DAFTAR PUSTAKA

Agustiwijaya, D.S. 2007. The Uniaxial Compressive Strength of Soft Rock. *Civil Engineering Dimension*. 9. pp. 9–14.

Aledejare, A., E. 2019. Evaluation of Empirical Estimation of Uniaxial Compressive Strength of Rock Using Measurements From Index and Physical Tests. *Journal of Rock Mechanics and Geotechnical Engineering.* Pages 1–15.

American Society for Testing and Materials. 1991. D 4543–85: Standard Practice for Preparing Rock Core Specimens and Determining Dimensional and Shape Tolerances. *Annual Book of ASTM Standards* 4 (08). pp.1–4.

American Society for Testing and Materials. 2011. D 2216 – 10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass. *Annual Book of ASTM Standards* 4 (06). pp. 1–7.

American Society for Testing and Materials. 2001. D 5873-00 Standard Test Method for Determination of Rock Hardness by Rebound Hammer Method. *Annual Book of ASTM Standards* 4 (09). pp. 1–9.

Arif, I. 2016. *Geoteknik Tambang: Mewujudkan Produksi Tambang yang Berkelanjutan dengan Menjaga Kestabilan Lereng*. Jakarta: PT Gramedia Pustaka Utama.

Asikin, S., Harsolumakso, A.H., Busono, H. Gafoer, S. 1992. *Peta Geologi Lembar Kebumen*. Bandung: P3G Bandung.

Attewal, P.B *and* Farmer, I.W. 1976*. Principles of Engineering Geology*. London: Chapman and Hall.

Aydin, A., *and* Basu, A. 2005. The Schmidt Hammer in Rock Material Characterization. *Engineering Geology.* 81. pp. 1–14.

Aydin, A., 2008. ISRM Suggested Method for Determination of the Schmidt Hammer Rebound Hardness: Revised Version. *The ISRM Suggested Methods for Rock Characterization*. Elsevier ltd. pp. 24–33.

Belyadi, H., Fathi, E., *and* Belyadi, F. 2019. *Rock Mechanical Properties and In Situ Stresses. Hydraulic Fracturing in Unconventional Reservoirs, Second Edition*. United States: Gulf Professional Publishing.

Best, G. 1982. *Igneous and Metamorphic Petrology*. San Fransisco: Freeman and Company.

Bieniawski, Z. T. 1989. *Engineering Rock Mass Classification a Complete Manual for Engineers and Geologist in Mining, Civil and Petroleum*. New York: John Wiley and Sons.

British Standard Institution. 2010. *Code of Practice for Site Investigation*. London: British Standards Institution Publication.

Fener, M., Kahraman, S., Bilgils, A., *and* Gunaydin, O. 2005. Technical Note A Comparative Evaluation of Indirect Methods to Estimate the Compressive Strength of Rocks. *Rock Mech. Rock Engineering.* 34. pp. 329–343.

Goodman, R.,E. 1989. *Introduction To Rock Mechanics*, *Second Edition*. New York: John and Willey.

Goudie, A.S. 2006. The Schmidt Hammer in Geomorphological Research. *Progress in Physical Geography.* 30. pp. 703–718.

Gusnarkali, Oktarianty, H., dan Armelia, D. 2020. Pengaruh Sifat Fisik Batuan terhadap Kuat Tekan Uniaksial pada Batu Granit di Pulau Bangka. *Jurnal Geomine.* Vol. 8. No. 3. hal. 214–219.

Hakim, R.N., Trides, T., Santoso, E., Bintara, H., *and* Melati, S. 2016. Pengaruh Bentuk dan Ukuran terhadap Kuat Tekan Uniaksial Batuan Utuh. *Jurnal Geosapta.* 2(1). hal. 16–20.

Hudson, J.A., *and* Harrison, J.P. 1997. *Engineering Rock Mechanics: An Introduction to the Principles*. United Kingdom: Pergamon.

Indian Berau of Mines. 2014. Application of Rock Mechanics in Surface and Underground Mining. *C.S Gundewar*. India. p. 132.

International Society of Rock Mechanics and Rock Engineering. 1979. Suggested Methods for Determining the Uniaxial Compressive Strength and Deformability of Rock Materials. *The Complete ISRM Suggested Methods for Rock Characterization, Testing, and Monitoring: 1974–2006*. pp.135–140.

International Society of Rock Mechanics and Rock Engineering. 1977. Suggested Method for Determining Water Content, Porosity, Density, Absorption, and Related Properties and Swelling and Slake-Durability Index Properties. *The Complete ISRM Suggested Methods for Rock Characterization, Testing, and Monitoring: 1974–2006*. pp.143–156.

Jaeger, J.C., Cook, N.G.W., *and* Zimmerman, R.W. 2007. *Fundamentals of Rocks Mechanics Fourth Edition*. Victoria: Blackwell Publishing.

