

# LAMPIRAN A

## DATA PENELITIAN

**Tabel A.1** Hasil Rancangan Campuran Beton

No.	Nama Percobaan	Nilai			
		A (0-0)	B (0-25)	C (0-50)	D (0-100)
1	Slump Rencana	10 cm	10 cm	10 cm	10 cm
2	Kuat Tekan Rencana	25 MPa	25 MPa	25 MPa	25 MPa
3	Target Strength	28,8 MPa	28,8 MPa	28,8 MPa	28,8 MPa
4	MSA	25mm	25mm	40mm	40mm
5	Berat Jenis Semen	3.15	3.15	3.15	3.15
6	Berat Jenis Pasir	2.586	2.585	2.586	2.585
7	Berat Jenis Agregat Kasar	2.604	2.604	2.647	2.647
8	Fine Modulus Pasir	2.258	2.316	2.258	2.316
9	w/c	0.533	0.533	0.533	0.533
10	Kandungan Udara (%)	5	5	4.5	4.5
11	S/A	41	41	36	36
12	Rencana Air Adukan	175	175	165	165

**Tabel A.2** Campuran Beton untuk Kuat Lentur

Sample	Cement (kg)	Water (kg)	A. Kasar Daur Ulang (kg)	A. Kasar Alami (kg)	A. Halus Daur Ulang (kg)	A. Halus Alami (kg)	TGL DICOR	TGL DITEST
A. (0%KDU – 0%HDU)	15,961	8,514	0	47,258	0	32,577	27-Mar	24-Apr
B. (0%KDU – 25%HDU)	15,997	8,533	0	46,982	8,189922361	24,57	05-Mar	02-Apr
C. (25%KDU – 0%HDU)	15,126	8,069	13,34	40,021	0	29,283	24-Apr	22-Mei
D. (25%KDU – 25%HDU)	15,162	8,088	13,268	39,803	7,369008032	22,107	10-Apr	08-Mei

**Tabel A.3** Campuran Beton untuk Perubahan Panjang

Sample	Cement (kg)	Water (kg)	A. Kasar Daur Ulang (kg)	A. Kasar Alami (kg)	A. Halus Daur Ulang (kg)	A. Halus Alami (kg)	TGL Dicor	TGL Akhir Test
A. (0%KDU – 0%HDU)	6,4489	3,44	0	19,0939	0	13,16	27-Mar	22-Mei
B. (0%KDU – 25%HDU)	6,4634	3,448	0	5,2729	0,9192	2,758	05-Mar	30-Apr
C. (25%KDU – 0%HDU)	6,1259	3,268	1,48908	4,46724	0,827	2,481	26-Mar	21-Mei
D. (25%KDU – 25%HDU)	6,1114	3,26	1,49722	4,49167	0	3,287	13-Mar	08-Mei



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0028 (Fax)

**ANALISA BUTIRAN**  
**SIEVE ANALYSIS**

Nama : Heidi Duma Dikerjakan

Judul : Diperiksa

Jenis Contoh : Tanggal

Tabel : Agregat Halus Alam

Berat : 500 gram

Sieve Size (mm)	Sample 1				Sample 2				Sample 3				Average	
	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Cum (%) Ret	Cum (%) Passing
4,75 (No.4)	0	0	0	100	0	0	0	100	0	0	0	100	0	100
2,36 (No.8)	0	0	0	100	0	0	0	100	0	0	0	100	0	100
1,18( No16)	91	18	18,2	81,8	98	20	20	80,3	71	14	14,2	85,8	17,4	83
0,6 (No.30)	138	28	45,9	54,1	132	27	46	53,7	118	24	37,8	62,2	43,3	57
0,3 (No.50)	133	27	72,5	27,5	132	27	73	27,2	143	29	66,4	33,6	70,6	29
0,15 (No.100)	113	23	95,2	4,81	111	22	95	4,83	134	27	93,2	6,8	94,5	5,5
0,074 (No.200)	17	3	98,6	1,4	17	3	99	1,41	24	5	98	2	98,4	1,6
Pan	7	1	100	0	7	1	100	0	10	2	100	0	100	0
	499				497				500					
FM	2,318637275				2,340040241				2,116					
Rata-rata FM	2,258225839													



**ANALISA BUTIRAN**  
**SIEVE ANALYSIS**

Nama : Heidi Duma Dikerjakan

Judul : Diperiksa

Jenis Contoh : Tanggal

Tabel : Agregat Halus Daur Ulang

Berat : 500 gram

Sieve Size (mm)	Sample 1				Sample 2				Sample 3				Average	
	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Cum (%) Ret	Cum (%) Passing
4,75 (No.4)	0	0	0	100	0	0	0	100	0	0	0	100	0	100
2,36 (No.8)	7	1,4	1,4	98,6	16	3,2	3,2	96,8	10	2	2	98	2,2	97,8
1,18 (No.16)	151	30,2	31,6	68,4	136	27,2	30,4	69,6	132	26,4	28,4	71,6	30,1333	69,8667
0,6 (No.30)	132	26,4	58	42	130	26	56,4	43,6	130	26	54,4	45,6	56,2667	43,7333
0,3 (No.50)	77	15,4	73,4	26,6	77	15,4	71,8	28,2	81	16,2	70,6	29,4	71,9333	28,0667
0,15 (No.100)	78	15,6	89	11	81	16,2	88	12	85	17	87,6	12,4	88,2	11,8
0,074 (No.200)	26	5,2	94,2	5,8	28	5,6	93,6	6,4	29	5,8	93,4	6,6	93,7333	6,26667
Pan	29	5,8	100	0	32	6,4	100	0	33	6,6	100	0	100	0
	500				500				500					



**ANALISA BUTIRAN**  
**SIEVE ANALYSIS**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Kasar Daur Ulang dan Alam  
Berat : 5000 gram

Sieve Size (mm)	Agregat Daur Ulang				Agregat Alam			
	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing	Weight Ret (grams)	Ind (%) Ret	Cum (%) Ret	Cum (%) Passing
1 1/2	0	0	0	100	0	0	0	100
1	663	13,26	13,26	86,74	230	4,595404595	4,595405	95,4046
3/4	1085	21,7	34,96	65,04	695	13,88611389	18,48152	81,51848
1/2	1610	32,2	67,16	32,84	1500	29,97002997	48,45155	51,54845
3/8	749	14,98	82,14	17,86	1080	21,57842158	70,02997	29,97003
4.75	673	13,46	95,6	4,4	1468	29,33066933	99,36064	0,639361
8	27	0,54	96,14	3,86	20	0,3996004	99,76024	0,23976
Pan	193	3,86	100	0	7	0,13986014	99,9001	0,0999
	5000				5000			
FM	2,9312				2,409190809			

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**PEMERIKSAAN BERAT ISI AGREGAT**

Nama : Heidi Duma Dikerjakan

Judul : Diperiksa

Jenis Contoh : Tanggal

Tabel : Agregat Halus Daur Ulang dan Alam

Pemeriksaan Berat Isi Agregat Halus	Agregat Daur Ulang			Agregat Alam								
	Cara Langsung	Cara Penusukkan	Cara Jigling	Cara Langsung			Cara Penusukkan			Cara Jigling		
				Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
W wadah (W1-1) (gram)	1055	1055	1055	1055	1055	1055	1055	1055	1055	1055	1055	1055
W wadah + Air (gram)	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055
W wadah + Benda uji (W1-2) (gram)	3991	4188	4157	3823	3786	3790	3921	3961	3972	4095	4062	4104
W3-3 (kg)	2,936	3,133	3,102	2,768	2,731	2,74	2,866	2,906	2,92	3,04	3,007	3,049
W air (gram)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
V wadah (dm <sup>3</sup> )	2	2	2	2	2	2	2	2	2	2	2	2
Berat Isi Agregat (kg/dm <sup>3</sup> )	<b>1,468</b>	<b>1,567</b>	<b>1,551</b>	1,384	1,366	1,37	1,433	1,453	1,46	1,52	1,504	1,5245
Rata-rata				<b>1,372333333</b>			<b>1,448166667</b>			<b>1,516</b>		



**PEMERIKSAAN BERAT ISI AGREGAT**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Kasar Daur Ulang dan Alam

Pemeriksaan Berat Isi Agregat Kasar	Agregat Daur Ulang			Agregat Alam		
	Cara Langsung	Cara Penusukkan	Cara Jigging	Cara Langsung	Cara Penusukkan	Cara Jigging
W wadah (W1-1) (gram)	5089	5089	5089	5089	5089	5089
W wadah + Air (gram)	14361	14361	14361	14361	14361	14361
W wadah + Benda uji (W1-2) (gram)	16250	16711	16339	17884	18338	18414
W3-3 (kg)	11,161	11,622	11,25	11,25	12,795	13,249
W air (gram)	9272	9272	9272	9272	9272	9272
V wadah (dm <sup>3</sup> )	9,272	9,272	9,272	9,272	9,272	9,272
Berat Isi Agregat (kg/dm <sup>3</sup> )	<b>1,2037317</b>	<b>1,253451251</b>	<b>1,21333046</b>	1,379961173	1,428925798	1,437122519



**ANALISA SPECIFIC GRAVITY DAN ABSORPSION AGREGAT**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Halus Daur Ulang dan Alam  
Berat : 500 gram

Analisa Spesific Gravity dan Absorpsi dari Agregat Halus	Agregat Daur ulang			Agregat Alam		
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C
Hasil Pengamatan						
Weight of oven dry specimen in air (gram)	497	494	494	497	497	497
Weight of picnometer filled with water (gram)	657	670	668	668	670	670
Weight of saturated surface dry specimen (gram)	500	500	500	500	500	500
Weight of picnometer with specimen and water to calibration mark (gram)	952	986	975	973	979	976
Bulk Specific Gravity	2,4243902	2,68478261	2,5595855	2,548718	2,602094	2,561856
Rata-rata Bulk Specific Gravity	<b>2,556252782</b>			<b>2,570889287</b>		
Bulk Specific Gravity (Saturated Surface Dry)	2,4390244	2,7173913	2,5906736	2,564103	2,617801	2,57732
Rata-rata Bulk Specific Gravity (Saturated Surface Dry)	<b>2,58236309</b>			<b>2,586407733</b>		
Apparent Specific Gravity	2,460396	2,7752809	2,6417112	2,588542	2,643617	2,602094
Rata-rata Apparent Specific Gravity	<b>2,625796056</b>			<b>2,611417643</b>		
Absorption (%)	0,6	1,2	1,2	0,6	0,6	0,6
Rata-rata Absorption (%)	<b>1</b>			<b>0,6</b>		



**ANALISA SPECIFIC GRAVITY DAN ABSORPSION AGREGAT**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Kasar Daur Ulang dan Alam  
Berat : 500 gram

Analisa Specific Gravity dan Absorpsi dari Agregat Kasar	Agregat Daur Ulang		Agregat Alam	
	Sample A	Sample B	Sample A	Sample B
Hasil Pengamatan				
Berat dari benda uji oven dry di udara (gram)	4227	4406	4881	4757
Berat dari benda uji pada kondisi SSD (gram)	5000	5000	5000	5000
Berat dari benda uji pada kondisi jenuh (gram)	3135	3261	3148	3006
Bulk Specific Gravity	2,2664879	2,53364	2,63553	2,385657
Rata-rata Bulk Specific Gravity	<b>2,400063979</b>		<b>2,510593064</b>	
Bulk Specific Gravity (Saturated Surface Dry)	2,6809651	2,875216	2,69978	2,5075226
Rata-rata Bulk Specific Gravity (Saturated Surface Dry)	<b>2,778090394</b>		<b>2,603653292</b>	
Apparent Specific Gravity	3,8708791	3,848035	2,8165	2,7167333
Rata-rata Apparent Specific Gravity	<b>3,859457028</b>		<b>2,766618234</b>	
Absorption (%)	15,46	11,88	2,38	4,86
Rata-rata Absorption	<b>13,67</b>		<b>3,62</b>	





