

BAB VI

KESIMPULAN DAN SARAN

6.1. Kesimpulan

Berdasarkan hasil pengujian, analisis data, dan pembahasan, maka dapat ditarik beberapa kesimpulan sebagai berikut :

1. Nilai kuat tekan beton serat SCC SS 65, SS 70, dan SS 75 secara berturut-turut adalah 45,9537 MPa, 44,7985 MPa, dan 62,7608 MPa. Hasil tertinggi terdapat pada panjang 75mm. Sedangkan pada nilai kuat tekan beton serat non SCC SN 65, SN 70, dan SN 75 secara berturut-turut adalah 34,7009 Mpa, 38,9310 MPa, dan 32,1054 MPa. Nilai kuat tekan tertinggi pada beton serat non SCC terdapat pada panjang 70mm. Pada pengujian kuat tekan beton ini baik dalam penambahan kawat sepanjang 65 mm, 70 mm, maupun 75 mm semuanya mengalami peningkatan. Besar peningkatannya secara berurutan adalah 32,4278 %, 15,0713 %, dan 95,4835 % dari beton serat non SCC.
2. Kuat tekan beton serat SCC umur 28 hari bila dibandingkan dengan hasil pengujian kua tekan beton SCC non serat (Lianasari, 2011) menunjukkan bahwa beton SCC dengan penambahan serat 65 mm, 70 mm dan 75 mm mengalami peningkatan. Besar peningkatan secara berurutan adalah 32,0509 %, 28,7313 % dan 80,3471 % dari beton SCC non serat.
3. Nilai kuat tarik belah beton serat SCC SS 65, SS 70, dan SS 75 secara berturut-turut adalah 4,2609 MPa, 4,8146 MPa, dan 3,4828 MPa,. Sedangkan pada nilai kuat tarik belah beton serat non SCC SN 65, SN 70, dan SN 75

secara berturut-turut adalah 4,2487 MPa, 3,3984 MPa, dan 4,0278 MPa. Terjadi peningkatan pada penambahan serat 65 mm dan 70 mm sebesar 0,2883 % dan 41,6697 % dari beton serat non SCC. Penurunan terjadi pada penambahan serat 75 mm sebesar 13,5310 %.

4. Nilai kuat lentur beton serat SCC SB 65, SB 70, dan SB 75 secara berturut-turut adalah 5,1756 MPa, 5,5038 MPa, dan 4,5688 MPa. Sedangkan pada nilai kuat lentur beton serat non SCC BN 65, BN 70, dan, BN 75 secara berturut-turut adalah 5,3114 MPa, 5,2894 MPa, dan 6,1396 MPa. Peningkatan terjadi pada panjang serat 70 mm sebesar 4,0521%, namun pada panjang 65 mm dan 75 mm mengalami penurunan masing-masing sebesar 2,5569 % dan 25,5850 %.
5. Hasil dari modulus elastisitas rata-rata pada beton serat SCC dengan variasi panjang serat 65 mm, 70 mm, dan 75 mm berturut-turut adalah 17718, 15977, dan 17616. Nilai tertinggi ada pada beton SS65 yaitu dengan penambahan serat dengan panjang 65 mm.
6. Hasil modulus elastisitas beton serat non SCC diperoleh nilai secara berturut-turut dari 65 mm, 70 mm, 75 mm adalah 14911, 17223, dan 15880. Menunjukkan bahwa nilai tertinggi ada pada beton dengan penambahan serat 70 mm.
7. Bila dibandingkan antara hasil perhitungan secara teoritis dengan hasil dari pengujian, nilai modulus elastisitas beton mengalami perbandingan yang sangat jauh. Hal ini bisa terjadi karena adanya *human error* pada saat pengujian.

8. Penambahan kawat galvanis dapat meningkatkan mutu beton SCC menjadi beton mutu tinggi. Tetapi pada penelitian ini tidak dapat disimpulkan nilai panjang serat optimum karena hasil tidak terlihat signifikan.

6.2. Saran

Berdasarkan pengalaman yang dialami oleh peneliti pada saat pelaksanaan penelitian, maka peneliti memberikan beberapa saran yang diperlukan apabila hendak menindaklanjuti penelitian ini. Adapun saran-saran untuk penelitian selanjutnya antara lain sebagai berikut :

1. Perlunya ketelatenan saat memotong kawat galvanis agar mendapatkan panjang yang sama tiap variasi.
2. Untuk penelitian selanjutnya dapat dicoba dengan menggunakan panjang dibawah 65 mm dengan membandingkan dengan beton normal (tanpa serat) agar mengetahui panjang maksimum yang baik untuk digunakan.
3. Untuk penelitian selanjutnya diusahakan untuk dapat membagi kawat secara merata pada tiap benda uji. Dan pada saat memasukkan dalam molen lebih hati-hati agar kawat tidak menggumpal pada satu tempat.
4. Pentingnya mengetahui cara menguji nilai *slump flow* agar syarat nilai tercapai dan jangan lupa untuk mencatat setiap hasil yang diperoleh selama proses pengerjaan.
5. Pentingnya mempelajari terlebih dahulu cara untuk menggunakan alat uji, guna memudahkan pada saat pengujian.

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A. PENGUJIAN BAHAN

A.1. PEMERIKSAAN GRADASI BESAR BUTIRAN PASIR

Bahan : Pasir
Asal : Kali Progo
Diperiksa : 12 Mei 2015

DAFTAR AYAKAN

| No. Saringan | Sisa Ayakan (gram) | | | Sisa Ayakan (%) | Jumlah Sisa Ayakan (%) | Jumlah yang Melalui Ayakan |
|--------------|-----------------------|----------------------------------|-----------------|-----------------|------------------------|----------------------------|
| | Berat Saringan (gram) | Berat Saringan + Tertahan (gram) | Jumlah Tertahan | | | |
| 3/8" | 545,93 | 545,96 | 0,03 | 0,003 | 10 | 0,003 |
| 4 | 532,99 | 550,65 | 17,66 | 1,766 | 23 | 1,769 |
| 8 | 327,72 | 347,7 | 19,98 | 1,998 | 51 | 3,767 |
| 30 | 425,9 | 484,9 | 59 | 5,9 | 386 | 9,667 |
| 50 | 293,68 | 352,95 | 59,27 | 5,927 | 752 | 15,594 |
| 100 | 374,7 | 987,23 | 612,53 | 61,253 | 986 | 76,847 |
| 200 | 285,19 | 437,98 | 152,79 | 15,279 | 998 | 92,126 |
| Pan | 277,79 | 298,16 | 20,37 | 2,037 | 1000 | 94,163 |
| Total | | | 1000 | | 293,933 | |

$$\text{Modulus halus butir} = \frac{293,933}{100} = 2,94$$

Kesimpulan: MHB pasir $2,3 < 2,94 < 3,1$ Syarat terpenuhi (OK)



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A.2. PEMERIKSAAN BERAT JENIS DAN PENYERAPAN PASIR

Bahan : Pasir
Asal : Kali Progo
Diperiksa : 14 Mei 2015

| | Nomor Pemeriksaan | I |
|---|--|-------------|
| A | Berat Contoh Jenuh Kering Permukaan (SSD) (V) | 500 gram |
| B | Berat Contoh Kering (A) | 467,19 gram |
| C | Jumlah Air (W) | 307 Cc |
| E | Berat Jenis <i>Bulk</i> = $\frac{(A)}{(V - W)}$ | 2,421 |
| F | BJ Jenuh Kering Permukaan (SSD) = $\frac{(500)}{(V - W)}$ | 2,591 |
| G | Berat Jenis Semu (<i>Apparent</i>) = $\frac{(A)}{(V - W) - (500 - A)}$ | 2,916 |
| H | Penyerapan (<i>Absorption</i>) = $\frac{(500 - A)}{(A)} \times 100 \%$ | 7,023% |

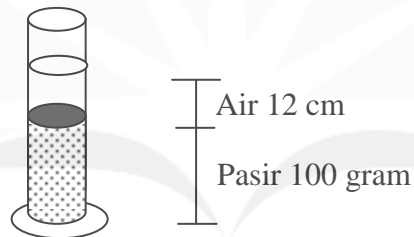


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A.3. PEMERIKSAAN KANDUNGAN LUMPUR DALAM PASIR

- I. Waktu Pemeriksaan: 14 Mei 2015
- II. Bahan
 - a. Pasir kering tungku, Asal : Kali Progo, Berat: 100 gram
 - b. Air jernih asal : LSBB Prodi TS FT-UAJY
- III. Alat
 - a. Gelas ukur, ukuran: 250 cc
 - b. Timbangan
 - c. Tungku (*oven*), suhu dibuat antara 105-110°C
 - d. Air tetap jernih setelah 5 kali pengocokan
 - e. Pasir+piring masuk tungku tanggal 14 Mei jam 09.48 WIB
- IV. Sketsa



- V. Hasil
- Setelah pasir keluar tungku tanggal 15 Mei jam 10.00 WIB

- a. Berat piring+pasir = 223,2 gram
- b. Berat piring kosong = 123,5 gram
- c. Berat pasir = 99,7 gram

$$\text{Kandungan Lumpur} = \frac{100 - 99,7}{100} \times 100\% \\ = 0,3 \%$$

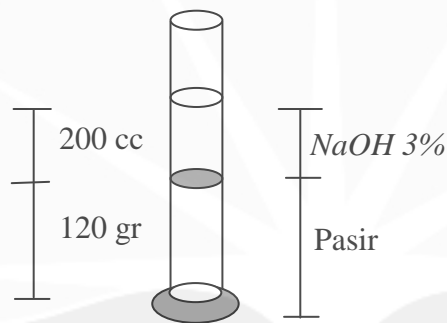


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A.4. PEMERIKSAAN KANDUNGAN ZAT ORGANIK DALAM PASIR

- I. Waktu Pemeriksaan: 14 Mei 2015
- II. Bahan
 - a. Pasir kering tungku, Asal: Kali Progo, Volume: 120 gram
 - b. Larutan NaOH 3%
- III. Alat
Gelas ukur, ukuran: 250cc
- IV. Sketsa



- V. Hasil
Setelah didiamkan selama 24 jam, warna larutan di atas pasir sesuai dengan warna *Gardner Standard Color* No. 8.



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A.5. PEMERIKSAAN GRADASI BESAR BUTIRAN *SPLIT*

Bahan : *Split*
Asal : Clereng
Diperiksa : 16 Mei 2014

DAFTAR AYAKAN

| No. Saringan | Berat Saringan (gram) | Berat Saringan + Tertahan (gram) | Berat Tertahan (gram) | Σ Berat Tertahan (gram) | Persentase Berat Tertahan (%) | Persentase Lolos (%) |
|--------------|-----------------------|----------------------------------|-----------------------|-------------------------|-------------------------------|----------------------|
| 3/4" | 559 | 559 | 0 | 0 | 0 | 100 |
| 1/2" | 462 | 508 | 46 | 46 | 4.6 | 95.4 |
| 3/8" | 547 | 955 | 408 | 454 | 45.4 | 59.2 |
| 4 | 416 | 935 | 519 | 973 | 97.3 | 2.7 |
| 8 | 329 | 342 | 13 | 986 | 98.6 | 1.4 |
| 30 | 295 | 297 | 2 | 988 | 98.8 | 1.2 |
| 50 | 294 | 295 | 1 | 989 | 98.9 | 1.1 |
| 100 | 286 | 289 | 3 | 992 | 99.2 | 0.8 |
| 200 | 339 | 342 | 3 | 995 | 99.5 | 0.5 |
| Pan | 378 | 383 | 5 | 1000 | 100 | 0 |
| Total | | | 1000 | | 642.3 | |

$$\text{Modulus halus butir} = \frac{642,3}{100} = 6,423$$

Kesimpulan: MHB *split* $6 < 6,423 < 7,1$ Syarat terpenuhi (OK)



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A.6. PEMERIKSAAN BERAT JENIS DAN PENYERAPAN *SPLIT*

Bahan : Batu Pecah (*Split*)
Asal : Clereng
Diperiksa : 16 Mei 2015

| | Nomor Pemeriksaan | I |
|---|--|--------------|
| A | Berat Contoh Kering | 1000,58 gram |
| B | Berat Contoh Jenuh Kering Permukaan (SSD) | 1012,96 gram |
| C | Berat Contoh Dalam Air | 624 gram |
| D | Berat Jenis <i>Bulk</i> = $\frac{(A)}{(B) - (C)}$ | 2,561 |
| E | BJ Jenuh Kering Permukaan (SSD) = $\frac{(B)}{(B) - (C)}$ | 2,604 |
| F | Berat Jenis Semu (<i>Apparent</i>) = $\frac{(A)}{(A) - (C)}$ | 2,677 |
| G | Penyerapan (<i>Absorption</i>) = $\frac{(B) - (A)}{(A)} \times 100 \%$ | 0,0169% |



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A.7. PEMERIKSAAN LOS ANGELES ABRASION TEST

Bahan : Agregat kasar
Asal : Kali Progo
Diperiksa : 20 April 2015

| Gradasi Saringan | | Nomor Contoh |
|------------------|-----------------|------------------------------------|
| | | I |
| <i>Lolos</i> | <i>Tertahan</i> | <i>Berat Masing-Masing Agregat</i> |
| $\frac{3}{4}$ " | $\frac{1}{2}$ " | 2500 gram |
| $\frac{1}{2}$ " | $\frac{3}{8}$ " | 2500 gram |

| Nomor Contoh | I |
|--|------------|
| Berat sebelumnya (A) | 5000 gram |
| Berat sesudah diayak saringan No. 12 (B) | 35722 gram |
| Berat sesudah (A)-(B) | 1428 gram |
| Keausan = $\frac{(A)-(B)}{(A)} \times 100\%$ | 28,56% |
| Keausan Rata-rata | 28,56% |



B. PERHITUNGAN *MIX DESIGN*

A. Data Bahan

1. Bahan Agregat Halus (pasir) : Kali Progo, Kulon Progo
2. Bahan Agregat Kasar (Krikil) : Kali Clereng, Kulon Progo
3. Jenis Semen : Semen Komposit, Merk Holcim

B. Data Specific Gravity

1. Specific Gravity Agregat Halus (pasir) : 2,591
2. Specific Gravity Agregat Kasar (krikil) : 2,604

C. Hitungan

1. Kuat tekan beton yang diisyaratkan (f'_c) pada umur 28 hari.
 $f'_c = 30 \text{ Mpa}$
2. Menentukan nilai deviasi standard berdasarkan tingkat mutu pengendalian pelaksanaan pencampuran.
3. Nilai margin ditentukan sebesar 12 Mpa karena jumlah benda uji yang kurang dari 15 buah.
4. Menetapkan kuat tekan beton rata-rata yang direncanakan :
 $f'_c = f'_c + m = 30 + 12 = 42 \text{ Mpa}$
5. Menentukan Jenis Semen
Jenis Semen Serbaguna dari *Holcim*, bisa digunakan untuk segala pekerjaan konstruksi umum seperti pekerjaan beton, pemasangan, bata, selokan, paving block, pracetak, dll. Oleh karena itu semen *Holcim* Serbaguna setara dengan Tipe I pada merk semen lainnya.
6. Menetapkan Jenis Agregat :
Agregat Halus : Pasir Alam
Agregat Kasar : Batu Pecah
7. Menetapkan faktor air semen, berdasarkan jenis semen yang dipakai, dan kuat tekan rata-rata silinder beton yang direncanakan pada umur tertentu.
Direncanakan sebesar 0,39



8. Menetapkan faktor air semen maksimum.

Berdasarkan Tabel 3 SK SNI T-15-1990-03, untuk beton dalam ruangan bangunan sekeliling non korosif, benton diluar ruangan bangunan terlindung dari hujan dan terik matahari langsung.

Fas Maksimum = 0,6

Bandingkan dengan no.7 ,dipakai yang terkecil. Jadi digunakan fas 0,39

9. Menetapkan nilai “Slump”

Digunakan nilai “Slump” dengan nilai ± 10 cm

10. Menetapkan besar butir agregat maksimum 10 mm

11. Menetapkam jumlah air yang diperlukan tiap m³ beton.

- Ukuran Maksimum 10 mm
- Nilai “Slump” 75mm – 150 mm

$$\begin{aligned} A &= (0,67 \times Ah) + (0,33 \times Ak) \\ &= (0,67 \times 225) + (0,33 \times 250) \\ &= 233,25 \text{ ltr} \end{aligned}$$

Dengan :

Ah : Jumlah air yang dibutuhkan menurut jenis agregat halus nya.

Ak : Jumlah air yang dibutuhkan menurut jenis agregat kasarnya.

12. Menghitung berat semen yang diperlukan

$$\text{Per m}^3 \text{ beton} = (A / \text{Fas}) = 233,25 / 0,39 = 598,0789 \text{ kg}$$

13. Keperluan semen minimum

Berdasarkan tabel Persyaratan fas maksimum dan semen minimum (kg/m³) untuk berbagai pembetonan dan lingkungan khusus. (SNI-T-15-1990-03)

14. Jumlah semen yang dipakai adalah 598,1 kg

15. Penyesuaian jumlah air atau fas 0,39

16. Penentuan daerah gradasi agregat halus

(Grafik 3 – 6 SK SNI-T-15-1990-03)



17. Perbandingan agregat halus dan kasar.

(Grafik 10 – 12 SK-SNI-T-15-1990-03)

- Ukuran maksimum 10 mm
- Nilai “Slump” 75 – 150 mm
- Fas 0,39
- Jenis gradasi pasir no.2 Grafik SK SNI-T-15-1990-03

Sehingga diperoleh proporsi pasir 50% dan kerikil 50%

18. Berat jenis agregat campuran :

$$\begin{aligned} &= (P/100) \times \text{BJ Agregat Halus} + (K/100) \times \text{BJ Agregat Kasar} \\ &= ((50/100) \times 2,591) + ((50/100) \times 2,604) \\ &= 2,5975 \text{ kg/m}^3 \end{aligned}$$

P : Persen agregat halus terhadap agregat campuran

K : Persen agregat kasar terhadap agregat campuran

19. Berat jenis beton

Grafik 13 SK SNI-T-15-1990-03, diperoleh hasil 2325 kg/m³

20. Keperluan agregat campuran :

$$\begin{aligned} &= \text{Berat beton tiap m}^3 - \text{Keperluanair dan semen} \\ &= 2325 - (233,25 + 598,0789) \\ &= 1493,6711 \text{ kg/m}^3 \end{aligned}$$

21. Menghitung berat agregat halus :

$$\begin{aligned} \text{Berat agregat halus} &= (\% \text{ agregat halus}) \times (\text{berat agregat campuran}) \\ &= (50\% \times 1493,6711 \text{ kg/m}^3) \\ &= 746,8356 \text{ kg/m}^3 \end{aligned}$$

22. Menghitung berat agregat kasar :

$$\begin{aligned} \text{Berat agregat kasar} &= (\text{hasil no.20} - \text{hasil no.21}) \\ &= (1493,6711 \text{ kg/m}^3 - 746,8356 \text{ kg/m}^3) \\ &= 746,8355 \text{ kg/m}^3 \end{aligned}$$



23. Kebutuhan bahan untuk 1 m³ beton normal dengan fas 0,39

| | |
|---------|--------------------------------|
| Air | = 233,25 liter |
| Semen | = 598,1 kg |
| Pasir | = 746,8356 kg |
| Kerikil | = 746,8355 kg |
| SP | = 1,5 % x 598,1 = 8,9712 kg |
| Zeolit | = 10 % x 598,0789 = 59,8079 kg |

Setelah diperoleh kebutuhan bahan pada beton normal, penambahan serat peneliti mengacu pada mix design menurut Bambang Suhendro mengenai beton berserat.

Nilai yang diambil :

$$W/(c + F) = 0,39 \%$$

$$SP/c + F = 1,5 \%$$

$$F/c + F = 0,1$$

$$(s+g)/(c+F) = 2,27$$

$$s/g = 1$$

Keterangan :

C = semen

S = pasir

g = kerikil

F = Zeolit

Sp = Superplasticizer

W = air

Koefisien adukan =

$$K = \frac{1}{(1 - F/(c + F))} = \frac{1}{1 - 0,1} = 1,1111$$



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$$\begin{aligned}F/c &= K (F/c + F) &&= 0,1111 \\W/c &= K (W/(c + F)) &&= 0,4333 \\SP/c &= K (SP/c+F) &&= 1,667 \%\end{aligned}$$

$$(s+g)/c = K (s+g/c+F) = 2,5222$$

Maka :

$$C = \frac{1 - V_y}{\frac{F/c}{2200} + \frac{1}{3150} + \frac{W/c}{1000} + \frac{SP/c}{1000} + \frac{(S+g)/c}{2652}} = 562,4691 \text{ kg}$$

$$\begin{aligned}F &= 0,1111 (562,4691) &&= 62,4903 \text{ kg} \\W &= 0,4333 (562,4691) &&= 243,4903 \text{ kg} \\SP &= 1,667\% (562,4691) &&= 9,3764 \text{ kg} \\s+g &= 2,5222 (562,4691) &&= 1418,6596\end{aligned}$$

$$\begin{aligned}s/(c + g) &= s/g / (s/g + 1) \\&= 1 / (1+1) \\&= 0,5\end{aligned}$$

$$\begin{aligned}S &= 0,5 (1418,6596) &&= 709,3298 \text{ kg} \\g &= 1418,6595 - 709,3298 &&= 709,3298 \text{ kg}\end{aligned}$$

$$\text{volume 3 silinder} = 0,0159 \text{ m}^3$$

$$\text{volume 3 balok} = 0,015 \text{ m}^3$$



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Kebutuhan Bahan 3 silinder

| | Kebutuhan Bahan | faktor pengaman | Kebutuhan Total (kg) |
|---------|-----------------|-----------------|----------------------|
| fly ash | 0,9936 | 1,3 | 1,2917 |
| air | 3,8751 | 1,3 | 5,0376 |
| SP | 0,1491 | 1,3 | 0,1938 |
| semen | 8,9433 | 1,3 | 11,6263 |
| pasir | 11,2783 | 1,3 | 14,6618 |
| kerikil | 11,2783 | 1,3 | 14,6618 |
| kawat | 0,2374 | 1,3 | 0,3086 |

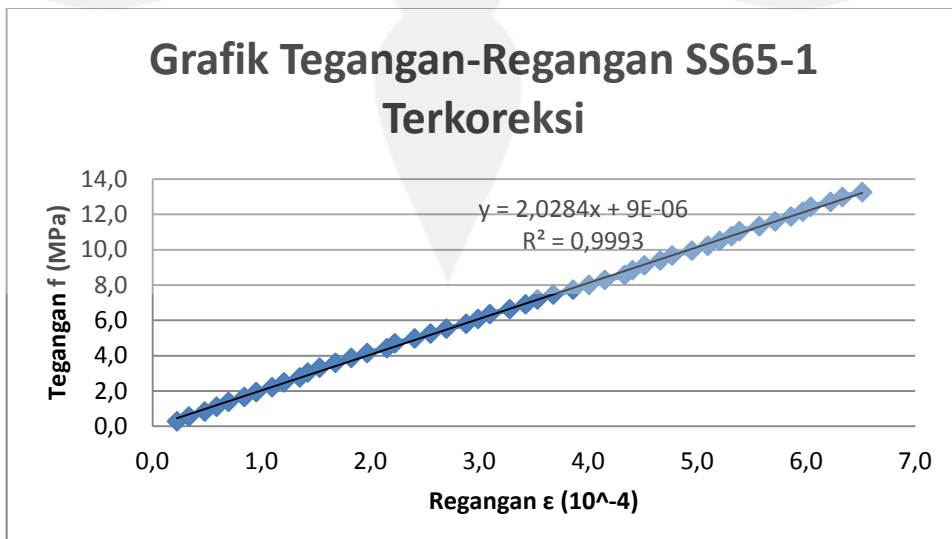
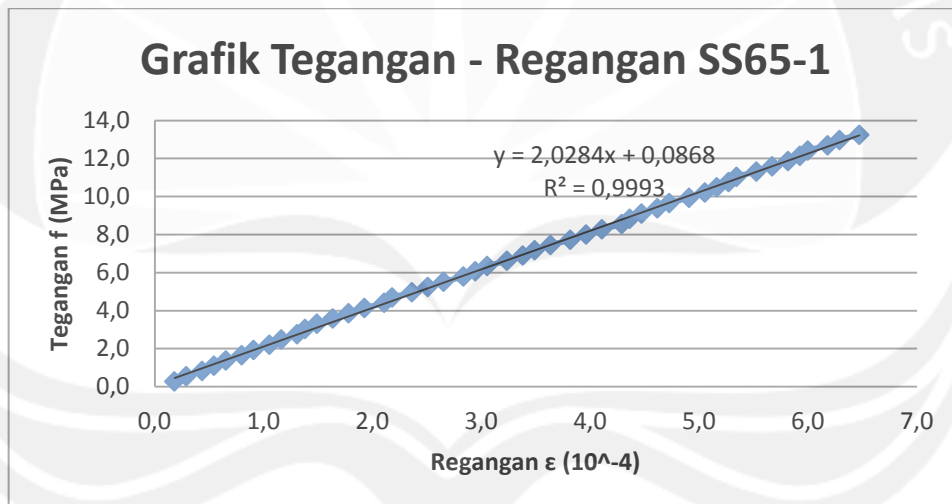
Kebutuhan Bahan 3 Balok

| | Kebutuhan Bahan | faktor pengaman | Kebutuhan Total (kg) |
|---------|-----------------|-----------------|----------------------|
| fly ash | 0,9374 | 1,3 | 1,2186 |
| air | 3,6558 | 1,3 | 4,7525 |
| SP | 0,1406 | 1,3 | 0,1828 |
| semen | 8,437 | 1,3 | 10,9681 |
| pasir | 10,6399 | 1,3 | 13,8319 |
| kerikil | 10,6399 | 1,3 | 13,8319 |
| kawat | 0,2239 | 1,3 | 0,2911 |



F. PENGUJIAN MODULUS ELASTISITAS

| | | | | |
|------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 65 - 1 | | |
| D rata - rata | = | 150,40 | mm | |
| H rata - rata | = | 300,10 | mm | |
| BERAT | = | 12527 | gram | = 12,527 kg |
| BERAT JENIS | = | 2349,6086 | kg/m ³ | |
| P (BEBAN MAKS) | = | 840 | KN | = 840000 N |
| Po | = | 137,5 | mm | |
| LA rata - rata | = | 17765,8321 | mm ² | |
| KUAT TEKAN | = | 47,2818 | Mpa | |
| 0,25 F _{maks} | = | 11,8204 | | |
| ANGKA KOREKSI | = | -0,0428 | | |
| MODULUS ELASTISITAS | = | 20284 | | |
| Ec = 4700√f'c | = | 32318,01841 | | |





