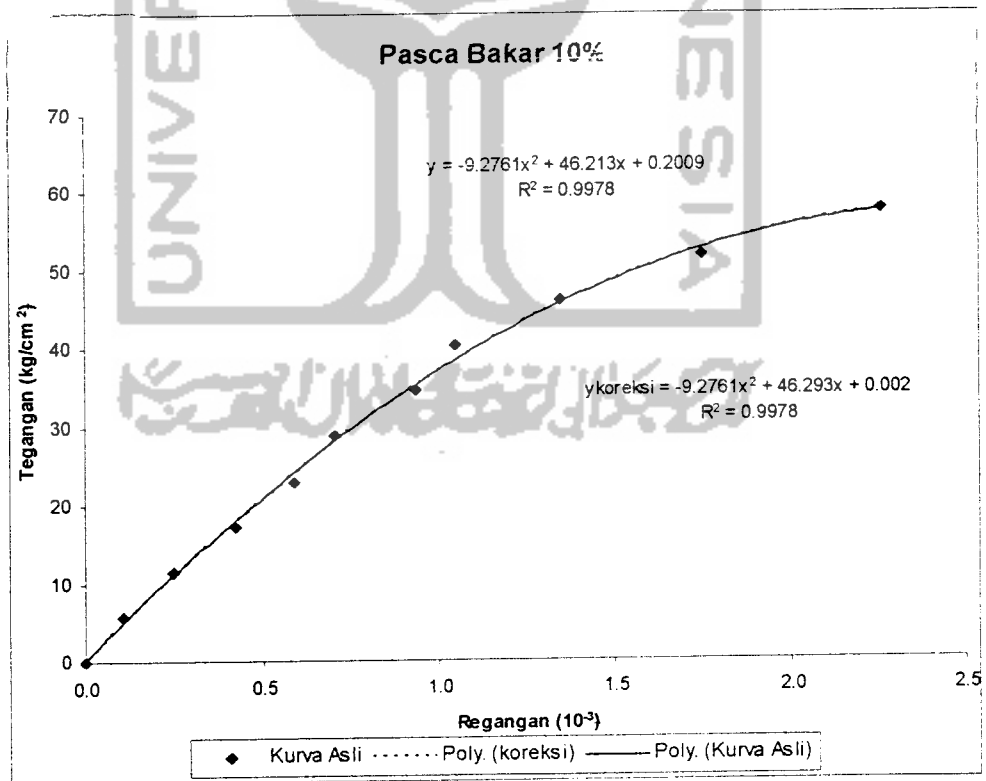
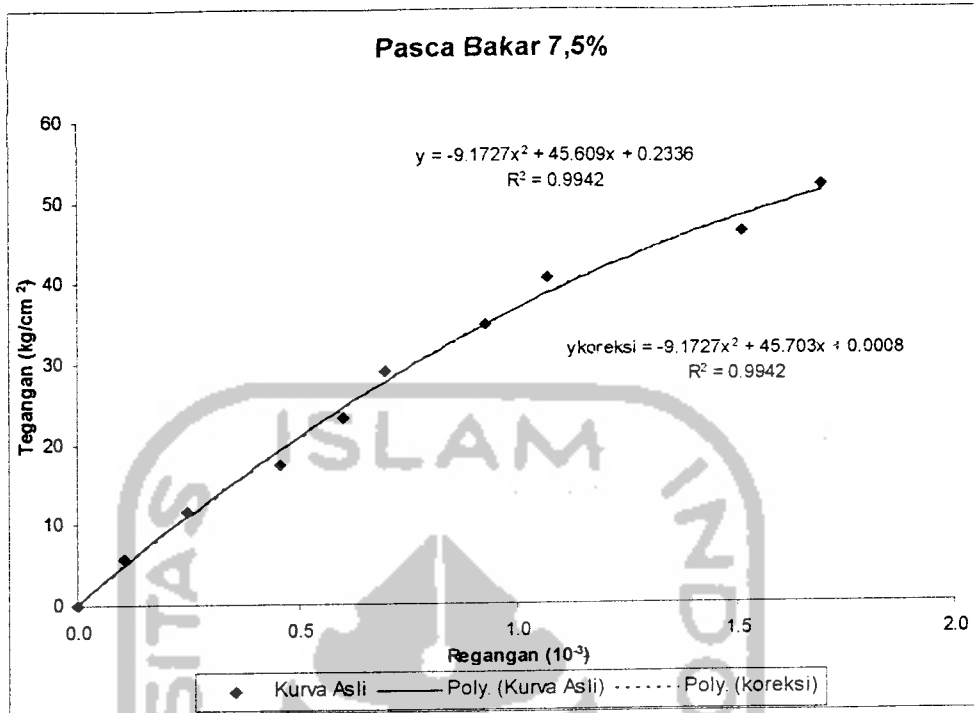