**PEMERIKSAAN BAHAN LEWAT SARINGAN NO. 200**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Halus Daur Ulang dan Alam  
Berat : 500 gram

Pemeriksaan Bahan Lewat Saringan No.200	Agregat Daur Ulang		Agregat Alam
	Sample 1	Sample 2	Sample 1
Berat Benda uji semula (gram)	500	500	500
Berat Benda uji tertahan saringan No.200 (gram)	461	464	477
Jumlah bahan lewat saringan No.200 (%)	7,8	7,2	4,6
Rata – rata (%)	7.5		4.6



**PEMERIKSAAN KEAUSAN AGREGAT KASAR**  
**DENGAN MESIN LOS ANGELES**

Nama : Heidi Duma Dikerjakan  
:  
Judul : Diperiksa  
:  
Jenis Contoh : Tanggal  
Tabel : Agregat Kasar Daur Ulang dan Alam  
Berat : 5000 gram

<b>Pemeriksaan Keausan Agregat dengan Mesin Los Angeles</b>	Agregat Daur Ulang (12 bola)	Agregat Alam (11 bola)
	Sample 1	Sample 1
Berat benda uji semula (gram)	5000	5000
berat benda uji tertahan saringan No.12 (gram)	2939	4046
Keausan (%)	41,22	19,08

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**TEST RESULT OF CONCRETE SHRINKAGE**

No. :  
Sample : A (0% KDU – 0% HDU)  
Class : 25 MPa  
Type :  
Size : 10 cm x 10 cm x 50 cm  
Date of Mix : 27 Maret 2008  
Requested by :  
Project : Penelitian Tugas Akhir  
Address :  
Skala dial comparator : 0.01 mm

Tested by : Heidi Duma  
Checked by :

Date of Test	Jam	Sample 1			Sample 2			Sample 3			Remarks
		Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	
28-Mar	14.06	15.19	0	14.09	15.01	0	14.09	15.21	0	14.09	75%, 27.8°C
29-Mar	11.35	15.2	1E-04	14.09	15.02	1E-04	14.09	15.21	0	14.09	76%, 27.4°C
30-Mar	15.39	15.19	0	14.09	15.01	0	14.09	15.21	0	14.09	78%, 27.5°C
31-Mar	15.04	15.19	0	14.09	15.01	0	14.09	15.21	0	14.09	73%, 27.2°C
1-Apr	16.04	15.19	0	14.09	15.02	1E-04	14.09	15.21	0	14.09	75%, 27.6°C
2-Apr	11.08	15.19	0	14.09	15.02	1E-04	14.09	15.21	0	14.09	67%, 27.6°C
3-Apr	09.23	15.2	1E-04	14.09	15.02	1E-04	14.09	15.21	0	14.09	75%, 27.3°C
4-Apr	14.42	15.2	1E-04	14.09	15.02	1E-04	14.09	15.21	0	14.09	84%, 27.4°C
5-Apr	10.03	15.2	1E-04	14.09	15.03	0.0002	14.09	15.23	0.0002	14.09	82%, 27.3°C
6-Apr	09.50	15.2	1E-04	14.09	15.04	0.0003	14.09	15.22	1E-04	14.09	85%, 27.5°C
7-Apr	15.16	15.2	1E-04	14.09	15.04	0.0003	14.09	15.21	0	14.09	74%, 28.5°C
8-Apr	15.47	15.2	1E-04	14.09	15.04	0.0003	14.09	15.21	0	14.09	80%, 27.6°C

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9-Apr	14.35	15.21	0.0002	14.09	15.05	0.0004	14.09	15.22	1E-04	14.09	85%, 28.4°C
10-Apr	16.33	15.22	0.0003	14.09	15.06	0.0005	14.09	15.22	1E-04	14.09	86%, 26.2°C
11-Apr	16.28	15.21	0.0002	14.09	15.03	0.0002	14.09	15.23	0.0002	14.09	83%, 27.3°C
12-Apr	10.21	15.21	0.0002	14.09	15.02	1E-04	14.09	15.21	0	14.09	90%, 26.4°C
13-Apr	10.44	15.21	0.0002	14.09	15.03	0.0002	14.09	15.21	0	14.09	85%, 27.6°C
14-Apr	13.39	15.21	0.0002	14.09	15.04	0.0003	14.09	15.21	0	14.09	88%, 25.5°C
15-Apr	13.52	15.22	0.0003	14.09	15.04	0.0003	14.09	15.22	1E-04	14.09	85%, 26.6°C
16-Apr	13.50	15.22	0.0003	14.09	15.04	0.0003	14.09	15.23	0.0002	14.09	71%, 28.6°C
17-Apr	13.28	15.23	0.0004	14.09	15.04	0.0003	14.09	15.23	0.0002	14.09	75%, 27.7°C
18-Apr	13.35	15.22	0.0003	14.09	15.04	0.0003	14.09	15.23	0.0002	14.09	76%, 28.2°C
19-Apr	10.07	15.22	0.0003	14.09	15.04	0.0003	14.09	15.23	0.0002	14.09	81%, 27.2°C
20-Apr	10.30	15.23	0.0004	14.09	15.05	0.0004	14.09	15.24	0.0003	14.09	81%, 26.5°C
21-Apr	11.45	15.23	0.0004	14.09	15.05	0.0004	14.09	15.24	0.0003	14.09	80%, 26.9°C
22-Apr	13.25	15.23	0.0004	14.09	15.05	0.0004	14.09	15.24	0.0003	14.09	87%, 27.1°C
23-Apr	13.13	15.23	0.0004	14.09	15.05	0.0004	14.09	15.24	0.0003	14.09	89%, 27.3°C
24-Apr	10.57	15.23	0.0004	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	82%, 27.6°C
25-Apr	15.14	15.23	0.0004	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	79%, 27.9°C
26-Apr	10.49	15.24	0.0005	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	78%, 27.8°C
27-Apr	10.57	15.24	0.0005	14.09	15.07	0.0006	14.09	15.25	0.0004	14.09	81%, 27.8°C
28-Apr	12.28	15.24	0.0005	14.09	15.07	0.0006	14.09	15.26	0.0005	14.09	72%, 28.6°C
29-Apr	12.15	15.25	0.0006	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	78%, 28.8°C
30-Apr	13.39	15.25	0.0006	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	80%, 28.7°C
1-May	10.48	15.25	0.0006	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	81%, 27.4°C
2-May	13.07	15.26	0.0007	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	81%, 27.7°C
3-May	10.42	15.26	0.0007	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	80%, 27.2°C



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4-May	10.54	15.26	0.0007	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	78%, 27.4°C
5-May	11.08	15.26	0.0007	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	83%, 27.8°C
6-May	10.11	15.26	0.0007	14.09	15.06	0.0005	14.09	15.25	0.0004	14.09	80%, 27.7°C
7-May	11.00	15.26	0.0007	14.09	15.05	0.0004	14.09	15.25	0.0004	14.09	81%, 27.3°C
8-May	15.36	15.26	0.0007	14.09	15.07	0.0006	14.09	15.23	0.0002	14.09	77%, 28°C
9-May	15.02	15.26	0.0007	14.09	15.07	0.0006	14.09	15.24	0.0003	14.09	74%, 28°C
10-May	09.53	15.25	0.0006	14.09	15.07	0.0006	14.09	15.24	0.0003	14.09	76%, 28.3°C
11-May	10.11	15.25	0.0006	14.09	15.07	0.0006	14.09	15.24	0.0003	14.09	75%, 27.3°C
12-May	12.51	15.26	0.0007	14.09	15.07	0.0006	14.09	15.24	0.0003	14.09	75%, 27.9°C
13-May	11.06	15.26	0.0007	14.09	15.08	0.0007	14.09	15.25	0.0004	14.09	76%, 27.7°C
14-May	15.24	15.27	0.0008	14.09	15.08	0.0007	14.09	15.25	0.0004	14.09	72%, 27.8°C
15-May	10.38	15.27	0.0008	14.09	15.08	0.0007	14.09	15.25	0.0004	14.09	74%, 28.6°C
16-May	10.5	15.27	0.0008	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	74%, 27.6°C
17-May	12.26	15.28	0.0009	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	77%, 28.1°C
18-May	10.42	15.28	0.0009	14.09	15.09	0.0008	14.09	15.24	0.0003	14.09	77%, 27.6°C
19-May	11.36	15.28	0.0009	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	70%, 28.7°C
20-May	10.15	15.28	0.0009	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	73%, 28.1°C
21-May	10.48	15.28	0.0009	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	80%, 27.7°C
22-May	15.44	15.28	0.0009	14.09	15.08	0.0007	14.09	15.24	0.0003	14.09	70%, 29.3°C

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**TEST RESULT OF CONCRETE SHRINKAGE**

No. :  
Sample : B (0% KDU – 25% HDU)  
Class : 25 MPa  
Type :  
Size : 10 cm x 10 cm x 50 cm  
Date of Mix : 5 Maret 2008  
Requested by :  
Project : Penelitian Tugas Akhir  
Address :  
Skala dial comparator : 0.01 mm

Tested by : Heidi Duma  
Checked by :

Date of Test	Jam	Sample 1			Sample 2			Sample 3			Remarks
		Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	
6-Mar	16.15	6.52	0	10.8	6.55	0	10.8	6.51	0	10.8	74%, 26.5°C
7-Mar	15.40	6.52	0	10.8	6.55	0	10.8	6.51	0	10.8	82%, 27.5°C
8-Mar	17.12	6.51	-1E-04	10.8	6.53	-0.0002	10.8	6.52	1E-04	10.8	87%, 26.6°C
9-Mar	11.40	6.51	-1E-04	10.8	6.53	-0.0002	10.8	6.53	0.0002	10.8	85%, 26.8°C
10-Mar	13.34	6.51	-1E-04	10.8	6.53	-0.0002	10.8	6.52	1E-04	10.8	83%, 27.4°C
11-Mar	16.14	6.52	0	10.8	6.54	-1E-04	10.8	6.52	1E-04	10.8	85%, 26.7°C
12-Mar	15.40	6.52	0	10.8	6.54	-1E-04	10.8	6.52	1E-04	10.8	84%, 26.4°C
13-Mar	13.10	6.53	0.0001	10.8	6.55	0	10.8	6.52	1E-04	10.8	80%, 26.7°C
14-Mar	15.17	6.54	0.0002	10.8	6.55	0	10.8	6.53	0.0002	10.8	85%, 27.3°C
15-Mar	13.53	6.54	0.0002	10.8	6.55	0	10.8	6.53	0.0002	10.8	85%, 27.3°C