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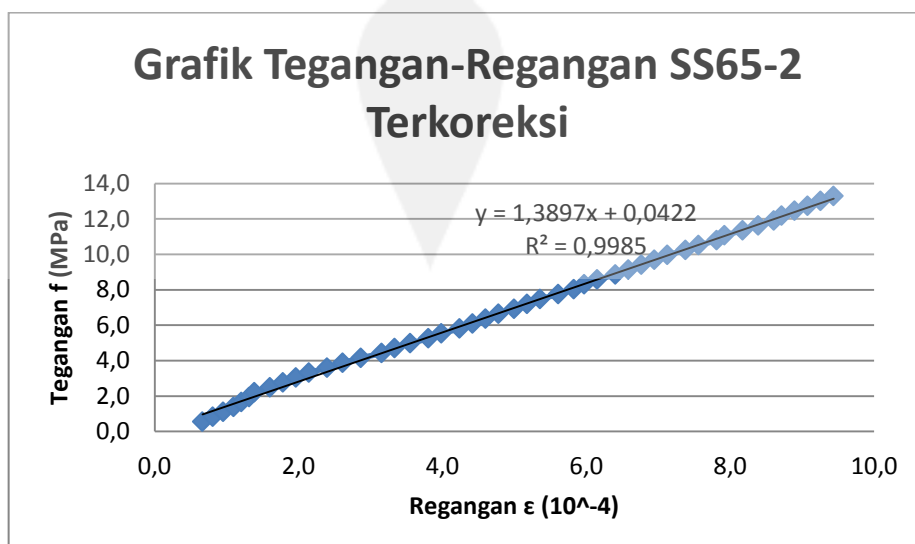
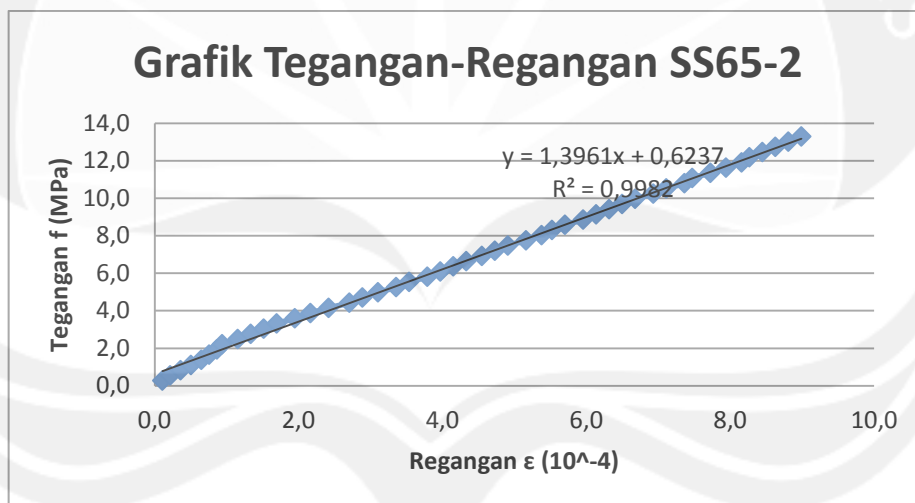
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2760 | 0,1818 | 0,2246 |
| 1000 | 9806,7100 | 8 | 0,8 | 0,4000 | 0,5520 | 0,2909 | 0,3337 |
| 1500 | 14710,0650 | 12 | 1,2 | 0,6000 | 0,8280 | 0,4364 | 0,4792 |
| 2000 | 19613,4200 | 15 | 1,5 | 0,7500 | 1,1040 | 0,5455 | 0,5882 |
| 2500 | 24516,7750 | 18 | 1,8 | 0,9000 | 1,3800 | 0,6545 | 0,6973 |
| 3000 | 29420,1300 | 22 | 2,2 | 1,1000 | 1,6560 | 0,8000 | 0,8428 |
| 3500 | 34323,4850 | 25 | 2,5 | 1,2500 | 1,9320 | 0,9091 | 0,9519 |
| 4000 | 39226,8400 | 29 | 2,9 | 1,4500 | 2,2080 | 1,0545 | 1,0973 |
| 4500 | 44130,1950 | 32 | 3,2 | 1,6000 | 2,4840 | 1,1636 | 1,2064 |
| 5000 | 49033,5500 | 36 | 3,6 | 1,8000 | 2,7600 | 1,3091 | 1,3519 |
| 5500 | 53936,9050 | 38 | 3,8 | 1,9000 | 3,0360 | 1,3818 | 1,4246 |
| 6000 | 58840,2600 | 41 | 4,1 | 2,0500 | 3,3120 | 1,4909 | 1,5337 |
| 6500 | 63743,6150 | 45 | 4,5 | 2,2500 | 3,5880 | 1,6364 | 1,6792 |
| 7000 | 68646,9700 | 49 | 4,9 | 2,4500 | 3,8640 | 1,7818 | 1,8246 |
| 7500 | 73550,3250 | 53 | 5,3 | 2,6500 | 4,1400 | 1,9273 | 1,9701 |
| 8000 | 78453,6800 | 58 | 5,8 | 2,9000 | 4,4160 | 2,1091 | 2,1519 |
| 8500 | 83357,0350 | 60 | 6 | 3,0000 | 4,6920 | 2,1818 | 2,2246 |
| 9000 | 88260,3900 | 65 | 6,5 | 3,2500 | 4,9680 | 2,3636 | 2,4064 |
| 9500 | 93163,7450 | 69 | 6,9 | 3,4500 | 5,2440 | 2,5091 | 2,5519 |
| 10000 | 98067,1000 | 73 | 7,3 | 3,6500 | 5,5200 | 2,6545 | 2,6973 |
| 10500 | 102970,4550 | 78 | 7,8 | 3,9000 | 5,7960 | 2,8364 | 2,8792 |
| 11000 | 107873,8100 | 81 | 8,1 | 4,0500 | 6,0720 | 2,9455 | 2,9882 |
| 11500 | 112777,1650 | 84 | 8,4 | 4,2000 | 6,3480 | 3,0545 | 3,0973 |
| 12000 | 117680,5200 | 89 | 8,9 | 4,4500 | 6,6240 | 3,2364 | 3,2792 |
| 12500 | 122583,8750 | 93 | 9,3 | 4,6500 | 6,9000 | 3,3818 | 3,4246 |
| 13000 | 127487,2300 | 96 | 9,6 | 4,8000 | 7,1760 | 3,4909 | 3,5337 |
| 13500 | 132390,5850 | 100 | 10 | 5,0000 | 7,4520 | 3,6364 | 3,6792 |
| 14000 | 137293,9400 | 105 | 10,5 | 5,2500 | 7,7280 | 3,8182 | 3,8610 |
| 14500 | 142197,2950 | 109 | 10,9 | 5,4500 | 8,0040 | 3,9636 | 4,0064 |
| 15000 | 147100,6500 | 113 | 11,3 | 5,6500 | 8,2800 | 4,1091 | 4,1519 |
| 15500 | 152004,0050 | 118 | 11,8 | 5,9000 | 8,5560 | 4,2909 | 4,3337 |
| 16000 | 156907,3600 | 120 | 12 | 6,0000 | 8,8320 | 4,3636 | 4,4064 |
| 16500 | 161810,7150 | 123 | 12,3 | 6,1500 | 9,1080 | 4,4727 | 4,5155 |
| 17000 | 166714,0700 | 127 | 12,7 | 6,3500 | 9,3840 | 4,6182 | 4,6610 |
| 17500 | 171617,4250 | 130 | 13 | 6,5000 | 9,6600 | 4,7273 | 4,7701 |
| 18000 | 176520,7800 | 135 | 13,5 | 6,7500 | 9,9360 | 4,9091 | 4,9519 |
| 18500 | 181424,1350 | 139 | 13,9 | 6,9500 | 10,2120 | 5,0545 | 5,0973 |
| 19000 | 186327,4900 | 142 | 14,2 | 7,1000 | 10,4880 | 5,1636 | 5,2064 |
| 19500 | 191230,8450 | 145 | 14,5 | 7,2500 | 10,7640 | 5,2727 | 5,3155 |
| 20000 | 196134,2000 | 147 | 14,7 | 7,3500 | 11,0400 | 5,3455 | 5,3882 |
| 20500 | 201037,5550 | 152 | 15,2 | 7,6000 | 11,3160 | 5,5273 | 5,5701 |
| 21000 | 205940,9100 | 156 | 15,6 | 7,8000 | 11,5920 | 5,6727 | 5,7155 |
| 21500 | 210844,2650 | 160 | 16 | 8,0000 | 11,8680 | 5,8182 | 5,8610 |
| 22000 | 215747,6200 | 163 | 16,3 | 8,1500 | 12,1440 | 5,9273 | 5,9701 |
| 22500 | 220650,9750 | 165 | 16,5 | 8,2500 | 12,4200 | 6,0000 | 6,0428 |
| 23000 | 225554,3300 | 170 | 17 | 8,5000 | 12,6960 | 6,1818 | 6,2246 |
| 23500 | 230457,6850 | 173 | 17,3 | 8,6500 | 12,9720 | 6,2909 | 6,3337 |
| 24000 | 235361,0400 | 178 | 17,8 | 8,9000 | 13,2480 | 6,4727 | 6,5155 |



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| | | | | | |
|------------------------|---|------------------|-------------------|---|----------|
| NAMA SAMPLE | = | SS 65 - 2 | | | |
| D rata- rata | = | 150,13 | mm | | |
| H rata - rata | = | 300,10 | mm | | |
| BERAT | = | 12600 | gram | = | 12,6 kg |
| BERAT JENIS | = | 2371,7036 | kg/m ³ | | |
| P (BEBAN MAKS) | = | 790 | KN | = | 790000 N |
| Po | = | 138,5 | mm | | |
| LA rata - rata | = | 17702,8886 | mm ² | | |
| KUAT TEKAN | = | 44,6255 | Mpa | | |
| 0,25 F _{maks} | = | 11,1564 | | | |
| ANGKA KOREKSI | = | -0,4467 | | | |
| MODULUS ELASTISITAS | = | 13961 | | | |
| Ec = 4700√fc | = | 31397,0855 | | | |





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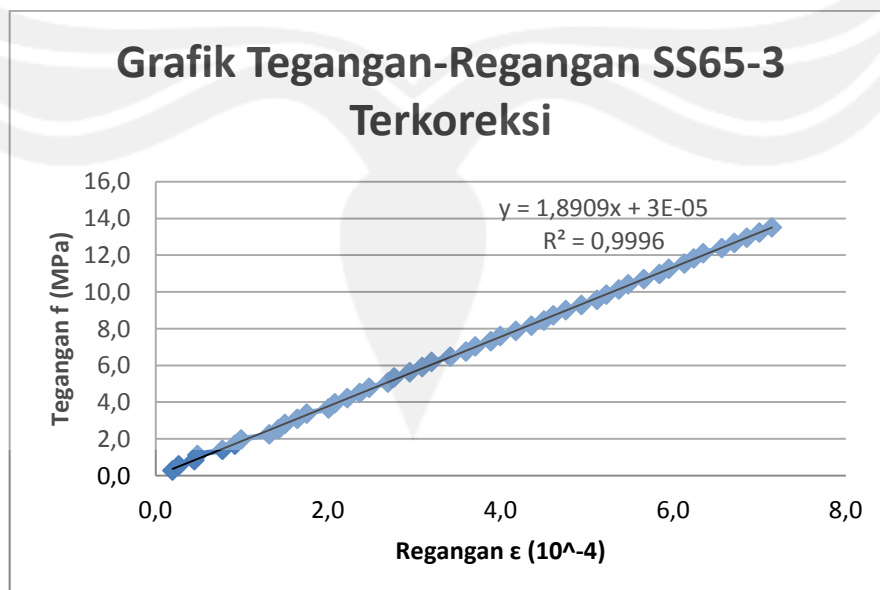
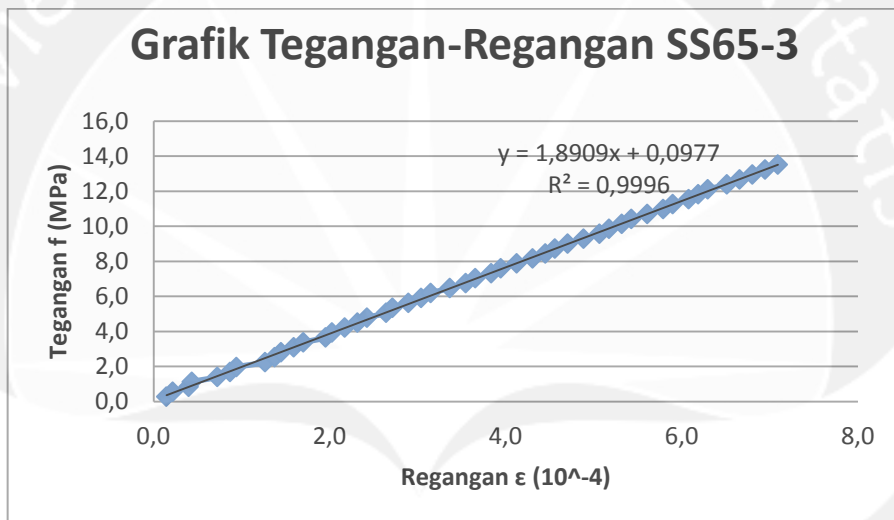
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 3 | 0,3 | 0,1500 | 0,2770 | 0,1083 | 0,5550 |
| 1000 | 9806,7100 | 6 | 0,6 | 0,3000 | 0,5540 | 0,2166 | 0,6634 |
| 1500 | 14710,0650 | 10 | 1 | 0,5000 | 0,8309 | 0,3610 | 0,8078 |
| 2000 | 19613,4200 | 14 | 1,4 | 0,7000 | 1,1079 | 0,5054 | 0,9522 |
| 2500 | 24516,7750 | 18 | 1,8 | 0,9000 | 1,3849 | 0,6498 | 1,0966 |
| 3000 | 29420,1300 | 21 | 2,1 | 1,0500 | 1,6619 | 0,7581 | 1,2049 |
| 3500 | 34323,4850 | 24 | 2,4 | 1,2000 | 1,9389 | 0,8664 | 1,3132 |
| 4000 | 39226,8400 | 26 | 2,6 | 1,3000 | 2,2158 | 0,9386 | 1,3854 |
| 4500 | 44130,1950 | 32 | 3,2 | 1,6000 | 2,4928 | 1,1552 | 1,6020 |
| 5000 | 49033,5500 | 37 | 3,7 | 1,8500 | 2,7698 | 1,3357 | 1,7825 |
| 5500 | 53936,9050 | 42 | 4,2 | 2,1000 | 3,0468 | 1,5162 | 1,9630 |
| 6000 | 58840,2600 | 47 | 4,7 | 2,3500 | 3,3238 | 1,6968 | 2,1435 |
| 6500 | 63743,6150 | 54 | 5,4 | 2,7000 | 3,6007 | 1,9495 | 2,3962 |
| 7000 | 68646,9700 | 60 | 6 | 3,0000 | 3,8777 | 2,1661 | 2,6128 |
| 7500 | 73550,3250 | 67 | 6,7 | 3,3500 | 4,1547 | 2,4188 | 2,8655 |
| 8000 | 78453,6800 | 75 | 7,5 | 3,7500 | 4,4317 | 2,7076 | 3,1543 |
| 8500 | 83357,0350 | 80 | 8 | 4,0000 | 4,7087 | 2,8881 | 3,3348 |
| 9000 | 88260,3900 | 86 | 8,6 | 4,3000 | 4,9856 | 3,1047 | 3,5514 |
| 9500 | 93163,7450 | 93 | 9,3 | 4,6500 | 5,2626 | 3,3574 | 3,8041 |
| 10000 | 98067,1000 | 98 | 9,8 | 4,9000 | 5,5396 | 3,5379 | 3,9847 |
| 10500 | 102970,4550 | 105 | 10,5 | 5,2500 | 5,8166 | 3,7906 | 4,2374 |
| 11000 | 107873,8100 | 110 | 11 | 5,5000 | 6,0936 | 3,9711 | 4,4179 |
| 11500 | 112777,1650 | 115 | 11,5 | 5,7500 | 6,3706 | 4,1516 | 4,5984 |
| 12000 | 117680,5200 | 120 | 12 | 6,0000 | 6,6475 | 4,3321 | 4,7789 |
| 12500 | 122583,8750 | 126 | 12,6 | 6,3000 | 6,9245 | 4,5487 | 4,9955 |
| 13000 | 127487,2300 | 131 | 13,1 | 6,5500 | 7,2015 | 4,7292 | 5,1760 |
| 13500 | 132390,5850 | 136 | 13,6 | 6,8000 | 7,4785 | 4,9097 | 5,3565 |
| 14000 | 137293,9400 | 143 | 14,3 | 7,1500 | 7,7555 | 5,1625 | 5,6092 |
| 14500 | 142197,2950 | 149 | 14,9 | 7,4500 | 8,0324 | 5,3791 | 5,8258 |
| 15000 | 147100,6500 | 153 | 15,3 | 7,6500 | 8,3094 | 5,5235 | 5,9702 |
| 15500 | 152004,0050 | 158 | 15,8 | 7,9000 | 8,5864 | 5,7040 | 6,1507 |
| 16000 | 156907,3600 | 165 | 16,5 | 8,2500 | 8,8634 | 5,9567 | 6,4034 |
| 16500 | 161810,7150 | 170 | 17 | 8,5000 | 9,1404 | 6,1372 | 6,5839 |
| 17000 | 166714,0700 | 175 | 17,5 | 8,7500 | 9,4173 | 6,3177 | 6,7644 |
| 17500 | 171617,4250 | 180 | 18 | 9,0000 | 9,6943 | 6,4982 | 6,9449 |
| 18000 | 176520,7800 | 185 | 18,5 | 9,2500 | 9,9713 | 6,6787 | 7,1254 |
| 18500 | 181424,1350 | 192 | 19,2 | 9,6000 | 10,2483 | 6,9314 | 7,3782 |
| 19000 | 186327,4900 | 197 | 19,7 | 9,8500 | 10,5253 | 7,1119 | 7,5587 |
| 19500 | 191230,8450 | 204 | 20,4 | 10,2000 | 10,8022 | 7,3646 | 7,8114 |
| 20000 | 196134,2000 | 207 | 20,7 | 10,3500 | 11,0792 | 7,4729 | 7,9197 |
| 20500 | 201037,5550 | 214 | 21,4 | 10,7000 | 11,3562 | 7,7256 | 8,1724 |
| 21000 | 205940,9100 | 220 | 22 | 11,0000 | 11,6332 | 7,9422 | 8,3890 |
| 21500 | 210844,2650 | 226 | 22,6 | 11,3000 | 11,9102 | 8,1588 | 8,6056 |
| 22000 | 215747,6200 | 229 | 22,9 | 11,4500 | 12,1871 | 8,2671 | 8,7139 |
| 22500 | 220650,9750 | 234 | 23,4 | 11,7000 | 12,4641 | 8,4477 | 8,8944 |
| 23000 | 225554,3300 | 239 | 23,9 | 11,9500 | 12,7411 | 8,6282 | 9,0749 |
| 23500 | 230457,6850 | 244 | 24,4 | 12,2000 | 13,0181 | 8,8087 | 9,2554 |
| 24000 | 235361,0400 | 249 | 24,9 | 12,4500 | 13,2951 | 8,9892 | 9,4359 |



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| | | | | | |
|--------------------------------------|---|------------------|-------------------|---|-----------|
| NAMA SAMPLE | = | SS 65 - 3 | | | |
| D rata- rata | = | 148,90 | mm | | |
| H rata - rata | = | 302,73 | mm | | |
| BERAT | = | 12589 | gram | = | 12,589 kg |
| BERAT JENIS | = | 2388,0956 | kg/m ³ | | |
| P (BEBAN MAKS) | = | 940 | KN | = | 940000 N |
| Po | = | 138,2 | mm | | |
| LA rata - rata | = | 17413,2276 | mm ² | | |
| KUAT TEKAN | = | 53,9820 | Mpa | | |
| 0,25 F _{maks} | = | 13,4955 | | | |
| ANGKA KOREKSI | = | -0,0517 | | | |
| MODULUS ELASTISITAS | = | 18909 | | | |
| E _c = 4700√f _c | = | 34532,03292 | | | |





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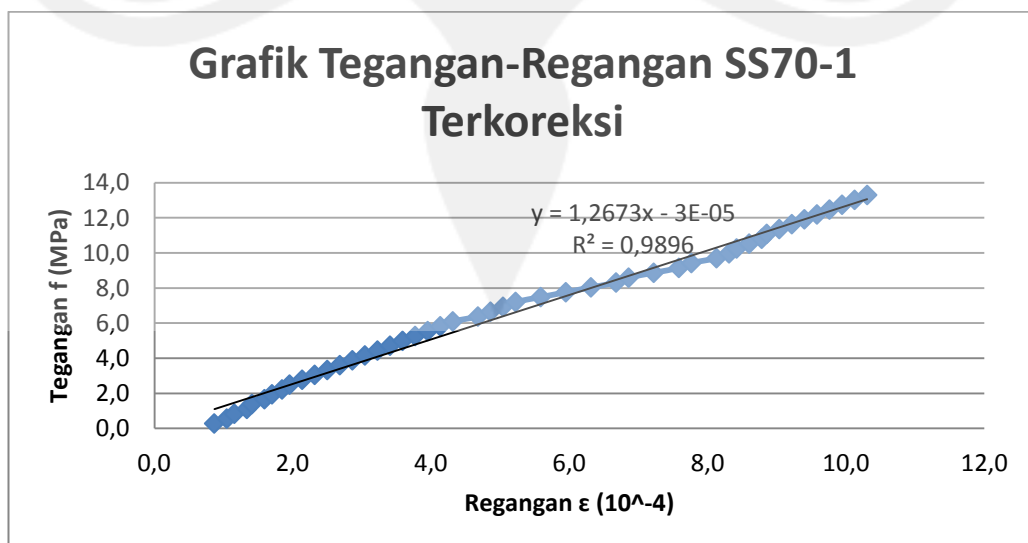
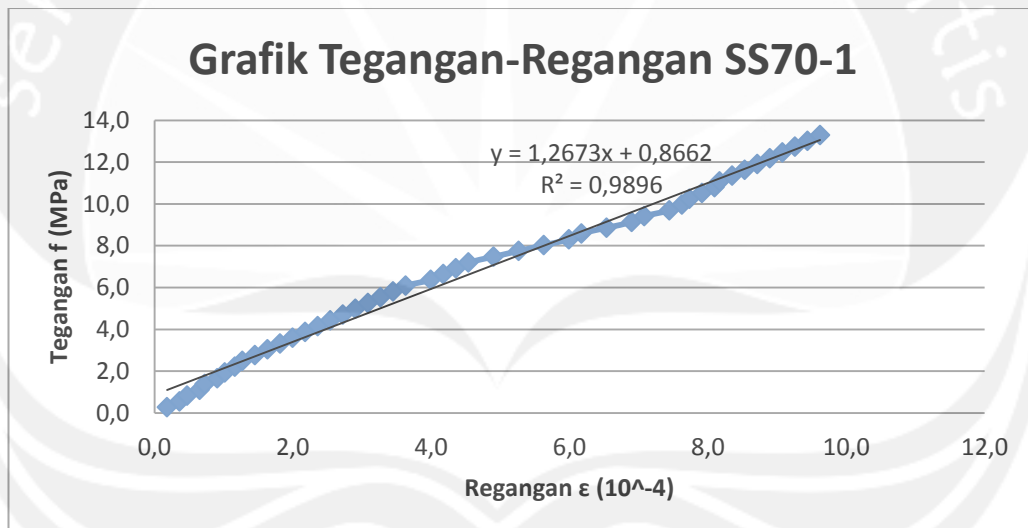
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 4 | 0,4 | 0,2000 | 0,2816 | 0,1447 | 0,1964 |
| 1000 | 9806,7100 | 6 | 0,6 | 0,3000 | 0,5632 | 0,2171 | 0,2687 |
| 1500 | 14710,0650 | 11 | 1,1 | 0,5500 | 0,8448 | 0,3980 | 0,4496 |
| 2000 | 19613,4200 | 12 | 1,2 | 0,6000 | 1,1264 | 0,4342 | 0,4858 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,4079 | 0,7236 | 0,7753 |
| 3000 | 29420,1300 | 24 | 2,4 | 1,2000 | 1,6895 | 0,8683 | 0,9200 |
| 3500 | 34323,4850 | 26 | 2,6 | 1,3000 | 1,9711 | 0,9407 | 0,9923 |
| 4000 | 39226,8400 | 35 | 3,5 | 1,7500 | 2,2527 | 1,2663 | 1,3179 |
| 4500 | 44130,1950 | 38 | 3,8 | 1,9000 | 2,5343 | 1,3748 | 1,4265 |
| 5000 | 49033,5500 | 40 | 4 | 2,0000 | 2,8159 | 1,4472 | 1,4988 |
| 5500 | 53936,9050 | 44 | 4,4 | 2,2000 | 3,0975 | 1,5919 | 1,6436 |
| 6000 | 58840,2600 | 47 | 4,7 | 2,3500 | 3,3791 | 1,7004 | 1,7521 |
| 6500 | 63743,6150 | 54 | 5,4 | 2,7000 | 3,6606 | 1,9537 | 2,0054 |
| 7000 | 68646,9700 | 56 | 5,6 | 2,8000 | 3,9422 | 2,0260 | 2,0777 |
| 7500 | 73550,3250 | 60 | 6 | 3,0000 | 4,2238 | 2,1708 | 2,2224 |
| 8000 | 78453,6800 | 64 | 6,4 | 3,2000 | 4,5054 | 2,3155 | 2,3672 |
| 8500 | 83357,0350 | 67 | 6,7 | 3,3500 | 4,7870 | 2,4240 | 2,4757 |
| 9000 | 88260,3900 | 73 | 7,3 | 3,6500 | 5,0686 | 2,6411 | 2,6928 |
| 9500 | 93163,7450 | 75 | 7,5 | 3,7500 | 5,3502 | 2,7135 | 2,7651 |
| 10000 | 98067,1000 | 80 | 8 | 4,0000 | 5,6318 | 2,8944 | 2,9460 |
| 10500 | 102970,4550 | 84 | 8,4 | 4,2000 | 5,9133 | 3,0391 | 3,0907 |
| 11000 | 107873,8100 | 87 | 8,7 | 4,3500 | 6,1949 | 3,1476 | 3,1993 |
| 11500 | 112777,1650 | 93 | 9,3 | 4,6500 | 6,4765 | 3,3647 | 3,4164 |
| 12000 | 117680,5200 | 98 | 9,8 | 4,9000 | 6,7581 | 3,5456 | 3,5973 |
| 12500 | 122583,8750 | 101 | 10,1 | 5,0500 | 7,0397 | 3,6541 | 3,7058 |
| 13000 | 127487,2300 | 106 | 10,6 | 5,3000 | 7,3213 | 3,8350 | 3,8867 |
| 13500 | 132390,5850 | 109 | 10,9 | 5,4500 | 7,6029 | 3,9436 | 3,9952 |
| 14000 | 137293,9400 | 114 | 11,4 | 5,7000 | 7,8845 | 4,1245 | 4,1761 |
| 14500 | 142197,2950 | 119 | 11,9 | 5,9500 | 8,1661 | 4,3054 | 4,3570 |
| 15000 | 147100,6500 | 123 | 12,3 | 6,1500 | 8,4476 | 4,4501 | 4,5017 |
| 15500 | 152004,0050 | 126 | 12,6 | 6,3000 | 8,7292 | 4,5586 | 4,6103 |
| 16000 | 156907,3600 | 130 | 13 | 6,5000 | 9,0108 | 4,7033 | 4,7550 |
| 16500 | 161810,7150 | 135 | 13,5 | 6,7500 | 9,2924 | 4,8842 | 4,9359 |
| 17000 | 166714,0700 | 140 | 14 | 7,0000 | 9,5740 | 5,0651 | 5,1168 |
| 17500 | 171617,4250 | 143 | 14,3 | 7,1500 | 9,8556 | 5,1737 | 5,2253 |
| 18000 | 176520,7800 | 147 | 14,7 | 7,3500 | 10,1372 | 5,3184 | 5,3700 |
| 18500 | 181424,1350 | 150 | 15 | 7,5000 | 10,4188 | 5,4269 | 5,4786 |
| 19000 | 186327,4900 | 155 | 15,5 | 7,7500 | 10,7003 | 5,6078 | 5,6595 |
| 19500 | 191230,8450 | 160 | 16 | 8,0000 | 10,9819 | 5,7887 | 5,8404 |
| 20000 | 196134,2000 | 163 | 16,3 | 8,1500 | 11,2635 | 5,8973 | 5,9489 |
| 20500 | 201037,5550 | 168 | 16,8 | 8,4000 | 11,5451 | 6,0781 | 6,1298 |
| 21000 | 205940,9100 | 171 | 17,1 | 8,5500 | 11,8267 | 6,1867 | 6,2384 |
| 21500 | 210844,2650 | 174 | 17,4 | 8,7000 | 12,1083 | 6,2952 | 6,3469 |
| 22000 | 215747,6200 | 180 | 18 | 9,0000 | 12,3899 | 6,5123 | 6,5640 |
| 22500 | 220650,9750 | 184 | 18,4 | 9,2000 | 12,6715 | 6,6570 | 6,7087 |
| 23000 | 225554,3300 | 188 | 18,8 | 9,4000 | 12,9530 | 6,8017 | 6,8534 |
| 23500 | 230457,6850 | 192 | 19,2 | 9,6000 | 13,2346 | 6,9465 | 6,9981 |
| 24000 | 235361,0400 | 196 | 19,6 | 9,8000 | 13,5162 | 7,0912 | 7,1428 |



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 Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | | | |
|------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 70 - 1 | | |
| D rata - rata | = | 150,13 | mm | |
| H rata - rata | = | 319,00 | mm | |
| BERAT | = | 12211 | gram | = 12,211 kg |
| BERAT JENIS | = | 2162,3023 | kg/m ³ | |
| P (BEBAN MAKS) | = | 690 | KN | = 690000 N |
| Po | = | 137,7 | mm | |
| LA rata - rata | = | 17702,8886 | mm ² | |
| KUAT TEKAN | = | 38,9767 | Mpa | |
| 0,25 F _{maks} | = | 9,7442 | | |
| ANGKA KOREKSI | = | -0,6835 | | |
| MODULUS ELASTISITAS | = | 12673 | | |
| Ec = 4700√f'c | = | 29342,71771 | | |