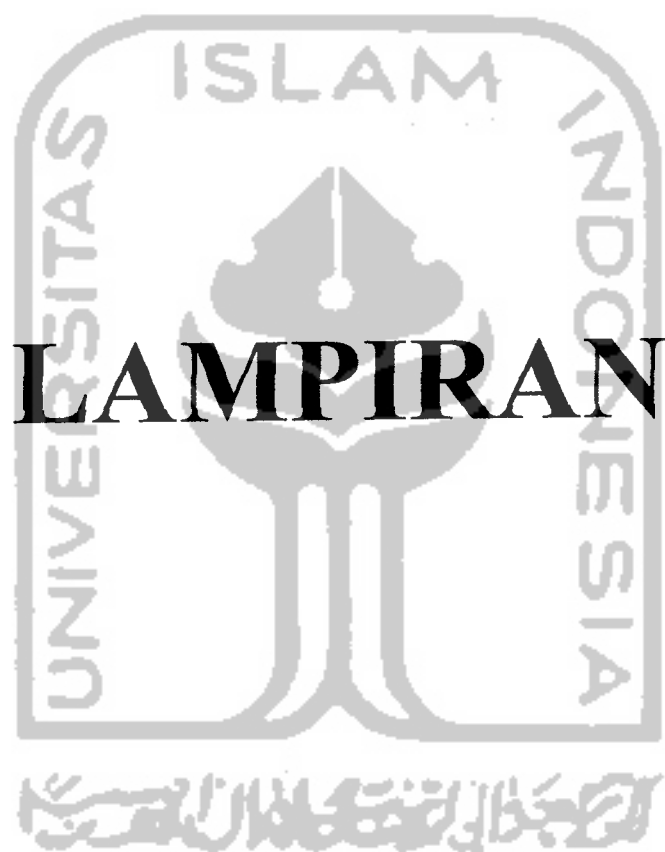






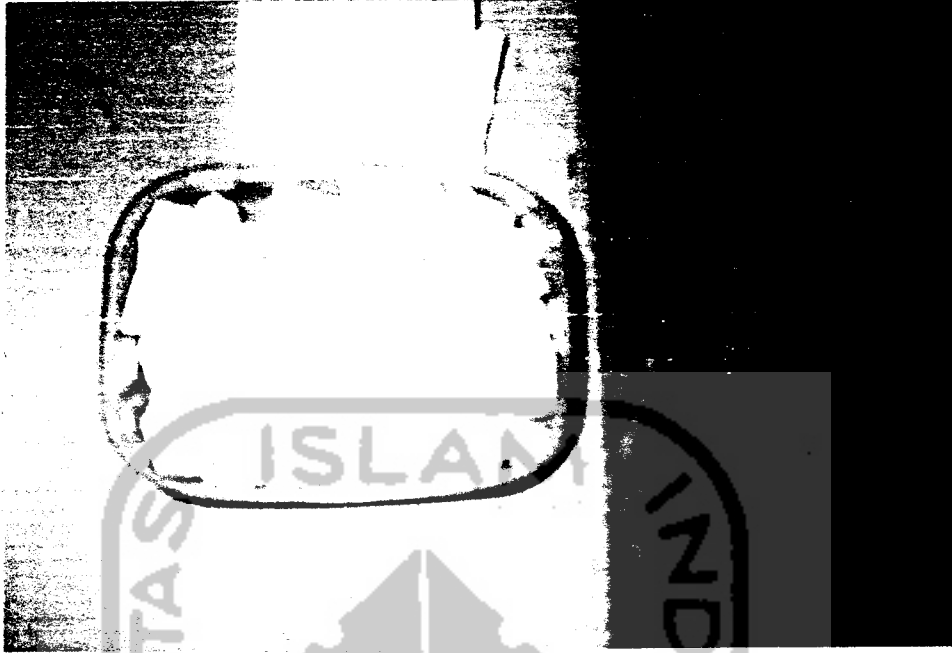




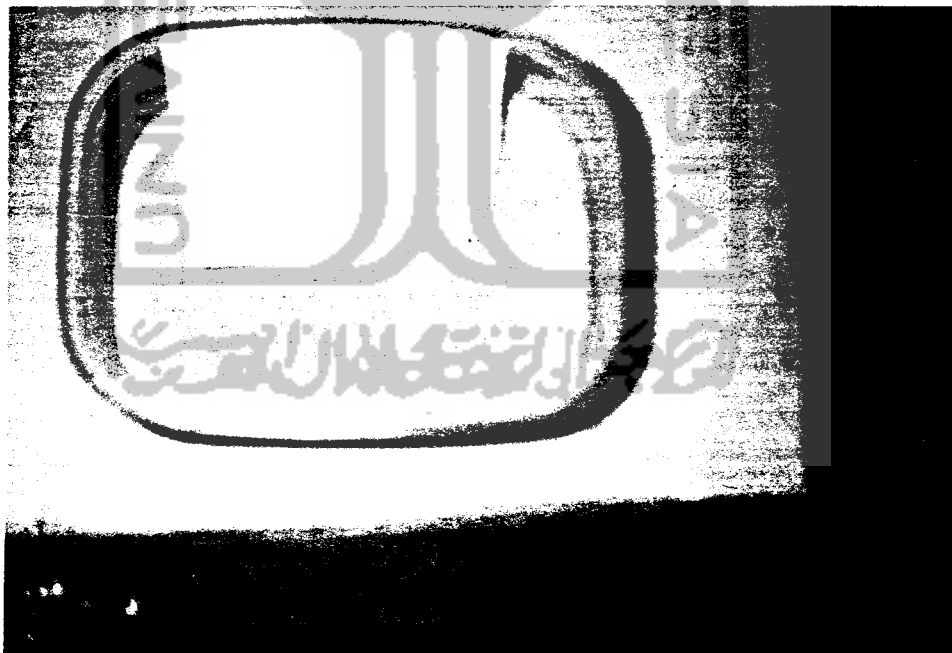