Kahraman S., *and* Kesimal. 2014. The Determination of Uniaxial Compressive Strength from Point Load Strength for Pyroclastic Rocks. *Engineering Geology.* pp170:33–42.

Karakus, M., Kumral, M., *and* Kilic, O. 2005. Predicting Elastic Properties of Intact Rocks from Index Tests Using Multiple Regression Modeling. *International Journal of Rock Mechanics and Mining Sciences*. 42:323–330.

Katz, O., Reches, Z., *and* Roegiers, J.C. 2000. Evaluation of Mechanical Rock Properties Using A Schmidt Hammer. *International Journal of Rock Mechanics and Mining Sciences*. 37: 723 728.

Kim, J.K. *and* Yi, S.T. 2002. Application of Size Effect to Compressive Strength of Concrete Members. *Sadhana Journal* 27(4): pp.467–484.

Lashkaripour, G.R., *and* Ajalloeian, R. 2015. The Effect of Water Content on The Mechanical Behaviour of Fine-Grained Sedimentary Rocks. *Researchgate*. pp. 1–7.

Leba, P., E., Erong, F., N., O., Marasabesy, Z., dan Cahyono, Y., D., G. 2020. Analisis Pengaruh Kuat Tekan Batu Andesit terhadap Model dan Arah Rekahan. *Prosiding: Seminar Teknologi Kebumian dan Kelautan ITATS.* Vol. 2. No. 1. Hal. 417–421.

Melati, S. 2019. Studi Karakteristik Relasi Parameter Sifat Fisik dan Kuat Tekan Uniaksial Pada Contoh Batulempung, Andesit, dan Beton. *Jurnal Geosapta*. Vol. 5. No. 2.

Momeni, E., Armaghani, D.J., Hajihassani, M., *and* Amin, M.F.M. 2015. Prediction of Uniaxial Compressive Strength of Rock Samples Using Hybrid Particle Warm Optimization-Based Artificial Neural Networks. *Science Direct* (60): pp.50–63.

Nazir, R., Momeni, E., Armaghani, D.J., *and* Amin, M.F.M. 2013. Prediction of Uniaxial Compressive Strength of Limestone Rock Samples Using L-Types Schmidt Hammer. *Electronic Journal of Geotechnical Engineering* (18): Hal.1767–1775.

Nuryadi, Astuti, T.D., Utami, E.S., dan Budiantara, M. 2017. *Dasar-Dasar Statistika Penelitian*. Yogyakarta: Sibuku Media.

Prasetya, Zanuar Ifan. 2013. Sifat Fisik dan Manfaat Batuan Beku di Desa Sapulante, Kecamatan Pasrepah Kabupaten Pasuruan, Jawa Timur. *Jurnal Ilmiah MTG*. Vol. 6, No. 1.

Qaidahiyani, N., F., Purwanto, *and* Djamaluddin. 2021. Characterization of Rock Strength in Gowa Regency: Implications for Development Planning. *AIP Conference Proceedings.* Pages 1–6.

Rai, M.A., Kramadibrata, S., dan Wattimena, R.K. 2014. *Mekanika Batuan*. Bandung: Penerbit ITB.

Rajabzadeh, M.A., Moosavinasab, Z., *and* Rakhshandehroo, G. 2012. Effect of Rock Classes and Porosity on The Relation Between Uniaxial Compressive Strength and Some Rock Properties for Carbonate Rocks. *Rock Mechanics and Rock Engineering* (45): pp.113– 122.

Sachpazis, C., I. 1990. Correlating Schmidt Hardness with Compressive Strength and Young's Modulus of Carbonate Rocks. *Bulletin of The International Association of Engineering Geology.* 42(1):75–83.

Said, I. 2008. *Moisture Batubara (Bagian 1)*. https://idhamds.wordpress.com/2008/09/15/moisture-batubara-bagian1/#comment-11. Diakses pada tanggal 6 November 2021.

Saptono, S., Hariyanto, R., Thaib, H.S. *and* Wahyudi, M.D. 2013. Penentuan Pengaruh Air Terhadap Kohesi dan Sudut Gesek Dalam pada Batugamping. *Jurnal Geosapta.* Hal. 1–9.

Siegesmudn, S. *and* Dürrast, H., 2010. Physical and Mechanical Properties of Rock. *Stone in Architrcture*. Page: 97–225.

Singh, T., Rao, S.K., *and* Jain, A. 2019. Rock Failure Pattern Under Uniaxial, Triaxial Compression and Brazilian Loading Condition. *Geotechnical Applications*. pp.241–249.

Sugiyono. 2018. *Metode Penelitian Bisnis, Pendekatan Kuantitatif, Kualitatif, dan R&D.* Bandung: Alfabeta.

Sunyoto, D. 2012. *Statistika Induktif: Untuk Penelitian Ekonomi dan Bisnis*. Yogyakarta: Caps.