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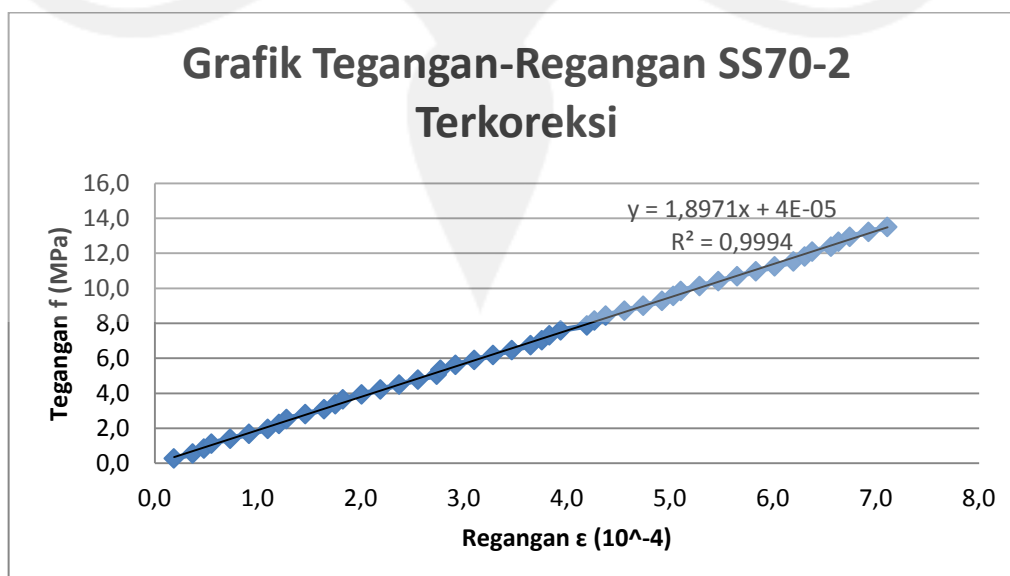
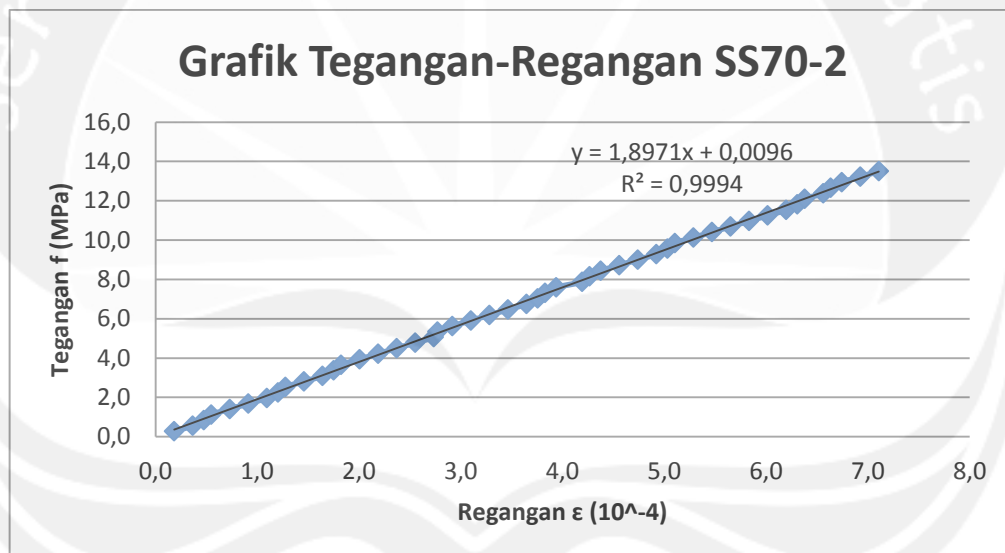
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2770 | 0,1816 | 0,8651 |
| 1000 | 9806,7100 | 10 | 1 | 0,5000 | 0,5540 | 0,3631 | 1,0466 |
| 1500 | 14710,0650 | 13 | 1,3 | 0,6500 | 0,8309 | 0,4720 | 1,1555 |
| 2000 | 19613,4200 | 18 | 1,8 | 0,9000 | 1,1079 | 0,6536 | 1,3371 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,3849 | 0,7262 | 1,4097 |
| 3000 | 29420,1300 | 25 | 2,5 | 1,2500 | 1,6619 | 0,9078 | 1,5913 |
| 3500 | 34323,4850 | 28 | 2,8 | 1,4000 | 1,9389 | 1,0167 | 1,7002 |
| 4000 | 39226,8400 | 32 | 3,2 | 1,6000 | 2,2158 | 1,1619 | 1,8454 |
| 4500 | 44130,1950 | 35 | 3,5 | 1,7500 | 2,4928 | 1,2709 | 1,9544 |
| 5000 | 49033,5500 | 40 | 4 | 2,0000 | 2,7698 | 1,4524 | 2,1359 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0468 | 1,6340 | 2,3175 |
| 6000 | 58840,2600 | 50 | 5 | 2,5000 | 3,3238 | 1,8155 | 2,4990 |
| 6500 | 63743,6150 | 55 | 5,5 | 2,7500 | 3,6007 | 1,9971 | 2,6806 |
| 7000 | 68646,9700 | 60 | 6 | 3,0000 | 3,8777 | 2,1786 | 2,8621 |
| 7500 | 73550,3250 | 65 | 6,5 | 3,2500 | 4,1547 | 2,3602 | 3,0437 |
| 8000 | 78453,6800 | 70 | 7 | 3,5000 | 4,4317 | 2,5418 | 3,2253 |
| 8500 | 83357,0350 | 75 | 7,5 | 3,7500 | 4,7087 | 2,7233 | 3,4068 |
| 9000 | 88260,3900 | 80 | 8 | 4,0000 | 4,9856 | 2,9049 | 3,5884 |
| 9500 | 93163,7450 | 85 | 8,5 | 4,2500 | 5,2626 | 3,0864 | 3,7699 |
| 10000 | 98067,1000 | 90 | 9 | 4,5000 | 5,5396 | 3,2680 | 3,9515 |
| 10500 | 102970,4550 | 95 | 9,5 | 4,7500 | 5,8166 | 3,4495 | 4,1330 |
| 11000 | 107873,8100 | 100 | 10 | 5,0000 | 6,0936 | 3,6311 | 4,3146 |
| 11500 | 112777,1650 | 110 | 11 | 5,5000 | 6,3706 | 3,9942 | 4,6777 |
| 12000 | 117680,5200 | 115 | 11,5 | 5,7500 | 6,6475 | 4,1757 | 4,8592 |
| 12500 | 122583,8750 | 120 | 12 | 6,0000 | 6,9245 | 4,3573 | 5,0408 |
| 13000 | 127487,2300 | 125 | 12,5 | 6,2500 | 7,2015 | 4,5389 | 5,2224 |
| 13500 | 132390,5850 | 135 | 13,5 | 6,7500 | 7,4785 | 4,9020 | 5,5855 |
| 14000 | 137293,9400 | 145 | 14,5 | 7,2500 | 7,7555 | 5,2651 | 5,9486 |
| 14500 | 142197,2950 | 155 | 15,5 | 7,7500 | 8,0324 | 5,6282 | 6,3117 |
| 15000 | 147100,6500 | 165 | 16,5 | 8,2500 | 8,3094 | 5,9913 | 6,6748 |
| 15500 | 152004,0050 | 170 | 17 | 8,5000 | 8,5864 | 6,1728 | 6,8563 |
| 16000 | 156907,3600 | 180 | 18 | 9,0000 | 8,8634 | 6,5359 | 7,2194 |
| 16500 | 161810,7150 | 190 | 19 | 9,5000 | 9,1404 | 6,8991 | 7,5826 |
| 17000 | 166714,0700 | 195 | 19,5 | 9,7500 | 9,4173 | 7,0806 | 7,7641 |
| 17500 | 171617,4250 | 205 | 20,5 | 10,2500 | 9,6943 | 7,4437 | 8,1272 |
| 18000 | 176520,7800 | 210 | 21 | 10,5000 | 9,9713 | 7,6253 | 8,3088 |
| 18500 | 181424,1350 | 213 | 21,3 | 10,6500 | 10,2483 | 7,7342 | 8,4177 |
| 19000 | 186327,4900 | 218 | 21,8 | 10,9000 | 10,5253 | 7,9158 | 8,5993 |
| 19500 | 191230,8450 | 223 | 22,3 | 11,1500 | 10,8022 | 8,0973 | 8,7808 |
| 20000 | 196134,2000 | 225 | 22,5 | 11,2500 | 11,0792 | 8,1699 | 8,8534 |
| 20500 | 201037,5550 | 230 | 23 | 11,5000 | 11,3562 | 8,3515 | 9,0350 |
| 21000 | 205940,9100 | 235 | 23,5 | 11,7500 | 11,6332 | 8,5330 | 9,2165 |
| 21500 | 210844,2650 | 240 | 24 | 12,0000 | 11,9102 | 8,7146 | 9,3981 |
| 22000 | 215747,6200 | 245 | 24,5 | 12,2500 | 12,1871 | 8,8962 | 9,5797 |
| 22500 | 220650,9750 | 250 | 25 | 12,5000 | 12,4641 | 9,0777 | 9,7612 |
| 23000 | 225554,3300 | 255 | 25,5 | 12,7500 | 12,7411 | 9,2593 | 9,9428 |
| 23500 | 230457,6850 | 260 | 26 | 13,0000 | 13,0181 | 9,4408 | 10,1243 |
| 24000 | 235361,0400 | 265 | 26,5 | 13,2500 | 13,2951 | 9,6224 | 10,3059 |



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| | | | | |
|--------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 70 - 2 | | |
| D rata - rata | = | 148,93 | mm | |
| H rata - rata | = | 313,53 | mm | |
| BERAT | = | 12258 | gram | = 12,258 kg |
| BERAT JENIS | = | 2244,2033 | kg/m ³ | |
| P (BEBAN MAKS) | = | 755 | KN | = 755000 N |
| Po | = | 137,2 | mm | |
| LA rata - rata | = | 17421,0249 | mm ² | |
| KUAT TEKAN | = | 43,3384 | Mpa | |
| 0,25 F _{maks} | = | 10,8346 | | |
| ANGKA KOREKSI | = | -0,0051 | | |
| MODULUS ELASTISITAS | = | 18971 | | |
| Ec = 4700√f _c | = | 30941,0098 | | |





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 Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2815 | 0,1822 | 0,1873 |
| 1000 | 9806,7100 | 10 | 1 | 0,5000 | 0,5629 | 0,3644 | 0,3695 |
| 1500 | 14710,0650 | 13 | 1,3 | 0,6500 | 0,8444 | 0,4738 | 0,4788 |
| 2000 | 19613,4200 | 15 | 1,5 | 0,7500 | 1,1258 | 0,5466 | 0,5517 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,4073 | 0,7289 | 0,7339 |
| 3000 | 29420,1300 | 25 | 2,5 | 1,2500 | 1,6888 | 0,9111 | 0,9161 |
| 3500 | 34323,4850 | 30 | 3 | 1,5000 | 1,9702 | 1,0933 | 1,0984 |
| 4000 | 39226,8400 | 33 | 3,3 | 1,6500 | 2,2517 | 1,2026 | 1,2077 |
| 4500 | 44130,1950 | 35 | 3,5 | 1,7500 | 2,5332 | 1,2755 | 1,2806 |
| 5000 | 49033,5500 | 40 | 4 | 2,0000 | 2,8146 | 1,4577 | 1,4628 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0961 | 1,6399 | 1,6450 |
| 6000 | 58840,2600 | 48 | 4,8 | 2,4000 | 3,3775 | 1,7493 | 1,7543 |
| 6500 | 63743,6150 | 50 | 5 | 2,5000 | 3,6590 | 1,8222 | 1,8272 |
| 7000 | 68646,9700 | 55 | 5,5 | 2,7500 | 3,9405 | 2,0044 | 2,0094 |
| 7500 | 73550,3250 | 60 | 6 | 3,0000 | 4,2219 | 2,1866 | 2,1916 |
| 8000 | 78453,6800 | 65 | 6,5 | 3,2500 | 4,5034 | 2,3688 | 2,3739 |
| 8500 | 83357,0350 | 70 | 7 | 3,5000 | 4,7849 | 2,5510 | 2,5561 |
| 9000 | 88260,3900 | 75 | 7,5 | 3,7500 | 5,0663 | 2,7332 | 2,7383 |
| 9500 | 93163,7450 | 76 | 7,6 | 3,8000 | 5,3478 | 2,7697 | 2,7747 |
| 10000 | 98067,1000 | 80 | 8 | 4,0000 | 5,6292 | 2,9155 | 2,9205 |
| 10500 | 102970,4550 | 85 | 8,5 | 4,2500 | 5,9107 | 3,0977 | 3,1027 |
| 11000 | 107873,8100 | 90 | 9 | 4,5000 | 6,1922 | 3,2799 | 3,2849 |
| 11500 | 112777,1650 | 95 | 9,5 | 4,7500 | 6,4736 | 3,4621 | 3,4672 |
| 12000 | 117680,5200 | 100 | 10 | 5,0000 | 6,7551 | 3,6443 | 3,6494 |
| 12500 | 122583,8750 | 103 | 10,3 | 5,1500 | 7,0365 | 3,7536 | 3,7587 |
| 13000 | 127487,2300 | 105 | 10,5 | 5,2500 | 7,3180 | 3,8265 | 3,8316 |
| 13500 | 132390,5850 | 108 | 10,8 | 5,4000 | 7,5995 | 3,9359 | 3,9409 |
| 14000 | 137293,9400 | 115 | 11,5 | 5,7500 | 7,8809 | 4,1910 | 4,1960 |
| 14500 | 142197,2950 | 117 | 11,7 | 5,8500 | 8,1624 | 4,2638 | 4,2689 |
| 15000 | 147100,6500 | 120 | 12 | 6,0000 | 8,4439 | 4,3732 | 4,3782 |
| 15500 | 152004,0050 | 125 | 12,5 | 6,2500 | 8,7253 | 4,5554 | 4,5605 |
| 16000 | 156907,3600 | 130 | 13 | 6,5000 | 9,0068 | 4,7376 | 4,7427 |
| 16500 | 161810,7150 | 135 | 13,5 | 6,7500 | 9,2882 | 4,9198 | 4,9249 |
| 17000 | 166714,0700 | 138 | 13,8 | 6,9000 | 9,5697 | 5,0292 | 5,0342 |
| 17500 | 171617,4250 | 140 | 14 | 7,0000 | 9,8512 | 5,1020 | 5,1071 |
| 18000 | 176520,7800 | 145 | 14,5 | 7,2500 | 10,1326 | 5,2843 | 5,2893 |
| 18500 | 181424,1350 | 150 | 15 | 7,5000 | 10,4141 | 5,4665 | 5,4715 |
| 19000 | 186327,4900 | 155 | 15,5 | 7,7500 | 10,6956 | 5,6487 | 5,6537 |
| 19500 | 191230,8450 | 160 | 16 | 8,0000 | 10,9770 | 5,8309 | 5,8360 |
| 20000 | 196134,2000 | 165 | 16,5 | 8,2500 | 11,2585 | 6,0131 | 6,0182 |
| 20500 | 201037,5550 | 170 | 17 | 8,5000 | 11,5399 | 6,1953 | 6,2004 |
| 21000 | 205940,9100 | 173 | 17,3 | 8,6500 | 11,8214 | 6,3047 | 6,3097 |
| 21500 | 210844,2650 | 175 | 17,5 | 8,7500 | 12,1029 | 6,3776 | 6,3826 |
| 22000 | 215747,6200 | 180 | 18 | 9,0000 | 12,3843 | 6,5598 | 6,5648 |
| 22500 | 220650,9750 | 182 | 18,2 | 9,1000 | 12,6658 | 6,6327 | 6,6377 |
| 23000 | 225554,3300 | 185 | 18,5 | 9,2500 | 12,9472 | 6,7420 | 6,7470 |
| 23500 | 230457,6850 | 190 | 19 | 9,5000 | 13,2287 | 6,9242 | 6,9293 |
| 24000 | 235361,0400 | 195 | 19,5 | 9,7500 | 13,5102 | 7,1064 | 7,1115 |

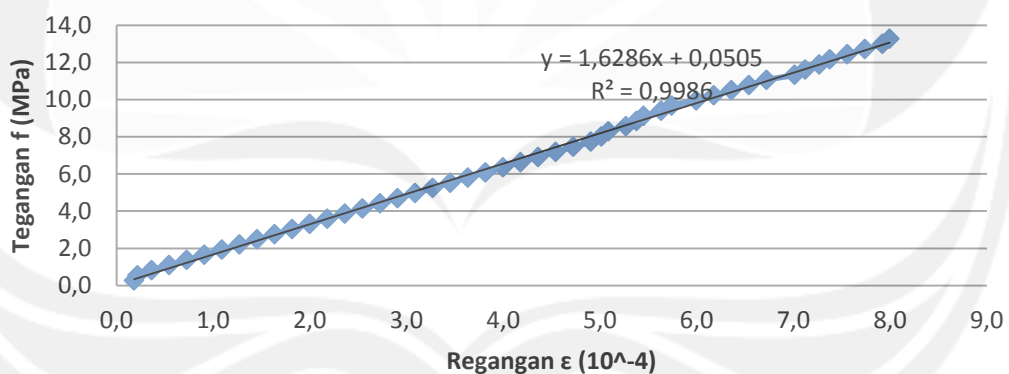


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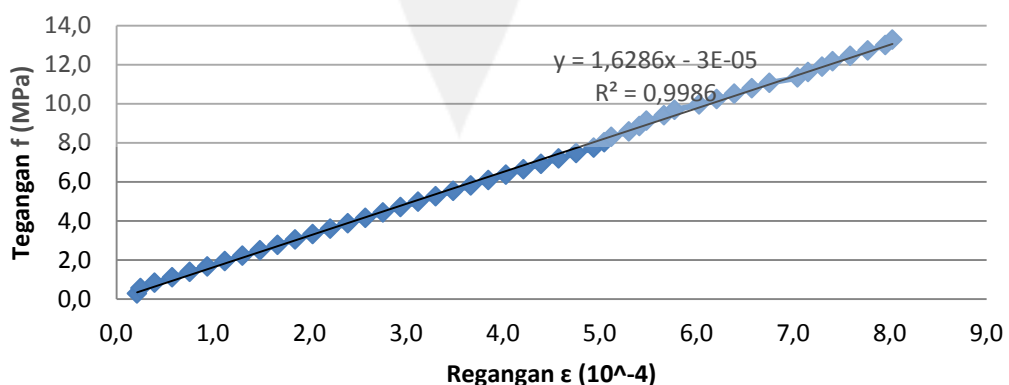
Jl. Babarsari No.44 Yogyakarta 55281 Indonesia Kotak Pos 1086
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Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | | | |
|--------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 70 - 3 | | |
| D rata- rata | = | 150,23 | mm | |
| H rata - rata | = | 298,87 | mm | |
| BERAT | = | 12152 | gram | = 12,152 kg |
| BERAT JENIS | = | 2293,7590 | kg/m ³ | |
| P (BEBAN MAKS) | = | 820 | KN | = 820000 N |
| Po | = | 137,6 | mm | |
| LA rata - rata | = | 17726,4793 | mm ² | |
| KUAT TEKAN | = | 46,2585 | Mpa | |
| 0,25 F _{maks} | = | 11,5646 | | |
| ANGKA KOREKSI | = | -0,0310 | | |
| MODULUS ELASTISITAS | = | 16286 | | |
| Ec = 4700√f _c | = | 31966,3861 | | |

Grafik Tegangan-Regangan SS70-3



**Grafik Tegangan-Regangan SS70-3
Terkoreksi**





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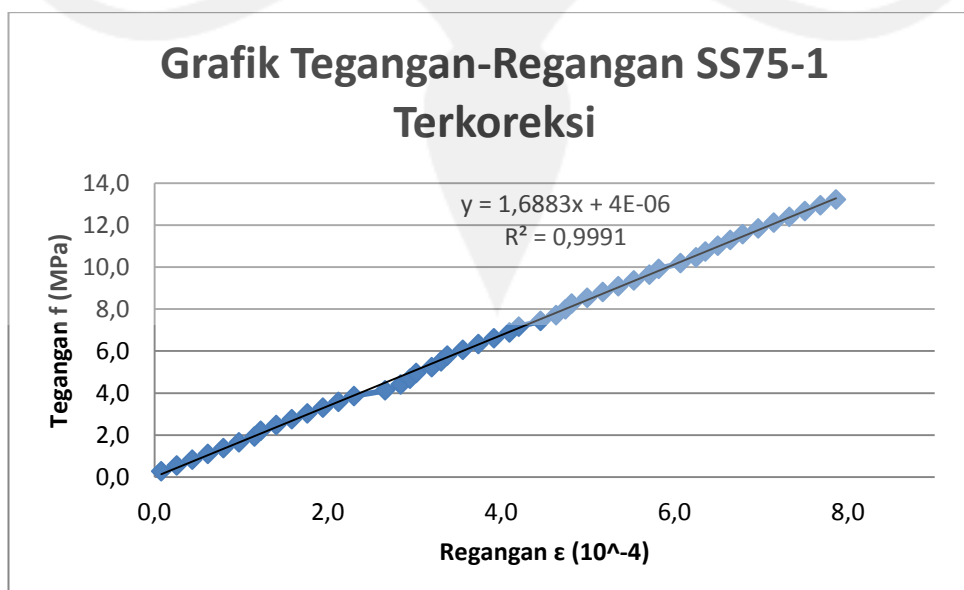
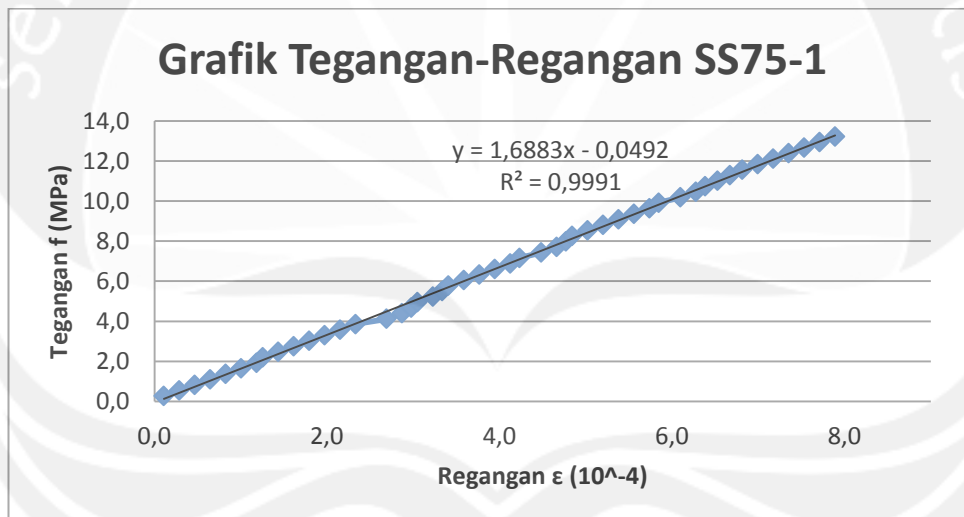
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2766 | 0,1817 | 0,2127 |
| 1000 | 9806,7100 | 6 | 0,6 | 0,3000 | 0,5532 | 0,2180 | 0,2490 |
| 1500 | 14710,0650 | 10 | 1 | 0,5000 | 0,8298 | 0,3634 | 0,3944 |
| 2000 | 19613,4200 | 15 | 1,5 | 0,7500 | 1,1064 | 0,5451 | 0,5761 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,3831 | 0,7267 | 0,7578 |
| 3000 | 29420,1300 | 25 | 2,5 | 1,2500 | 1,6597 | 0,9084 | 0,9394 |
| 3500 | 34323,4850 | 30 | 3 | 1,5000 | 1,9363 | 1,0901 | 1,1211 |
| 4000 | 39226,8400 | 35 | 3,5 | 1,7500 | 2,2129 | 1,2718 | 1,3028 |
| 4500 | 44130,1950 | 40 | 4 | 2,0000 | 2,4895 | 1,4535 | 1,4845 |
| 5000 | 49033,5500 | 45 | 4,5 | 2,2500 | 2,7661 | 1,6352 | 1,6662 |
| 5500 | 53936,9050 | 50 | 5 | 2,5000 | 3,0427 | 1,8169 | 1,8479 |
| 6000 | 58840,2600 | 55 | 5,5 | 2,7500 | 3,3193 | 1,9985 | 2,0296 |
| 6500 | 63743,6150 | 60 | 6 | 3,0000 | 3,5960 | 2,1802 | 2,2112 |
| 7000 | 68646,9700 | 65 | 6,5 | 3,2500 | 3,8726 | 2,3619 | 2,3929 |
| 7500 | 73550,3250 | 70 | 7 | 3,5000 | 4,1492 | 2,5436 | 2,5746 |
| 8000 | 78453,6800 | 75 | 7,5 | 3,7500 | 4,4258 | 2,7253 | 2,7563 |
| 8500 | 83357,0350 | 80 | 8 | 4,0000 | 4,7024 | 2,9070 | 2,9380 |
| 9000 | 88260,3900 | 85 | 8,5 | 4,2500 | 4,9790 | 3,0887 | 3,1197 |
| 9500 | 93163,7450 | 90 | 9 | 4,5000 | 5,2556 | 3,2703 | 3,3014 |
| 10000 | 98067,1000 | 95 | 9,5 | 4,7500 | 5,5322 | 3,4520 | 3,4830 |
| 10500 | 102970,4550 | 100 | 10 | 5,0000 | 5,8088 | 3,6337 | 3,6647 |
| 11000 | 107873,8100 | 105 | 10,5 | 5,2500 | 6,0855 | 3,8154 | 3,8464 |
| 11500 | 112777,1650 | 110 | 11 | 5,5000 | 6,3621 | 3,9971 | 4,0281 |
| 12000 | 117680,5200 | 115 | 11,5 | 5,7500 | 6,6387 | 4,1788 | 4,2098 |
| 12500 | 122583,8750 | 120 | 12 | 6,0000 | 6,9153 | 4,3605 | 4,3915 |
| 13000 | 127487,2300 | 125 | 12,5 | 6,2500 | 7,1919 | 4,5422 | 4,5732 |
| 13500 | 132390,5850 | 130 | 13 | 6,5000 | 7,4685 | 4,7238 | 4,7548 |
| 14000 | 137293,9400 | 135 | 13,5 | 6,7500 | 7,7451 | 4,9055 | 4,9365 |
| 14500 | 142197,2950 | 138 | 13,8 | 6,9000 | 8,0217 | 5,0145 | 5,0455 |
| 15000 | 147100,6500 | 140 | 14 | 7,0000 | 8,2984 | 5,0872 | 5,1182 |
| 15500 | 152004,0050 | 145 | 14,5 | 7,2500 | 8,5750 | 5,2689 | 5,2999 |
| 16000 | 156907,3600 | 148 | 14,8 | 7,4000 | 8,8516 | 5,3779 | 5,4089 |
| 16500 | 161810,7150 | 150 | 15 | 7,5000 | 9,1282 | 5,4506 | 5,4816 |
| 17000 | 166714,0700 | 155 | 15,5 | 7,7500 | 9,4048 | 5,6323 | 5,6633 |
| 17500 | 171617,4250 | 158 | 15,8 | 7,9000 | 9,6814 | 5,7413 | 5,7723 |
| 18000 | 176520,7800 | 165 | 16,5 | 8,2500 | 9,9580 | 5,9956 | 6,0266 |
| 18500 | 181424,1350 | 170 | 17 | 8,5000 | 10,2346 | 6,1773 | 6,2083 |
| 19000 | 186327,4900 | 175 | 17,5 | 8,7500 | 10,5113 | 6,3590 | 6,3900 |
| 19500 | 191230,8450 | 180 | 18 | 9,0000 | 10,7879 | 6,5407 | 6,5717 |
| 20000 | 196134,2000 | 185 | 18,5 | 9,2500 | 11,0645 | 6,7224 | 6,7534 |
| 20500 | 201037,5550 | 193 | 19,3 | 9,6500 | 11,3411 | 7,0131 | 7,0441 |
| 21000 | 205940,9100 | 196 | 19,6 | 9,8000 | 11,6177 | 7,1221 | 7,1531 |
| 21500 | 210844,2650 | 200 | 20 | 10,0000 | 11,8943 | 7,2674 | 7,2985 |
| 22000 | 215747,6200 | 203 | 20,3 | 10,1500 | 12,1709 | 7,3765 | 7,4075 |
| 22500 | 220650,9750 | 208 | 20,8 | 10,4000 | 12,4475 | 7,5581 | 7,5891 |
| 23000 | 225554,3300 | 213 | 21,3 | 10,6500 | 12,7241 | 7,7398 | 7,7708 |
| 23500 | 230457,6850 | 218 | 21,8 | 10,9000 | 13,0008 | 7,9215 | 7,9525 |
| 24000 | 235361,0400 | 220 | 22 | 11,0000 | 13,2774 | 7,9942 | 8,0252 |