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16-Mar	13.30	6.53	0.0001	10.8	6.55	0	10.8	6.53	0.0002	10.8	84%, 26.9°C
17-Mar	12.17	6.53	0.0001	10.8	6.55	0	10.8	6.53	0.0002	10.8	85%, 27.4°C
18-Mar	15.32	6.53	0.0001	10.8	6.55	0	10.8	6.53	0.0002	10.8	84%, 27.3°C
19-Mar	12.27	6.53	0.0001	10.8	6.56	1E-04	10.8	6.54	0.0003	10.8	85%, 26.5°C
20-Mar	10.12	6.53	0.0001	10.8	6.56	1E-04	10.8	6.56	0.0005	10.8	90%, 25.8°C
21-Mar	9.57	6.53	0.0001	10.8	6.58	0.0003	10.8	6.55	0.0004	10.8	84%, 26.2°C
22-Mar	9.30	6.54	0.0002	10.8	6.58	0.0003	10.8	6.55	0.0004	10.8	82%, 26.2°C
23-Mar	10.07	6.54	0.0002	10.8	6.58	0.0003	10.8	6.55	0.0004	10.8	85%, 26.1°C
24-Mar	15.43	6.54	0.0002	10.8	6.58	0.0003	10.8	6.55	0.0004	10.8	79%, 27°C
25-Mar	13.08	6.54	0.0002	10.8	6.57	0.0002	10.8	6.55	0.0004	10.8	85%, 25.8°C
26-Mar	14.35	6.56	0.0004	10.8	6.57	0.0002	10.8	6.55	0.0004	10.8	80%, 26.4°C
27-Mar	12.50	6.56	0.0004	10.8	6.57	0.0002	10.8	6.55	0.0004	10.8	82%, 27.3°C
28-Mar	13.41	6.57	0.0005	10.8	6.58	0.0003	10.8	6.57	0.0006	10.8	76%, 27.1°C
29-Mar	10.44	6.57	0.0005	10.8	6.57	0.0002	10.8	6.56	0.0005	10.8	73%, 25.6°C
30-Mar	15.20	6.57	0.0005	10.8	6.57	0.0002	10.8	6.56	0.0005	10.8	76%, 23.8°C
31-Mar	15.49	6.57	0.0005	10.8	6.58	0.0003	10.8	6.56	0.0005	10.8	71%, 27°C
1-Apr	15.24	6.57	0.0005	10.8	6.58	0.0003	10.8	6.56	0.0005	10.8	75%, 27.3°C
2-Apr	11.39	6.57	0.0005	10.8	6.58	0.0003	10.8	6.57	0.0006	10.8	69%, 27.6°C
3-Apr	09.07	6.57	0.0005	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	75%, 27.3°C
4-Apr	15.04	6.57	0.0005	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	83%, 27.5°C
5-Apr	10.34	6.57	0.0005	10.8	6.59	0.0004	10.8	6.58	0.0007	10.8	79%, 27.5°C
6-Apr	10.12	6.57	0.0005	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	76%, 27.4°C
7-Apr	15.40	6.56	0.0004	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	74%, 28.4°C
8-Apr	16.10	6.57	0.0005	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	81%, 27.6°C
9-Apr	14.52	6.57	0.0005	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	85%, 28.2°C

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10-Apr	16.45	6.57	0.0005	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	85% 26.2°C
11-Apr	16.30	6.57	0.0005	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	85%, 27.2°C
12-Apr	10.49	6.58	0.0006	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	91%, 26.5
13-Apr	10.16	6.57	0.0005	10.8	6.58	0.0003	10.8	6.58	0.0007	10.8	84%, 26.7°C
14-Apr	13.50	6.56	0.0004	10.8	6.58	0.0003	10.8	6.59	0.0008	10.8	89%, 25.5°C
15-Apr	13.29	6.57	0.0005	10.8	6.58	0.0003	10.8	6.59	0.0008	10.8	85%, 26.6°C
16-Apr	13.54	6.58	0.0006	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	72%, 28.6°C
17-Apr	13.08	6.58	0.0006	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	75%, 27.7°C
18-Apr	13.50	6.58	0.0006	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	76%, 28.1°C
19-Apr	10.20	6.58	0.0006	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	80%, 27°C
20-Apr	10.40	6.59	0.0007	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	81%, 28.3°C
21-Apr	11.54	6.59	0.0007	10.8	6.59	0.0004	10.8	6.59	0.0008	10.8	79%, 27.1°C
22-Apr	13.40	6.59	0.0007	10.8	6.6	0.0005	10.8	6.6	0.0009	10.8	82%, 27.1°C
23-Apr	13.36	6.58	0.0006	10.8	6.6	0.0005	10.8	6.6	0.0009	10.8	90%, 27.4°C
24-Apr	11.16	6.58	0.0006	10.8	6.6	0.0005	10.8	6.6	0.0009	10.8	83%, 27.7°C
25-Apr	15.33	6.58	0.0006	10.8	6.6	0.0005	10.8	6.6	0.0009	10.8	79%, 28°C
26-Apr	10.25	6.58	0.0006	10.8	6.61	0.0006	10.8	6.6	0.0009	10.8	78%, 27.8°C
27-Apr	10.30	6.58	0.0006	10.8	6.61	0.0006	10.8	6.6	0.0009	10.8	81%, 27.6°C
28-Apr	12.38	6.58	0.0006	10.8	6.61	0.0006	10.8	6.6	0.0009	10.8	72%, 28.6°C
29-Apr	12.23	6.58	0.0006	10.8	6.61	0.0006	10.8	6.6	0.0009	10.8	78%, 28.8°C
30-Apr	14.01	6.58	0.0006	10.8	6.61	0.0006	10.8	6.6	0.0009	10.8	79%, 28.2°C



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**TEST RESULT OF CONCRETE SHRINKAGE**

No. :  
Sample : C (25% KDU – 0% HDU)  
Class : 25 MPa  
Type :  
Size : 10 cm x 10 cm x 50 cm  
Date of Mix : 26 Maret 2008  
Requested by :  
Project : Penelitian Tugas Akhir  
Address :  
Skala dial comparator : 0.01 mm

Tested by : Heidi Duma  
Checked by :

Date of Test	Jam	Sample 1			Sample 2			Sample 3			Remarks
		Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	
27-Mar	14.30	14.8	0	14.09	14.92	0	14.09	14.6	0	14.09	83%, 26.8°C
28-Mar	14.01	14.79	-0.0001	14.09	14.93	1E-04	14.09	14.61	1E-04	14.09	74%, 27.8°C
29-Mar	11.33	14.79	-0.0001	14.09	14.93	1E-04	14.09	14.61	1E-04	14.09	75%, 27.4°C
30-Mar	15.41	14.79	-0.0001	14.09	14.93	1E-04	14.09	14.61	1E-04	14.09	78%, 27.4°C
31-Mar	16.01	14.79	-0.0001	14.09	14.94	0.0002	14.09	14.62	0.0002	14.09	73%, 27.1°C
1-Apr	15.58	14.8	0	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	75%, 27.6°C
2-Apr	10.54	14.8	0	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	70%, 27.6°C
3-Apr	09.27	14.8	0	14.09	14.94	0.0002	14.09	14.65	0.0005	14.09	75%, 27.4°C
4-Apr	14.38	14.81	1E-04	14.09	14.94	0.0002	14.09	14.65	0.0005	14.09	84%, 27.4°C

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5-Apr	10.11	14.82	0.0002	14.09	14.94	0.0002	14.09	14.65	0.0005	14.09	82%, 27.4°C
6-Apr	09.45	14.84	0.0004	14.09	14.94	0.0002	14.09	14.64	0.0004	14.09	83%, 27.6°C
7-Apr	15.12	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	73%, 28.6°C
8-Apr	15.53	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	80%, 27.6°C
9-Apr	14.32	14.83	0.0003	14.09	14.95	0.0003	14.09	14.63	0.0003	14.09	84%, 28.5°C
10-Apr	16.29	14.84	0.0004	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	85%, 26.4°C
11-Apr	16.30	14.83	0.0003	14.09	14.93	1E-04	14.09	14.63	0.0003	14.09	84%, 27.2°C
12-Apr	10.26	14.82	0.0002	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	84%, 27.3°C
13-Apr	10.38	14.83	0.0003	14.09	14.93	1E-04	14.09	14.63	0.0003	14.09	86%, 27.3°C
14-Apr	13.37	14.83	0.0003	14.09	14.93	1E-04	14.09	14.63	0.0003	14.09	88%, 25.5°C
15-Apr	13.46	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	85%, 26.6°C
16-Apr	13.52	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	71%, 28.6°C
17-Apr	13.24	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	75%, 27.7°C
18-Apr	13.45	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	76%, 28.1°C
19-Apr	10.00	14.83	0.0003	14.09	14.94	0.0002	14.09	14.63	0.0003	14.09	80%, 27.1°C
20-Apr	10.26	14.84	0.0004	14.09	14.95	0.0003	14.09	14.64	0.0004	14.09	80%, 27°C
21-Apr	11.49	14.85	0.0005	14.09	14.95	0.0003	14.09	14.64	0.0004	14.09	79%, 27.1°C
22-Apr	13.33	14.85	0.0005	14.09	14.95	0.0003	14.09	14.64	0.0004	14.09	87%, 27.1°C
23-Apr	13.19	14.85	0.0005	14.09	14.95	0.0003	14.09	14.65	0.0005	14.09	89%, 27.3°C
24-Apr	11.04	14.86	0.0006	14.09	14.95	0.0003	14.09	14.64	0.0004	14.09	82%, 27.6°C
25-Apr	15.21	14.86	0.0006	14.09	14.95	0.0003	14.09	14.65	0.0005	14.09	80%, 27.9°C
26-Apr	10.44	14.87	0.0007	14.09	14.96	0.0004	14.09	14.65	0.0005	14.09	78%, 27.8°C
27-Apr	10.52	14.87	0.0007	14.09	14.96	0.0004	14.09	14.66	0.0006	14.09	81%, 27.8°C
28-Apr	12.31	14.87	0.0007	14.09	14.97	0.0005	14.09	14.66	0.0006	14.09	72%, 28.6°C

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29-Apr	12.19	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	79%, 28.8°C
30-Apr	13.53	14.87	0.0007	14.09	14.98	0.0006	14.09	14.66	0.0006	14.09	79%, 28.2°C
1-May	10.41	14.86	0.0006	14.09	14.98	0.0006	14.09	14.66	0.0006	14.09	81%, 27.4°C
2-May	13.12	14.86	0.0006	14.09	14.97	0.0005	14.09	14.66	0.0006	14.09	81%, 27.7°C
3-May	10.36	14.86	0.0006	14.09	14.98	0.0006	14.09	14.65	0.0005	14.09	80%, 27.2°C
4-May	10.47	14.86	0.0006	14.09	14.98	0.0006	14.09	14.65	0.0005	14.09	78%, 27.4°C
5-May	11.14	14.86	0.0006	14.09	14.98	0.0006	14.09	14.65	0.0005	14.09	83%, 27.8°C
6-May	10.07	14.86	0.0006	14.09	14.98	0.0006	14.09	14.66	0.0006	14.09	80%, 27.7°C
7-May	10.54	14.87	0.0007	14.09	14.97	0.0005	14.09	14.66	0.0006	14.09	82%, 27.2°C
8-May	15.25	14.86	0.0006	14.09	14.98	0.0006	14.09	14.66	0.0006	14.09	76%, 28.1°C
9-May	14.56	14.86	0.0006	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	73%, 28°C
10-May	09.48	14.85	0.0005	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	75%, 28.3°C
11-May	10.01	14.86	0.0006	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	75%, 27.3°C
12-May	12.44	14.86	0.0006	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	73%, 27.8°C
13-May	11.06	14.86	0.0006	14.09	14.97	0.0005	14.09	14.67	0.0007	14.09	75%, 27.7°C
14-May	15.24	14.86	0.0006	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	72%, 27.6°C
15-May	10.38	14.86	0.0006	14.09	14.97	0.0005	14.09	14.67	0.0007	14.09	78%, 28°C
16-May	10.5	14.87	0.0007	14.09	14.97	0.0005	14.09	14.67	0.0007	14.09	73%, 27.6°C
17-May	12.26	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	76%, 28°C
18-May	10.42	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	77%, 27.6°C
19-May	11.36	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	79%, 28.5°C
20-May	10.15	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	72%, 28°C
21-May	10.44	14.87	0.0007	14.09	14.98	0.0006	14.09	14.67	0.0007	14.09	80%, 27.6°C

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**TEST RESULT OF CONCRETE SHRINKAGE**

No. :  
Sample : D (25% KDU – 25% HDU)  
Class : 25 MPa  
Type :  
Size : 10 cm x 10 cm x 50 cm  
Date of Mix : 13 Maret 2008  
Requested by :  
Project : Penelitian Tugas Akhir  
Address :  
Skala dial comparator : 0.01 mm

Tested by : Heidi Duma  
Checked by :