# LAMPIRAN 5





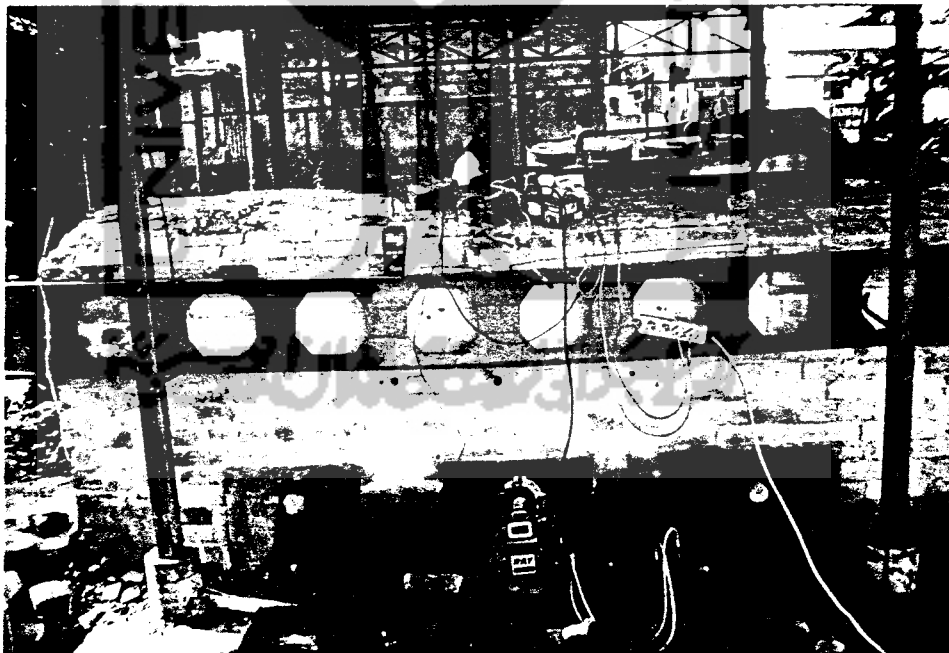
Gambar 1. Agregat Kasar batu Bentonit



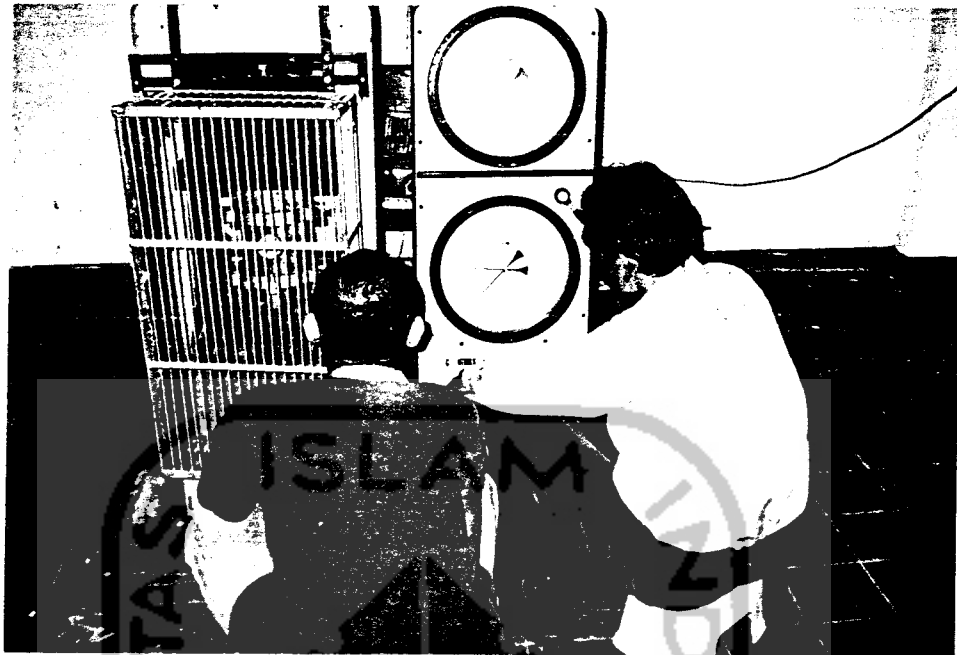
Gambar 2. Bahan Tambah *Silica Fume*