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Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | | | |
|------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 75 - 1 | | |
| D rata- rata | = | 150,57 | mm | |
| H rata - rata | = | 296,97 | mm | |
| BERAT | = | 12648 | gram | = 12,648 kg |
| BERAT JENIS | = | 2392,0299 | kg/m ³ | |
| P (BEBAN MAKS) | = | 1110 | KN | = 1110000 N |
| Po | = | 139,4 | mm | |
| LA rata - rata | = | 17805,2286 | mm ² | |
| KUAT TEKAN | = | 62,3412 | Mpa | |
| 0,25 F _{maks} | = | 15,5853 | | |
| ANGKA KOREKSI | = | 0,0291 | | |
| MODULUS ELASTISITAS | = | 16883 | | |
| Ec = 4700√fc | = | 37109,54 | | |





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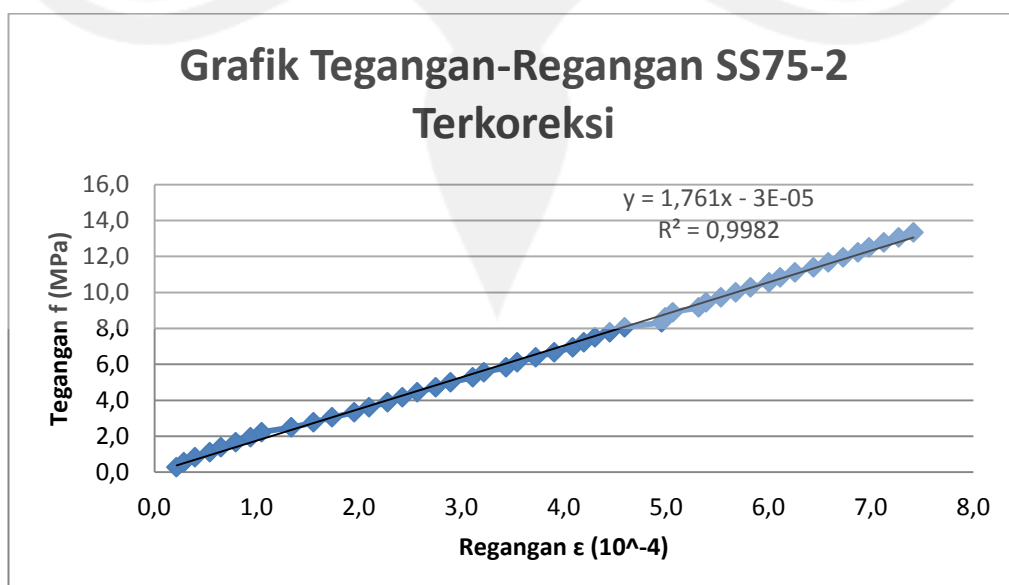
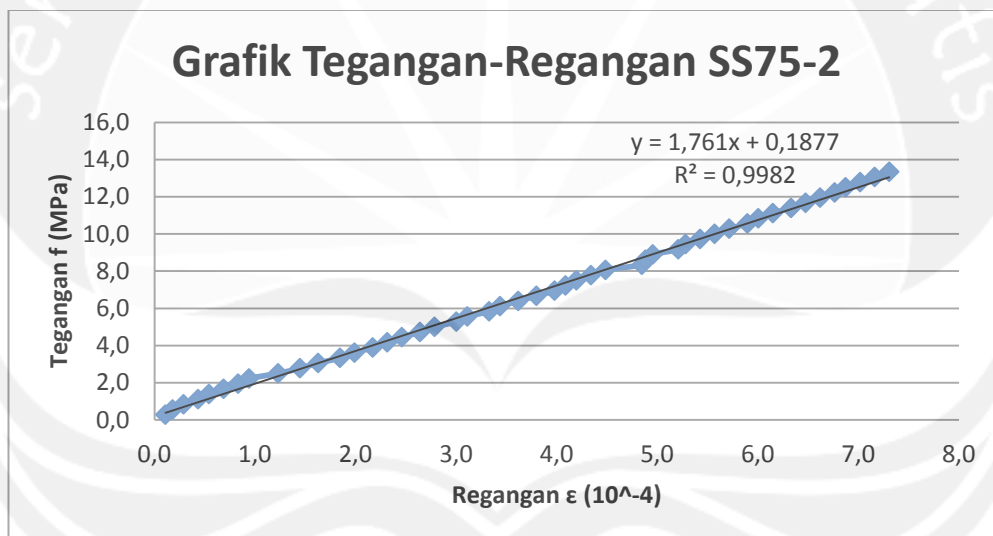
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 3 | 0,3 | 0,1500 | 0,2754 | 0,1076 | 0,0785 |
| 1000 | 9806,7100 | 8 | 0,8 | 0,4000 | 0,5508 | 0,2869 | 0,2578 |
| 1500 | 14710,0650 | 13 | 1,3 | 0,6500 | 0,8262 | 0,4663 | 0,4371 |
| 2000 | 19613,4200 | 18 | 1,8 | 0,9000 | 1,1016 | 0,6456 | 0,6165 |
| 2500 | 24516,7750 | 23 | 2,3 | 1,1500 | 1,3769 | 0,8250 | 0,7958 |
| 3000 | 29420,1300 | 28 | 2,8 | 1,4000 | 1,6523 | 1,0043 | 0,9752 |
| 3500 | 34323,4850 | 33 | 3,3 | 1,6500 | 1,9277 | 1,1836 | 1,1545 |
| 4000 | 39226,8400 | 35 | 3,5 | 1,7500 | 2,2031 | 1,2554 | 1,2262 |
| 4500 | 44130,1950 | 40 | 4 | 2,0000 | 2,4785 | 1,4347 | 1,4056 |
| 5000 | 49033,5500 | 45 | 4,5 | 2,2500 | 2,7539 | 1,6141 | 1,5849 |
| 5500 | 53936,9050 | 50 | 5 | 2,5000 | 3,0293 | 1,7934 | 1,7643 |
| 6000 | 58840,2600 | 55 | 5,5 | 2,7500 | 3,3047 | 1,9727 | 1,9436 |
| 6500 | 63743,6150 | 60 | 6 | 3,0000 | 3,5801 | 2,1521 | 2,1229 |
| 7000 | 68646,9700 | 65 | 6,5 | 3,2500 | 3,8554 | 2,3314 | 2,3023 |
| 7500 | 73550,3250 | 75 | 7,5 | 3,7500 | 4,1308 | 2,6901 | 2,6610 |
| 8000 | 78453,6800 | 80 | 8 | 4,0000 | 4,4062 | 2,8694 | 2,8403 |
| 8500 | 83357,0350 | 83 | 8,3 | 4,1500 | 4,6816 | 2,9770 | 2,9479 |
| 9000 | 88260,3900 | 85 | 8,5 | 4,2500 | 4,9570 | 3,0488 | 3,0196 |
| 9500 | 93163,7450 | 90 | 9 | 4,5000 | 5,2324 | 3,2281 | 3,1990 |
| 10000 | 98067,1000 | 93 | 9,3 | 4,6500 | 5,5078 | 3,3357 | 3,3066 |
| 10500 | 102970,4550 | 95 | 9,5 | 4,7500 | 5,7832 | 3,4075 | 3,3783 |
| 11000 | 107873,8100 | 100 | 10 | 5,0000 | 6,0585 | 3,5868 | 3,5577 |
| 11500 | 112777,1650 | 105 | 10,5 | 5,2500 | 6,3339 | 3,7661 | 3,7370 |
| 12000 | 117680,5200 | 110 | 11 | 5,5000 | 6,6093 | 3,9455 | 3,9163 |
| 12500 | 122583,8750 | 115 | 11,5 | 5,7500 | 6,8847 | 4,1248 | 4,0957 |
| 13000 | 127487,2300 | 118 | 11,8 | 5,9000 | 7,1601 | 4,2324 | 4,2033 |
| 13500 | 132390,5850 | 125 | 12,5 | 6,2500 | 7,4355 | 4,4835 | 4,4544 |
| 14000 | 137293,9400 | 130 | 13 | 6,5000 | 7,7109 | 4,6628 | 4,6337 |
| 14500 | 142197,2950 | 133 | 13,3 | 6,6500 | 7,9863 | 4,7704 | 4,7413 |
| 15000 | 147100,6500 | 135 | 13,5 | 6,7500 | 8,2617 | 4,8422 | 4,8130 |
| 15500 | 152004,0050 | 140 | 14 | 7,0000 | 8,5370 | 5,0215 | 4,9924 |
| 16000 | 156907,3600 | 145 | 14,5 | 7,2500 | 8,8124 | 5,2009 | 5,1717 |
| 16500 | 161810,7150 | 150 | 15 | 7,5000 | 9,0878 | 5,3802 | 5,3511 |
| 17000 | 166714,0700 | 155 | 15,5 | 7,7500 | 9,3632 | 5,5595 | 5,5304 |
| 17500 | 171617,4250 | 160 | 16 | 8,0000 | 9,6386 | 5,7389 | 5,7097 |
| 18000 | 176520,7800 | 163 | 16,3 | 8,1500 | 9,9140 | 5,8465 | 5,8173 |
| 18500 | 181424,1350 | 170 | 17 | 8,5000 | 10,1894 | 6,0976 | 6,0684 |
| 19000 | 186327,4900 | 175 | 17,5 | 8,7500 | 10,4648 | 6,2769 | 6,2478 |
| 19500 | 191230,8450 | 178 | 17,8 | 8,9000 | 10,7402 | 6,3845 | 6,3554 |
| 20000 | 196134,2000 | 182 | 18,2 | 9,1000 | 11,0155 | 6,5280 | 6,4988 |
| 20500 | 201037,5550 | 186 | 18,6 | 9,3000 | 11,2909 | 6,6714 | 6,6423 |
| 21000 | 205940,9100 | 190 | 19 | 9,5000 | 11,5663 | 6,8149 | 6,7858 |
| 21500 | 210844,2650 | 195 | 19,5 | 9,7500 | 11,8417 | 6,9943 | 6,9651 |
| 22000 | 215747,6200 | 200 | 20 | 10,0000 | 12,1171 | 7,1736 | 7,1445 |
| 22500 | 220650,9750 | 205 | 20,5 | 10,2500 | 12,3925 | 7,3529 | 7,3238 |
| 23000 | 225554,3300 | 210 | 21 | 10,5000 | 12,6679 | 7,5323 | 7,5031 |
| 23500 | 230457,6850 | 215 | 21,5 | 10,7500 | 12,9433 | 7,7116 | 7,6825 |
| 24000 | 235361,0400 | 220 | 22 | 11,0000 | 13,2186 | 7,8910 | 7,8618 |



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| | | | | |
|--------------------------|----------|------------------|-------------------|-------------|
| NAMA SAMPLE | = | SS 75 - 2 | | |
| D rata- rata | = | 149,90 | mm | |
| H rata - rata | = | 300,23 | mm | |
| BERAT | = | 12694 | gram | = 12,694 kg |
| BERAT JENIS | = | 2395,7773 | kg/m ³ | |
| P (BEBAN MAKS) | = | 1115 | KN | = 1115000 N |
| Po | = | 138,2 | mm | |
| LA rata - rata | = | 17647,9046 | mm ² | |
| KUAT TEKAN | = | 63,1803 | Mpa | |
| 0,25 F _{maks} | = | 15,7951 | | |
| ANGKA KOREKSI | = | -0,1066 | | |
| MODULUS ELASTISITAS | = | 17610 | | |
| Ec = 4700√f _c | = | 37358,4387 | | |





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 Telp: (0274) 487711 Fax: (0274) 487748
 Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

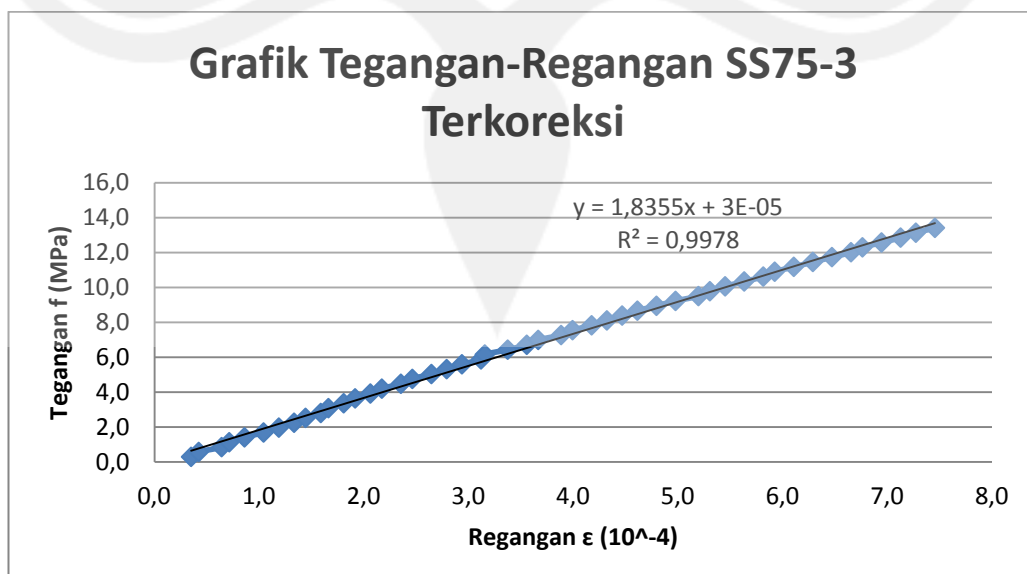
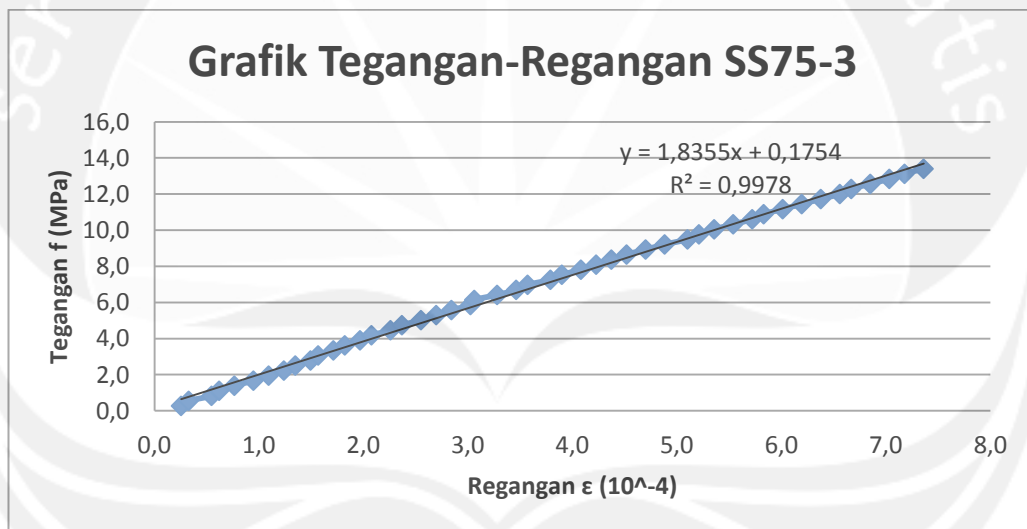
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 3 | 0,3 | 0,1500 | 0,2778 | 0,1085 | 0,2151 |
| 1000 | 9806,7100 | 5 | 0,5 | 0,2500 | 0,5557 | 0,1809 | 0,2875 |
| 1500 | 14710,0650 | 8 | 0,8 | 0,4000 | 0,8335 | 0,2894 | 0,3960 |
| 2000 | 19613,4200 | 12 | 1,2 | 0,6000 | 1,1114 | 0,4342 | 0,5407 |
| 2500 | 24516,7750 | 15 | 1,5 | 0,7500 | 1,3892 | 0,5427 | 0,6493 |
| 3000 | 29420,1300 | 19 | 1,9 | 0,9500 | 1,6671 | 0,6874 | 0,7940 |
| 3500 | 34323,4850 | 23 | 2,3 | 1,1500 | 1,9449 | 0,8321 | 0,9387 |
| 4000 | 39226,8400 | 26 | 2,6 | 1,3000 | 2,2227 | 0,9407 | 1,0473 |
| 4500 | 44130,1950 | 34 | 3,4 | 1,7000 | 2,5006 | 1,2301 | 1,3367 |
| 5000 | 49033,5500 | 40 | 4 | 2,0000 | 2,7784 | 1,4472 | 1,5538 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0563 | 1,6281 | 1,7347 |
| 6000 | 58840,2600 | 51 | 5,1 | 2,5500 | 3,3341 | 1,8452 | 1,9517 |
| 6500 | 63743,6150 | 55 | 5,5 | 2,7500 | 3,6120 | 1,9899 | 2,0965 |
| 7000 | 68646,9700 | 60 | 6 | 3,0000 | 3,8898 | 2,1708 | 2,2774 |
| 7500 | 73550,3250 | 64 | 6,4 | 3,2000 | 4,1677 | 2,3155 | 2,4221 |
| 8000 | 78453,6800 | 68 | 6,8 | 3,4000 | 4,4455 | 2,4602 | 2,5668 |
| 8500 | 83357,0350 | 73 | 7,3 | 3,6500 | 4,7233 | 2,6411 | 2,7477 |
| 9000 | 88260,3900 | 77 | 7,7 | 3,8500 | 5,0012 | 2,7858 | 2,8924 |
| 9500 | 93163,7450 | 83 | 8,3 | 4,1500 | 5,2790 | 3,0029 | 3,1095 |
| 10000 | 98067,1000 | 86 | 8,6 | 4,3000 | 5,5569 | 3,1114 | 3,2180 |
| 10500 | 102970,4550 | 92 | 9,2 | 4,6000 | 5,8347 | 3,3285 | 3,4351 |
| 11000 | 107873,8100 | 95 | 9,5 | 4,7500 | 6,1126 | 3,4370 | 3,5436 |
| 11500 | 112777,1650 | 100 | 10 | 5,0000 | 6,3904 | 3,6179 | 3,7245 |
| 12000 | 117680,5200 | 105 | 10,5 | 5,2500 | 6,6682 | 3,7988 | 3,9054 |
| 12500 | 122583,8750 | 110 | 11 | 5,5000 | 6,9461 | 3,9797 | 4,0863 |
| 13000 | 127487,2300 | 113 | 11,3 | 5,6500 | 7,2239 | 4,0883 | 4,1949 |
| 13500 | 132390,5850 | 116 | 11,6 | 5,8000 | 7,5018 | 4,1968 | 4,3034 |
| 14000 | 137293,9400 | 120 | 12 | 6,0000 | 7,7796 | 4,3415 | 4,4481 |
| 14500 | 142197,2950 | 124 | 12,4 | 6,2000 | 8,0575 | 4,4863 | 4,5928 |
| 15000 | 147100,6500 | 134 | 13,4 | 6,7000 | 8,3353 | 4,8480 | 4,9546 |
| 15500 | 152004,0050 | 135 | 13,5 | 6,7500 | 8,6131 | 4,8842 | 4,9908 |
| 16000 | 156907,3600 | 137 | 13,7 | 6,8500 | 8,8910 | 4,9566 | 5,0632 |
| 16500 | 161810,7150 | 144 | 14,4 | 7,2000 | 9,1688 | 5,2098 | 5,3164 |
| 17000 | 166714,0700 | 146 | 14,6 | 7,3000 | 9,4467 | 5,2822 | 5,3888 |
| 17500 | 171617,4250 | 150 | 15 | 7,5000 | 9,7245 | 5,4269 | 5,5335 |
| 18000 | 176520,7800 | 154 | 15,4 | 7,7000 | 10,0024 | 5,5716 | 5,6782 |
| 18500 | 181424,1350 | 158 | 15,8 | 7,9000 | 10,2802 | 5,7164 | 5,8229 |
| 19000 | 186327,4900 | 163 | 16,3 | 8,1500 | 10,5581 | 5,8973 | 6,0038 |
| 19500 | 191230,8450 | 166 | 16,6 | 8,3000 | 10,8359 | 6,0058 | 6,1124 |
| 20000 | 196134,2000 | 170 | 17 | 8,5000 | 11,1137 | 6,1505 | 6,2571 |
| 20500 | 201037,5550 | 175 | 17,5 | 8,7500 | 11,3916 | 6,3314 | 6,4380 |
| 21000 | 205940,9100 | 179 | 17,9 | 8,9500 | 11,6694 | 6,4761 | 6,5827 |
| 21500 | 210844,2650 | 183 | 18,3 | 9,1500 | 11,9473 | 6,6208 | 6,7274 |
| 22000 | 215747,6200 | 187 | 18,7 | 9,3500 | 12,2251 | 6,7656 | 6,8721 |
| 22500 | 220650,9750 | 190 | 19 | 9,5000 | 12,5030 | 6,8741 | 6,9807 |
| 23000 | 225554,3300 | 194 | 19,4 | 9,7000 | 12,7808 | 7,0188 | 7,1254 |
| 23500 | 230457,6850 | 198 | 19,8 | 9,9000 | 13,0586 | 7,1635 | 7,2701 |
| 24000 | 235361,0400 | 202 | 20,2 | 10,1000 | 13,3365 | 7,3082 | 7,4148 |



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| | | |
|------------------------|----------|-----------------------------|
| NAMA SAMPLE | = | SS 75 - 3 |
| D rata - rata | = | 149,50 mm |
| H rata - rata | = | 300,00 mm |
| BERAT | = | 12832 gram = 12,832 kg |
| BERAT JENIS | = | 2436,6931 kg/m ³ |
| P (BEBAN MAKS) | = | 835 KN = 835000 N |
| Po | = | 137,2 mm |
| LA rata - rata | = | 17553,8453 mm ² |
| KUAT TEKAN | = | 47,5679 Mpa |
| 0,25 F _{maks} | = | 11,8920 |
| ANGKA KOREKSI | = | -0,0956 |
| MODULUS ELASTISITAS | = | 18355 |
| Ec = 4700√fc | = | 32415,667 |





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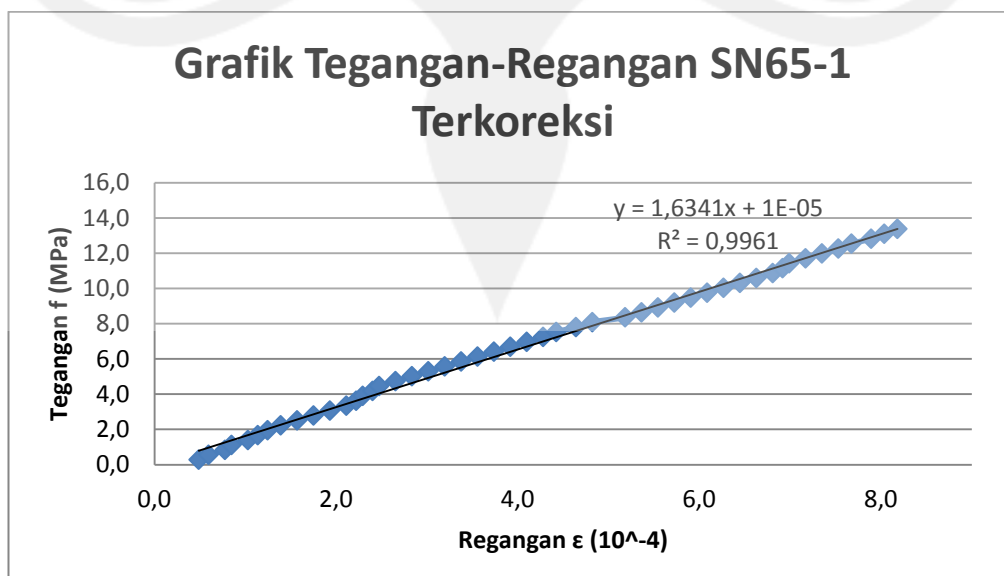
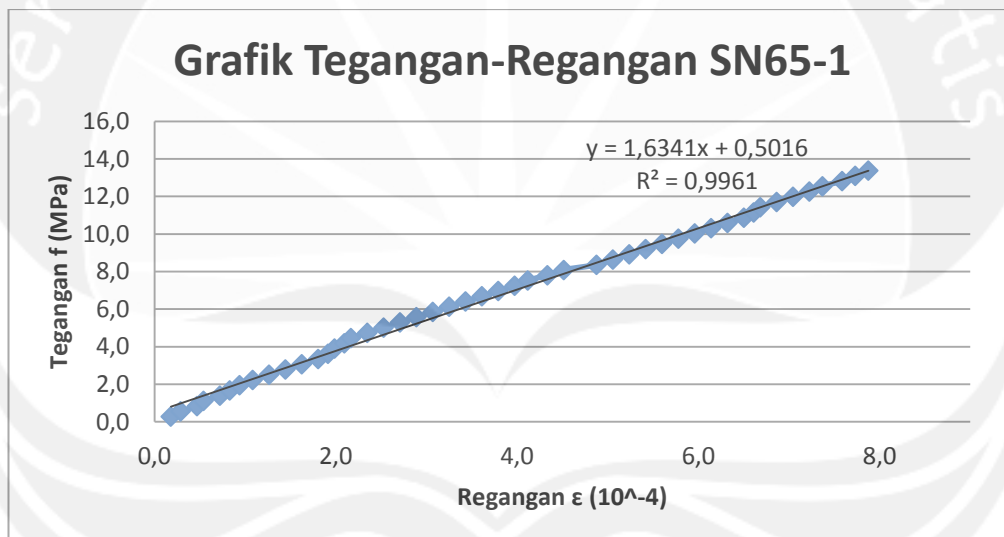
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 7 | 0,7 | 0,3500 | 0,2793 | 0,2551 | 0,3507 |
| 1000 | 9806,7100 | 9 | 0,9 | 0,4500 | 0,5587 | 0,3280 | 0,4235 |
| 1500 | 14710,0650 | 15 | 1,5 | 0,7500 | 0,8380 | 0,5466 | 0,6422 |
| 2000 | 19613,4200 | 17 | 1,7 | 0,8500 | 1,1173 | 0,6195 | 0,7151 |
| 2500 | 24516,7750 | 21 | 2,1 | 1,0500 | 1,3967 | 0,7653 | 0,8609 |
| 3000 | 29420,1300 | 26 | 2,6 | 1,3000 | 1,6760 | 0,9475 | 1,0431 |
| 3500 | 34323,4850 | 30 | 3 | 1,5000 | 1,9553 | 1,0933 | 1,1889 |
| 4000 | 39226,8400 | 34 | 3,4 | 1,7000 | 2,2347 | 1,2391 | 1,3346 |
| 4500 | 44130,1950 | 37 | 3,7 | 1,8500 | 2,5140 | 1,3484 | 1,4440 |
| 5000 | 49033,5500 | 41 | 4,1 | 2,0500 | 2,7933 | 1,4942 | 1,5897 |
| 5500 | 53936,9050 | 43 | 4,3 | 2,1500 | 3,0727 | 1,5671 | 1,6626 |
| 6000 | 58840,2600 | 47 | 4,7 | 2,3500 | 3,3520 | 1,7128 | 1,8084 |
| 6500 | 63743,6150 | 50 | 5 | 2,5000 | 3,6313 | 1,8222 | 1,9177 |
| 7000 | 68646,9700 | 54 | 5,4 | 2,7000 | 3,9107 | 1,9679 | 2,0635 |
| 7500 | 73550,3250 | 57 | 5,7 | 2,8500 | 4,1900 | 2,0773 | 2,1728 |
| 8000 | 78453,6800 | 62 | 6,2 | 3,1000 | 4,4693 | 2,2595 | 2,3550 |
| 8500 | 83357,0350 | 65 | 6,5 | 3,2500 | 4,7486 | 2,3688 | 2,4644 |
| 9000 | 88260,3900 | 70 | 7 | 3,5000 | 5,0280 | 2,5510 | 2,6466 |
| 9500 | 93163,7450 | 74 | 7,4 | 3,7000 | 5,3073 | 2,6968 | 2,7924 |
| 10000 | 98067,1000 | 78 | 7,8 | 3,9000 | 5,5866 | 2,8426 | 2,9381 |
| 10500 | 102970,4550 | 83 | 8,3 | 4,1500 | 5,8660 | 3,0248 | 3,1203 |
| 11000 | 107873,8100 | 84 | 8,4 | 4,2000 | 6,1453 | 3,0612 | 3,1568 |
| 11500 | 112777,1650 | 90 | 9 | 4,5000 | 6,4246 | 3,2799 | 3,3754 |
| 12000 | 117680,5200 | 95 | 9,5 | 4,7500 | 6,7040 | 3,4621 | 3,5577 |
| 12500 | 122583,8750 | 98 | 9,8 | 4,9000 | 6,9833 | 3,5714 | 3,6670 |
| 13000 | 127487,2300 | 104 | 10,4 | 5,2000 | 7,2626 | 3,7901 | 3,8856 |
| 13500 | 132390,5850 | 107 | 10,7 | 5,3500 | 7,5420 | 3,8994 | 3,9950 |
| 14000 | 137293,9400 | 112 | 11,2 | 5,6000 | 7,8213 | 4,0816 | 4,1772 |
| 14500 | 142197,2950 | 116 | 11,6 | 5,8000 | 8,1006 | 4,2274 | 4,3230 |
| 15000 | 147100,6500 | 120 | 12 | 6,0000 | 8,3800 | 4,3732 | 4,4687 |
| 15500 | 152004,0050 | 124 | 12,4 | 6,2000 | 8,6593 | 4,5190 | 4,6145 |
| 16000 | 156907,3600 | 129 | 12,9 | 6,4500 | 8,9386 | 4,7012 | 4,7967 |
| 16500 | 161810,7150 | 134 | 13,4 | 6,7000 | 9,2180 | 4,8834 | 4,9789 |
| 17000 | 166714,0700 | 140 | 14 | 7,0000 | 9,4973 | 5,1020 | 5,1976 |
| 17500 | 171617,4250 | 143 | 14,3 | 7,1500 | 9,7766 | 5,2114 | 5,3069 |
| 18000 | 176520,7800 | 147 | 14,7 | 7,3500 | 10,0560 | 5,3571 | 5,4527 |
| 18500 | 181424,1350 | 152 | 15,2 | 7,6000 | 10,3353 | 5,5394 | 5,6349 |
| 19000 | 186327,4900 | 157 | 15,7 | 7,8500 | 10,6146 | 5,7216 | 5,8171 |
| 19500 | 191230,8450 | 160 | 16 | 8,0000 | 10,8940 | 5,8309 | 5,9265 |
| 20000 | 196134,2000 | 165 | 16,5 | 8,2500 | 11,1733 | 6,0131 | 6,1087 |
| 20500 | 201037,5550 | 170 | 17 | 8,5000 | 11,4526 | 6,1953 | 6,2909 |
| 21000 | 205940,9100 | 175 | 17,5 | 8,7500 | 11,7320 | 6,3776 | 6,4731 |
| 21500 | 210844,2650 | 180 | 18 | 9,0000 | 12,0113 | 6,5598 | 6,6553 |
| 22000 | 215747,6200 | 183 | 18,3 | 9,1500 | 12,2906 | 6,6691 | 6,7647 |
| 22500 | 220650,9750 | 188 | 18,8 | 9,4000 | 12,5700 | 6,8513 | 6,9469 |
| 23000 | 225554,3300 | 193 | 19,3 | 9,6500 | 12,8493 | 7,0335 | 7,1291 |
| 23500 | 230457,6850 | 197 | 19,7 | 9,8500 | 13,1286 | 7,1793 | 7,2749 |
| 24000 | 235361,0400 | 202 | 20,2 | 10,1000 | 13,4079 | 7,3615 | 7,4571 |