Date of Test	Jam	Sample 1			Sample 2			Sample 3			Remarks
		Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	Dial Redialing	$\Delta L$	Batang Baja	
14-Mar	15.54	6.86	0	10.8	6.5	0	10.8	6.39	0	10.8	85%, 27.3°C
15-Mar	14.10	6.86	0	10.8	6.52	0.0002	10.8	6.39	0	10.8	86%, 26.7°C
16-Mar	13.34	6.86	0	10.8	6.53	0.0003	10.8	6.38	-1E-04	10.8	85%, 27.6°C
17-Mar	12.29	6.86	0	10.8	6.53	0.0003	10.8	6.37	-0.0002	10.8	84%, 27.6°C
18-Mar	15.49	6.85	-0.0001	10.8	6.53	0.0003	10.8	6.38	-1E-04	10.8	84%, 27.3°C
19-Mar	13.49	6.86	0	10.8	6.54	0.0004	10.8	6.38	-1E-04	10.8	86%, 26.7°C
20-Mar	10.30	6.86	0	10.8	6.54	0.0004	10.8	6.38	-1E-04	10.8	88%, 26°C
21-Mar	10.08	6.85	-0.0001	10.8	6.54	0.0004	10.8	6.38	-1E-04	10.8	83%, 26.3°C
22-Mar	9.40	6.86	0	10.8	6.54	0.0004	10.8	6.38	-1E-04	10.8	81%, 26.4°C
23-Mar	10.30	6.86	0	10.8	6.54	0.0004	10.8	6.39	0	10.8	85%, 26.1°C



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24-Mar	16.01	6.87	1E-04	10.8	6.54	0.0004	10.8	6.39	0	10.8	81%, 26.9°C
25-Mar	13.24	6.87	1E-04	10.8	6.54	0.0004	10.8	6.39	0	10.8	86%, 26.2°C
26-Mar	14.44	6.87	1E-04	10.8	6.54	0.0004	10.8	6.39	0	10.8	80%, 27°C
27-Mar	13.12	6.87	1E-04	10.8	6.54	0.0004	10.8	6.4	0.0001	10.8	80%, 27.7°C
28-Mar	13.55	6.87	1E-04	10.8	6.55	0.0005	10.8	6.4	0.0001	10.8	75%, 27.6°C
29-Mar	11.19	6.88	0.0002	10.8	6.55	0.0005	10.8	6.4	0.0001	10.8	75%, 27.1°C
30-Mar	15.31	6.88	0.0002	10.8	6.55	0.0005	10.8	6.4	0.0001	10.8	76%, 27.2°C
31-Mar	15.57	6.88	0.0002	10.8	6.55	0.0005	10.8	6.4	0.0001	10.8	72%, 27.1°C
1-Apr	15.45	6.88	0.0002	10.8	6.56	0.0006	10.8	6.41	0.0002	10.8	75%, 27.5°C
2-Apr	12.03	6.87	1E-04	10.8	6.56	0.0006	10.8	6.41	0.0002	10.8	70%, 27.4°C
3-Apr	09.16	6.87	1E-04	10.8	6.56	0.0006	10.8	6.41	0.0002	10.8	75%, 27.3°C
4-Apr	15.12	6.87	1E-04	10.8	6.56	0.0006	10.8	6.4	0.0001	10.8	83%, 27.6°C
5-Apr	10.47	6.87	1E-04	10.8	6.55	0.0005	10.8	6.4	0.0001	10.8	79%, 27.6°C
6-Apr	10.28	6.88	0.0002	10.8	6.57	0.0007	10.8	6.4	0.0001	10.8	76%, 27.5°C
7-Apr	15.49	6.88	0.0002	10.8	6.57	0.0007	10.8	6.4	0.0001	10.8	74%, 28.4°C
8-Apr	16.30	6.88	0.0002	10.8	6.57	0.0007	10.8	6.41	0.0002	10.8	80%, 27.5°C
9-Apr	15.02	6.88	0.0002	10.8	6.57	0.0007	10.8	6.41	0.0002	10.8	85%, 28.2°C
10-Apr	16.58	6.89	0.0003	10.8	6.57	0.0007	10.8	6.42	0.0003	10.8	84%, 26.2°C
11-Apr	17.01	6.89	0.0003	10.8	6.58	0.0008	10.8	6.42	0.0003	10.8	86%, 27.2°C
12-Apr	10.51	6.88	0.0002	10.8	6.58	0.0008	10.8	6.42	0.0003	10.8	91%, 26.5°C
13-Apr	10.33	6.89	0.0003	10.8	6.58	0.0008	10.8	6.42	0.0003	10.8	86%, 26.4°C
14-Apr	13.56	6.89	0.0003	10.8	6.59	0.0009	10.8	6.43	0.0004	10.8	88%, 25.6°C
15-Apr	13.42	6.89	0.0003	10.8	6.59	0.0009	10.8	6.43	0.0004	10.8	85%, 26.6°C
16-Apr	13.54	6.89	0.0003	10.8	6.59	0.0009	10.8	6.43	0.0004	10.8	72%, 28.6°C

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17-Apr	13.20	6.89	0.0003	10.8	6.59	0.0009	10.8	6.43	0.0004	10.8	75%, 27.7°C
18-Apr	13.48	6.89	0.0003	10.8	6.59	0.0009	10.8	6.44	0.0005	10.8	76%, 28.4°C
19-Apr	10.15	6.88	0.0002	10.8	6.6	0.001	10.8	6.44	0.0005	10.8	80%, 27.1°C
20-Apr	10.35	6.88	0.0002	10.8	6.61	0.0011	10.8	6.44	0.0005	10.8	76%, 28.2°C
21-Apr	11.58	6.88	0.0002	10.8	6.61	0.0011	10.8	6.44	0.0005	10.8	79%, 27.1°C
22-Apr	13.45	6.88	0.0002	10.8	6.62	0.0012	10.8	6.45	0.0006	10.8	87%, 27.1°C
23-Apr	13.52	6.89	0.0003	10.8	6.62	0.0012	10.8	6.45	0.0006	10.8	90%, 27.4°C
24-Apr	11.26	6.89	0.0003	10.8	6.62	0.0012	10.8	6.44	0.0005	10.8	83%, 27.8°C
25-Apr	15.50	6.9	0.0004	10.8	6.62	0.0012	10.8	6.44	0.0005	10.8	79%, 28°C
26-Apr	10.39	6.9	0.0004	10.8	6.62	0.0012	10.8	6.45	0.0006	10.8	78%, 27.8°C
27-Apr	10.48	6.89	0.0003	10.8	6.62	0.0012	10.8	6.45	0.0006	10.8	81%, 27.8°C
28-Apr	12.39	6.89	0.0003	10.8	6.61	0.0011	10.8	6.45	0.0006	10.8	73%, 28.6°C
29-Apr	12.35	6.89	0.0003	10.8	6.6	0.001	10.8	6.45	0.0006	10.8	79%, 25.9°C
30-Apr	14.10	6.89	0.0003	10.8	6.6	0.001	10.8	6.46	0.0007	10.8	80%, 28.2°C
1-May	10.37	6.89	0.0003	10.8	6.6	0.001	10.8	6.46	0.0007	10.8	81%, 27.4°C
2-May	13.20	6.89	0.0003	10.8	6.6	0.001	10.8	6.46	0.0007	10.8	81%, 27.8°C
3-May	10.31	6.9	0.0004	10.8	6.6	0.001	10.8	6.46	0.0007	10.8	79%, 27.2°C
4-May	10.43	6.9	0.0004	10.8	6.6	0.001	10.8	6.46	0.0007	10.8	77%, 27.4°C
5-May	11.23	6.9	0.0004	10.8	6.61	0.0011	10.8	6.46	0.0007	10.8	84%, 27.8°C
6-May	10.03	6.91	0.0005	10.8	6.61	0.0011	10.8	6.47	0.0008	10.8	79%, 27.7°C
7-May	10.51	6.9	0.0004	10.8	6.61	0.0011	10.8	6.47	0.0008	10.8	82%, 27.1°C
8-May	15.22	6.9	0.0004	10.8	6.61	0.0011	10.8	6.47	0.0008	10.8	76%, 28.1°C



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**TEST CONCRETE FLEXURAL STRENGTH**

No. :  
 Class : 25 MPa  
 Type :  
 Size : 15 cm x 15 cm x 55 cm  
 Project : Penelitian Tugas Akhir  
 Address :

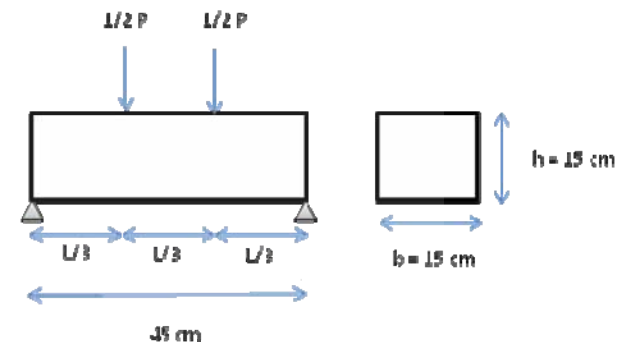
Tested by : Heidi Duma  
 Checked by :

NO	Tanggal		Umur (Hari)	Kode	Bentuk & Luas Penampang (cm)	Bentang (L) (cm)	Dimensi		P1 (kg)	P2 (kg)	P3 (kg)	P Rata-rata (kg)	W 1/6 .b.h <sup>2</sup> (cm <sup>3</sup> )	MOMEN LENTUR M = 1/6.P.L (kg.cm)	TEGANGAN LENTUR (M/W) (kg/cm <sup>2</sup> )	KETERANGAN
	Dicor	Ditest					b (cm)	h (cm)								
1	5-Mar	2-Apr	28	A	15 X 15 X 55	45	15	15	2550	2700	2650	2633.333	562.5	19750	35.11111	82%, 27.7
2	27-Mar	24-Apr	28	B	15 X 15 X 55	45	15	15	2500	2550	2350	2466.67	562.5	18500	32.889	67%, 27.6
3	10-Apr	8-May	28	C	15 X 15 X 55	45	15	15	2600	2550	2650	2600	562.5	19500	34.66667	80%, 27.8
4	24-Apr	22-May	28	D	15 X 15 X 55	45	15	15	2450	2300	2400	2383.333	562.5	17875	31.77778	77%, 28

**Keterangan :**

- A : Percobaan Campuran Beton (0% AKDU, 0% AHDU)
- B : Percobaan Campuran Beton (0% AKDU, 25% AHDU)
- C : Percobaan Campuran Beton (25% AKDU, 0% AHDU)
- D : Percobaan Campuran Beton (25% AKDU, 25% AHDU)

Detail Gambar:





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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : A (0% KDU – 0% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Siklus 1					Siklus 2					Siklus 3									
Beban (kg)	$\sigma$ Mpa	LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long
0	0	0	0	0	0.5	0.003	1.3E-05	0	0	0	0.5	0.0025	1.3E-05	0	0	0	0.5	0.0025	1.25E-05
2500	1.415	0.5	0.0025	1.3E-05	2	0.01	0.00005	1	0.005	3E-05	1.5	0.0075	3.8E-05	0.5	0.003	1.3E-05	1.5	0.0075	3.75E-05
5000	2.831	2	0.01	0.00005	4	0.02	0.0001	2.5	0.0125	6E-05	3.5	0.0175	8.8E-05	3	0.015	7.5E-05	4	0.02	0.0001
7500	4.246	3	0.015	7.5E-05	6	0.03	0.00015	5	0.025	0.0001	5	0.025	0.00013	5.5	0.028	0.00014	6.5	0.0325	0.000163
10000	5.662	5	0.025	0.00013	8.5	0.043	0.00021	7	0.035	0.0002	7.5	0.0375	0.00019	7.5	0.038	0.00019	8.5	0.0425	0.000213
12500	7.077	7.5	0.0375	0.00019	10	0.05	0.00025	9.5	0.0475	0.0002	9.5	0.0475	0.00024	10	0.05	0.00025	10	0.05	0.00025
15000	8.493	12	0.06	0.0003	12	0.06	0.0003	12	0.06	0.0003	12	0.06	0.0003	12	0.06	0.0003	12	0.06	0.0003
17500	9.908	14.5	0.0725	0.00036	14	0.07	0.00035	14.5	0.0725	0.0004	14	0.07	0.00035	14	0.07	0.00035	14	0.07	0.00035
20000	11.32	16	0.08	0.0004	16	0.08	0.0004	16	0.08	0.0004	16	0.08	0.0004	16	0.08	0.0004	16	0.08	0.0004