Gambar 3. Perawatan beton dengan perendaman air



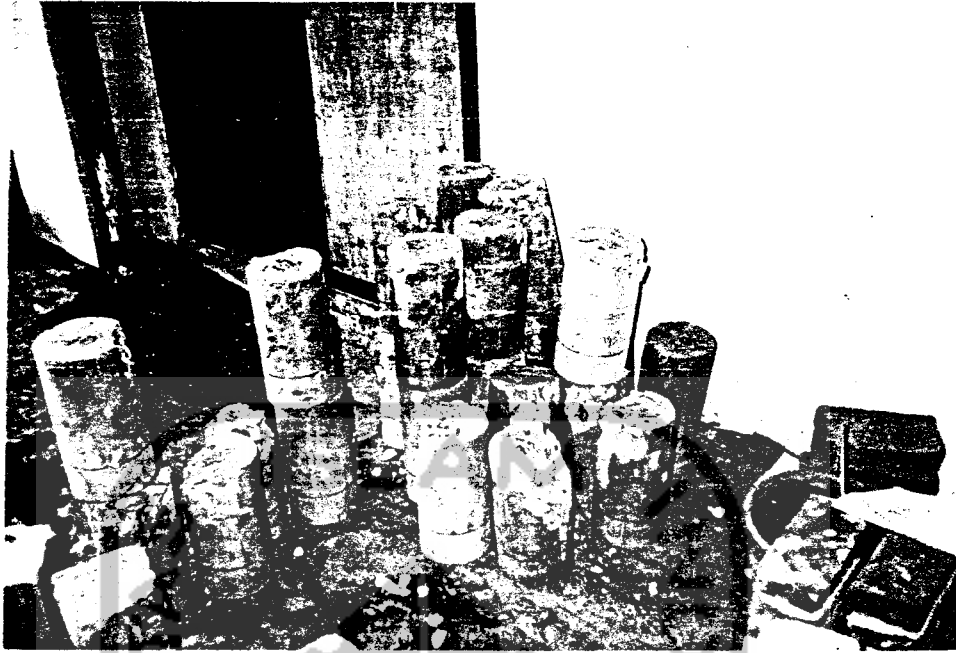
Gambar 4. Tungku pembakaran, *burner* dan *thermochouple*