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| | | | | |
|--------------------------|---|----------------|-------------------|-------------|
| NAMA SAMPLE | = | SN 65-1 | | |
| D rata- rata | = | 149,67 | mm | |
| H rata - rata | = | 301,10 | mm | |
| BERAT | = | 12254 | gram | = 12,254 kg |
| BERAT JENIS | = | 2313,2739 | kg/m ³ | |
| P (BEBAN MAKS) | = | 610 | KN | = 610000 N |
| Po | = | 138,4 | mm | |
| LA rata - rata | = | 17593,0061 | mm ² | |
| KUAT TEKAN | = | 34,6729 | Mpa | |
| 0,25 F _{maks} | = | 8,6682 | | |
| ANGKA KOREKSI | = | -0,3070 | | |
| MODULUS ELASTISITAS | = | 16341 | | |
| Ec = 4700√f _c | = | 27675,3262 | | |





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 Telp: (0274) 487711 Fax: (0274) 487748
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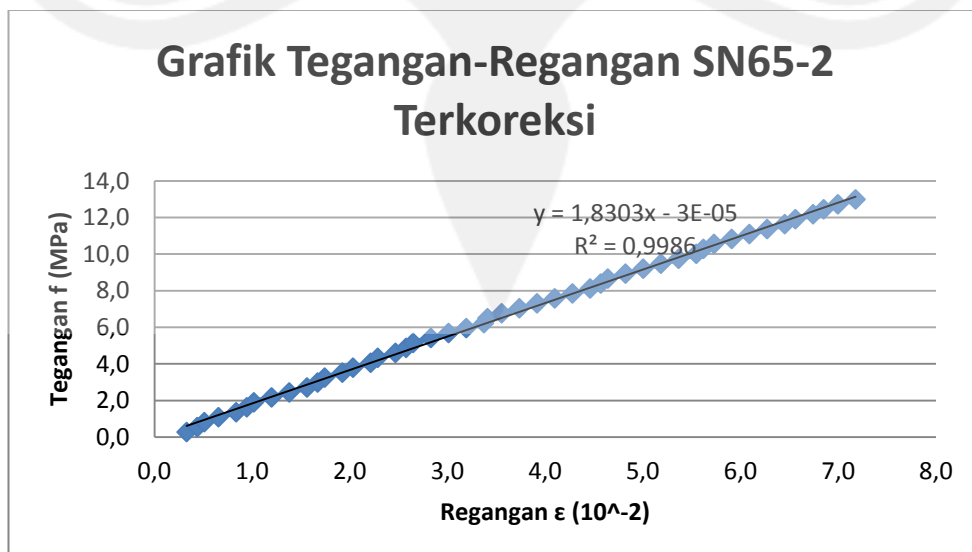
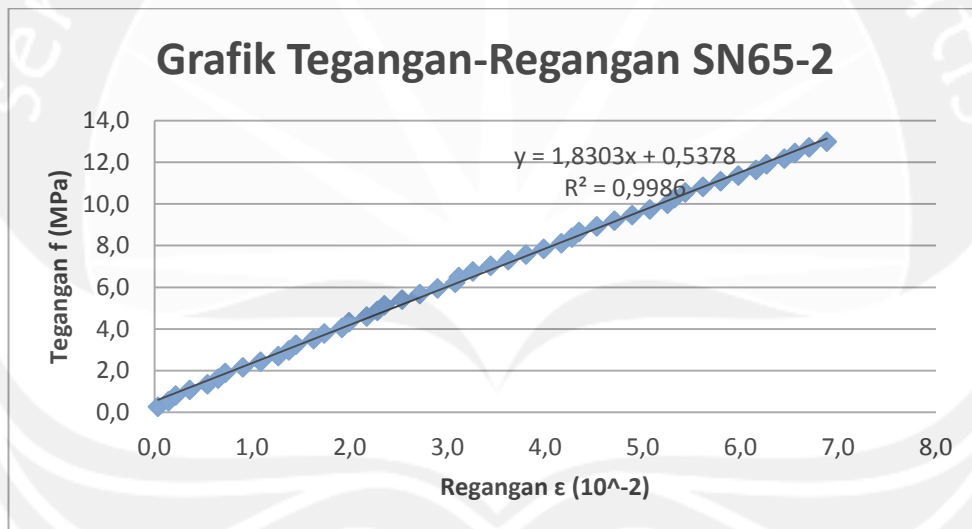
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2787 | 0,1806 | 0,4876 |
| 1000 | 9806,7100 | 8 | 0,8 | 0,4000 | 0,5574 | 0,2890 | 0,5960 |
| 1500 | 14710,0650 | 13 | 1,3 | 0,6500 | 0,8361 | 0,4697 | 0,7766 |
| 2000 | 19613,4200 | 15 | 1,5 | 0,7500 | 1,1148 | 0,5419 | 0,8489 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,3936 | 0,7225 | 1,0295 |
| 3000 | 29420,1300 | 23 | 2,3 | 1,1500 | 1,6723 | 0,8309 | 1,1379 |
| 3500 | 34323,4850 | 26 | 2,6 | 1,3000 | 1,9510 | 0,9393 | 1,2463 |
| 4000 | 39226,8400 | 30 | 3 | 1,5000 | 2,2297 | 1,0838 | 1,3908 |
| 4500 | 44130,1950 | 35 | 3,5 | 1,7500 | 2,5084 | 1,2645 | 1,5714 |
| 5000 | 49033,5500 | 40 | 4 | 2,0000 | 2,7871 | 1,4451 | 1,7520 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0658 | 1,6257 | 1,9327 |
| 6000 | 58840,2600 | 50 | 5 | 2,5000 | 3,3445 | 1,8064 | 2,1133 |
| 6500 | 63743,6150 | 53 | 5,3 | 2,6500 | 3,6232 | 1,9147 | 2,2217 |
| 7000 | 68646,9700 | 55 | 5,5 | 2,7500 | 3,9019 | 1,9870 | 2,2940 |
| 7500 | 73550,3250 | 58 | 5,8 | 2,9000 | 4,1807 | 2,0954 | 2,4023 |
| 8000 | 78453,6800 | 60 | 6 | 3,0000 | 4,4594 | 2,1676 | 2,4746 |
| 8500 | 83357,0350 | 65 | 6,5 | 3,2500 | 4,7381 | 2,3483 | 2,6552 |
| 9000 | 88260,3900 | 70 | 7 | 3,5000 | 5,0168 | 2,5289 | 2,8359 |
| 9500 | 93163,7450 | 75 | 7,5 | 3,7500 | 5,2955 | 2,7095 | 3,0165 |
| 10000 | 98067,1000 | 80 | 8 | 4,0000 | 5,5742 | 2,8902 | 3,1971 |
| 10500 | 102970,4550 | 85 | 8,5 | 4,2500 | 5,8529 | 3,0708 | 3,3778 |
| 11000 | 107873,8100 | 90 | 9 | 4,5000 | 6,1316 | 3,2514 | 3,5584 |
| 11500 | 112777,1650 | 95 | 9,5 | 4,7500 | 6,4103 | 3,4321 | 3,7390 |
| 12000 | 117680,5200 | 100 | 10 | 5,0000 | 6,6891 | 3,6127 | 3,9197 |
| 12500 | 122583,8750 | 105 | 10,5 | 5,2500 | 6,9678 | 3,7934 | 4,1003 |
| 13000 | 127487,2300 | 110 | 11 | 5,5000 | 7,2465 | 3,9740 | 4,2809 |
| 13500 | 132390,5850 | 114 | 11,4 | 5,7000 | 7,5252 | 4,1185 | 4,4255 |
| 14000 | 137293,9400 | 120 | 12 | 6,0000 | 7,8039 | 4,3353 | 4,6422 |
| 14500 | 142197,2950 | 125 | 12,5 | 6,2500 | 8,0826 | 4,5159 | 4,8229 |
| 15000 | 147100,6500 | 135 | 13,5 | 6,7500 | 8,3613 | 4,8772 | 5,1841 |
| 15500 | 152004,0050 | 140 | 14 | 7,0000 | 8,6400 | 5,0578 | 5,3648 |
| 16000 | 156907,3600 | 145 | 14,5 | 7,2500 | 8,9187 | 5,2384 | 5,5454 |
| 16500 | 161810,7150 | 150 | 15 | 7,5000 | 9,1974 | 5,4191 | 5,7260 |
| 17000 | 166714,0700 | 155 | 15,5 | 7,7500 | 9,4762 | 5,5997 | 5,9067 |
| 17500 | 171617,4250 | 160 | 16 | 8,0000 | 9,7549 | 5,7803 | 6,0873 |
| 18000 | 176520,7800 | 165 | 16,5 | 8,2500 | 10,0336 | 5,9610 | 6,2679 |
| 18500 | 181424,1350 | 170 | 17 | 8,5000 | 10,3123 | 6,1416 | 6,4486 |
| 19000 | 186327,4900 | 175 | 17,5 | 8,7500 | 10,5910 | 6,3223 | 6,6292 |
| 19500 | 191230,8450 | 180 | 18 | 9,0000 | 10,8697 | 6,5029 | 6,8098 |
| 20000 | 196134,2000 | 183 | 18,3 | 9,1500 | 11,1484 | 6,6113 | 6,9182 |
| 20500 | 201037,5550 | 185 | 18,5 | 9,2500 | 11,4271 | 6,6835 | 6,9905 |
| 21000 | 205940,9100 | 190 | 19 | 9,5000 | 11,7058 | 6,8642 | 7,1711 |
| 21500 | 210844,2650 | 195 | 19,5 | 9,7500 | 11,9846 | 7,0448 | 7,3518 |
| 22000 | 215747,6200 | 200 | 20 | 10,0000 | 12,2633 | 7,2254 | 7,5324 |
| 22500 | 220650,9750 | 204 | 20,4 | 10,2000 | 12,5420 | 7,3699 | 7,6769 |
| 23000 | 225554,3300 | 210 | 21 | 10,5000 | 12,8207 | 7,5867 | 7,8937 |
| 23500 | 230457,6850 | 214 | 21,4 | 10,7000 | 13,0994 | 7,7312 | 8,0382 |
| 24000 | 235361,0400 | 218 | 21,8 | 10,9000 | 13,3781 | 7,8757 | 8,1827 |



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Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | |
|--------------------------|---|-----------------------------|
| NAMA SAMPLE | = | SN 65-2 |
| D rata- rata | = | 151,90 mm |
| H rata - rata | = | 301,40 mm |
| BERAT | = | 12557 gram = 12,557 kg |
| BERAT JENIS | = | 2298,9907 kg/m ³ |
| P (BEBAN MAKS) | = | 800 KN = 800000 N |
| Po | = | 138 mm |
| LA rata - rata | = | 18121,9709 mm ² |
| KUAT TEKAN | = | 44,1453 Mpa |
| 0,25 F _{maks} | = | 11,0363 |
| ANGKA KOREKSI | = | -0,2938 |
| MODULUS ELASTISITAS | = | 18303 |
| Ec = 4700√f _c | = | 31227,7099 |





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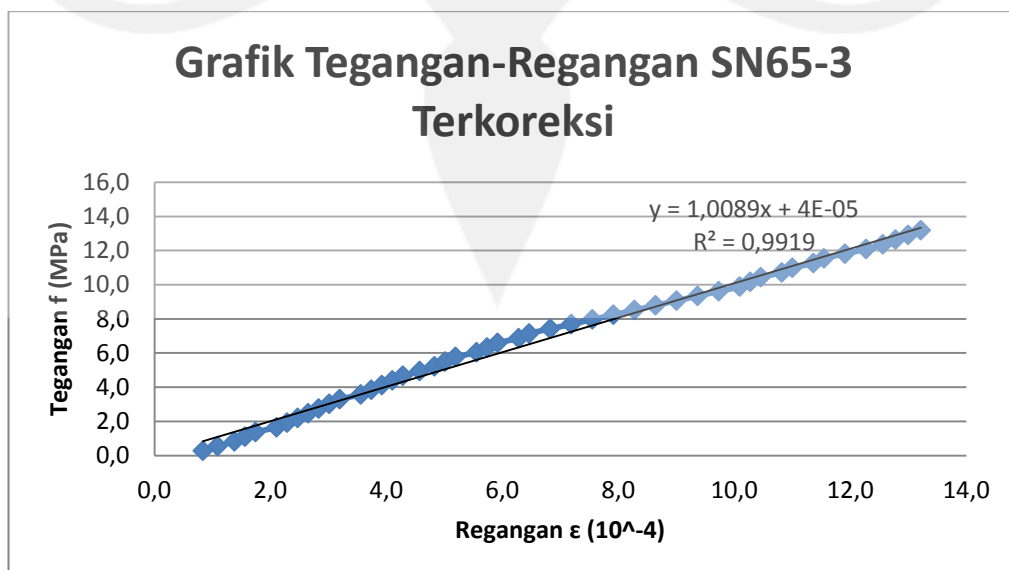
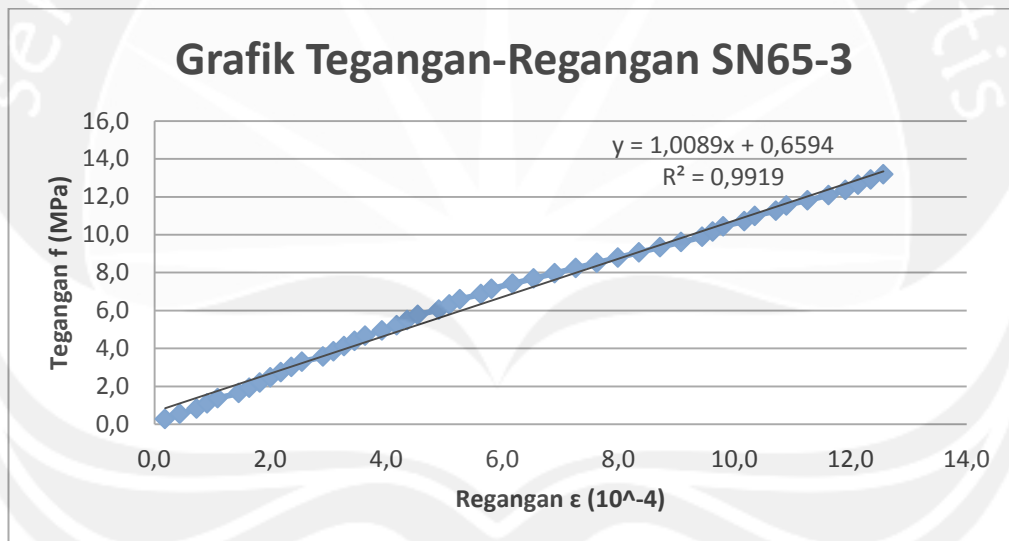
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 1 | 0,1 | 0,0500 | 0,2706 | 0,0362 | 0,3301 |
| 1000 | 9806,7100 | 4 | 0,4 | 0,2000 | 0,5412 | 0,1449 | 0,4388 |
| 1500 | 14710,0650 | 6 | 0,6 | 0,3000 | 0,8117 | 0,2174 | 0,5112 |
| 2000 | 19613,4200 | 10 | 1 | 0,5000 | 1,0823 | 0,3623 | 0,6562 |
| 2500 | 24516,7750 | 15 | 1,5 | 0,7500 | 1,3529 | 0,5435 | 0,8373 |
| 3000 | 29420,1300 | 18 | 1,8 | 0,9000 | 1,6235 | 0,6522 | 0,9460 |
| 3500 | 34323,4850 | 20 | 2 | 1,0000 | 1,8940 | 0,7246 | 1,0185 |
| 4000 | 39226,8400 | 25 | 2,5 | 1,2500 | 2,1646 | 0,9058 | 1,1996 |
| 4500 | 44130,1950 | 30 | 3 | 1,5000 | 2,4352 | 1,0870 | 1,3808 |
| 5000 | 49033,5500 | 35 | 3,5 | 1,7500 | 2,7058 | 1,2681 | 1,5619 |
| 5500 | 53936,9050 | 38 | 3,8 | 1,9000 | 2,9763 | 1,3768 | 1,6706 |
| 6000 | 58840,2600 | 40 | 4 | 2,0000 | 3,2469 | 1,4493 | 1,7431 |
| 6500 | 63743,6150 | 45 | 4,5 | 2,2500 | 3,5175 | 1,6304 | 1,9243 |
| 7000 | 68646,9700 | 48 | 4,8 | 2,4000 | 3,7881 | 1,7391 | 2,0330 |
| 7500 | 73550,3250 | 53 | 5,3 | 2,6500 | 4,0586 | 1,9203 | 2,2141 |
| 8000 | 78453,6800 | 55 | 5,5 | 2,7500 | 4,3292 | 1,9928 | 2,2866 |
| 8500 | 83357,0350 | 60 | 6 | 3,0000 | 4,5998 | 2,1739 | 2,4677 |
| 9000 | 88260,3900 | 63 | 6,3 | 3,1500 | 4,8704 | 2,2826 | 2,5764 |
| 9500 | 93163,7450 | 65 | 6,5 | 3,2500 | 5,1409 | 2,3551 | 2,6489 |
| 10000 | 98067,1000 | 70 | 7 | 3,5000 | 5,4115 | 2,5362 | 2,8301 |
| 10500 | 102970,4550 | 75 | 7,5 | 3,7500 | 5,6821 | 2,7174 | 3,0112 |
| 11000 | 107873,8100 | 80 | 8 | 4,0000 | 5,9527 | 2,8986 | 3,1924 |
| 11500 | 112777,1650 | 85 | 8,5 | 4,2500 | 6,2232 | 3,0797 | 3,3735 |
| 12000 | 117680,5200 | 86 | 8,6 | 4,3000 | 6,4938 | 3,1159 | 3,4098 |
| 12500 | 122583,8750 | 90 | 9 | 4,5000 | 6,7644 | 3,2609 | 3,5547 |
| 13000 | 127487,2300 | 95 | 9,5 | 4,7500 | 7,0350 | 3,4420 | 3,7359 |
| 13500 | 132390,5850 | 100 | 10 | 5,0000 | 7,3055 | 3,6232 | 3,9170 |
| 14000 | 137293,9400 | 105 | 10,5 | 5,2500 | 7,5761 | 3,8043 | 4,0982 |
| 14500 | 142197,2950 | 110 | 11 | 5,5000 | 7,8467 | 3,9855 | 4,2793 |
| 15000 | 147100,6500 | 115 | 11,5 | 5,7500 | 8,1173 | 4,1667 | 4,4605 |
| 15500 | 152004,0050 | 118 | 11,8 | 5,9000 | 8,3878 | 4,2754 | 4,5692 |
| 16000 | 156907,3600 | 120 | 12 | 6,0000 | 8,6584 | 4,3478 | 4,6417 |
| 16500 | 161810,7150 | 125 | 12,5 | 6,2500 | 8,9290 | 4,5290 | 4,8228 |
| 17000 | 166714,0700 | 130 | 13 | 6,5000 | 9,1996 | 4,7101 | 5,0040 |
| 17500 | 171617,4250 | 135 | 13,5 | 6,7500 | 9,4701 | 4,8913 | 5,1851 |
| 18000 | 176520,7800 | 140 | 14 | 7,0000 | 9,7407 | 5,0725 | 5,3663 |
| 18500 | 181424,1350 | 145 | 14,5 | 7,2500 | 10,0113 | 5,2536 | 5,5475 |
| 19000 | 186327,4900 | 147 | 14,7 | 7,3500 | 10,2819 | 5,3261 | 5,6199 |
| 19500 | 191230,8450 | 150 | 15 | 7,5000 | 10,5524 | 5,4348 | 5,7286 |
| 20000 | 196134,2000 | 155 | 15,5 | 7,7500 | 10,8230 | 5,6159 | 5,9098 |
| 20500 | 201037,5550 | 160 | 16 | 8,0000 | 11,0936 | 5,7971 | 6,0909 |
| 21000 | 205940,9100 | 165 | 16,5 | 8,2500 | 11,3642 | 5,9783 | 6,2721 |
| 21500 | 210844,2650 | 170 | 17 | 8,5000 | 11,6347 | 6,1594 | 6,4533 |
| 22000 | 215747,6200 | 173 | 17,3 | 8,6500 | 11,9053 | 6,2681 | 6,5619 |
| 22500 | 220650,9750 | 178 | 17,8 | 8,9000 | 12,1759 | 6,4493 | 6,7431 |
| 23000 | 225554,3300 | 181 | 18,1 | 9,0500 | 12,4465 | 6,5580 | 6,8518 |
| 23500 | 230457,6850 | 185 | 18,5 | 9,2500 | 12,7170 | 6,7029 | 6,9967 |
| 24000 | 235361,0400 | 190 | 19 | 9,5000 | 12,9876 | 6,8841 | 7,1779 |



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| | | | | |
|------------------------|---|----------------|-------------------|-------------|
| NAMA SAMPLE | = | SN 65-3 | | |
| D rata- rata | = | 150,77 | mm | |
| H rata - rata | = | 302,90 | mm | |
| BERAT | = | 12388 | gram | = 12,388 kg |
| BERAT JENIS | = | 2290,8749 | kg/m ³ | |
| P (BEBAN MAKS) | = | 620 | KN | = 620000 N |
| Po | = | 137,7 | mm | |
| LA rata - rata | = | 17852,5619 | mm ² | |
| KUAT TEKAN | = | 34,7289 | Mpa | |
| 0,25 F _{maks} | = | 8,6822 | | |
| ANGKA KOREKSI | = | -0,6536 | | |
| MODULUS ELASTISITAS | = | 10089 | | |
| Ec = 4700√f'c | = | 27697,68227 | | |





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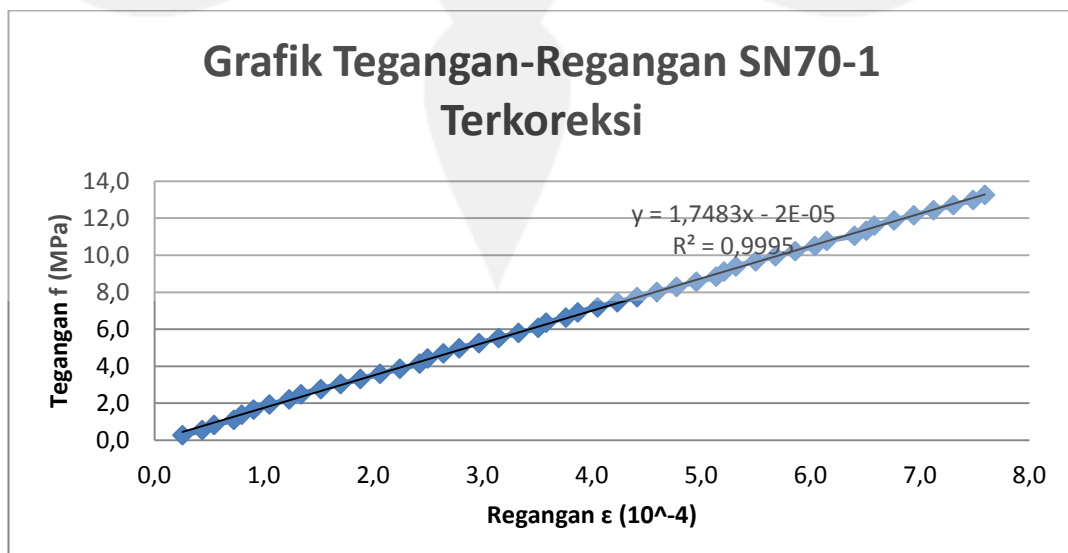
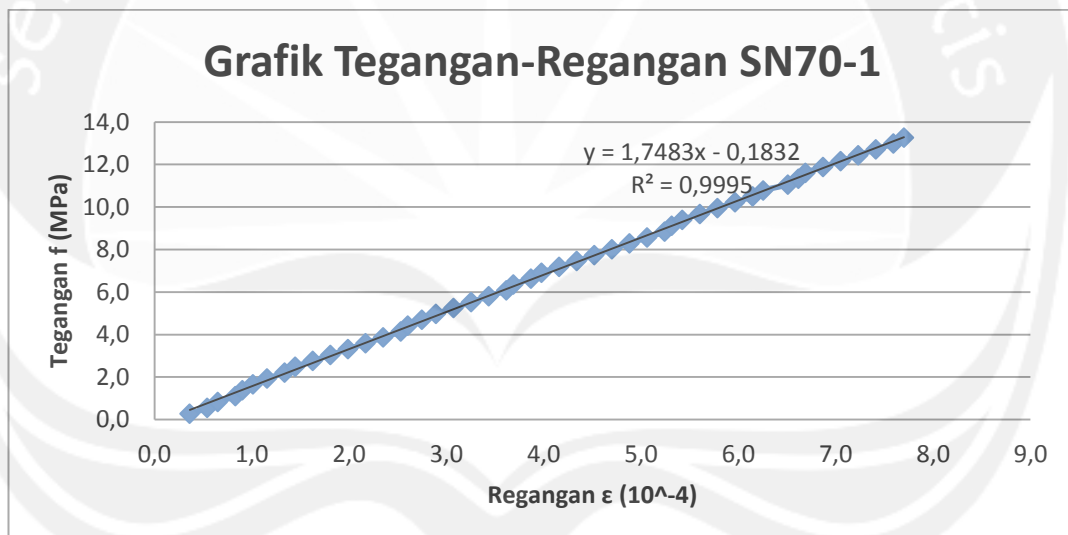
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2747 | 0,1816 | 0,8351 |
| 1000 | 9806,7100 | 12 | 1,2 | 0,6000 | 0,5493 | 0,4357 | 1,0893 |
| 1500 | 14710,0650 | 20 | 2 | 1,0000 | 0,8240 | 0,7262 | 1,3798 |
| 2000 | 19613,4200 | 25 | 2,5 | 1,2500 | 1,0986 | 0,9078 | 1,5614 |
| 2500 | 24516,7750 | 30 | 3 | 1,5000 | 1,3733 | 1,0893 | 1,7429 |
| 3000 | 29420,1300 | 40 | 4 | 2,0000 | 1,6480 | 1,4524 | 2,1060 |
| 3500 | 34323,4850 | 45 | 4,5 | 2,2500 | 1,9226 | 1,6340 | 2,2876 |
| 4000 | 39226,8400 | 50 | 5 | 2,5000 | 2,1973 | 1,8155 | 2,4691 |
| 4500 | 44130,1950 | 55 | 5,5 | 2,7500 | 2,4719 | 1,9971 | 2,6507 |
| 5000 | 49033,5500 | 60 | 6 | 3,0000 | 2,7466 | 2,1786 | 2,8322 |
| 5500 | 53936,9050 | 65 | 6,5 | 3,2500 | 3,0212 | 2,3602 | 3,0138 |
| 6000 | 58840,2600 | 70 | 7 | 3,5000 | 3,2959 | 2,5418 | 3,1953 |
| 6500 | 63743,6150 | 80 | 8 | 4,0000 | 3,5706 | 2,9049 | 3,5584 |
| 7000 | 68646,9700 | 85 | 8,5 | 4,2500 | 3,8452 | 3,0864 | 3,7400 |
| 7500 | 73550,3250 | 90 | 9 | 4,5000 | 4,1199 | 3,2680 | 3,9216 |
| 8000 | 78453,6800 | 95 | 9,5 | 4,7500 | 4,3945 | 3,4495 | 4,1031 |
| 8500 | 83357,0350 | 100 | 10 | 5,0000 | 4,6692 | 3,6311 | 4,2847 |
| 9000 | 88260,3900 | 108 | 10,8 | 5,4000 | 4,9439 | 3,9216 | 4,5752 |
| 9500 | 93163,7450 | 115 | 11,5 | 5,7500 | 5,2185 | 4,1757 | 4,8293 |
| 10000 | 98067,1000 | 120 | 12 | 6,0000 | 5,4932 | 4,3573 | 5,0109 |
| 10500 | 102970,4550 | 125 | 12,5 | 6,2500 | 5,7678 | 4,5389 | 5,1924 |
| 11000 | 107873,8100 | 135 | 13,5 | 6,7500 | 6,0425 | 4,9020 | 5,5555 |
| 11500 | 112777,1650 | 140 | 14 | 7,0000 | 6,3171 | 5,0835 | 5,7371 |
| 12000 | 117680,5200 | 145 | 14,5 | 7,2500 | 6,5918 | 5,2651 | 5,9187 |
| 12500 | 122583,8750 | 155 | 15,5 | 7,7500 | 6,8665 | 5,6282 | 6,2818 |
| 13000 | 127487,2300 | 160 | 16 | 8,0000 | 7,1411 | 5,8097 | 6,4633 |
| 13500 | 132390,5850 | 170 | 17 | 8,5000 | 7,4158 | 6,1728 | 6,8264 |
| 14000 | 137293,9400 | 180 | 18 | 9,0000 | 7,6904 | 6,5359 | 7,1895 |
| 14500 | 142197,2950 | 190 | 19 | 9,5000 | 7,9651 | 6,8991 | 7,5526 |
| 15000 | 147100,6500 | 200 | 20 | 10,0000 | 8,2398 | 7,2622 | 7,9157 |
| 15500 | 152004,0050 | 210 | 21 | 10,5000 | 8,5144 | 7,6253 | 8,2789 |
| 16000 | 156907,3600 | 220 | 22 | 11,0000 | 8,7891 | 7,9884 | 8,6420 |
| 16500 | 161810,7150 | 230 | 23 | 11,5000 | 9,0637 | 8,3515 | 9,0051 |
| 17000 | 166714,0700 | 240 | 24 | 12,0000 | 9,3384 | 8,7146 | 9,3682 |
| 17500 | 171617,4250 | 250 | 25 | 12,5000 | 9,6130 | 9,0777 | 9,7313 |
| 18000 | 176520,7800 | 260 | 26 | 13,0000 | 9,8877 | 9,4408 | 10,0944 |
| 18500 | 181424,1350 | 265 | 26,5 | 13,2500 | 10,1624 | 9,6224 | 10,2760 |
| 19000 | 186327,4900 | 270 | 27 | 13,5000 | 10,4370 | 9,8039 | 10,4575 |
| 19500 | 191230,8450 | 280 | 28 | 14,0000 | 10,7117 | 10,1670 | 10,8206 |
| 20000 | 196134,2000 | 285 | 28,5 | 14,2500 | 10,9863 | 10,3486 | 11,0022 |
| 20500 | 201037,5550 | 295 | 29,5 | 14,7500 | 11,2610 | 10,7117 | 11,3653 |
| 21000 | 205940,9100 | 300 | 30 | 15,0000 | 11,5357 | 10,8932 | 11,5468 |
| 21500 | 210844,2650 | 310 | 31 | 15,5000 | 11,8103 | 11,2564 | 11,9099 |
| 22000 | 215747,6200 | 320 | 32 | 16,0000 | 12,0850 | 11,6195 | 12,2730 |
| 22500 | 220650,9750 | 328 | 32,8 | 16,4000 | 12,3596 | 11,9099 | 12,5635 |
| 23000 | 225554,3300 | 334 | 33,4 | 16,7000 | 12,6343 | 12,1278 | 12,7814 |
| 23500 | 230457,6850 | 340 | 34 | 17,0000 | 12,9089 | 12,3457 | 12,9993 |
| 24000 | 235361,0400 | 346 | 34,6 | 17,3000 | 13,1836 | 12,5635 | 13,2171 |