Thuro, K., Plinninger, R.J., Zah, S., *and* Schütz, S. 2001. Scale Effect in Rock Strength Properties: Unconfined Compressive Test and Brazilian Test. *ISRM Regional Symposium EUROCK 2001 Rock Mechanics a Challenge For Society*. Finland: 3–7 June 2001. pp.169–174.

Usman, H. dan Akbar, R.P.S. 2012. *Pengantar Statistika Edisi 2 Cetakan ke 6*. Jakarta: Bumi Aksara.

Vasarhelyi, B. 2005. Statistical Analysis of The Influence of Water Content on The Strength of Th Miocene Limestone. *Rock Mech and Rock Engineering.* 38. pp. 69–76.

Vasarhelyi, B., *and* Van, P., 2006. Influence of Water Content on The Strength of Rock. *Engineering Geology*. 84(1-2). page: 70–74.

Verma, D., Kainthola, A., Singh, T. N. *and* Thareja, R. 2014. Influence of Water Content on Geotechnical Properties of Deccan Basalt, Maharashtra, India. *International Research Journal of Geology and Mining*, 4, pp. 122–132.

Williams, H., Turner, F.J., Gilbert, C.M. 1982. *Petrography, An Introduction to Study of Rocks In Thin Section.* New York: Freeman and Company.

Wilson, M. 1991. *Igneous Petrogenesis, A Global Tectonic Approach*. London: Harper Collins.

Xiu, Z., Wang, S., Ji, Y., Wang, F., Ren, F., *and* Nguyen, V. T. 2020. Loading Rate Effect on the Uniaxial Compressive Strength (UCS) Behavior of Cemented Paste Backfill (CPB). *Constructing and Building Materials Journal* (271): pp.526–538.

Yilmaz, I., *and* Sendir, H. 2002. Correlation Of Schmidt Hardness with Uniaksial Compressive Strength and Young's Modulus in Gypsum From Sivas. *Engineering Geology*, 66, pp. 211– 219.

Zhang, J.J. 2019. Rock Physical and Mechanical Properties. *Applied Petroleum Geomechanics*. Elsevier. Pages 29–80.

LAMPIRAN

LAMPIRAN A

PETA LOKASI PENGAMBILAN BATUAN

PETA LOKASI PENELITIAN

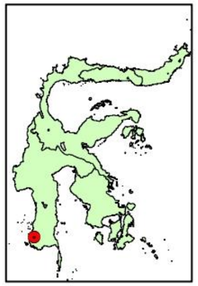
N
W E
S

0 0.0225 0.045 0.09 Km

1:1,500

Legenda

Titik Pengambilan Sampel



DEPARTEMEN TEKNIK PERTAMBANGAN
FAKULTAS TEKNIK
UNIVERSITAS HASANUDDIN

SKRIPSI

ANALISIS PENGARUH KADAR AIR TERHADAP
NILAI INDEKS KEKERASAN *SCHMIDT HAMMER*
DAN NILAI KUAT TEKAN UNIAKSIAL PADA BASAL

DIGAMBAR OLEH : DODI DEWANTARA
NIM : D111171313

Pembimbing

Dr.Eng. Purwanto,S.T., M.T.
NIP. 197111282005011002

Nirmana Fiqra Qaidahiyani, S.T., M.T.
NIP. 199304222019032018

Tahun	Lampiran	Halaman
2022	A	90

LAMPIRAN B

LEMBAR DESKRIPSI MAKROSKOPIS BATUAN

LEMBAR DESKRIPSI BATUAN BEKU

Jenis Batuan : Batuan Beku

Warna

- Warna Segar : Abu-Abu Kehitaman
- Warna Lapuk : Jingga Kehitaman

Tekstur

- Kristalinitas : Holokristalin
- Granularitas : Porfiritik
- Fabrik
  - Bentuk : Subhedral
  - Relasi : Equigranular

Struktur : Masif

Komposisi Mineral :

Fenokris : Piroksin (Hitam)

Massa Dasar : Olivin (Hijau), Plagioklas Feldpar (Putih), Kuarsa (Putih)