Gambar 5. Pengujian kuat desak beton



Gambar 6. Benda uji setelah diuji desak



Gambar 7. Limbah beton dari pengujian kuat desak





# LAMPIRAN 6



UNTUK MAHASISWA

FM-UII-AA-FPU-09

**KARTU PESERTA TUGAS AKHIR**

NO.	N A M A	NO. MHS.	BID.STUDI
1	Nomida Setradi	99 511 257	Teknik Sipil
2	Dani Purwo Prasetyo	99 511 377	Teknik Sipil

**JUDUL TUGAS AKHIR :**

Pengaruh variasi penambahan silica fume terhadap kuat desak beton dengan penggunaan batu bentonit sebagai agregat kasar pada beton ringan

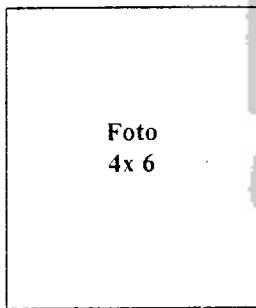
**PERIODE III : MARET - AGUSTUS**  
**TAHUN : 2003- 2004**

No.	Kegiatan	Bulan Ke :					
		Mar.	Apr.	Mei.	Jun.	Jul.	Aug.
1.	Pendaftaran	■					
2.	Penentuan Dosen Pembimbing	■					
3.	Pembuatan Proposal		■				
4.	Seminar Proposal			■			
5.	Konsultasi Penyusunan TA.				■		
6.	Sidang-Sidang					■	
7.	Pendadaran.						■

DOSEN PEMBIMBING I : Sarwidi,Ir,H,MSCE,Ph.D  
 DOSEN PEMBIMBING II : A Kadir Aboe,Ir,H,MS

11-Mei-04

Yogyakarta, .....  
 a.n. Dekan,



Ir.H.Munadhir.MT

**Catatan.**

Seminar : .....  
 Sidang : .....  
 Pendadaran : .....

Setiap kali mahasiswa konsultasi dosen pembimbing diminta untuk selalu menanyakan KRS Mahasiswa yang bersangkutan yang didalamnya harus tercantum SKS TA ( tugas Akhir ), bila SKS TA tidak tercantum maka dosen tidak boleh melayani konsultasi mahasiswa yang bersangkutan



FAKULTAS TEKNIK SIPIL DAN PERENCANAAN  
 JL. KALIURANG KM.14,4 TELP.895042  
 EMAIL : FTSP.UII.AC.ID JOGJAKARTA KODE POS 55584

UNTUK DOSEN

**KARTU PRESENSESI KONSULTASI**  
**TUGAS AKHIR MAHASISWA**

PEROIDE KE : III ( Mar 04 - Agst 04 )

NO	NAMA	NO.MHS	BID.STUDI
1.	Nomida Setiadi	99 511 257	Teknik Sipil
2.	Dani Purwo Prasetyo	99 511 377	Teknik Sipil

**JUDUL TUGAS AKHIR**

Pengaruh variasi penambahan silica fume terhadap kuat desak beton dengan penggunaan batu bentonit sebagai agregat kasar pada beton ringan

DOSEN PEMBIMBING I : Sarwidi,Ir,H,MSCE,Ph.D

DOSEN PEMBIMBING II : A Kadir Aboe,Ir,H,MS

Pas Foto  
4 x 6



Jakarta, 11-Mei-04

Yogyakarta

FAKULTAS TEKNIK SIPIL  
 DAN PERENCANAAN

YOGYAKARTA

(H.Munadhir, MS)



الجامعة الإسلامية الإندونيسية

**UNIVERSITAS ISLAM INDONESIA**  
**FAKULTAS TEKNIK SIPIL DAN PERENCANAAN**

JURUSAN : TEKNIK SIPIL, ARSITEKTUR, TEKNIK LINGKUNGAN  
KAMPUS : Jalan Kaliurang KM 14,4 Telp. (0274) 895042, 895707, 896440. Fax: 895330  
Email : dekanat@ftsp.uii.ac.id. Yogyakarta Kode Pos 55584

Nomor : 340 /Dek.70/FTSP/IV/2004  
Lamp. : -  
Hal : Ijin peminjaman Lab. BKT

Jogyakarta, 11-May-04

Kepada Yth : Kepala Laboratorium Bahan Konstruksi Teknik  
FTSP - UII Jogjakarta

Assalamu'alaikum Wr.Wb.