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Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | |
|------------------------|---|-----------------------------|
| NAMA SAMPLE | = | SN 70 -1 |
| D rata- rata | = | 150,30 mm |
| H rata - rata | = | 301,87 mm |
| BERAT | = | 12408 gram = 12,408 kg |
| BERAT JENIS | = | 2316,7479 kg/m ³ |
| P (BEBAN MAKS) | = | 700 KN = 700000 N |
| Po | = | 138,3 mm |
| LA rata - rata | = | 17742,2152 mm ² |
| KUAT TEKAN | = | 39,4539 Mpa |
| 0,25 F _{maks} | = | 9,8635 |
| ANGKA KOREKSI | = | 0,1048 |
| MODULUS ELASTISITAS | = | 17483 |
| Ec = 4700√f'c | = | 29521,80836 |





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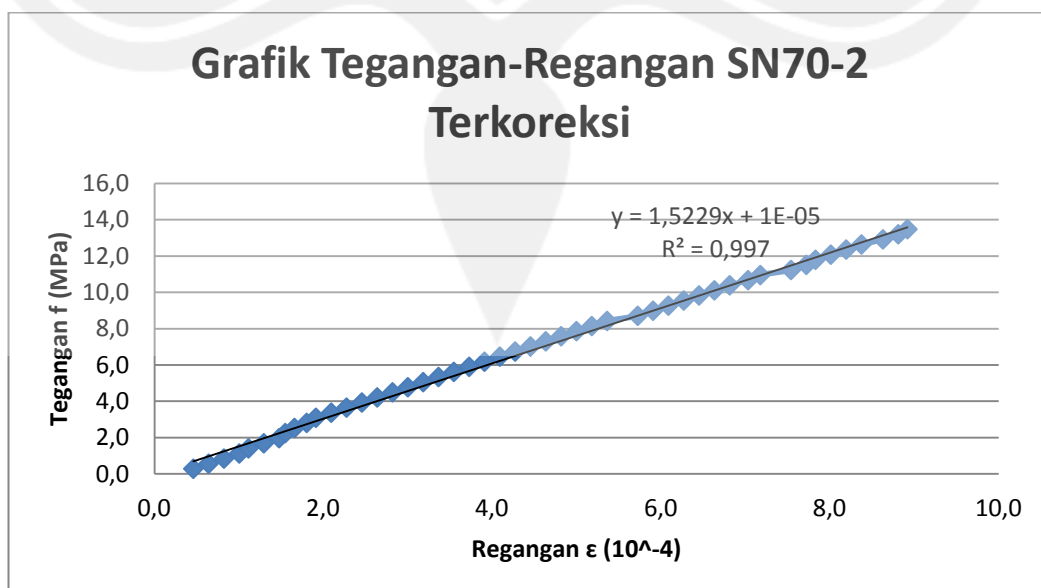
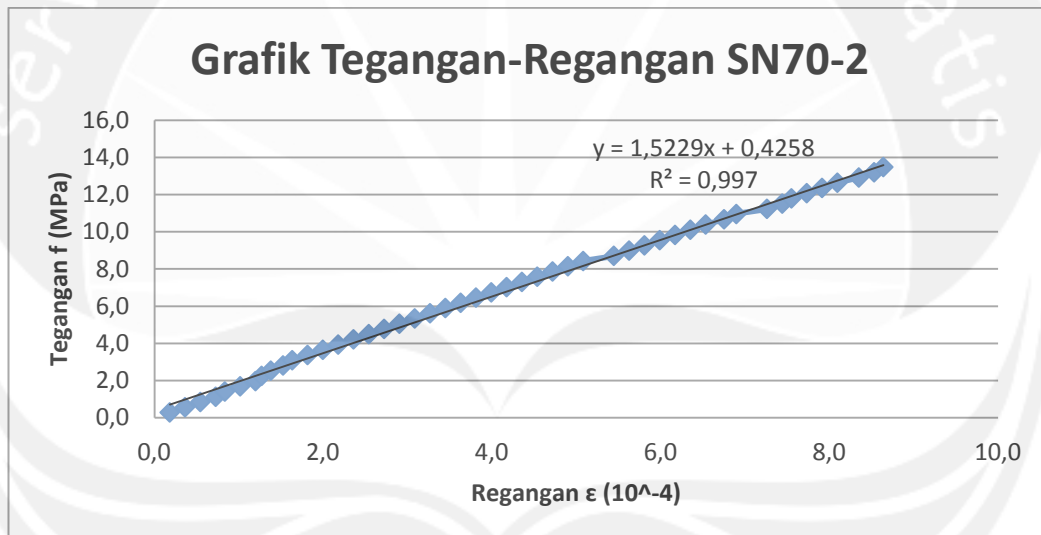
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 10 | 1 | 0,5000 | 0,2764 | 0,3615 | 0,2567 |
| 1000 | 9806,7100 | 15 | 1,5 | 0,7500 | 0,5527 | 0,5423 | 0,4375 |
| 1500 | 14710,0650 | 18 | 1,8 | 0,9000 | 0,8291 | 0,6508 | 0,5460 |
| 2000 | 19613,4200 | 23 | 2,3 | 1,1500 | 1,1055 | 0,8315 | 0,7267 |
| 2500 | 24516,7750 | 25 | 2,5 | 1,2500 | 1,3818 | 0,9038 | 0,7990 |
| 3000 | 29420,1300 | 28 | 2,8 | 1,4000 | 1,6582 | 1,0123 | 0,9075 |
| 3500 | 34323,4850 | 32 | 3,2 | 1,6000 | 1,9346 | 1,1569 | 1,0521 |
| 4000 | 39226,8400 | 37 | 3,7 | 1,8500 | 2,2109 | 1,3377 | 1,2329 |
| 4500 | 44130,1950 | 40 | 4 | 2,0000 | 2,4873 | 1,4461 | 1,3413 |
| 5000 | 49033,5500 | 45 | 4,5 | 2,2500 | 2,7637 | 1,6269 | 1,5221 |
| 5500 | 53936,9050 | 50 | 5 | 2,5000 | 3,0400 | 1,8077 | 1,7029 |
| 6000 | 58840,2600 | 55 | 5,5 | 2,7500 | 3,3164 | 1,9884 | 1,8836 |
| 6500 | 63743,6150 | 60 | 6 | 3,0000 | 3,5928 | 2,1692 | 2,0644 |
| 7000 | 68646,9700 | 65 | 6,5 | 3,2500 | 3,8691 | 2,3500 | 2,2452 |
| 7500 | 73550,3250 | 70 | 7 | 3,5000 | 4,1455 | 2,5307 | 2,4259 |
| 8000 | 78453,6800 | 72 | 7,2 | 3,6000 | 4,4219 | 2,6030 | 2,4982 |
| 8500 | 83357,0350 | 76 | 7,6 | 3,8000 | 4,6982 | 2,7477 | 2,6429 |
| 9000 | 88260,3900 | 80 | 8 | 4,0000 | 4,9746 | 2,8923 | 2,7875 |
| 9500 | 93163,7450 | 85 | 8,5 | 4,2500 | 5,2510 | 3,0730 | 2,9682 |
| 10000 | 98067,1000 | 90 | 9 | 4,5000 | 5,5273 | 3,2538 | 3,1490 |
| 10500 | 102970,4550 | 95 | 9,5 | 4,7500 | 5,8037 | 3,4346 | 3,3298 |
| 11000 | 107873,8100 | 100 | 10 | 5,0000 | 6,0801 | 3,6153 | 3,5105 |
| 11500 | 112777,1650 | 102 | 10,2 | 5,1000 | 6,3564 | 3,6876 | 3,5828 |
| 12000 | 117680,5200 | 107 | 10,7 | 5,3500 | 6,6328 | 3,8684 | 3,7636 |
| 12500 | 122583,8750 | 110 | 11 | 5,5000 | 6,9092 | 3,9769 | 3,8721 |
| 13000 | 127487,2300 | 115 | 11,5 | 5,7500 | 7,1855 | 4,1576 | 4,0528 |
| 13500 | 132390,5850 | 120 | 12 | 6,0000 | 7,4619 | 4,3384 | 4,2336 |
| 14000 | 137293,9400 | 125 | 12,5 | 6,2500 | 7,7383 | 4,5192 | 4,4144 |
| 14500 | 142197,2950 | 130 | 13 | 6,5000 | 8,0146 | 4,6999 | 4,5951 |
| 15000 | 147100,6500 | 135 | 13,5 | 6,7500 | 8,2910 | 4,8807 | 4,7759 |
| 15500 | 152004,0050 | 140 | 14 | 7,0000 | 8,5674 | 5,0615 | 4,9567 |
| 16000 | 156907,3600 | 145 | 14,5 | 7,2500 | 8,8437 | 5,2422 | 5,1374 |
| 16500 | 161810,7150 | 147 | 14,7 | 7,3500 | 9,1201 | 5,3145 | 5,2097 |
| 17000 | 166714,0700 | 150 | 15 | 7,5000 | 9,3965 | 5,4230 | 5,3182 |
| 17500 | 171617,4250 | 155 | 15,5 | 7,7500 | 9,6728 | 5,6038 | 5,4990 |
| 18000 | 176520,7800 | 160 | 16 | 8,0000 | 9,9492 | 5,7845 | 5,6797 |
| 18500 | 181424,1350 | 165 | 16,5 | 8,2500 | 10,2256 | 5,9653 | 5,8605 |
| 19000 | 186327,4900 | 170 | 17 | 8,5000 | 10,5019 | 6,1461 | 6,0413 |
| 19500 | 191230,8450 | 173 | 17,3 | 8,6500 | 10,7783 | 6,2545 | 6,1497 |
| 20000 | 196134,2000 | 180 | 18 | 9,0000 | 11,0547 | 6,5076 | 6,4028 |
| 20500 | 201037,5550 | 183 | 18,3 | 9,1500 | 11,3310 | 6,6161 | 6,5113 |
| 21000 | 205940,9100 | 185 | 18,5 | 9,2500 | 11,6074 | 6,6884 | 6,5836 |
| 21500 | 210844,2650 | 190 | 19 | 9,5000 | 11,8838 | 6,8691 | 6,7643 |
| 22000 | 215747,6200 | 195 | 19,5 | 9,7500 | 12,1601 | 7,0499 | 6,9451 |
| 22500 | 220650,9750 | 200 | 20 | 10,0000 | 12,4365 | 7,2307 | 7,1259 |
| 23000 | 225554,3300 | 205 | 20,5 | 10,2500 | 12,7129 | 7,4114 | 7,3066 |
| 23500 | 230457,6850 | 210 | 21 | 10,5000 | 12,9892 | 7,5922 | 7,4874 |
| 24000 | 235361,0400 | 213 | 21,3 | 10,6500 | 13,2656 | 7,7007 | 7,5959 |



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Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | | | |
|------------------------|---|-----------------|-------------------|-------------|
| NAMA SAMPLE | = | SN 70 -2 | | |
| D rata- rata | = | 149,13 | mm | |
| H rata - rata | = | 301,40 | mm | |
| BERAT | = | 12297 | gram | = 12,297 kg |
| BERAT JENIS | = | 2335,6975 | kg/m ³ | |
| P (BEBAN MAKS) | = | 630 | KN | = 630000 N |
| Po | = | 137,7 | mm | |
| LA rata - rata | = | 17467,8451 | mm ² | |
| KUAT TEKAN | = | 36,0663 | Mpa | |
| 0,25 F _{maks} | = | 9,0166 | | |
| ANGKA KOREKSI | = | -0,2796 | | |
| MODULUS ELASTISITAS | = | 15229 | | |
| Ec = 4700√fc | = | 28225,94344 | | |





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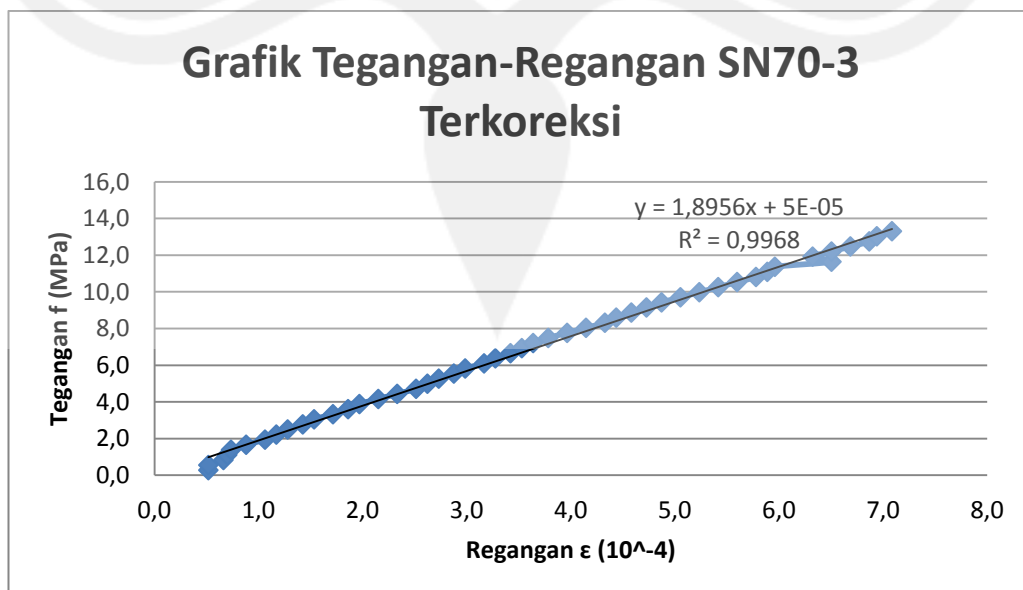
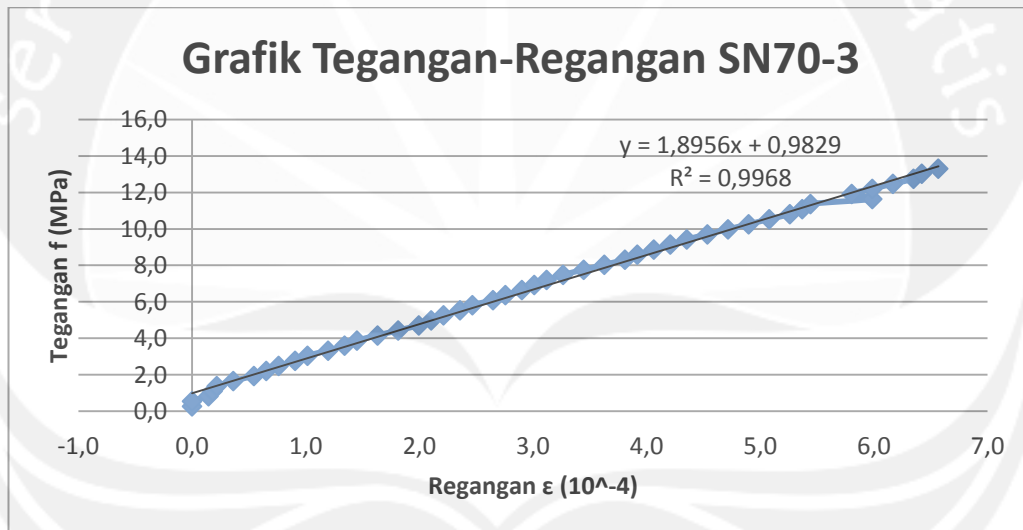
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2807 | 0,1816 | 0,4612 |
| 1000 | 9806,7100 | 10 | 1 | 0,5000 | 0,5614 | 0,3631 | 0,6427 |
| 1500 | 14710,0650 | 15 | 1,5 | 0,7500 | 0,8421 | 0,5447 | 0,8243 |
| 2000 | 19613,4200 | 20 | 2 | 1,0000 | 1,1228 | 0,7262 | 1,0058 |
| 2500 | 24516,7750 | 23 | 2,3 | 1,1500 | 1,4035 | 0,8351 | 1,1147 |
| 3000 | 29420,1300 | 28 | 2,8 | 1,4000 | 1,6842 | 1,0167 | 1,2963 |
| 3500 | 34323,4850 | 33 | 3,3 | 1,6500 | 1,9650 | 1,1983 | 1,4779 |
| 4000 | 39226,8400 | 35 | 3,5 | 1,7500 | 2,2457 | 1,2709 | 1,5505 |
| 4500 | 44130,1950 | 38 | 3,8 | 1,9000 | 2,5264 | 1,3798 | 1,6594 |
| 5000 | 49033,5500 | 42 | 4,2 | 2,1000 | 2,8071 | 1,5251 | 1,8047 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0878 | 1,6340 | 1,9136 |
| 6000 | 58840,2600 | 50 | 5 | 2,5000 | 3,3685 | 1,8155 | 2,0951 |
| 6500 | 63743,6150 | 55 | 5,5 | 2,7500 | 3,6492 | 1,9971 | 2,2767 |
| 7000 | 68646,9700 | 60 | 6 | 3,0000 | 3,9299 | 2,1786 | 2,4582 |
| 7500 | 73550,3250 | 65 | 6,5 | 3,2500 | 4,2106 | 2,3602 | 2,6398 |
| 8000 | 78453,6800 | 70 | 7 | 3,5000 | 4,4913 | 2,5418 | 2,8214 |
| 8500 | 83357,0350 | 75 | 7,5 | 3,7500 | 4,7720 | 2,7233 | 3,0029 |
| 9000 | 88260,3900 | 80 | 8 | 4,0000 | 5,0527 | 2,9049 | 3,1845 |
| 9500 | 93163,7450 | 85 | 8,5 | 4,2500 | 5,3334 | 3,0864 | 3,3660 |
| 10000 | 98067,1000 | 90 | 9 | 4,5000 | 5,6141 | 3,2680 | 3,5476 |
| 10500 | 102970,4550 | 95 | 9,5 | 4,7500 | 5,8949 | 3,4495 | 3,7291 |
| 11000 | 107873,8100 | 100 | 10 | 5,0000 | 6,1756 | 3,6311 | 3,9107 |
| 11500 | 112777,1650 | 105 | 10,5 | 5,2500 | 6,4563 | 3,8126 | 4,0922 |
| 12000 | 117680,5200 | 110 | 11 | 5,5000 | 6,7370 | 3,9942 | 4,2738 |
| 12500 | 122583,8750 | 115 | 11,5 | 5,7500 | 7,0177 | 4,1757 | 4,4553 |
| 13000 | 127487,2300 | 120 | 12 | 6,0000 | 7,2984 | 4,3573 | 4,6369 |
| 13500 | 132390,5850 | 125 | 12,5 | 6,2500 | 7,5791 | 4,5389 | 4,8185 |
| 14000 | 137293,9400 | 130 | 13 | 6,5000 | 7,8598 | 4,7204 | 5,0000 |
| 14500 | 142197,2950 | 135 | 13,5 | 6,7500 | 8,1405 | 4,9020 | 5,1816 |
| 15000 | 147100,6500 | 140 | 14 | 7,0000 | 8,4212 | 5,0835 | 5,3631 |
| 15500 | 152004,0050 | 150 | 15 | 7,5000 | 8,7019 | 5,4466 | 5,7262 |
| 16000 | 156907,3600 | 155 | 15,5 | 7,7500 | 8,9826 | 5,6282 | 5,9078 |
| 16500 | 161810,7150 | 160 | 16 | 8,0000 | 9,2633 | 5,8097 | 6,0893 |
| 17000 | 166714,0700 | 165 | 16,5 | 8,2500 | 9,5441 | 5,9913 | 6,2709 |
| 17500 | 171617,4250 | 170 | 17 | 8,5000 | 9,8248 | 6,1728 | 6,4524 |
| 18000 | 176520,7800 | 175 | 17,5 | 8,7500 | 10,1055 | 6,3544 | 6,6340 |
| 18500 | 181424,1350 | 180 | 18 | 9,0000 | 10,3862 | 6,5359 | 6,8155 |
| 19000 | 186327,4900 | 186 | 18,6 | 9,3000 | 10,6669 | 6,7538 | 7,0334 |
| 19500 | 191230,8450 | 190 | 19 | 9,5000 | 10,9476 | 6,8991 | 7,1787 |
| 20000 | 196134,2000 | 200 | 20 | 10,0000 | 11,2283 | 7,2622 | 7,5418 |
| 20500 | 201037,5550 | 205 | 20,5 | 10,2500 | 11,5090 | 7,4437 | 7,7233 |
| 21000 | 205940,9100 | 208 | 20,8 | 10,4000 | 11,7897 | 7,5527 | 7,8322 |
| 21500 | 210844,2650 | 213 | 21,3 | 10,6500 | 12,0704 | 7,7342 | 8,0138 |
| 22000 | 215747,6200 | 218 | 21,8 | 10,9000 | 12,3511 | 7,9158 | 8,1954 |
| 22500 | 220650,9750 | 223 | 22,3 | 11,1500 | 12,6318 | 8,0973 | 8,3769 |
| 23000 | 225554,3300 | 230 | 23 | 11,5000 | 12,9125 | 8,3515 | 8,6311 |
| 23500 | 230457,6850 | 235 | 23,5 | 11,7500 | 13,1933 | 8,5330 | 8,8126 |
| 24000 | 235361,0400 | 238 | 23,8 | 11,9000 | 13,4740 | 8,6420 | 8,9216 |



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 Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

| | | | |
|--------------------------|----------|-----------------|-------------------|
| NAMA SAMPLE | = | SN 70 -3 | |
| D rata- rata | = | 150,07 | mm |
| H rata - rata | = | 302,23 | mm |
| BERAT | = | 12549 | gram = 12,549 kg |
| BERAT JENIS | = | 2347,5152 | kg/m ³ |
| P (BEBAN MAKS) | = | 730 | KN = 730000 N |
| Po | = | 137,8 | mm |
| LA rata - rata | = | 17687,1701 | mm ² |
| KUAT TEKAN | = | 41,2729 | Mpa |
| 0,25 F _{maks} | = | 10,3182 | |
| ANGKA KOREKSI | = | -0,5185 | |
| MODULUS ELASTISITAS | = | 18956 | |
| Ec = 4700√f _c | = | 30194,65775 | |





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 Telp: (0274) 487711 Fax: (0274) 487748
 Website: www.ujy.ac.id Email: fteknik@mail.ujy.ac.id