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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : A (0% KDU – 0% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Beban (kg)	$\sigma$ Mpa	Siklus 1						Siklus 2						Siklus 3						
		LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING			
		g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	
0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.0033	1.6E-05	0	0	0	0	0	0
2500	1.415	0	0	0	0	0	0	0.5	0.0033	2E-05	0.5	0.0033	1.6E-05	0	0	0	0	0	0	
5000	2.831	0	0	0	0.5	0.003	1.6E-05	0.5	0.0033	2E-05	1	0.0066	3.3E-05	0.5	0.003	1.6E-05	0.5	0.0033	1.64E-05	
7500	4.246	0.5	0.0033	1.6E-05	1	0.007	3.3E-05	1	0.0066	3E-05	1.5	0.0098	4.9E-05	1	0.007	3.3E-05	1	0.0066	3.28E-05	
10000	5.662	1	0.0066	3.3E-05	1.5	0.01	4.9E-05	1.5	0.0098	5E-05	2	0.0131	6.6E-05	1.5	0.01	4.9E-05	1.5	0.0098	4.91E-05	
12500	7.077	1.5	0.0098	4.9E-05	2	0.013	6.6E-05	2	0.0131	7E-05	2.5	0.0164	8.2E-05	2	0.013	6.6E-05	2	0.0131	6.55E-05	
15000	8.493	2	0.0131	6.6E-05	2.5	0.016	8.2E-05	2.5	0.0164	8E-05	3	0.0197	9.8E-05	2.5	0.016	8.2E-05	2.5	0.0164	8.19E-05	
17500	9.908	2.5	0.0164	8.2E-05	3	0.02	9.8E-05	3	0.0197	1E-04	3.5	0.0229	0.00011	3	0.02	9.8E-05	3	0.0197	9.83E-05	
20000	11.32	3	0.0197	9.8E-05	3	0.02	9.8E-05	3.5	0.0229	0.0001	3.5	0.0229	0.00011	3.5	0.023	0.00011	3.5	0.0229	0.000115	



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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : B (0% KDU – 25% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Beban (kg)	$\sigma$ Mpa	Siklus 1						Siklus 2						Siklus 3					
		LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long
0	0	0	0	0	1.5	0.008	3.8E-05	0	0	0	0.5	0.003	1E-05	0	0	0	0.5	0.003	1E-05
2500	1.415	2	0.01	0.00005	2	0.01	0.00005	1.5	0.008	3.8E-05	2	0.01	5E-05	2	0.01	5E-05	2	0.01	5E-05
5000	2.831	4	0.02	0.0001	5	0.025	0.00013	3	0.015	7.5E-05	4	0.02	0.0001	4	0.02	0.0001	4.5	0.023	0.0001
7500	4.246	6.5	0.033	0.00016	7.5	0.038	0.00019	6	0.03	0.00015	6.5	0.033	0.0002	6.5	0.0325	0.0002	6	0.03	0.0002
10000	5.662	8	0.04	0.0002	9.5	0.048	0.00024	8	0.04	0.0002	8.5	0.043	0.0002	8.5	0.0425	0.0002	9.5	0.048	0.0002
12500	7.077	10	0.05	0.00025	11.5	0.058	0.00029	10	0.05	0.00025	10.5	0.053	0.0003	11	0.055	0.0003	11.5	0.058	0.0003
15000	8.493	12.5	0.063	0.00031	13	0.065	0.00033	12	0.06	0.0003	13	0.065	0.0003	13.5	0.0675	0.0003	13.5	0.068	0.0003
17500	9.908	15	0.075	0.00038	15	0.075	0.00038	14	0.07	0.00035	14.5	0.073	0.0004	15	0.075	0.0004	15.5	0.078	0.0004
20000	11.32	18	0.09	0.00045	18	0.09	0.00045	17	0.085	0.00043	17	0.085	0.0004	17.5	0.0875	0.0004	17.5	0.088	0.0004



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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : B (0% KDU – 25% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Beban (kg)	$\sigma$ Mpa	Siklus 1						Siklus 2						Siklus 3					
		LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat
0	0	0	0	0	0.5	0.003	1.6E-05	0	0	0	0.5	0.003	2E-05	0	0	0	0	0	0
2500	1.415	0.5	0.003	1.6E-05	1	0.007	3.3E-05	0.5	0.003	1.6E-05	1	0.007	3E-05	0.5	0.0033	2E-05	0.5	0.003	2E-05
5000	2.831	1	0.007	3.3E-05	1.5	0.01	4.9E-05	1	0.007	3.3E-05	1.5	0.01	5E-05	1	0.0066	3E-05	1	0.007	3E-05
7500	4.246	1.5	0.01	4.9E-05	2	0.013	6.6E-05	1.5	0.01	4.9E-05	2	0.013	7E-05	1.5	0.0098	5E-05	1.5	0.01	5E-05
10000	5.662	2	0.013	6.6E-05	2.5	0.016	8.2E-05	2.5	0.016	8.2E-05	2.5	0.016	8E-05	2	0.0131	7E-05	2	0.013	7E-05
12500	7.077	3	0.02	9.8E-05	3	0.02	9.8E-05	3	0.02	9.8E-05	3	0.02	1E-04	3	0.0197	1E-04	2.5	0.016	8E-05
15000	8.493	3.5	0.023	0.00011	3.5	0.023	0.00011	3.5	0.023	0.00011	3.5	0.023	0.0001	3.5	0.0229	0.0001	3.5	0.023	0.0001
17500	9.908	4	0.026	0.00013	4	0.026	0.00013	4	0.026	0.00013	4	0.026	0.0001	4	0.0262	0.0001	4	0.026	0.0001
20000	11.32	4	0.026	0.00013	4	0.026	0.00013	4.5	0.029	0.00015	4.5	0.029	0.0001	4.5	0.0295	0.0001	4.5	0.029	0.0001



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University of Indonesia

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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : C (25% KDU – 0% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Beban (kg)	$\sigma$ Mpa	Siklus 1						Siklus 2						Siklus 3					
		LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long
0	0	0	0	0	1.5	0.008	3.8E-05	0	0	0	0.5	0.003	1.3E-05	0	0	0	0	0	0
2500	1.415	2	0.01	5E-05	2.5	0.013	6.3E-05	1.5	0.008	4E-05	2	0.01	0.00005	1	0.005	2.5E-05	2	0.01	5E-05
5000	2.831	3	0.015	8E-05	6	0.03	0.00015	3.5	0.018	9E-05	4.5	0.023	0.00011	3	0.015	7.5E-05	4	0.02	0.0001
7500	4.246	5	0.025	1E-04	8	0.04	0.0002	5	0.025	1E-04	7.5	0.038	0.00019	4.5	0.0225	0.00011	7.5	0.038	0.0002
10000	5.662	6.5	0.0325	2E-04	10	0.05	0.00025	6.5	0.033	2E-04	10.5	0.053	0.00026	7	0.035	0.00018	9.5	0.048	0.0002
12500	7.077	10	0.05	3E-04	13	0.065	0.00033	9.5	0.048	2E-04	12	0.06	0.0003	10	0.05	0.00025	12	0.06	0.0003
15000	8.493	12	0.06	3E-04	14	0.07	0.00035	11.5	0.058	3E-04	13.5	0.068	0.00034	12	0.06	0.0003	14	0.07	0.0004
17500	9.908	14	0.07	4E-04	17	0.085	0.00043	14.5	0.073	4E-04	15.5	0.078	0.00039	15	0.075	0.00038	17.5	0.088	0.0004
20000	11.32	18	0.09	5E-04	18	0.09	0.00045	17.5	0.088	4E-04	17.5	0.088	0.00044	19	0.095	0.00048	19	0.095	0.0005



**SRUCTURE AND MATERIAL LABORATORY**

Department of Civil Engineering - Faculty of Engineering

University of Indonesia

Kampus Baru UI Depok, Telp. 787 4878 - 727 0029 (Ext. 110/111) - 727 0028 (Fax)

**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : C (25% KDU – 0% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

		Siklus 1						Siklus 2						Siklus 3					
Beban (kg)	$\sigma$ Mpa	LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat
0	0	0	0	0	0	0	0	0	0	0	0.5	0.003	1.6E-05	0	0	0	0	0	0
2500	1.415	0	0	0	0	0	0	0.5	0.003	2E-05	0.5	0.003	1.6E-05	0	0	0	0	0	0
5000	2.831	0	0	0	0.5	0.003	1.6E-05	0.5	0.003	2E-05	1	0.007	3.3E-05	0.5	0.0033	1.6E-05	0.5	0.003	2E-05
7500	4.246	0.5	0.0033	2E-05	1	0.007	3.3E-05	1	0.007	3E-05	1.5	0.01	4.9E-05	1	0.0066	3.3E-05	1	0.007	3E-05
10000	5.662	1	0.0066	3E-05	1.5	0.01	4.9E-05	1.5	0.01	5E-05	2	0.013	6.6E-05	1.5	0.0098	4.9E-05	1.5	0.01	5E-05
12500	7.077	1.5	0.0098	5E-05	2	0.013	6.6E-05	2	0.013	7E-05	2.5	0.016	8.2E-05	2	0.0131	6.6E-05	2	0.013	7E-05
15000	8.493	2	0.0131	7E-05	2.5	0.016	8.2E-05	2.5	0.016	8E-05	3	0.02	9.8E-05	2.5	0.0164	8.2E-05	2.5	0.016	8E-05
17500	9.908	2.5	0.0164	8E-05	3	0.02	9.8E-05	3	0.02	1E-04	3.5	0.023	0.00011	3	0.0197	9.8E-05	3	0.02	1E-04
20000	11.32	3	0.0197	1E-04	3	0.02	9.8E-05	3.5	0.023	1E-04	3.5	0.023	0.00011	3.5	0.0229	0.00011	3.5	0.023	0.0001



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**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : D (25% KDU – 25% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

		Siklus 1						Siklus 2						Siklus 3						
Beban (kg)	$\sigma$ Mpa	LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING			
		g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	g long	d	$\epsilon$ long	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.005	2.5E-05
2500	1.415	2.5	0.0125	6.3E-05	2.5	0.013	6E-05	1.5	0.0075	3.75E-05	1.5	0.0075	3.8E-05	2.5	0.0125	6.3E-05	2.5	0.013	6.3E-05	
5000	2.831	5	0.025	0.00013	4	0.02	0.0001	4	0.02	0.0001	5.5	0.0275	0.00014	5	0.025	0.00013	5.5	0.028	0.00014	
7500	4.246	7.5	0.0375	0.00019	7	0.035	0.0002	7.5	0.0375	0.000188	8.5	0.0425	0.00021	7.5	0.0375	0.00019	8.5	0.043	0.00021	
10000	5.662	10	0.05	0.00025	11.5	0.058	0.0003	9.5	0.0475	0.000238	11.5	0.0575	0.00029	10.5	0.0525	0.00026	11.5	0.058	0.00029	
12500	7.077	14	0.07	0.00035	14	0.07	0.0004	12.5	0.0625	0.000313	15	0.075	0.00038	11.5	0.0575	0.00029	14.5	0.073	0.00036	
15000	8.493	15.5	0.0775	0.00039	16	0.08	0.0004	15	0.075	0.000375	16.5	0.0825	0.00041	14.5	0.0725	0.00036	17.5	0.088	0.00044	
17500	9.908	18	0.09	0.00045	20	0.1	0.0005	17	0.085	0.000425	19.5	0.0975	0.00049	17.5	0.0875	0.00044	19.5	0.098	0.00049	
20000	11.32	22	0.11	0.00055	21.5	0.108	0.0005	20.5	0.1025	0.000513	20.5	0.1025	0.00051	22	0.11	0.00055	22	0.11	0.00055	