Sehubungan dengan Tugas Akhir yang akan dilaksanakan oleh mahasiswa kami, **Jurusan Teknik Sipil** Fakultas Teknik Sipil Dan Perencanaan **Universitas Islam Indonesia** Yogyakarta yang bernama sbb :

No	Nama Mahasiswa	No.Mahasiswa
1.	Nomida Setiadi	99 511 257
2.	Dani Purwo Prasetyo	99 511 377

Berkenaan hal tersebut kiranya mahasiswa memerlukan **bantuan nya untuk dapat meminjamkan fasilitas Lab. BKT Jurusan Teknik Sipil FT. UII**, untuk mendukung penyusunan Tugas Akhir, maka dengan ini kami mohon kepada Bapak/ Ibu sudilah kiranya dapat memberikan bantuan yang diperlukan untuk menyelesaikan Tugas Akhir.

Demikian permohonan kami , atas perkenan serta bantuan dan bimbingannya diucapkan banyak terima kasih.

Wassalamu' alaikum Wr.Wb

D e k a n .



Prof. Ir. H. Widodo, MSCE, Ph.D.

Tembusan :

- Mahasiswa ybs.
- Arsip.





الجامعة الإسلامية الإندونيسية

**UNIVERSITAS ISLAM INDONESIA**  
**FAKULTAS TEKNIK SIPIL DAN PERENCANAAN**

JURUSAN : TEKNIK SIPIL, ARSITEKTUR, TEKNIK LINGKUNGAN  
KAMPUS : Jalan Kaliurang KM 14,4 Telp. (0274) 895042, 895707, 896440. Fax: 895330  
Email : dekanat@ftsp.uii.ac.id. Yogyakarta Kode Pos 55584

Nomor : 390 /Dek.70/FTSP/IV/2004 Jogjakarta, 23-Jun-04  
Lamp. : -  
Hal : ljin penggunaan Lab. Struktur JTS. FT. UGM

Kepada Yth : Kepala Laboratorium Struktur Teknik Sipil  
Fakultas Teknik Universitas Gadjah Mada  
Di-  
Jogjakarta

Assalamu'alaikum Wr.Wb.

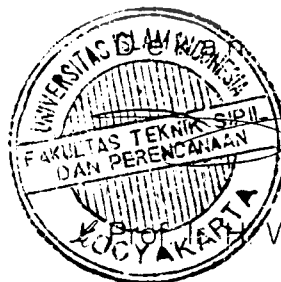
Sehubungan dengan Tugas Akhir yang akan dilaksanakan oleh mahasiswa kami, **Jurusan Teknik Sipil** Fakultas Teknik Sipil Dan Perencanaan **Universitas Islam Indonesia** Yogyakarta yang bernama sbb :

No	Nama Mahasiswa	No.Mahasiswa
1.	Nomida Setiadi	99 511 257
2	Dani Purwo Prasetyo	99 511 377

Berkenaan hal tersebut kiranya mahasiswa memerlukan **bantuan nya untuk dapat menggunakan fasilitas Lab. Struktur Teknik Sipil FT. UGM**, untuk mendukung penyusunan Tugas Akhir, maka dengan ini kami mohon kepada Bapak/ Ibu sudilah kiranya dapat memberikan bantuan yang diperlukan untuk menyelesaikan Tugas Akhir.

Demikian permohonan kami , atas perkenan serta bantuan dan bimbingannya diucapkan banyak terima kasih.

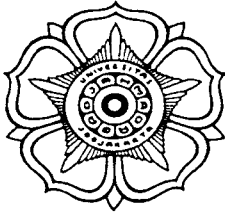
Wassalamu' alaikum Wr.Wb



  
Widodo, MSCE. Ph.D.