Nama Batuan : Basal

LAMPIRAN C

HASIL UJI INDEKS KEKERASAN *SCHMIDT HAMMER*

HASIL UJI INDEKS KEKERASAN *SCHMIDT HAMMER* PADA BASAL

Kondisi Batuan	Kode Sampel	Nilai Pantul (N/mm^2)																				Rata-rata	R	Rata-rata
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	(MPa)	Koreksi (0^0)	R Koreksi
Kering	SC-K1A	56	50	52	54	54	50	52	46	52	52	52	52	52	52	52	54	52	52	54	50	52,00	53,90	49,75
	SC-K1B	46	50	50	52	52	50	48	50	52	52	52	48	54	54	50	48	52	50	44	48	50,10	50,65	
	SC-K1C	52	42	46	44	48	52	44	44	48	44	50	48	40	48	48	48	48	44	42	48	46,40	44,70	
Lembab	SC-K2A	48	52	50	48	48	52	52	52	50	50	48	48	48	42	46	48	48	50	44	46	48,50	48,05	41,63
	SC-K2B	44	46	48	50	47	44	50	50	46	46	40	42	36	40	42	32	40	38	42	44	43,35	39,73	
	SC-K2C	42	40	44	40	46	42	34	42	38	46	44	46	46	44	42	42	40	42	36	40	41,80	37,10	
Basah	SC-K3A	40	42	44	44	42	40	38	40	44	40	42	42	42	44	38	42	44	44	40	38	41,50	36,80	35,00
	SC-K3B	38	36	36	32	34	34	36	32	34	36	38	40	32	36	36	38	34	34	36	34	35,30	27,80	
	SC-K3C	40	42	42	46	44	46	48	42	44	44	46	46	44	48	46	40	42	38	40	44	43,60	40,40	

LAMPIRAN D

PERHITUNGAN SIFAT FISIK BATUAN

A. Data pengujian sifat fisik basal

Data pengujian sifat fisik berupa berat natural (W_n), berat jenuh (W_w), berat gantung (W_S), dan berat kering (W_O). Berikut merupakan urian data uji sifat fisik sampel batuan.

Kode	W Natural (gr), Wn	W Kering (gr), Wo	W Jenuh (gr), Ww	W Gantung (gr), Ws
PKK-1A	141,2	141,2	142,3	94,3
PKK-1B	82,9	82,9	83,6	52,7
PKK-1C	208,7	208,7	210,3	134,8
PKB-1A	108,1	107,3	108,1	73,1
PKB-1B	156,2	155	156,2	103,2
PKB-1C	178,2	176,9	178,2	117,9
SC-K1A	163,6	163,3	164,5	108,3
SC-K1B	96,6	96,4	97,2	62,8
SC-K1C	128,7	128,4	129,4	85,4
SC-K2A	141,5	141	142,1	92,3
SC-K2B	187,2	186,5	187,9	124,5
SC-K2C	180,6	179,9	181,3	119,7
SC-K3A	234,8	233,1	235	153,5
SC-K3B	204,3	202,8	204,4	136
SC-K3C	89,3	88,8	89,4	59,8

B. Bobot isi

Bobot isi terbagi menjadi bobot isi asli (*natural density*), bobot isi kering (*dry density*), dan bobot isi jenuh (*saturated density*). Berikut perhitungan nilai bobot isi batuan.

1. Bobot isi asli (*natural density*)

   Nilai bobot isi asli dihitung menggunakan Persamaan 2.1. Nilai bobot isi asli dari batuan adalah:

   Bobot isi natural PKK 1A =

$$\frac{W_n}{W_w - W_s} = \frac{141{,}2\ g}{142{,}3\ g - 94{,}3\ g} = \frac{141{,}2\ g}{48\ g} = 2{,}942$$

Bobot isi natural PKK 1B =

$$\frac{W_n}{W_w - W_s} = \frac{82{,}9 \text{ g}}{83{,}6 \text{ g} - 52{,}7 \text{ g}} = \frac{82{,}9 \text{ g}}{30{,}9 \text{ g}} = 2{,}683$$

Bobot isi natural PKK 1C =

$$\frac{W_n}{W_w - W_s} = \frac{208{,}7 \text{ g}}{210{,}3 \text{ g} - 134{,}8 \text{ g}} = \frac{208{,}7 \text{ g}}{75{,}5 \text{ g}} = 2{,}764$$

Bobot isi natural PKB 1A =

$$\frac{W_n}{W_w - W_s} = \frac{107{,}3 \text{ g}}{108{,}1 \text{ g} - 73{,}1 \text{ g}} = \frac{107{,}3 \text{ g}}{34{,}8 \text{ g}} = 3{,}089$$

Bobot isi natural PKB 1B =

$$\frac{W_n}{W_w - W_s} = \frac{155 \text{ g}}{156{,}2 \text{ g} - 103{,}2 \text{ g}} = \frac{155 \text{ g}}{53 \text{ g}} = 2{,}947$$

Bobot isi natural PKB 1C =

$$\frac{W_n}{W_w - W_s} = \frac{176{,}9 \text{ g}}{178{,}2 \text{ g} - 117{,}9 \text{ g}} = \frac{176{,}9 \text{ g}}{60{,}3 \text{ g}} = 2{,}955$$

Bobot isi natural SC-K1A =

$$\frac{W_n}{W_w - W_s} = \frac{163{,}3 \text{ g}}{164{,}5 \text{ g} - 108{,}3 \text{ g}} = \frac{163{,}3 \text{ g}}{56{,}2 \text{ g}} = 2{,}911$$