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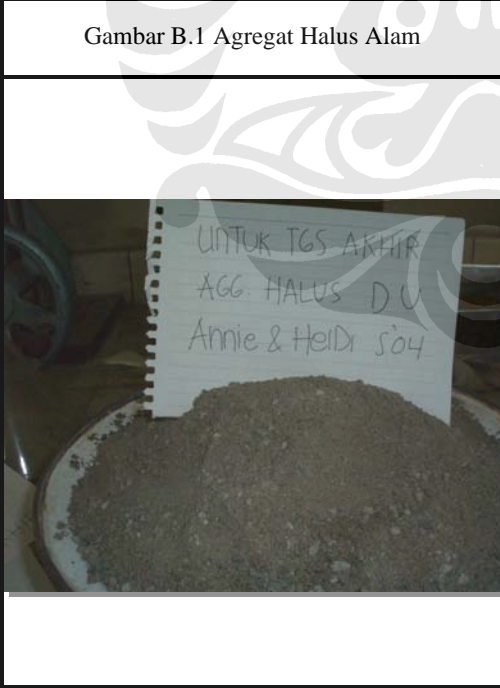

**TEST MODULUS OF ELASTICITY**

No. :  
 Class : 25 MPa  
 Type : D (25% KDU – 25% HDU)  
 Size : 15 cm x 30 cm (Silinder)  
 Project : Penelitian Tugas Akhir  
 Address :

Tested by : Heidi Duma  
 Checked by :

Beban (kg)	$\sigma$ Mpa	Siklus 1						Siklus 2						Siklus 3					
		LOADING			UNLOADING			LOADING			UNLOADING			LOADING			UNLOADING		
		g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat	g lat	d	$\epsilon$ lat
0	0	0	0	0	0.5	0.003	2E-05	0	0	0	0	0	0	0	0	0	0	0	0
2500	1.415	0.5	0.0033	1.6E-05	1	0.007	3E-05	0.5	0.0033	1.64E-05	1	0.0066	3.3E-05	0.5	0.0033	1.6E-05	0.5	0.003	1.6E-05
5000	2.831	1	0.0066	3.3E-05	2	0.013	7E-05	1	0.0066	3.28E-05	1.5	0.0098	4.9E-05	1	0.0066	3.3E-05	1.5	0.01	4.9E-05
7500	4.246	1.5	0.0098	4.9E-05	3	0.02	1E-04	1.5	0.0098	4.91E-05	2	0.0131	6.6E-05	1.5	0.0098	4.9E-05	2.5	0.016	8.2E-05
10000	5.662	2.5	0.0164	8.2E-05	3.5	0.023	0.0001	2	0.0131	6.55E-05	3	0.0197	9.8E-05	2	0.0131	6.6E-05	3	0.02	9.8E-05
12500	7.077	3	0.0197	9.8E-05	4	0.026	0.0001	2.5	0.0164	8.19E-05	3.5	0.0229	0.00011	3	0.0197	9.8E-05	4	0.026	0.00013
15000	8.493	3.5	0.0229	0.00011	4.5	0.029	0.0001	3	0.0197	9.83E-05	4	0.0262	0.00013	3.5	0.0229	0.00011	4.5	0.029	0.00015
17500	9.908	4	0.0262	0.00013	5	0.033	0.0002	4	0.0262	0.000131	4.5	0.0295	0.00015	4	0.0262	0.00013	5	0.033	0.00016
20000	11.32	5	0.0328	0.00016	5	0.033	0.0002	4.5	0.0295	0.000147	4.5	0.0295	0.00015	5	0.0328	0.00016	5	0.033	0.00016

**LAMPIRAN B**  
**FOTO-FOTO PENELITIAN**

	
<p style="text-align: center;">Gambar B.1 Agregat Halus Alam</p>	<p style="text-align: center;">Gambar B.2 Agregat Kasar Alam</p>
	
<p style="text-align: center;">Gambar B.3 Agregat Halus Daur Ulang</p>	<p style="text-align: center;">Gambar B.4 Agregat Kasar Daur Ulang</p>





Gambar B.5 Pemisahan Agregat Kasar dan Halus



Gambar B.6 Penimbangan Bahan



Gambar B.7 Perendaman Agregat Kasar



Gambar B.8 Penglapan Agregat Kasar



Gambar B.9 Pengujian SG Agregat Halus

Gambar B.10 Pengujian Berat Isi Agregat Halus



Gambar B.11 Alat Oven



Gambar B.12 Pencucian Agregat Kasar



Gambar B.13 Pengujian *Sieve Analysis*



Gambar B.14 Alat *Mixer*



Gambar B.15 Pengujian Slump Beton



Gambar B.16 Balok Susut



Gambar B.17 Alat Uji Test Susut



Gambar B.18 Alat Pengukur Suhu dan Kelembaban



Gambar B.19 Pembacaan Dial



Gambar B.20 Kondisi Alat yang Sudah Karat





Gambar B.21 Balok Uji Kuat Lentur



Gambar B.22 Alat Uji Kuat Lentur Third Point Loading



Gambar B.23 Posisi Penempatan Balok Pada Alat



Gambar B.24 Pola Retak pada Uji Kuat Lentur



Gambar B.25 Cetakan Balok Lentur



Gambar B.26 Cetakan Balok Susut



Gambar B.27 Tempat Perendaman Balok Uji



Gambar B.28 Kondisi Alat Uji Susut



Gambar B.29 Compressometer



Gambar B.30 Dial Pada Arah Lateral dan Longitudinal



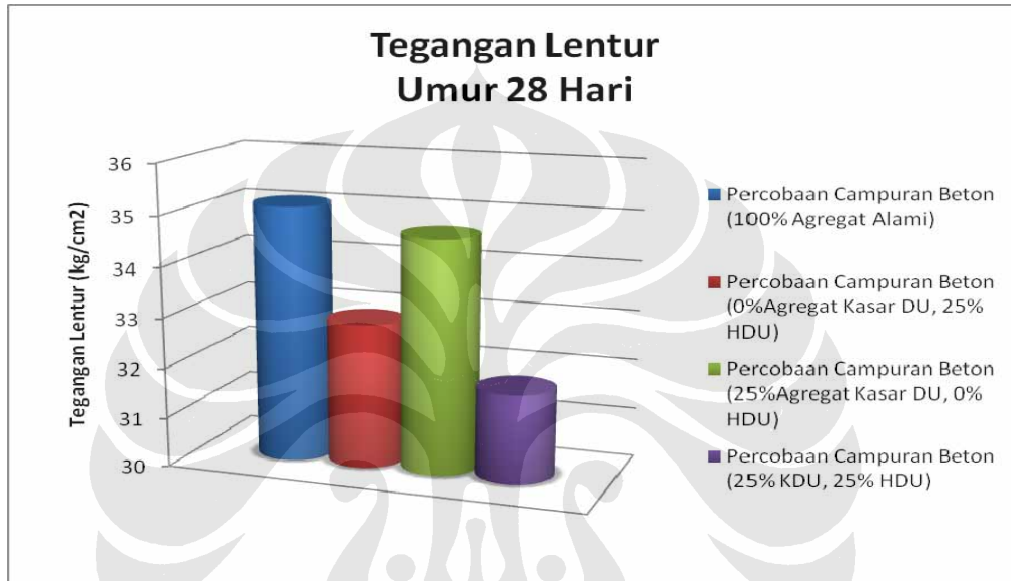
Gambar B.31 *Mold* Uji Susut



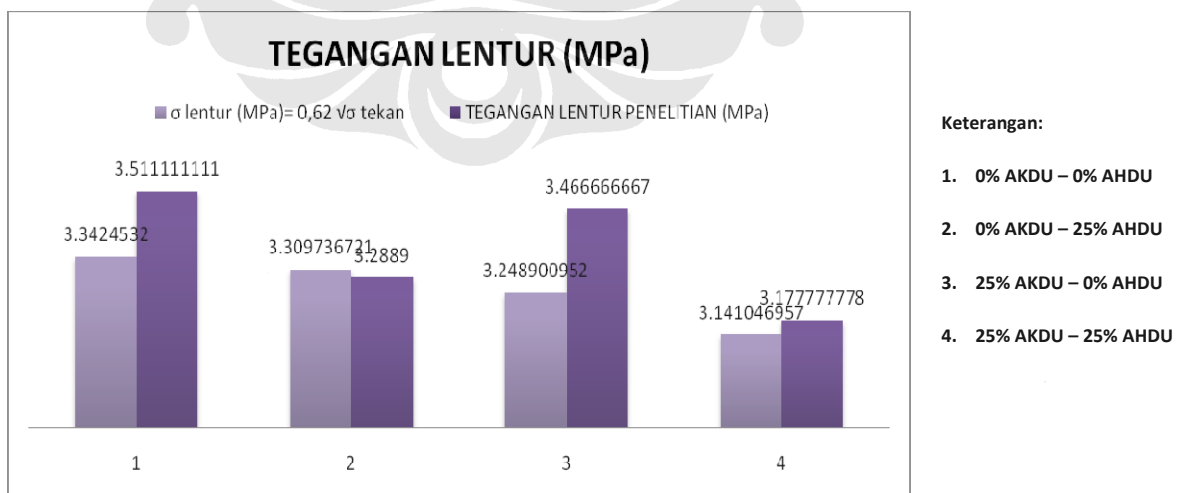
Gambar B.32 *Comparator* Uji Susut Yang Tetap