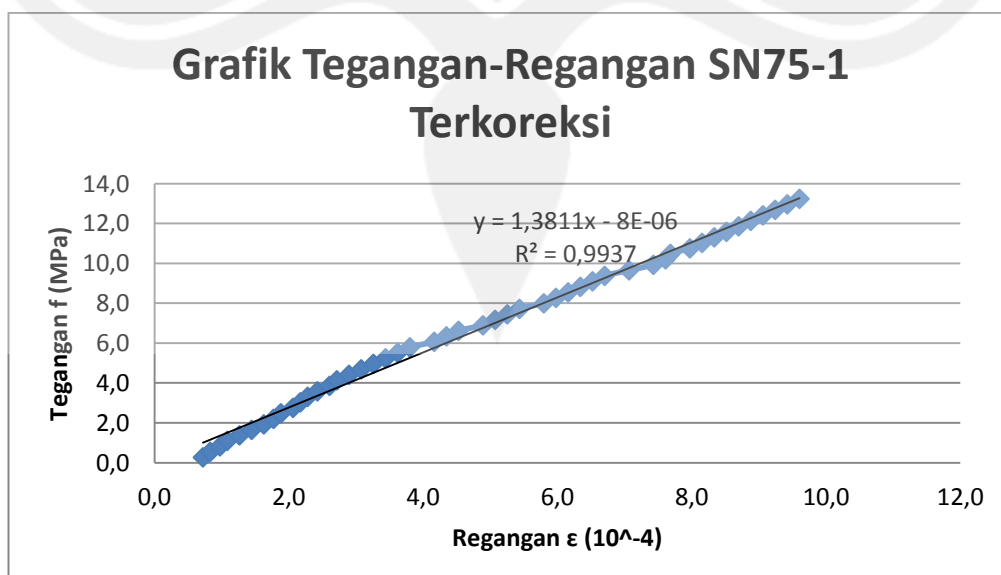
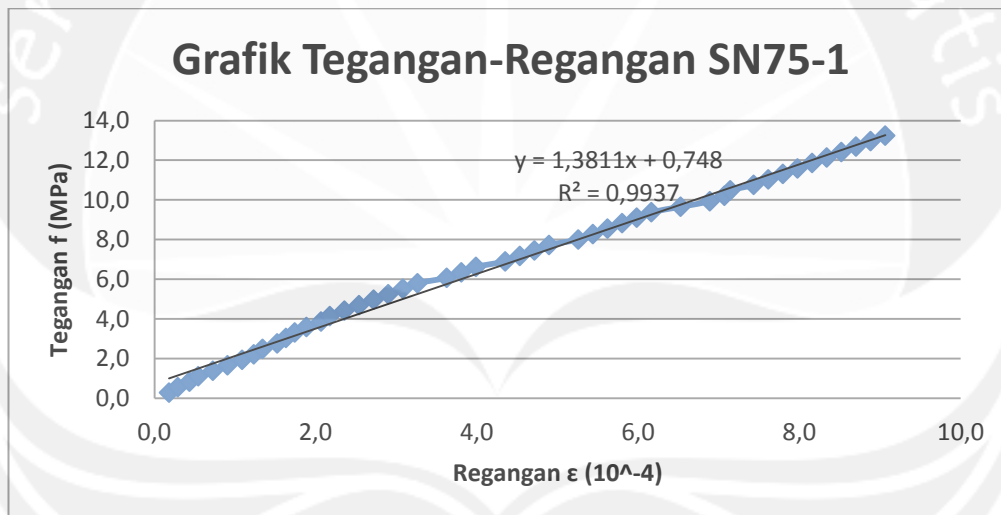
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 0 | 0 | 0,0000 | 0,2772 | 0,0000 | 0,5185 |
| 1000 | 9806,7100 | 0 | 0 | 0,0000 | 0,5545 | 0,0000 | 0,5185 |
| 1500 | 14710,0650 | 4 | 0,4 | 0,2000 | 0,8317 | 0,1451 | 0,6637 |
| 2000 | 19613,4200 | 5 | 0,5 | 0,2500 | 1,1089 | 0,1814 | 0,6999 |
| 2500 | 24516,7750 | 6 | 0,6 | 0,3000 | 1,3861 | 0,2177 | 0,7362 |
| 3000 | 29420,1300 | 10 | 1 | 0,5000 | 1,6634 | 0,3628 | 0,8814 |
| 3500 | 34323,4850 | 15 | 1,5 | 0,7500 | 1,9406 | 0,5443 | 1,0628 |
| 4000 | 39226,8400 | 18 | 1,8 | 0,9000 | 2,2178 | 0,6531 | 1,1716 |
| 4500 | 44130,1950 | 21 | 2,1 | 1,0500 | 2,4950 | 0,7620 | 1,2805 |
| 5000 | 49033,5500 | 25 | 2,5 | 1,2500 | 2,7723 | 0,9071 | 1,4256 |
| 5500 | 53936,9050 | 28 | 2,8 | 1,4000 | 3,0495 | 1,0160 | 1,5345 |
| 6000 | 58840,2600 | 33 | 3,3 | 1,6500 | 3,3267 | 1,1974 | 1,7159 |
| 6500 | 63743,6150 | 37 | 3,7 | 1,8500 | 3,6039 | 1,3425 | 1,8610 |
| 7000 | 68646,9700 | 40 | 4 | 2,0000 | 3,8812 | 1,4514 | 1,9699 |
| 7500 | 73550,3250 | 45 | 4,5 | 2,2500 | 4,1584 | 1,6328 | 2,1513 |
| 8000 | 78453,6800 | 50 | 5 | 2,5000 | 4,4356 | 1,8142 | 2,3327 |
| 8500 | 83357,0350 | 55 | 5,5 | 2,7500 | 4,7129 | 1,9956 | 2,5142 |
| 9000 | 88260,3900 | 58 | 5,8 | 2,9000 | 4,9901 | 2,1045 | 2,6230 |
| 9500 | 93163,7450 | 61 | 6,1 | 3,0500 | 5,2673 | 2,2134 | 2,7319 |
| 10000 | 98067,1000 | 65 | 6,5 | 3,2500 | 5,5445 | 2,3585 | 2,8770 |
| 10500 | 102970,4550 | 68 | 6,8 | 3,4000 | 5,8218 | 2,4673 | 2,9859 |
| 11000 | 107873,8100 | 73 | 7,3 | 3,6500 | 6,0990 | 2,6488 | 3,1673 |
| 11500 | 112777,1650 | 76 | 7,6 | 3,8000 | 6,3762 | 2,7576 | 3,2761 |
| 12000 | 117680,5200 | 80 | 8 | 4,0000 | 6,6534 | 2,9028 | 3,4213 |
| 12500 | 122583,8750 | 83 | 8,3 | 4,1500 | 6,9307 | 3,0116 | 3,5301 |
| 13000 | 127487,2300 | 86 | 8,6 | 4,3000 | 7,2079 | 3,1205 | 3,6390 |
| 13500 | 132390,5850 | 90 | 9 | 4,5000 | 7,4851 | 3,2656 | 3,7841 |
| 14000 | 137293,9400 | 95 | 9,5 | 4,7500 | 7,7623 | 3,4470 | 3,9655 |
| 14500 | 142197,2950 | 100 | 10 | 5,0000 | 8,0396 | 3,6284 | 4,1470 |
| 15000 | 147100,6500 | 105 | 10,5 | 5,2500 | 8,3168 | 3,8099 | 4,3284 |
| 15500 | 152004,0050 | 108 | 10,8 | 5,4000 | 8,5940 | 3,9187 | 4,4372 |
| 16000 | 156907,3600 | 112 | 11,2 | 5,6000 | 8,8713 | 4,0639 | 4,5824 |
| 16500 | 161810,7150 | 116 | 11,6 | 5,8000 | 9,1485 | 4,2090 | 4,7275 |
| 17000 | 166714,0700 | 120 | 12 | 6,0000 | 9,4257 | 4,3541 | 4,8727 |
| 17500 | 171617,4250 | 125 | 12,5 | 6,2500 | 9,7029 | 4,5356 | 5,0541 |
| 18000 | 176520,7800 | 130 | 13 | 6,5000 | 9,9802 | 4,7170 | 5,2355 |
| 18500 | 181424,1350 | 135 | 13,5 | 6,7500 | 10,2574 | 4,8984 | 5,4169 |
| 19000 | 186327,4900 | 140 | 14 | 7,0000 | 10,5346 | 5,0798 | 5,5983 |
| 19500 | 191230,8450 | 145 | 14,5 | 7,2500 | 10,8118 | 5,2612 | 5,7798 |
| 20000 | 196134,2000 | 148 | 14,8 | 7,4000 | 11,0891 | 5,3701 | 5,8886 |
| 20500 | 201037,5550 | 150 | 15 | 7,5000 | 11,3663 | 5,4427 | 5,9612 |
| 21000 | 205940,9100 | 165 | 16,5 | 8,2500 | 11,6435 | 5,9869 | 6,5055 |
| 21500 | 210844,2650 | 160 | 16 | 8,0000 | 11,9207 | 5,8055 | 6,3240 |
| 22000 | 215747,6200 | 165 | 16,5 | 8,2500 | 12,1980 | 5,9869 | 6,5055 |
| 22500 | 220650,9750 | 170 | 17 | 8,5000 | 12,4752 | 6,1684 | 6,6869 |
| 23000 | 225554,3300 | 175 | 17,5 | 8,7500 | 12,7524 | 6,3498 | 6,8683 |
| 23500 | 230457,6850 | 177 | 17,7 | 8,8500 | 13,0297 | 6,4224 | 6,9409 |
| 24000 | 235361,0400 | 181 | 18,1 | 9,0500 | 13,3069 | 6,5675 | 7,0860 |



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| | | | | |
|--------------------------|----------|-----------------|-------------------|-------------|
| NAMA SAMPLE | = | SN 75 -1 | | |
| D rata- rata | = | 150,43 | mm | |
| H rata - rata | = | 300,80 | mm | |
| BERAT | = | 12296 | gram | = 12,296 kg |
| BERAT JENIS | = | 2299,8949 | kg/m ³ | |
| P (BEBAN MAKS) | = | 570 | KN | = 570000 N |
| Po | = | 137,9 | mm | |
| LA rata - rata | = | 17773,7079 | mm ² | |
| KUAT TEKAN | = | 32,0698 | Mpa | |
| 0,25 F _{maks} | = | 8,0175 | | |
| ANGKA KOREKSI | = | -0,5416 | | |
| MODULUS ELASTISITAS | = | 13811 | | |
| Ec = 4700√f _c | = | 26616,2132 | | |





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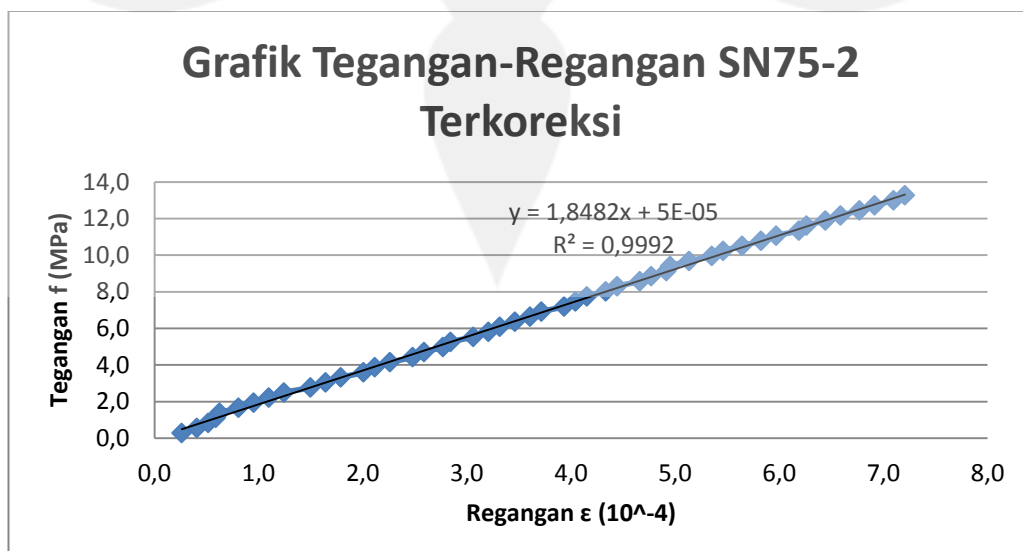
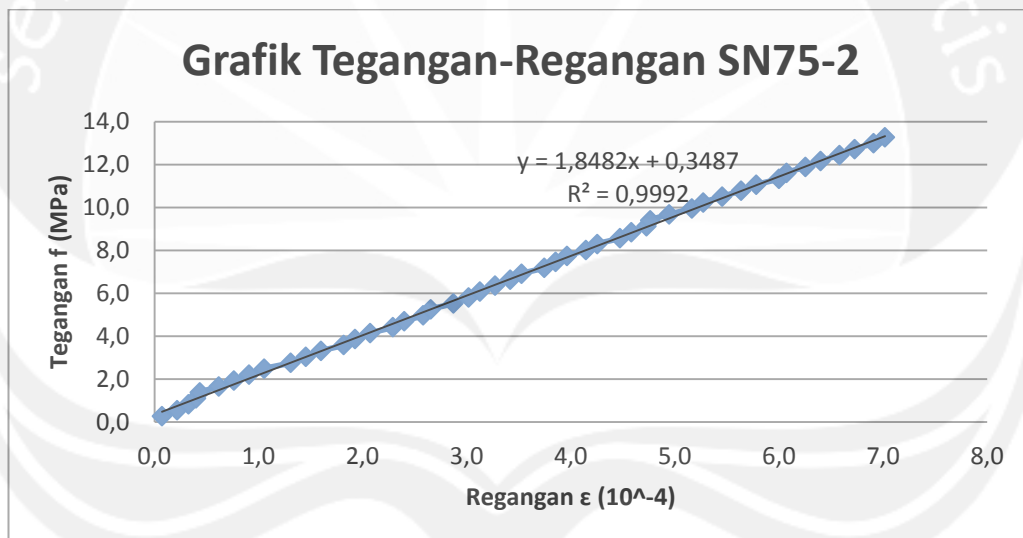
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 5 | 0,5 | 0,2500 | 0,2759 | 0,1813 | 0,7229 |
| 1000 | 9806,7100 | 8 | 0,8 | 0,4000 | 0,5518 | 0,2901 | 0,8317 |
| 1500 | 14710,0650 | 12 | 1,2 | 0,6000 | 0,8276 | 0,4351 | 0,9767 |
| 2000 | 19613,4200 | 15 | 1,5 | 0,7500 | 1,1035 | 0,5439 | 1,0855 |
| 2500 | 24516,7750 | 20 | 2 | 1,0000 | 1,3794 | 0,7252 | 1,2668 |
| 3000 | 29420,1300 | 25 | 2,5 | 1,2500 | 1,6553 | 0,9065 | 1,4481 |
| 3500 | 34323,4850 | 30 | 3 | 1,5000 | 1,9311 | 1,0877 | 1,6293 |
| 4000 | 39226,8400 | 34 | 3,4 | 1,7000 | 2,2070 | 1,2328 | 1,7744 |
| 4500 | 44130,1950 | 37 | 3,7 | 1,8500 | 2,4829 | 1,3416 | 1,8831 |
| 5000 | 49033,5500 | 42 | 4,2 | 2,1000 | 2,7588 | 1,5228 | 2,0644 |
| 5500 | 53936,9050 | 45 | 4,5 | 2,2500 | 3,0346 | 1,6316 | 2,1732 |
| 6000 | 58840,2600 | 48 | 4,8 | 2,4000 | 3,3105 | 1,7404 | 2,2820 |
| 6500 | 63743,6150 | 52 | 5,2 | 2,6000 | 3,5864 | 1,8854 | 2,4270 |
| 7000 | 68646,9700 | 57 | 5,7 | 2,8500 | 3,8623 | 2,0667 | 2,6083 |
| 7500 | 73550,3250 | 60 | 6 | 3,0000 | 4,1382 | 2,1755 | 2,7171 |
| 8000 | 78453,6800 | 65 | 6,5 | 3,2500 | 4,4140 | 2,3568 | 2,8984 |
| 8500 | 83357,0350 | 70 | 7 | 3,5000 | 4,6899 | 2,5381 | 3,0797 |
| 9000 | 88260,3900 | 75 | 7,5 | 3,7500 | 4,9658 | 2,7194 | 3,2610 |
| 9500 | 93163,7450 | 80 | 8 | 4,0000 | 5,2417 | 2,9007 | 3,4422 |
| 10000 | 98067,1000 | 85 | 8,5 | 4,2500 | 5,5175 | 3,0819 | 3,6235 |
| 10500 | 102970,4550 | 90 | 9 | 4,5000 | 5,7934 | 3,2632 | 3,8048 |
| 11000 | 107873,8100 | 100 | 10 | 5,0000 | 6,0693 | 3,6258 | 4,1674 |
| 11500 | 112777,1650 | 105 | 10,5 | 5,2500 | 6,3452 | 3,8071 | 4,3487 |
| 12000 | 117680,5200 | 110 | 11 | 5,5000 | 6,6210 | 3,9884 | 4,5300 |
| 12500 | 122583,8750 | 120 | 12 | 6,0000 | 6,8969 | 4,3510 | 4,8926 |
| 13000 | 127487,2300 | 125 | 12,5 | 6,2500 | 7,1728 | 4,5323 | 5,0739 |
| 13500 | 132390,5850 | 130 | 13 | 6,5000 | 7,4487 | 4,7136 | 5,2552 |
| 14000 | 137293,9400 | 135 | 13,5 | 6,7500 | 7,7246 | 4,8949 | 5,4364 |
| 14500 | 142197,2950 | 145 | 14,5 | 7,2500 | 8,0004 | 5,2574 | 5,7990 |
| 15000 | 147100,6500 | 150 | 15 | 7,5000 | 8,2763 | 5,4387 | 5,9803 |
| 15500 | 152004,0050 | 155 | 15,5 | 7,7500 | 8,5522 | 5,6200 | 6,1616 |
| 16000 | 156907,3600 | 160 | 16 | 8,0000 | 8,8281 | 5,8013 | 6,3429 |
| 16500 | 161810,7150 | 165 | 16,5 | 8,2500 | 9,1039 | 5,9826 | 6,5242 |
| 17000 | 166714,0700 | 170 | 17 | 8,5000 | 9,3798 | 6,1639 | 6,7055 |
| 17500 | 171617,4250 | 180 | 18 | 9,0000 | 9,6557 | 6,5265 | 7,0681 |
| 18000 | 176520,7800 | 190 | 19 | 9,5000 | 9,9316 | 6,8891 | 7,4306 |
| 18500 | 181424,1350 | 195 | 19,5 | 9,7500 | 10,2074 | 7,0703 | 7,6119 |
| 19000 | 186327,4900 | 197 | 19,7 | 9,8500 | 10,4833 | 7,1429 | 7,6845 |
| 19500 | 191230,8450 | 205 | 20,5 | 10,2500 | 10,7592 | 7,4329 | 7,9745 |
| 20000 | 196134,2000 | 210 | 21 | 10,5000 | 11,0351 | 7,6142 | 8,1558 |
| 20500 | 201037,5550 | 215 | 21,5 | 10,7500 | 11,3110 | 7,7955 | 8,3371 |
| 21000 | 205940,9100 | 220 | 22 | 11,0000 | 11,5868 | 7,9768 | 8,5184 |
| 21500 | 210844,2650 | 225 | 22,5 | 11,2500 | 11,8627 | 8,1581 | 8,6997 |
| 22000 | 215747,6200 | 230 | 23 | 11,5000 | 12,1386 | 8,3394 | 8,8810 |
| 22500 | 220650,9750 | 235 | 23,5 | 11,7500 | 12,4145 | 8,5207 | 9,0623 |
| 23000 | 225554,3300 | 240 | 24 | 12,0000 | 12,6903 | 8,7020 | 9,2436 |
| 23500 | 230457,6850 | 245 | 24,5 | 12,2500 | 12,9662 | 8,8832 | 9,4248 |
| 24000 | 235361,0400 | 250 | 25 | 12,5000 | 13,2421 | 9,0645 | 9,6061 |



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| | | |
|------------------------|---|-----------------------------|
| NAMA SAMPLE | = | SN 75 -2 |
| D rata- rata | = | 150,27 mm |
| H rata - rata | = | 301,50 mm |
| BERAT | = | 12359 gram = 12,359 kg |
| BERAT JENIS | = | 2311,4304 kg/m ³ |
| P (BEBAN MAKS) | = | 570 KN = 570000 N |
| Po | = | 137,5 mm |
| LA rata - rata | = | 17734,3464 mm ² |
| KUAT TEKAN | = | 32,1410 Mpa |
| 0,25 F _{maks} | = | 8,0353 |
| ANGKA KOREKSI | = | -0,1887 |
| MODULUS ELASTISITAS | = | 18482 |
| $E_c = 4700\sqrt{f_c}$ | = | 26645,734 |





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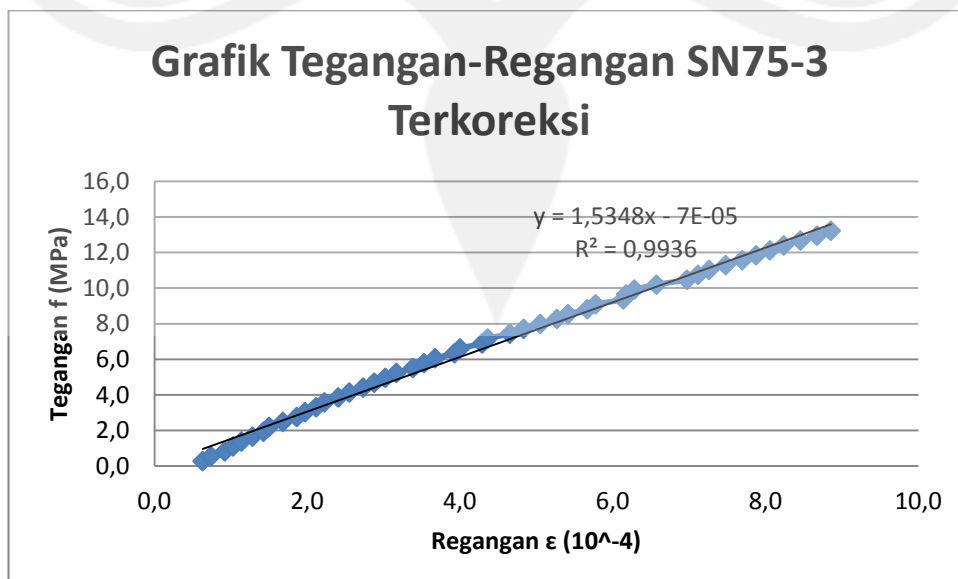
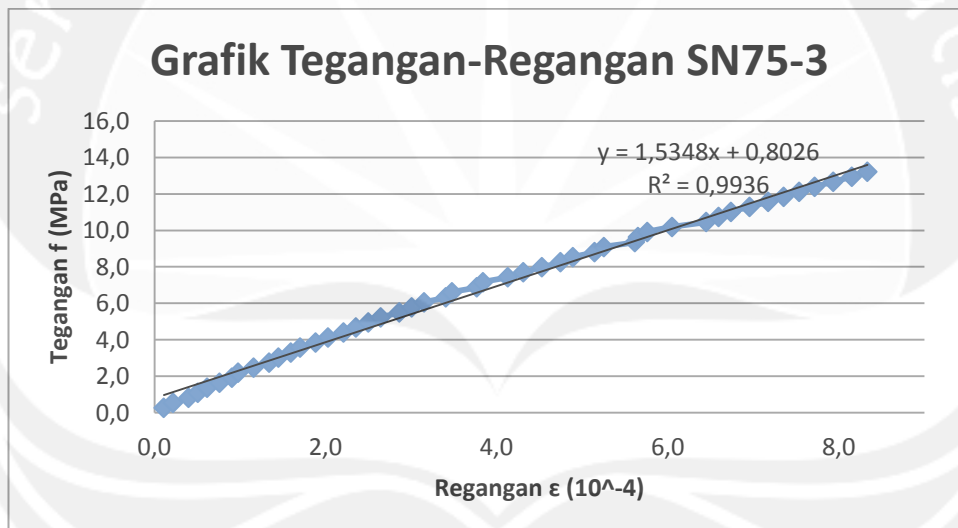
| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 2 | 0,2 | 0,1000 | 0,2765 | 0,0727 | 0,2614 |
| 1000 | 9806,7100 | 6 | 0,6 | 0,3000 | 0,5530 | 0,2182 | 0,4069 |
| 1500 | 14710,0650 | 9 | 0,9 | 0,4500 | 0,8295 | 0,3273 | 0,5159 |
| 2000 | 19613,4200 | 11 | 1,1 | 0,5500 | 1,1060 | 0,4000 | 0,5887 |
| 2500 | 24516,7750 | 12 | 1,2 | 0,6000 | 1,3824 | 0,4364 | 0,6250 |
| 3000 | 29420,1300 | 17 | 1,7 | 0,8500 | 1,6589 | 0,6182 | 0,8069 |
| 3500 | 34323,4850 | 21 | 2,1 | 1,0500 | 1,9354 | 0,7636 | 0,9523 |
| 4000 | 39226,8400 | 25 | 2,5 | 1,2500 | 2,2119 | 0,9091 | 1,0978 |
| 4500 | 44130,1950 | 29 | 2,9 | 1,4500 | 2,4884 | 1,0545 | 1,2432 |
| 5000 | 49033,5500 | 36 | 3,6 | 1,8000 | 2,7649 | 1,3091 | 1,4978 |
| 5500 | 53936,9050 | 40 | 4 | 2,0000 | 3,0414 | 1,4545 | 1,6432 |
| 6000 | 58840,2600 | 44 | 4,4 | 2,2000 | 3,3179 | 1,6000 | 1,7887 |
| 6500 | 63743,6150 | 50 | 5 | 2,5000 | 3,5944 | 1,8182 | 2,0069 |
| 7000 | 68646,9700 | 53 | 5,3 | 2,6500 | 3,8708 | 1,9273 | 2,1159 |
| 7500 | 73550,3250 | 57 | 5,7 | 2,8500 | 4,1473 | 2,0727 | 2,2614 |
| 8000 | 78453,6800 | 63 | 6,3 | 3,1500 | 4,4238 | 2,2909 | 2,4796 |
| 8500 | 83357,0350 | 66 | 6,6 | 3,3000 | 4,7003 | 2,4000 | 2,5887 |
| 9000 | 88260,3900 | 71 | 7,1 | 3,5500 | 4,9768 | 2,5818 | 2,7705 |
| 9500 | 93163,7450 | 73 | 7,3 | 3,6500 | 5,2533 | 2,6545 | 2,8432 |
| 10000 | 98067,1000 | 79 | 7,9 | 3,9500 | 5,5298 | 2,8727 | 3,0614 |
| 10500 | 102970,4550 | 83 | 8,3 | 4,1500 | 5,8063 | 3,0182 | 3,2069 |
| 11000 | 107873,8100 | 86 | 8,6 | 4,3000 | 6,0828 | 3,1273 | 3,3159 |
| 11500 | 112777,1650 | 90 | 9 | 4,5000 | 6,3593 | 3,2727 | 3,4614 |
| 12000 | 117680,5200 | 94 | 9,4 | 4,7000 | 6,6357 | 3,4182 | 3,6069 |
| 12500 | 122583,8750 | 97 | 9,7 | 4,8500 | 6,9122 | 3,5273 | 3,7159 |
| 13000 | 127487,2300 | 103 | 10,3 | 5,1500 | 7,1887 | 3,7455 | 3,9341 |
| 13500 | 132390,5850 | 106 | 10,6 | 5,3000 | 7,4652 | 3,8545 | 4,0432 |
| 14000 | 137293,9400 | 109 | 10,9 | 5,4500 | 7,7417 | 3,9636 | 4,1523 |
| 14500 | 142197,2950 | 114 | 11,4 | 5,7000 | 8,0182 | 4,1455 | 4,3341 |
| 15000 | 147100,6500 | 117 | 11,7 | 5,8500 | 8,2947 | 4,2545 | 4,4432 |
| 15500 | 152004,0050 | 123 | 12,3 | 6,1500 | 8,5712 | 4,4727 | 4,6614 |
| 16000 | 156907,3600 | 126 | 12,6 | 6,3000 | 8,8477 | 4,5818 | 4,7705 |
| 16500 | 161810,7150 | 130 | 13 | 6,5000 | 9,1241 | 4,7273 | 4,9159 |
| 17000 | 166714,0700 | 131 | 13,1 | 6,5500 | 9,4006 | 4,7636 | 4,9523 |
| 17500 | 171617,4250 | 136 | 13,6 | 6,8000 | 9,6771 | 4,9455 | 5,1341 |
| 18000 | 176520,7800 | 142 | 14,2 | 7,1000 | 9,9536 | 5,1636 | 5,3523 |
| 18500 | 181424,1350 | 145 | 14,5 | 7,2500 | 10,2301 | 5,2727 | 5,4614 |
| 19000 | 186327,4900 | 150 | 15 | 7,5000 | 10,5066 | 5,4545 | 5,6432 |
| 19500 | 191230,8450 | 155 | 15,5 | 7,7500 | 10,7831 | 5,6364 | 5,8250 |
| 20000 | 196134,2000 | 159 | 15,9 | 7,9500 | 11,0596 | 5,7818 | 5,9705 |
| 20500 | 201037,5550 | 165 | 16,5 | 8,2500 | 11,3361 | 6,0000 | 6,1887 |
| 21000 | 205940,9100 | 167 | 16,7 | 8,3500 | 11,6125 | 6,0727 | 6,2614 |
| 21500 | 210844,2650 | 172 | 17,2 | 8,6000 | 11,8890 | 6,2545 | 6,4432 |
| 22000 | 215747,6200 | 176 | 17,6 | 8,8000 | 12,1655 | 6,4000 | 6,5887 |
| 22500 | 220650,9750 | 181 | 18,1 | 9,0500 | 12,4420 | 6,5818 | 6,7705 |
| 23000 | 225554,3300 | 185 | 18,5 | 9,2500 | 12,7185 | 6,7273 | 6,9159 |
| 23500 | 230457,6850 | 190 | 19 | 9,5000 | 12,9950 | 6,9091 | 7,0978 |
| 24000 | 235361,0400 | 193 | 19,3 | 9,6500 | 13,2715 | 7,0182 | 7,2069 |