Bobot isi natural SC-K1B =

$$\frac{W_n}{W_w - W_s} = \frac{96{,}4 \text{ g}}{97{,}2 \text{ g} - 62{,}8 \text{ g}} = \frac{96{,}4 \text{ g}}{34{,}4 \text{ g}} = 2{,}808$$

Bobot isi natural SC-K1C =

$$\frac{W_n}{W_w - W_s} = \frac{128{,}4 \text{ g}}{129{,}4 \text{ g} - 85{,}4 \text{ g}} = \frac{128{,}4 \text{ g}}{44 \text{ g}} = 2{,}925$$

Bobot isi natural SC-K2A =

$$\frac{W_n}{W_w - W_s} = \frac{141 \text{ g}}{142{,}1 \text{ g} - 92{,}3 \text{ g}} = \frac{141 \text{ g}}{49{,}8 \text{ g}} = 2{,}841$$

Bobot isi natural SC-K2B =

$$\frac{W_n}{W_w - W_s} = \frac{186{,}5 \text{ g}}{187{,}9 \text{ g} - 124{,}5 \text{ g}} = \frac{186{,}5 \text{ g}}{63{,}4 \text{ g}} = 2{,}953$$

Bobot isi natural SC-K2C =

$$\frac{W_n}{W_w - W_s} = \frac{179{,}9\text{ g}}{181{,}3\text{ g} - 119{,}7\text{ g}} = \frac{179{,}9\text{ g}}{61{,}6\text{ g}} = 2{,}932$$

Bobot isi natural SC-K3A =

$$\frac{W_n}{W_w - W_s} = \frac{233{,}1\text{ g}}{235\text{ g} - 153{,}5\text{ g}} = \frac{233{,}1\text{ g}}{81{,}5\text{ g}} = 2{,}881$$

Bobot isi natural SC-K3B =

$$\frac{W_n}{W_w - W_s} = \frac{202{,}8\text{ g}}{204{,}4\text{ g} - 136\text{ g}} = \frac{202{,}8\text{ g}}{68{,}4\text{ g}} = 2{,}987$$

Bobot isi natural SC-K3C =

$$\frac{W_n}{W_w - W_s} = \frac{88{,}8\text{ g}}{89{,}4\text{ g} - 59{,}8\text{ g}} = \frac{88{,}8\text{ g}}{29{,}6\text{ g}} = 3{,}017$$

2. Bobot isi jenuh (*saturated density*)

   Nilai bobot isi jenuh dihitung menggunakan Persamaan 2.2. Nilai bobot isi jenuh dari batuan adalah:

   Bobot isi jenuh PKK 1A =

$$\frac{W_w}{W_w - W_s} = \frac{142{,}3\text{ g}}{142{,}3\text{ g} - 94{,}3\text{ g}} = \frac{142{,}3\text{ g}}{48\text{ g}} = 2{,}965$$

   Bobot isi jenuh PKK 1B =

$$\frac{W_w}{W_w - W_s} = \frac{83{,}6\text{ g}}{83{,}6\text{ g} - 52{,}7\text{ g}} = \frac{83{,}6\text{ g}}{30{,}9\text{ g}} = 2{,}706$$

   Bobot isi jenuh PKK 1C =

$$\frac{W_w}{W_w - W_s} = \frac{210{,}3\text{ g}}{210{,}3\text{ g} - 134{,}8\text{ g}} = \frac{210{,}3\text{ g}}{75{,}5\text{ g}} = 2{,}785$$

   Bobot isi jenuh PKB 1A =

$$\frac{W_w}{W_w - W_s} = \frac{108{,}1\text{ g}}{108{,}1\text{ g} - 73{,}1\text{ g}} = \frac{108{,}1\text{ g}}{34{,}8\text{ g}} = 3{,}089$$

   Bobot isi jenuh PKB 1B =

$$\frac{W_w}{W_w - W_s} = \frac{156{,}2\text{ g}}{156{,}2\text{ g} - 103{,}2\text{ g}} = \frac{156{,}2\text{ g}}{53\text{ g}} = 2{,}947$$

Bobot isi jenuh PKB 1C =

$$\frac{W_w}{W_w - W_s} = \frac{178{,}2\ g}{178{,}2\ g - 117{,}9\ g} = \frac{178{,}2\ g}{60{,}3\ g} = 2{,}955$$

Bobot isi jenuh SC-K1A =

$$\frac{W_w}{W_w - W_s} = \frac{164{,}5\ g}{164{,}5\ g - 108{,}3\ g} = \frac{164{,}5\ g}{56{,}2\ g} = 2{,}927$$

Bobot isi jenuh SC-K1B =

$$\frac{W_w}{W_w - W_s} = \frac{97{,}2\ g}{97{,}2\ g - 62{,}8\ g} = \frac{97{,}2\ g}{34{,}4\ g} = 2{,}826$$