## LAMPIRAN C

### GRAFIK HASIL PENELITIAN

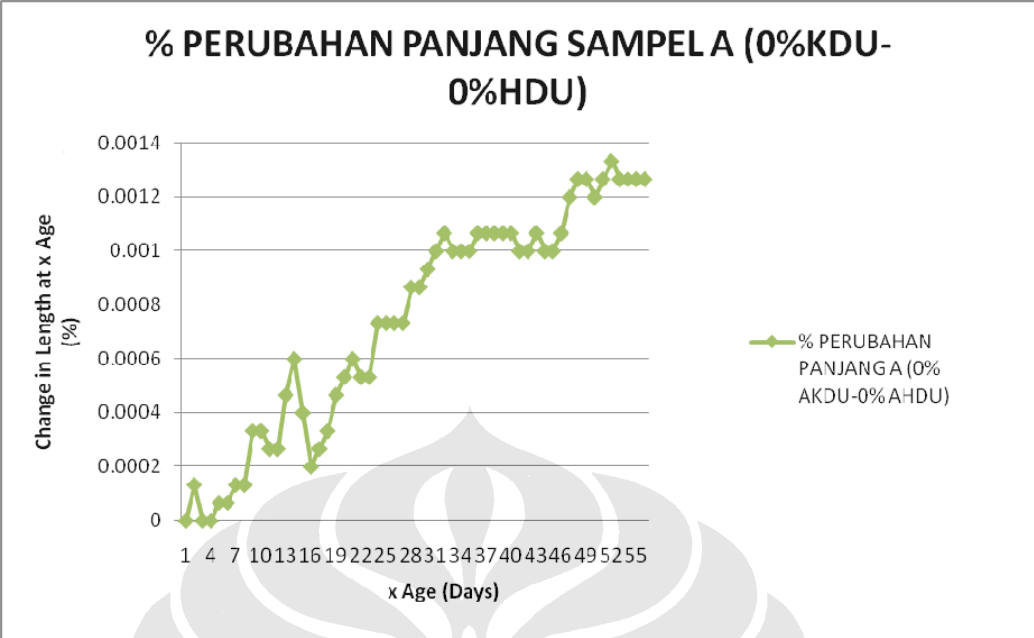


Grafik C.1 Tegangan lentur hasil penelitian pada umur 28 hari

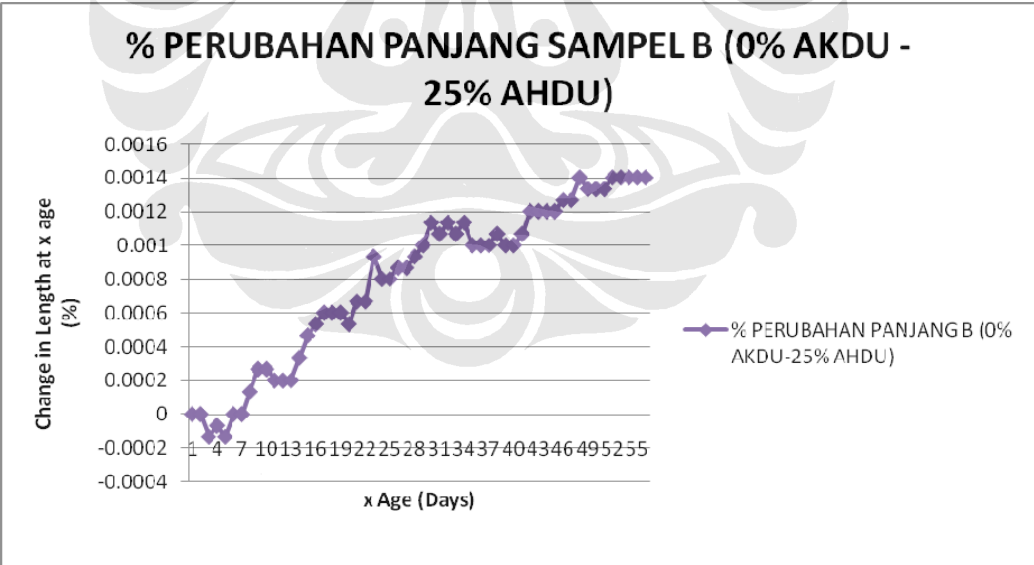


Grafik C.2 Tegangan lentur hasil penelitian vs tegangan lentur (0.62√fc') pada umur 28 hari

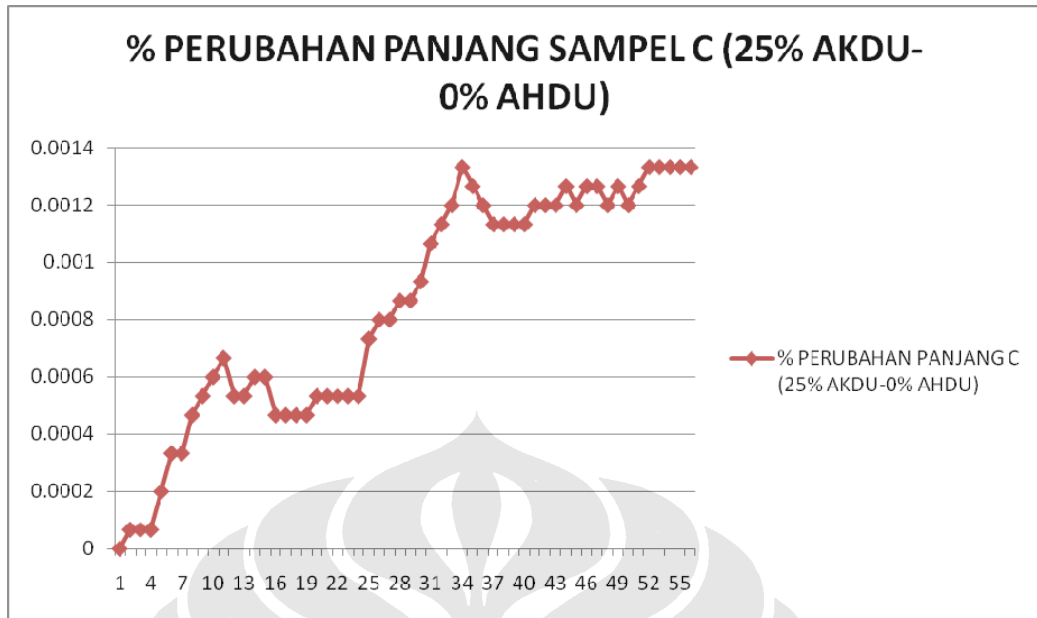




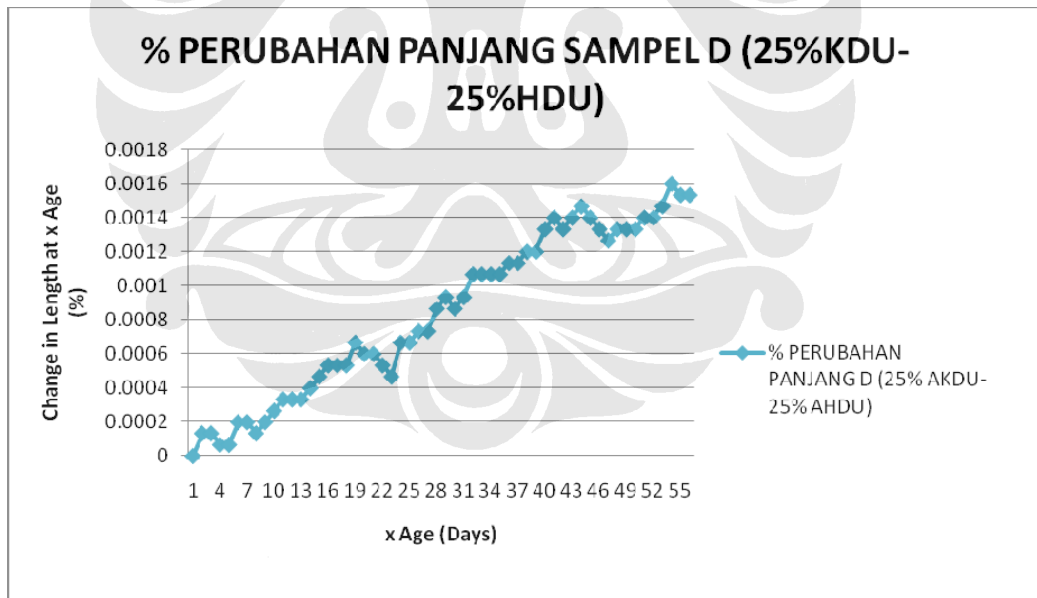
Grafik C.3 % Susut sampel A



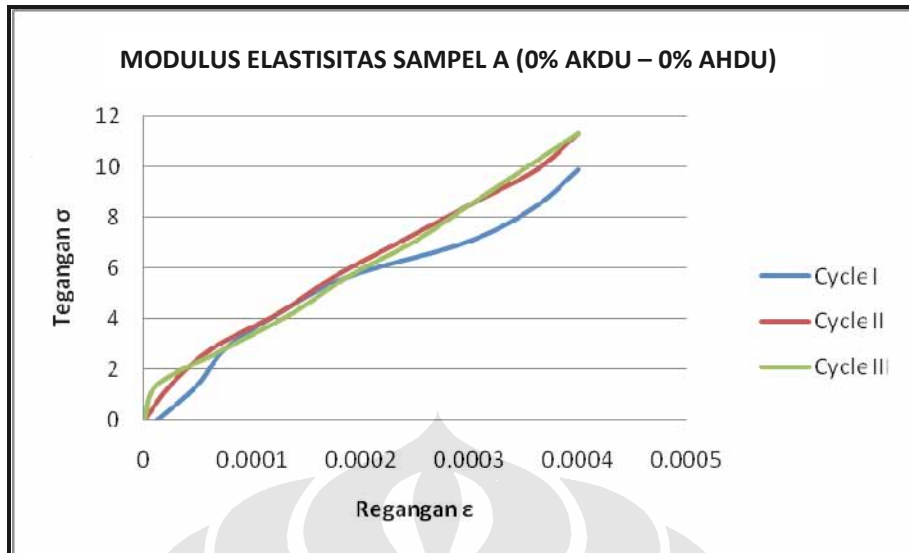
Grafik C.4 % Susut sampel B



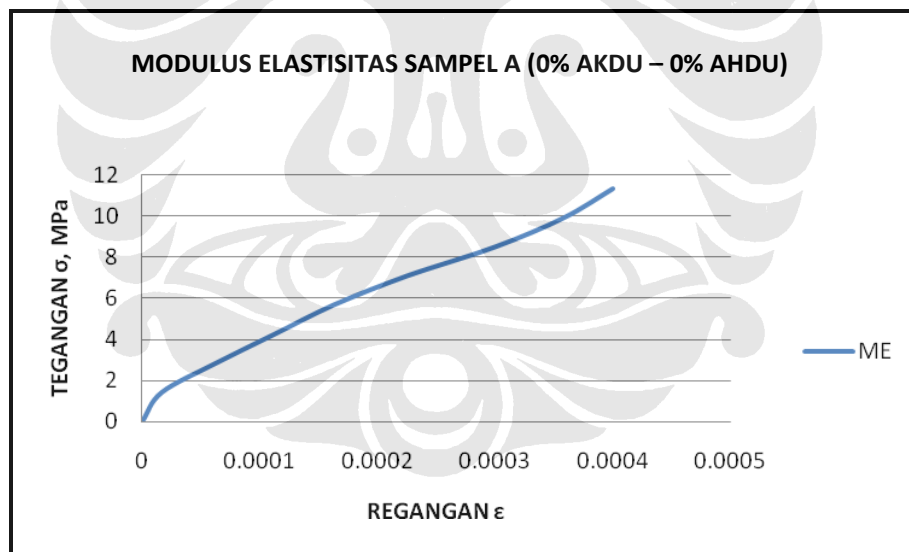
Grafik C.5 % Susut sampel C



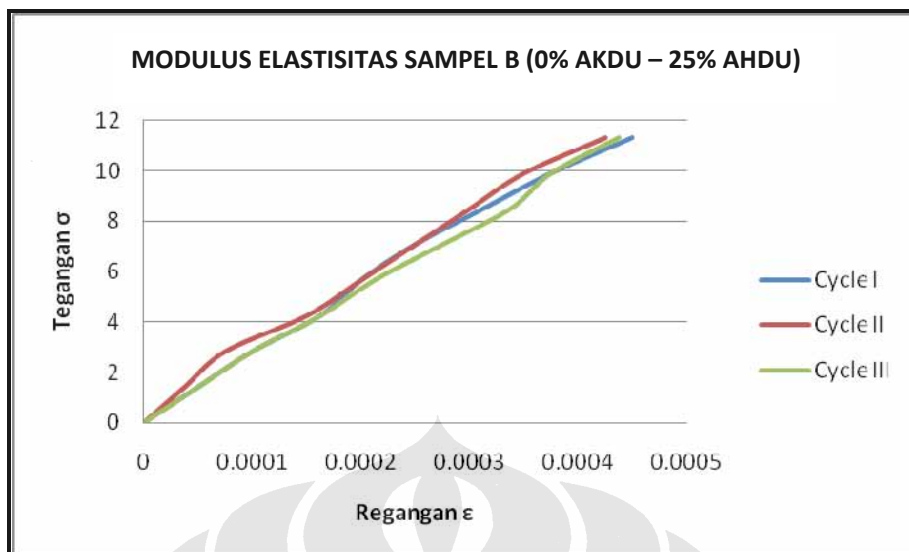
Grafik C.6 % Susut sampel D



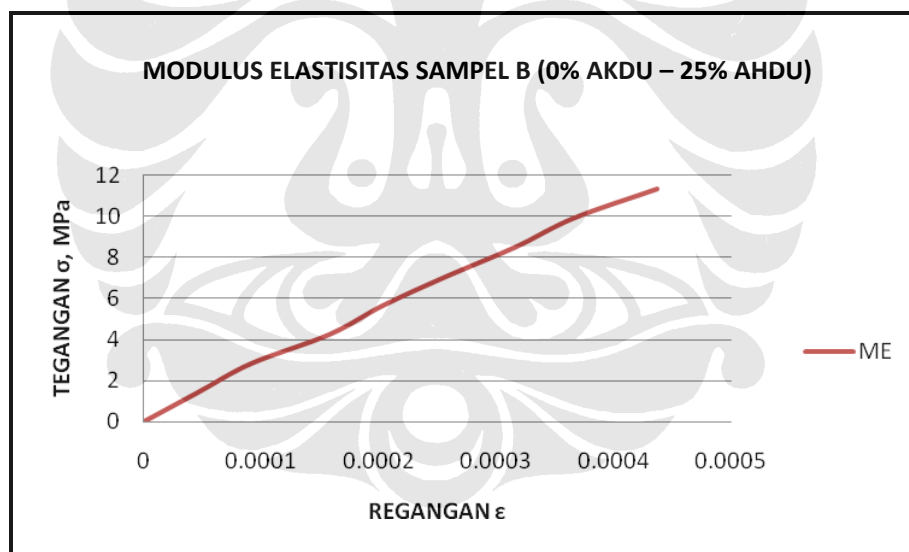
Grafik C.7 Tegangan vs regangan sampel A (0% AKDU – 0% AHDU)