Tembusan :

- Mahasiswa ybs.
- Arsip.



Nomor : 0198 / LTS / VII / 2004  
Hal : Ijin Penggunaan Lab.  
Lampiran :-

Yogyakarta, 06 Juli 2004

Kepada Yth.  
Dekan  
Fakultas Teknik Sipil Dan Perencanaan Universitas Islam Indonesia  
di Yogyakarta

Dengan hormat,

Menanggapi permohonan saudara nomor : 390/Dek.70/FTSP/IV/2004 tanggal 23 Juni 2004 perihal Permohonan Penggunaan Alat Laboratorium untuk mengadakan Pembakaran Benda Uji atas nama :

1. Sdr. **NOMIDA SETIADI** No.Mhs. 99 511 257

yang akan melakukan penelitian di laboratorium Teknik Struktur dengan menggunakan Tungku Pembakaran, Burner dan Thermo Couple yang ada, dalam rangka penyelesaian Tugas Akhir, dengan ini diberitahukan bahwa :

*Permohonan tersebut dapat disetujui*

Selanjutnya mahasiswa tersebut diminta untuk mencatatkan diri ke Sekretariat Laboratorium Teknik Struktur ( Sdr. Heri Mulyono ), dengan membawa surat Persetujuan ini dan membayar uang sejumlah Rp. 300.000,00 ( tiga ratus ribu rupiah) dengan rincian pemeliharaan lab. Rp. 50.000,- dan biaya pemakaian alat Rp. 250.000,- dibayarkan melalui rekening nomor : 228.005706384.901 Bank BNI cabang UGM Yogyakarta a.n. Dr.Ir. H.Morisco (Kepala Laboratorium Teknik Struktur)

Demikian harap maklum dan atas perhatiannya diucapkan terima kasih

Kepala,

Ir. Morisco, Ph.D.  
NIP 130516868

**Tembusan :**

→ Kepada : sdr. **NOMIDA SETIADI** No.Mhs. 99 511 257  
Mahasiswa Program Studi Teknik Sipil Fak.Teknik Sipil dan Perencanaan UII Yk

Waktu mencatatkan diri di Sekretariat saudara diminta menyerahkan :

1. Surat Permohonan Penggunaan Lab. yang sudah disetujui Ka. Lab.Struktur.
2. fotokopi bukti pembayaran Bank BNI 1946 cabang UGM untuk keperluan tersebut



# Concrete Admixtures

# SikaFume® Densified Silica Fume

## DESCRIPTION

*SikaFume is a new generation concrete additive in a fine powder form based on silica fume technology.*

*SikaFume is used as a highly effective additive for the production of high quality concrete.*

*Contains more than 96% Si O<sub>2</sub> particle size less than one micron.  
(100 times finer than cement)*

## USES

*SikaFume is used to increase the density, durability and compressive strength of concrete.*

## ADVANTAGES

*The use of SikaFume improves the performance characteristics of concrete in the follows ways :*

*Increased workability over a longer period of time.*

*Improves the cohesiveness and stability of green concrete.*

*Durability greatly increased.*

*Water permeability of set concrete reduced.*

*Permeability to gases greatly decreased.*

*Greatly improved resistance to carbonation*

*Infiltration of chlorides greatly reduced.*

*Very high early and ultimate strengths.*

*SikaFume contains no chlorides or other potentially corrosive substances. It can therefore be used with complete safety in reinforced and prestressed concrete.*

## DOSAGE

*3% - 10% by weight of cement.*

*SikaFume is compatible with most Sika admixture.*

*Please consult our Technical Service Division for further information.*

## INSTRUCTION FOR USE

*SikaFume should be dry-mixed with other concrete components before the mixing water is added. After the water is added, further mixing is required to allow the even distribution of ingredients throughout the mixed concrete.*

*For increased effectiveness, it is advisable to incorporate a super plasticiser such as Sikament-Range into the concrete mix.*

## CAUTIONS

*SikaFume is a powder product.*

*Wearing a mask is advisable when pouring the product into the mixer.*

## TECHNICAL DATA

FORM	Powder
COLOUR	Grey
BULK DENSITY	Approx 0.5 kg/l
SHELF LIFE	unlimited when unopened
PACKAGING	20 kg bag