Bobot isi jenuh SC-K1C =

$$\frac{W_w}{W_w - W_s} = \frac{129{,}4\ g}{129{,}4\ g - 85{,}4\ g} = \frac{129{,}4\ g}{44\ g} = 2{,}941$$

Bobot isi jenuh SC-K2A =

$$\frac{W_w}{W_w - W_s} = \frac{142{,}1\ g}{142{,}1\ g - 92{,}3\ g} = \frac{142{,}1\ g}{49{,}8\ g} = 2{,}853$$

Bobot isi jenuh SC-K2B =

$$\frac{W_w}{W_w - W_s} = \frac{187{,}9\ g}{187{,}9\ g - 124{,}5\ g} = \frac{187{,}9\ g}{63{,}4\ g} = 2{,}964$$

Bobot isi jenuh SC-K2C =

$$\frac{W_w}{W_w - W_s} = \frac{181{,}3\ g}{181{,}3\ g - 119{,}7\ g} = \frac{181{,}3\ g}{61{,}6\ g} = 2{,}943$$

Bobot isi jenuh SC-K3A =

$$\frac{W_w}{W_w - W_s} = \frac{235\ g}{235\ g - 153{,}5\ g} = \frac{235\ g}{81{,}5\ g} = 2{,}883$$

Bobot isi jenuh SC-K3B =

$$\frac{W_w}{W_w - W_s} = \frac{204.4\ g}{204{,}4\ g - 136\ g} = \frac{204{,}4\ g}{68{,}4\ g} = 2{,}988$$

Bobot isi jenuh SC-K3C =

$$\frac{W_w}{W_w - W_s} = \frac{89{,}4\ g}{89{,}4\ g - 59{,}8\ g} = \frac{89{,}4\ g}{29{,}6\ g} = 3{,}020$$

3. Bobot isi kering (*dry density*)

Nilai bobot isi kering dihitung menggunakan Persamaan 2.3. Nilai bobot isi kering dari batuan adalah:

Bobot isi kering PKK 1A =

$$\frac{W_o}{W_w - W_s} = \frac{141{,}2\ g}{142{,}3\ g - 94{,}3\ g} = \frac{141{,}2\ g}{48\ g} = 2{,}942$$

Bobot isi kering PKK 1B =

$$\frac{W_o}{W_w - W_s} = \frac{82{,}9\ g}{83{,}6\ g - 52{,}7\ g} = \frac{82{,}9\ g}{30{,}9\ g} = 2{,}683$$

Bobot isi kering PKK 1C =

$$\frac{W_o}{W_w - W_s} = \frac{208{,}7\ g}{210{,}2\ g - 134{,}8\ g} = \frac{208{,}7\ g}{75{,}5\ g} = 2{,}764$$

Bobot isi kering PKB 1A =

$$\frac{W_o}{W_w - W_s} = \frac{107{,}3\ g}{108{,}1\ g - 73{,}1\ g} = \frac{107{,}3\ g}{34{,}8\ g} = 3{,}066$$

Bobot isi kering PKB 1B =

$$\frac{W_o}{W_w - W_s} = \frac{155\ g}{156{,}2\ g - 103{,}2\ g} = \frac{155\ g}{53\ g} = 2{,}925$$

Bobot isi kering PKB 1C =

$$\frac{W_o}{W_w - W_s} = \frac{176{,}9\ g}{178{,}2\ g - 117{,}9\ g} = \frac{176{,}9\ g}{60{,}3\ g} = 2{,}934$$

Bobot isi kering SC-K1A =

$$\frac{W_o}{W_w - W_s} = \frac{163{,}3\ g}{164{,}5\ g - 108{,}3\ g} = \frac{163{,}3\ g}{56{,}2\ g} = 2{,}906$$

Bobot isi kering SC-K1B =

$$\frac{W_o}{W_w - W_s} = \frac{96{,}4\ g}{97{,}2\ g - 62{,}8\ g} = \frac{96{,}4\ g}{34{,}4\ g} = 2{,}802$$

Bobot isi kering SC-K1C =

$$\frac{W_o}{W_w - W_s} = \frac{128{,}4\ g}{129{,}4\ g - 85{,}4\ g} = \frac{128{,}4\ g}{44\ g} = 2{,}918$$

Bobot isi kering SC-K2A =

$$\frac{W_o}{W_w - W_s} = \frac{141\ g}{142{,}1\ g - 92{,}3\ g} = \frac{141\ g}{49{,}8\ g} = 2{,}831$$

Bobot isi kering SC-K2B =

$$\frac{W_o}{W_w - W_s} = \frac{186{,}5\ g}{187{,}9\ g - 124{,}5\ g} = \frac{186{,}5\ g}{63{,}4\ g} = 2{,}942$$