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| | | |
|------------------------|---|-----------------------------|
| NAMA SAMPLE | = | SN 75 -3 |
| D rata- rata | = | 150,57 mm |
| H rata - rata | = | 299,13 mm |
| BERAT | = | 12331 gram = 12,331 kg |
| BERAT JENIS | = | 2315,1862 kg/m ³ |
| P (BEBAN MAKS) | = | 735 KN = 735000 N |
| Po | = | 138 mm |
| LA rata - rata | = | 17805,2286 mm ² |
| KUAT TEKAN | = | 41,2800 Mpa |
| 0,25 F _{maks} | = | 10,3200 |
| ANGKA KOREKSI | = | -0,5229 |
| MODULUS ELASTISITAS | = | 15348 |
| $E_c = 4700\sqrt{f_c}$ | = | 30197,275 |





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| BEBAN | | ΔP | $\Delta P \times 10^{-2}$ | $0.5\Delta p \times 10^{-2}$ | F | ϵ | ϵ koreksi |
|-------|-------------|------------|---------------------------|------------------------------|---------|---------------|--------------------|
| Kgf | N | (mm) | (mm) | (mm) | (Mpa) | (10^{-4}) | (10^{-4}) |
| 500 | 4903,3550 | 3 | 0,3 | 0,1500 | 0,2754 | 0,1087 | 0,6316 |
| 1000 | 9806,7100 | 6 | 0,6 | 0,3000 | 0,5508 | 0,2174 | 0,7403 |
| 1500 | 14710,0650 | 11 | 1,1 | 0,5500 | 0,8262 | 0,3986 | 0,9215 |
| 2000 | 19613,4200 | 14 | 1,4 | 0,7000 | 1,1016 | 0,5072 | 1,0302 |
| 2500 | 24516,7750 | 17 | 1,7 | 0,8500 | 1,3769 | 0,6159 | 1,1389 |
| 3000 | 29420,1300 | 21 | 2,1 | 1,0500 | 1,6523 | 0,7609 | 1,2838 |
| 3500 | 34323,4850 | 25 | 2,5 | 1,2500 | 1,9277 | 0,9058 | 1,4287 |
| 4000 | 39226,8400 | 27 | 2,7 | 1,3500 | 2,2031 | 0,9783 | 1,5012 |
| 4500 | 44130,1950 | 32 | 3,2 | 1,6000 | 2,4785 | 1,1594 | 1,6824 |
| 5000 | 49033,5500 | 37 | 3,7 | 1,8500 | 2,7539 | 1,3406 | 1,8635 |
| 5500 | 53936,9050 | 40 | 4 | 2,0000 | 3,0293 | 1,4493 | 1,9722 |
| 6000 | 58840,2600 | 44 | 4,4 | 2,2000 | 3,3047 | 1,5942 | 2,1171 |
| 6500 | 63743,6150 | 47 | 4,7 | 2,3500 | 3,5801 | 1,7029 | 2,2258 |
| 7000 | 68646,9700 | 52 | 5,2 | 2,6000 | 3,8554 | 1,8841 | 2,4070 |
| 7500 | 73550,3250 | 56 | 5,6 | 2,8000 | 4,1308 | 2,0290 | 2,5519 |
| 8000 | 78453,6800 | 61 | 6,1 | 3,0500 | 4,4062 | 2,2101 | 2,7331 |
| 8500 | 83357,0350 | 65 | 6,5 | 3,2500 | 4,6816 | 2,3551 | 2,8780 |
| 9000 | 88260,3900 | 69 | 6,9 | 3,4500 | 4,9570 | 2,5000 | 3,0229 |
| 9500 | 93163,7450 | 73 | 7,3 | 3,6500 | 5,2324 | 2,6449 | 3,1679 |
| 10000 | 98067,1000 | 79 | 7,9 | 3,9500 | 5,5078 | 2,8623 | 3,3853 |
| 10500 | 102970,4550 | 83 | 8,3 | 4,1500 | 5,7832 | 3,0072 | 3,5302 |
| 11000 | 107873,8100 | 87 | 8,7 | 4,3500 | 6,0585 | 3,1522 | 3,6751 |
| 11500 | 112777,1650 | 94 | 9,4 | 4,7000 | 6,3339 | 3,4058 | 3,9287 |
| 12000 | 117680,5200 | 96 | 9,6 | 4,8000 | 6,6093 | 3,4783 | 4,0012 |
| 12500 | 122583,8750 | 104 | 10,4 | 5,2000 | 6,8847 | 3,7681 | 4,2911 |
| 13000 | 127487,2300 | 106 | 10,6 | 5,3000 | 7,1601 | 3,8406 | 4,3635 |
| 13500 | 132390,5850 | 114 | 11,4 | 5,7000 | 7,4355 | 4,1304 | 4,6534 |
| 14000 | 137293,9400 | 119 | 11,9 | 5,9500 | 7,7109 | 4,3116 | 4,8345 |
| 14500 | 142197,2950 | 125 | 12,5 | 6,2500 | 7,9863 | 4,5290 | 5,0519 |
| 15000 | 147100,6500 | 131 | 13,1 | 6,5500 | 8,2617 | 4,7464 | 5,2693 |
| 15500 | 152004,0050 | 135 | 13,5 | 6,7500 | 8,5370 | 4,8913 | 5,4142 |
| 16000 | 156907,3600 | 142 | 14,2 | 7,1000 | 8,8124 | 5,1449 | 5,6679 |
| 16500 | 161810,7150 | 145 | 14,5 | 7,2500 | 9,0878 | 5,2536 | 5,7766 |
| 17000 | 166714,0700 | 155 | 15,5 | 7,7500 | 9,3632 | 5,6159 | 6,1389 |
| 17500 | 171617,4250 | 156 | 15,6 | 7,8000 | 9,6386 | 5,6522 | 6,1751 |
| 18000 | 176520,7800 | 159 | 15,9 | 7,9500 | 9,9140 | 5,7609 | 6,2838 |
| 18500 | 181424,1350 | 167 | 16,7 | 8,3500 | 10,1894 | 6,0507 | 6,5737 |
| 19000 | 186327,4900 | 178 | 17,8 | 8,9000 | 10,4648 | 6,4493 | 6,9722 |
| 19500 | 191230,8450 | 182 | 18,2 | 9,1000 | 10,7402 | 6,5942 | 7,1171 |
| 20000 | 196134,2000 | 186 | 18,6 | 9,3000 | 11,0155 | 6,7391 | 7,2621 |
| 20500 | 201037,5550 | 192 | 19,2 | 9,6000 | 11,2909 | 6,9565 | 7,4795 |
| 21000 | 205940,9100 | 198 | 19,8 | 9,9000 | 11,5663 | 7,1739 | 7,6968 |
| 21500 | 210844,2650 | 203 | 20,3 | 10,1500 | 11,8417 | 7,3551 | 7,8780 |
| 22000 | 215747,6200 | 208 | 20,8 | 10,4000 | 12,1171 | 7,5362 | 8,0592 |
| 22500 | 220650,9750 | 213 | 21,3 | 10,6500 | 12,3925 | 7,7174 | 8,2403 |
| 23000 | 225554,3300 | 219 | 21,9 | 10,9500 | 12,6679 | 7,9348 | 8,4577 |
| 23500 | 230457,6850 | 225 | 22,5 | 11,2500 | 12,9433 | 8,1522 | 8,6751 |
| 24000 | 235361,0400 | 230 | 23 | 11,5000 | 13,2186 | 8,3333 | 8,8563 |



C. PENGUJIAN KUAT TEKAN BETON

UJI TEKAN

| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
|--------------------|-------------|-------|-------|-----|---------------|-------|-------|-------|---------------|--------------|-----------------|----------------|--------------|----------------------|----------------------------------|
| 1 | SS 65 - 1 | 300 | 300,3 | 300 | 300,10 | 149,3 | 150,5 | 151,4 | 150,40 | 17765,8321 | 840 | 47,2818 | 12527 | 0,0053 | 2349,6086 |
| 2 | SS 65 - 2 | 299,6 | 300,7 | 300 | 300,10 | 150 | 150,7 | 149,7 | 150,13 | 17702,8886 | 790 | 44,6255 | 12600 | 0,0053 | 2371,7036 |
| 3 | SS 65 - 3 | 303,2 | 303 | 302 | 302,73 | 149,6 | 148,7 | 148,4 | 148,90 | 17413,2276 | 940 | 53,9820 | 12589 | 0,0053 | 2388,0956 |
| RATA - RATA | | | | | | | | | | | 856,6667 | 48,6297 | 12572 | 0,0053 | 2369,8026 |

BETON SCC 70 (Tanggal Pengujian : 28 Juli 2015)

UJI TEKAN

| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
|--------------------|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|----------------|--------------|----------------------|----------------------------------|
| 1 | SS 70 - 1 | 320 | 316 | 321 | 319,00 | 150 | 150,8 | 149,6 | 150,13 | 17702,8886 | 690 | 38,9767 | 12211 | 0,0056 | 2162,3023 |
| 2 | SS 70 - 2 | 332 | 304,4 | 304,2 | 313,53 | 149,7 | 146,8 | 150,3 | 148,93 | 17421,0249 | 755 | 43,3384 | 12258 | 0,0055 | 2244,2033 |
| 3 | SS 70 - 3 | 297,1 | 299,6 | 299,9 | 298,87 | 150 | 150 | 150,7 | 150,23 | 17726,4793 | 820 | 46,2585 | 12152 | 0,0053 | 2293,7590 |
| RATA - RATA | | | | | | | | | | | 755 | 42,8579 | 12207 | 0,0055 | 2233,4215 |



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| BETON SCC 75 (Tanggal Pengujian : 27 Juli 2015) | | | | | | | | | | | | | | | |
|--|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|-------------|----------------|--------------|----------------------|----------------------------------|
| UJI TEKAN | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SS 75 - 1 | 296,6 | 297 | 297,3 | 296,97 | 149,9 | 150,7 | 151,1 | 150,57 | 17805,2286 | 1110 | 62,3412 | 12648 | 0,0053 | 2392,0299 |
| 2 | SS 75 - 2 | 301,2 | 299,5 | 300 | 300,23 | 149,3 | 150 | 150,4 | 149,90 | 17647,9046 | 1115 | 63,1803 | 12694 | 0,0053 | 2395,7773 |
| 3 | SS 75 - 3 | 300,3 | 299,8 | 299,9 | 300,00 | 149,7 | 149,4 | 149,4 | 149,50 | 17553,8453 | 835 | 47,5679 | 12832 | 0,0053 | 2436,6931 |
| RATA - RATA | | | | | | | | | | | 1020 | 57,6965 | 12725 | 0,0053 | 2408,1667 |

| BETON NON SCC 65 (Tanggal Pengujian : 31 Juli 2015) | | | | | | | | | | | | | | | |
|--|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|----------------|--------------|----------------------|----------------------------------|
| UJI TEKAN | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SN 65 - 1 | 300 | 302,2 | 301,1 | 301,10 | 150,5 | 149,8 | 148,7 | 149,67 | 17593,0061 | 610 | 34,6729 | 12254 | 0,0053 | 2313,2739 |
| 2 | SN 65 - 2 | 300,9 | 302,2 | 301,1 | 301,40 | 152,7 | 151,5 | 151,5 | 151,90 | 18121,9709 | 800 | 44,1453 | 12557 | 0,0055 | 2298,9907 |
| 3 | SN 65 - 3 | 303,1 | 301,3 | 304,3 | 302,90 | 150,7 | 151,1 | 150,5 | 150,77 | 17852,5619 | 620 | 34,7289 | 12388 | 0,0054 | 2290,8749 |
| RATA - RATA | | | | | | | | | | | 677 | 37,8490 | 12400 | 0,0054 | 2301,0465 |



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| BETON NON SCC 70 (Tanggal Pengujian : 31 Juli 2015) | | | | | | | | | | | | | | | |
|---|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|----------------|--------------|----------------------|----------------------------------|
| UJI TEKAN | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SN 70 - 1 | 302,2 | 302,1 | 301,3 | 301,87 | 150,2 | 150,5 | 150,2 | 150,30 | 17742,2152 | 700 | 39,4539 | 12408 | 0,0054 | 2316,7479 |
| 2 | SN 70 - 2 | 302,5 | 301,6 | 300,1 | 301,40 | 149,4 | 148 | 150 | 149,13 | 17467,8451 | 630 | 36,0663 | 12297 | 0,0053 | 2335,6975 |
| 3 | SN 70 - 3 | 302,7 | 302,7 | 301,3 | 302,23 | 150,3 | 149,6 | 150,3 | 150,07 | 17687,1701 | 730 | 41,2729 | 12549 | 0,0053 | 2347,5152 |
| RATA - RATA | | | | | | | | | | | 687 | 38,9310 | 12418 | 0,0053 | 2333,3202 |

| BETON NON SCC 75 (Tanggal Pengujian : 29 Juli 2015) | | | | | | | | | | | | | | | |
|---|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|----------------|--------------|----------------------|----------------------------------|
| UJI TEKAN | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SN 75 - 1 | 301 | 300,7 | 300,7 | 300,80 | 150,5 | 150,4 | 150,4 | 150,43 | 17773,7079 | 570 | 32,0698 | 12296 | 0,0053 | 2299,8949 |
| 2 | SN 75 - 2 | 302,1 | 301,1 | 301,3 | 301,50 | 150,6 | 150,2 | 150 | 150,27 | 17734,3464 | 570 | 32,1410 | 12359 | 0,0053 | 2311,4304 |
| 3 | SN 75 - 3 | 298,1 | 299,2 | 300,1 | 299,13 | 150,4 | 151,1 | 150,2 | 150,57 | 17805,2286 | 735 | 41,2800 | 12331 | 0,0053 | 2315,1862 |
| RATA - RATA | | | | | | | | | | | 625 | 35,1636 | 12329 | 0,0053 | 2308,8372 |



D. PENGUJIAN KUAT TARIK BELAH BETON

| BETON SCC 65 (Tanggal Pengujian : 24 Juli 2015) | | | | | | | | | | | | | | | |
|---|--------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|--------------------|---------------------|---------------|----------------|---------------------|-----------------------------|---------------------------------------|
| UJI TARIK | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m³) |
| 1 | SS 65 - 4 | 301,4 | 301,2 | 300 | 300,87 | 149,9 | 149,6 | 150 | 149,83 | 17632,2106 | 205 | 2,8950 | 12943 | 0,0053 | 2439,7994 |
| 2 | SS 65 - 5 | 303,2 | 303,5 | 300,7 | 302,47 | 149,7 | 148,6 | 150,5 | 149,60 | 17577,3366 | 270 | 3,7987 | 12661 | 0,0053 | 2381,4278 |
| 3 | SS 65 - 6 | 301,4 | 301,7 | 302,2 | 301,77 | 149,3 | 150 | 149,6 | 149,63 | 17585,1705 | 335 | 4,7231 | 12508 | 0,0053 | 2357,0567 |
| RATA - RATA | | | | | | | | | | | 270 | 3,8056 | 12704 | 0,0053 | 2392,7613 |

| BETON SCC 70 (Tanggal Pengujian : 28 Juli 2015) | | | | | | | | | | | | | | | |
|---|--------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|--------------------|---------------------|---------------|----------------|---------------------|-----------------------------|---------------------------------------|
| UJI TARIK | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m³) |
| 1 | SS 70 - 4 | 304,2 | 303,6 | 301,6 | 303,13 | 149,5 | 150 | 150,8 | 150,10 | 17695,0285 | 345 | 4,8271 | 12390 | 0,0054 | 2309,8637 |
| 2 | SS 70 - 5 | 301,2 | 301,5 | 299,6 | 300,77 | 150,4 | 150 | 149,2 | 149,87 | 17640,0567 | 340 | 4,8020 | 12285 | 0,0053 | 2315,5037 |
| 3 | SS 70 - 6 | 306,6 | 306,8 | 306 | 306,47 | 154,1 | 153,3 | 154,1 | 153,83 | 18586,2076 | 200 | 2,7007 | 13095 | 0,0057 | 2298,9603 |
| RATA - RATA | | | | | | | | | | | 295 | 4,1099 | 12590 | 0,0055 | 2308,1092 |



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| BETON SCC 75 (Tanggal Pengujian : 27 Juli 2015) | | | | | | | | | | | | | | | |
|---|--------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|--------------------|---------------------|---------------|----------------|---------------------|-----------------------------|---------------------------------------|
| UJI TARIK | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m³) |
| 1 | SS 75 - 4 | 320 | 320 | 300,2 | 313,40 | 148,4 | 150 | 150 | 149,47 | 17546,0184 | 280 | 3,8054 | 12954 | 0,0055 | 2355,7344 |
| 2 | SS 75 - 5 | 300 | 310 | 310 | 306,67 | 150,5 | 150,6 | 151,3 | 150,80 | 17860,4569 | 165 | 2,2714 | 13589 | 0,0055 | 2481,0091 |
| 3 | SS 75 - 6 | 300,4 | 301,6 | 300,3 | 300,77 | 150,4 | 149,4 | 152,3 | 150,70 | 17836,7771 | 225 | 3,1602 | 12549 | 0,0054 | 2339,1767 |
| RATA - RATA | | | | | | | | | | | 223 | 3,0790 | 13031 | 0,0054 | 2391,9734 |

| BETON NON SCC 65 (Tanggal Pengujian : 31 Juli 2015) | | | | | | | | | | | | | | | |
|---|--------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|--------------------|---------------------|---------------|----------------|---------------------|-----------------------------|---------------------------------------|
| UJI TARIK | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P(KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m³) |
| 1 | SN 65 - 4 | 298,4 | 298,1 | 299,3 | 298,60 | 149,7 | 149,3 | 149,9 | 149,63 | 17585,1705 | 275 | 3,9183 | 12186 | 0,0053 | 2320,7309 |
| 2 | SN 65 - 5 | 299,8 | 301,1 | 302,4 | 301,10 | 149,9 | 148,1 | 150,5 | 149,50 | 17553,8453 | 300 | 4,2428 | 12291 | 0,0053 | 2325,4350 |
| 3 | SN 65 - 6 | 300,5 | 299 | 301,1 | 300,20 | 150 | 149,7 | 150,4 | 150,03 | 17679,3135 | 301 | 4,2545 | 12320 | 0,0053 | 2321,3179 |
| RATA - RATA | | | | | | | | | | | 292 | 4,1385 | 12266 | 0,0053 | 2322,4946 |



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BETON NON SCC 70 (Tanggal Pengujian : 31 Juli 2015)

UJI TARIK

| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
|--------------------|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|---------------|--------------|----------------------|----------------------------------|
| 1 | SN 70 - 4 | 300,5 | 299,8 | 299,4 | 299,90 | 151,5 | 149 | 150,8 | 150,43 | 17773,7079 | 245 | 3,4572 | 12481 | 0,0053 | 2341,5039 |
| 2 | SN 70 - 5 | 299,1 | 298,6 | 299,5 | 299,07 | 150,8 | 151 | 151,1 | 150,97 | 17899,9581 | 255 | 3,5956 | 12312 | 0,0054 | 2299,8980 |
| 3 | SN 70 - 6 | 302,1 | 303 | 301,8 | 302,30 | 154 | 153,2 | 155,2 | 154,13 | 18658,7705 | 230 | 3,1425 | 13079 | 0,0056 | 2318,7470 |
| RATA - RATA | | | | | | | | | | | 243 | 3,3984 | 12624 | 0,0054 | 2320,0496 |

BETON NON SCC 75 (Tanggal Pengujian : 29 Juli 2015)

UJI TARIK

| NO | NAMA SAMPLE | H1 | H2 | H3 | H rata-rata | D1 | D2 | D3 | D rata-rata | LA rata-rata | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
|--------------------|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|--------------|------------|---------------|--------------|----------------------|----------------------------------|
| 1 | SN 75 - 4 | 302,4 | 300,1 | 301 | 301,17 | 151,4 | 149,4 | 150 | 150,27 | 17734,3464 | 265 | 3,7278 | 12463 | 0,0053 | 2333,4608 |
| 2 | SN 75 - 5 | 300 | 300 | 299,7 | 299,90 | 150 | 149,3 | 149,5 | 149,60 | 17577,3366 | 305 | 4,3278 | 12285 | 0,0053 | 2330,4813 |
| 3 | SN 75 - 6 | 301,2 | 302,7 | 303 | 302,30 | 153,6 | 154 | 154,1 | 153,90 | 18602,3204 | 200 | 2,7367 | 13125 | 0,0056 | 2333,9634 |
| RATA - RATA | | | | | | | | | | | 257 | 3,5975 | 12624 | 0,0054 | 2332,6352 |



E. PENGUJIAN KUAT LENTUR BETON

| BETON SCC 65 (Tanggal Pengujian : 24 Juli 2015) | | | | | | | | | | | | | | | | | | | | |
|--|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|---------------|-----------------|-------------|----------------|---------------|-------------------|----------------------|----------------------------------|
| UJI LENTUR | | | | | | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SB 65 - 1 | 101,4 | 101,6 | 101,6 | 101,53 | 101,5 | 101,4 | 101,5 | 101,47 | 502 | 502 | 502 | 502,00 | 10302,25 | 800 | 7,8453 | 3,3773 | 12104 | 0,0052 | 2340,4165 |
| 2 | SB 65 - 2 | 101,6 | 101,6 | 100,5 | 101,23 | 101,8 | 103,1 | 101,1 | 102,00 | 504 | 502 | 503 | 503,00 | 10325,80 | 1220 | 11,9641 | 5,1117 | 11878 | 0,0052 | 2286,9234 |
| 3 | SB 65 - 3 | 100 | 100 | 102 | 100,67 | 102 | 100,5 | 100,6 | 101,03 | 505 | 501 | 500 | 502,00 | 10170,69 | 1220 | 11,9641 | 5,2394 | 12260 | 0,0051 | 2401,2445 |
| | | | | | | | | | | | | | RATA - RATA | 10266,25 | 1080 | 10,5912 | 4,5761 | 12080,6667 | 0,0052 | 2342,8615 |

| BETON SCC 70 (Tanggal Pengujian : 28 Juli 2015) | | | | | | | | | | | | | | | | | | | | |
|--|-------------|------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|---------------|-----------------|-------------|-----------------|---------------|--------------|----------------------|----------------------------------|
| UJI LENTUR | | | | | | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SB 70 - 1 | 102 | 102,2 | 102,7 | 102,30 | 102,2 | 102,4 | 102,1 | 102,23 | 504 | 504 | 502 | 503,33 | 10458,47 | 1330 | 13,04284 | 5,4894 | 12362 | 0,0053 | 2348,3612 |
| 2 | SB 70 - 2 | 101 | 101,4 | 101 | 101,13 | 103,7 | 104,6 | 104,3 | 104,20 | 502 | 502 | 501 | 501,67 | 10538,09 | 1385 | 13,58221 | 5,5661 | 12211 | 0,0053 | 2309,7977 |
| 3 | SB 70 - 3 | 92,7 | 91,8 | 90,9 | 91,80 | 104,8 | 105,7 | 105,6 | 105,37 | 534 | 537 | 536 | 535,67 | 9672,66 | 1260 | 12,35638 | 5,4558 | 11913 | 0,0052 | 2299,2204 |
| | | | | | | | | | | | | | RATA - RATA | 10223,07 | 1325 | 12,99381 | 5,5038 | 12162 | 0,01 | 2319,1264 |



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| BETON SCC 75 (Tanggal Pengujian : 27 Juli 2015) | | | | | | | | | | | | | | | | | | | | |
|--|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|--------------------|----------------|-------------|-----------------|---------------|-------------------|----------------------|----------------------------------|
| UJI LENTUR | | | | | | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | SB 75 - 1 | 100,4 | 101 | 100,2 | 100,53 | 95 | 95,1 | 95,3 | 95,13 | 532 | 535 | 535 | 534,00 | 9564,07 | 1170 | 11,47378 | 5,6747 | 11336 | 0,0051 | 2219,6055 |
| 2 | SB 75 - 2 | 97,2 | 97,9 | 97,7 | 97,60 | 100,1 | 101,9 | 101,1 | 101,03 | 500 | 500 | 499 | 499,67 | 9860,85 | 1020 | 10,00278 | 4,5181 | 11474 | 0,0049 | 2328,7345 |
| 3 | SB 75 - 3 | 101,2 | 100,8 | 100,5 | 100,83 | 99,8 | 99,6 | 99,1 | 99,50 | 500 | 520 | 495 | 505,00 | 10032,92 | 1045 | 10,24795 | 4,6195 | 11434 | 0,0051 | 2256,7300 |
| | | | | | | | | | | | | | RATA - RATA | 9819,28 | 1078 | 10,57484 | 4,9374 | 11414,6667 | 0,0050 | 2268,3566 |

| BETON NON SCC 65 (Tanggal Pengujian : 31 Juli 2015) | | | | | | | | | | | | | | | | | | | | |
|--|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|--------------------|-----------------|-------------|-----------------|---------------|--------------|----------------------|----------------------------------|
| UJI LENTUR | | | | | | | | | | | | | | | | | | | | |
| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) |
| 1 | BN 65 - 1 | 102,5 | 101,3 | 101,1 | 101,63 | 104,6 | 104,6 | 104,7 | 104,63 | 501 | 500 | 500 | 500,33 | 10634,23 | 1380 | 13,53318 | 5,4731 | 12108 | 0,0053 | 2275,6567 |
| 2 | BN 65 - 2 | 96,1 | 97,9 | 99,6 | 97,87 | 103,5 | 103,1 | 102,2 | 102,93 | 534 | 533 | 533 | 533,33 | 10073,74 | 1210 | 11,86605 | 5,1496 | 12586 | 0,0054 | 2342,6001 |
| 3 | BN 65 - 3 | 99,3 | 97,2 | 101,3 | 99,27 | 103,2 | 105,3 | 104,4 | 104,30 | 534 | 532 | 532 | 532,67 | 10353,51 | 1090 | 10,68925 | 4,4544 | 12650 | 0,0055 | 2293,7562 |
| | | | | | | | | | | | | | RATA - RATA | 10353,83 | 1227 | 12,02949 | 5,0257 | 12448 | 0,0054 | 2304,0043 |



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BETON NON SCC 70 (Tanggal Pengujian : 31 Juli 2015)

UJI LENTUR

| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) | |
|----|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|---------------|--------------------|-----------------|-------------|-----------------|---------------|----------------------|----------------------------------|------------------|
| 1 | BN 70 - 1 | 104,4 | 106,7 | 106,1 | 105,73 | 97,9 | 97,5 | 97,6 | 97,67 | 535 | 534 | 534 | 534,33 | 10326,62 | 1195 | 11,71895 | 5,2287 | 12113 | 0,0055 | 2195,2357 | |
| 2 | BN 70 - 2 | 103,3 | 104,4 | 105,1 | 104,27 | 103,7 | 102,7 | 101,9 | 102,77 | 500 | 503 | 497 | 500,00 | 10715,14 | 1335 | 13,09188 | 5,3501 | 12129 | 0,0054 | 2263,9000 | |
| 3 | BN 70 - 3 | 101,4 | 103,6 | 104,4 | 103,13 | 103,7 | 105,1 | 104,9 | 104,57 | 503 | 501 | 502 | 502,00 | 10784,31 | 1115 | 10,93441 | 4,3634 | 11960 | 0,0054 | 2209,2006 | |
| | | | | | | | | | | | | | | RATA - RATA | 10608,69 | 1215 | 11,91508 | 4,9807 | 12067,3333 | 0,0054 | 2222,7787 |

BETON NORMAL 75 (Tanggal Pengujian : 29 Juli 2015)

UJI LENTUR

| NO | NAMA SAMPLE | B1 | B2 | B3 | B rata-rata | H1 | H2 | H3 | H rata-rata | T1 | T2 | T3 | T rata-rata | LA rata-rata | P(Kgf) | P (KN) | F (Mpa) | BERAT (GRAM) | VOLUME rata-rata (m) | BERAT JENIS (kg/m ³) | |
|----|-------------|-------|-------|-------|---------------|-------|-------|-------|---------------|-----|-----|-----|---------------|--------------------|-----------------|-------------|----------------|---------------|----------------------|----------------------------------|------------------|
| 1 | BN 75 - 1 | 100,3 | 102,6 | 103 | 101,97 | 101,1 | 101,3 | 101,8 | 101,40 | 498 | 497 | 500 | 498,33 | 10339,42 | 1450 | 14,21964 | 6,1033 | 12113 | 0,0052 | 2350,9078 | |
| 2 | BN 75 - 2 | 103,3 | 102,1 | 102,7 | 102,70 | 102,3 | 102,2 | 103 | 102,50 | 500 | 500 | 500 | 500,00 | 10526,75 | 1420 | 13,92544 | 5,8077 | 12129 | 0,0053 | 2304,4149 | |
| 3 | BN 75 - 3 | 103 | 104,7 | 103 | 103,57 | 94,2 | 93 | 91,4 | 92,87 | 535 | 534 | 533 | 534,00 | 9617,89 | 1250 | 12,25831 | 6,1759 | 11960 | 0,0051 | 2328,6814 | |
| | | | | | | | | | | | | | | RATA - RATA | 10161,35 | 1373 | 13,4678 | 6,0290 | 12067,3333 | 0,0052 | 2328,0014 |