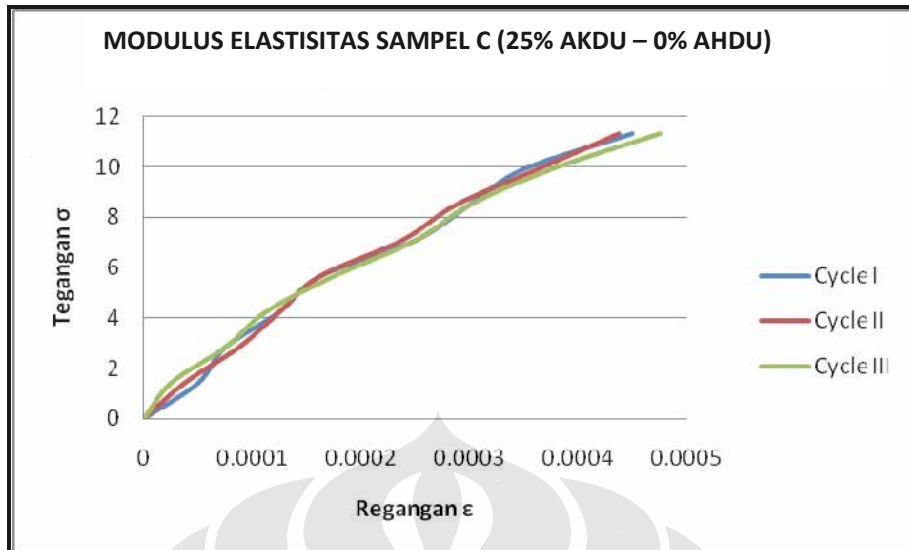
Grafik C.8 Tegangan vs regangan sampel A (0% AKDU – 0% AHDU) rata-rata



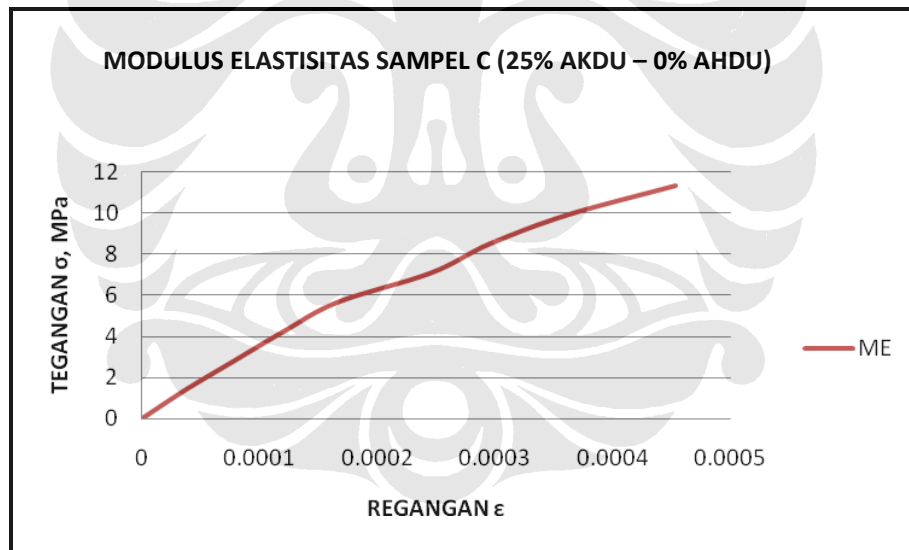
Grafik C.9 Tegangan vs regangan sampel B (0% AKDU – 25% AHDU)



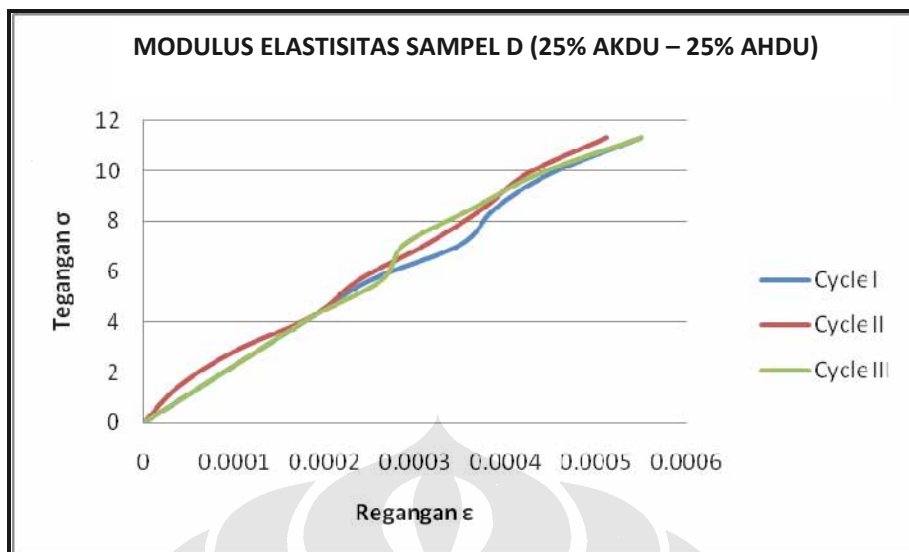
Grafik C.10 Tegangan vs regangan sampel B (0% AKDU – 25% AHDU) rata-rata



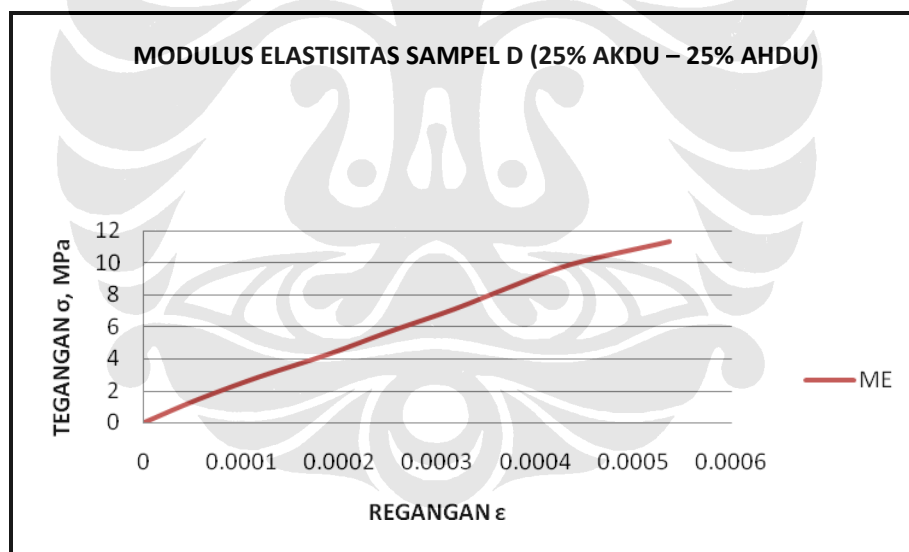
Grafik C.11 Tegangan vs regangan sampel C (25% KDU – 0% HDU)



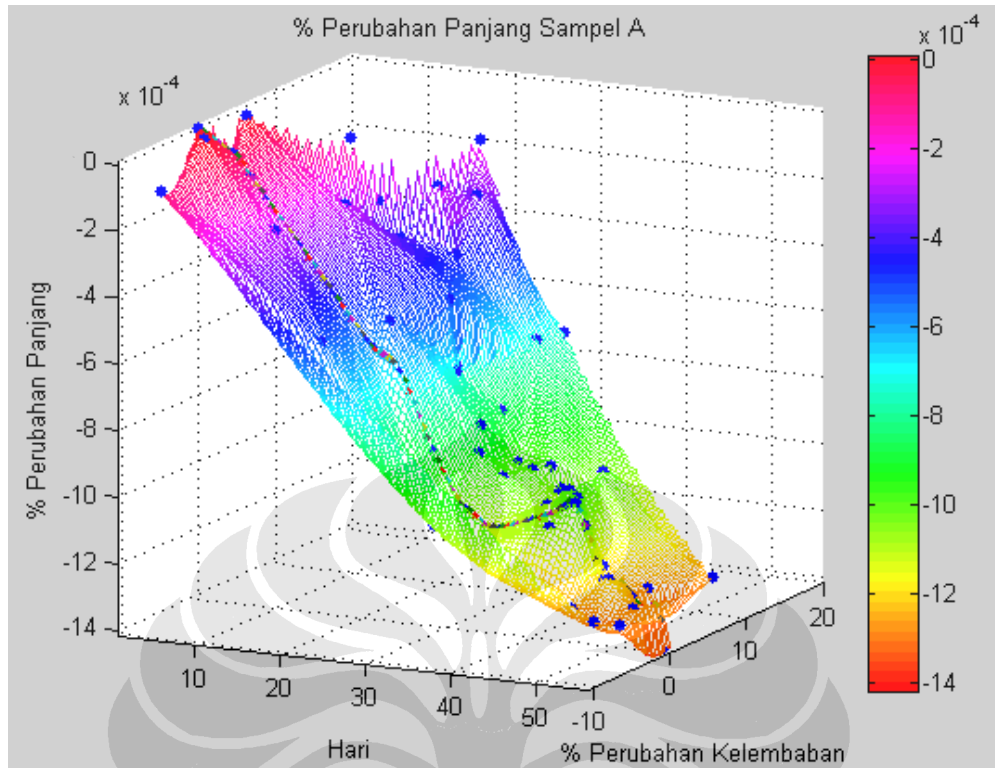
Grafik C.12 Tegangan vs regangan sampel C (25% KDU – 0% HDU) rata-rata



Grafik C.13 Tegangan vs regangan sampel D (25% KDU –25% HDU)



Grafik C.14 Tegangan vs regangan sampel D (25% KDU –25% HDU) rata-rata



**Grafik C.15** Perubahan panjang versus perubahan kelembaban pada sampel A

Grafik C.15 didapat dari program MATLAB version 7.1, dengan perintah:

```
load data.mat;
xlin = linspace(min(x),max(x),100);
ylin = linspace(min(y),max(y),100);
[X,Y] = meshgrid(xlin,ylin);
Z = griddata(x,y,z,X,Y,'cubic');
Y0 = zeros(100);
Z0 = griddata(x,y,z,X,Y0,'cubic');
mesh(X,Y,Z) %interpolated
axis tight; hold on
plot3(x,y,z, '.', 'MarkerSize',15) %nonuniform
plot3(X,Y0,Z0, '.', 'MarkerSize',5)
hold off
figure
mesh(X,Y0,Z0)
colormap hsv
colorbar
```