Bobot isi kering SC-K2C =

$$\frac{W_o}{W_w - W_s} = \frac{179{,}9\ g}{181{,}3\ g - 119{,}7\ g} = \frac{179{,}9\ g}{61{,}6\ g} = 2{,}920$$

Bobot isi kering SC-K3A =

$$\frac{W_o}{W_w - W_s} = \frac{233{,}1\ g}{235\ g - 153{,}5\ g} = \frac{233{,}1\ g}{81{,}5\ g} = 2{,}860$$

Bobot isi kering SC-K3B =

$$\frac{W_o}{W_w - W_s} = \frac{202{,}8\ g}{204{,}4\ g - 136\ g} = \frac{202{,}8\ g}{68{,}4\ g} = 2{,}965$$

Bobot isi kering SC-K3C =

$$\frac{W_o}{W_w - W_s} = \frac{88{,}8\ g}{89{,}4\ g - 59{,}8\ g} = \frac{88{,}8\ g}{29{,}6\ g} = 3{,}000$$

C. Kadar air

Kadar air terdiri atas kadar air asli (*natural water content*) dan kadar air jenuh (*saturated water content*). Berikut perhitungan nilai kadar air batuan berdasarkan hasil uji sifat fisik.

1. Kadar air asli (*natural water content*)

   Perhitungan nilai kadar air asli menggunakan Persamaan 2.6 sebagai berikut.

   Kadar air asli PKK 1A = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{141{,}2\ g - 141{,}2\ g}{141{,}2\ g}\right) \times 100\% = \left(\frac{0\ g}{141{,}2\ g}\right) \times 100\% = 0\%$$

Kadar air asli PKK 1B $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{82{,}9\text{ g} - 82{,}9\text{ g}}{82{,}9\text{ g}}\right) \times 100\% = \left(\frac{0\text{ g}}{82{,}9\text{ g}}\right) \times 100\% = 0\%$$

Kadar air asli PKK 1C $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{208{,}7\text{ g} - 208{,}7\text{ g}}{208{,}7\text{ g}}\right) \times 100\% = \left(\frac{0\text{ g}}{208{,}7\text{ g}}\right) \times 100\% = 0\%$$

Kadar air asli PKB 1A $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{108{,}1\text{ g} - 107{,}3\text{ g}}{107{,}3\text{ g}}\right) \times 100\% = \left(\frac{0{,}8\text{ g}}{107{,}3\text{ g}}\right) \times 100\% = 0{,}746\%$$

Kadar air asli PKB 1B $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{156{,}2\text{ g} - 155\text{ g}}{155\text{ g}}\right) \times 100\% = \left(\frac{1{,}2\text{ g}}{155\text{ g}}\right) \times 100\% = 0{,}774\%$$

Kadar air asli PKB 1C $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{178{,}2\text{ g} - 176{,}9\text{ g}}{176{,}9\text{ g}}\right) \times 100\% = \left(\frac{1{,}3\text{ g}}{176{,}9\text{ g}}\right) \times 100\% = 0{,}735\%$$

Kadar air asli SC-K1A $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{163{,}6\text{ g} - 163{,}3\text{ g}}{163{,}3\text{ g}}\right) \times 100\% = \left(\frac{0{,}3\text{ g}}{163{,}3\text{ g}}\right) \times 100\% = 0{,}184\%$$

Kadar air asli SC-K1B $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{96{,}6\text{ g} - 96{,}4\text{ g}}{96{,}4\text{ g}}\right) \times 100\% = \left(\frac{0{,}2\text{ g}}{96{,}4\text{ g}}\right) \times 100\% = 0{,}207\%$$

Kadar air asli SC-K1C $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{128{,}7\text{ g} - 128{,}4\text{ g}}{128{,}4\text{ g}}\right) \times 100\% = \left(\frac{0{,}3\text{ g}}{128{,}4\text{ g}}\right) \times 100\% = 0{,}234\%$$

Kadar air asli SC-K2A $= \left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{141{,}5\text{ g} - 141\text{ g}}{141\text{ g}}\right) \times 100\% = \left(\frac{0{,}5\text{ g}}{141\text{ g}}\right) \times 100\% = 0{,}355\%$$

Kadar air asli SC-K2B = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{187{,}2\ \text{g} - 186{,}5\ \text{g}}{186{,}5\ \text{g}}\right) \times 100\% = \left(\frac{0{,}7\ \text{g}}{186{,}5\ \text{g}}\right) \times 100\% = 0{,}375\%$$

Kadar air asli SC-K2C = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{180{,}6\ \text{g} - 179{,}9\ \text{g}}{179{,}9\ \text{g}}\right) \times 100\% = \left(\frac{0{,}7\ \text{g}}{179{,}9\ \text{g}}\right) \times 100\% = 0{,}389\%$$

Kadar air asli SC-K3A = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{234{,}8\ \text{g} - 233{,}1\ \text{g}}{233{,}1\ \text{g}}\right) \times 100\% = \left(\frac{1{,}7\ \text{g}}{233{,}1\ \text{g}}\right) \times 100\% = 0{,}729\%$$

Kadar air asli SC-K3B = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{204{,}3\ \text{g} - 202{,}8\ \text{g}}{202{,}8\ \text{g}}\right) \times 100\% = \left(\frac{1{,}5\ \text{g}}{202{,}8\ \text{g}}\right) \times 100\% = 0{,}740\%$$

Kadar air asli SC-K3C = $\left(\frac{W_n - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{89{,}3\ \text{g} - 88{,}8\ \text{g}}{88{,}8\ \text{g}}\right) \times 100\% = \left(\frac{0{,}5\ \text{g}}{88{,}8\ \text{g}}\right) \times 100\% = 0{,}563\%$$

2. Kadar air jenuh (*saturated water content*)

Perhitungan nilai kadar air jenuh menggunakan Persamaan 2.7 sebagai berikut.

Kadar air jenuh PKK 1A = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{142{,}3\ \text{g} - 141{,}2\ \text{g}}{141{,}2\ \text{g}}\right) \times 100\% = \left(\frac{1{,}1\ \text{g}}{141{,}2\ \text{g}}\right) \times 100\% = 0{,}779\%$$

Kadar air jenuh PKK 1B = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{83{,}6\ \text{g} - 82{,}9\ \text{g}}{82{,}9\ \text{g}}\right) \times 100\% = \left(\frac{0{,}7\ \text{g}}{82{,}9\ \text{g}}\right) \times 100\% = 0{,}844\%$$

Kadar air jenuh PKK 1C = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{210{,}3\ \text{g} - 208{,}7\ \text{g}}{208{,}7\ \text{g}}\right) \times 100\% = \left(\frac{1{,}6\ \text{g}}{208{,}7\ \text{g}}\right) \times 100\% = 0{,}767\%$$

Kadar air jenuh PKB 1A = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{108{,}1\ \text{g} - 107{,}3\ \text{g}}{107{,}3\ \text{g}}\right) \times 100\% = \left(\frac{0{,}8\ \text{g}}{107{,}3\ \text{g}}\right) \times 100\% = 0{,}746\%$$

Kadar air jenuh PKB 1B = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{256{,}2\ \text{g} - 155\ \text{g}}{155\ \text{g}}\right) \times 100\% = \left(\frac{1{,}2\ \text{g}}{155\ \text{g}}\right) \times 100\% = 0{,}774\%$$

Kadar air jenuh PKB 1C = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{178{,}2\ \text{g} - 176{,}9\ \text{g}}{176{,}9\ \text{g}}\right) \times 100\% = \left(\frac{1{,}3\ \text{g}}{176{,}9\ \text{g}}\right) \times 100\% = 0{,}735\%$$

Kadar air jenuh SC-K1A = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{164{,}5\ \text{g} - 163{,}3\ \text{g}}{163{,}3\ \text{g}}\right) \times 100\% = \left(\frac{1{,}2\ \text{g}}{163{,}3\ \text{g}}\right) \times 100\% = 0{,}735\%$$

Kadar air jenuh SC-K1B = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{97{,}2\ \text{g} - 96{,}4\ \text{g}}{96{,}4\ \text{g}}\right) \times 100\% = \left(\frac{0{,}8\ \text{g}}{96{,}4\ \text{g}}\right) \times 100\% = 0{,}830\%$$

Kadar air jenuh SC-K1C = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{129{,}4\ \text{g} - 128{,}4\ \text{g}}{128{,}4\ \text{g}}\right) \times 100\% = \left(\frac{1\ \text{g}}{128{,}4\ \text{g}}\right) \times 100\% = 0{,}779\%$$

Kadar air jenuh SC-K2A = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{142{,}1\ \text{g} - 141\ \text{g}}{141\ \text{g}}\right) \times 100\% = \left(\frac{1{,}1\ \text{g}}{141\ \text{g}}\right) \times 100\% = 0{,}780\%$$

Kadar air jenuh SC-K2B = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{187{,}9\ \text{g} - 186{,}5\ \text{g}}{186{,}5\ \text{g}}\right) \times 100\% = \left(\frac{1{,}4\ \text{g}}{186{,}5\ \text{g}}\right) \times 100\% = 0{,}751\%$$

Kadar air jenuh SC-K2C = $\left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{181{,}3\ \text{g} - 179{,}9\ \text{g}}{179{,}9\ \text{g}}\right) \times 100\% = \left(\frac{1{,}4\ \text{g}}{179{,}9\ \text{g}}\right) \times 100\% = 0{,}778\%$$

Kadar air jenuh SC-K3A $= \left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{235\ g - 233{,}1\ g}{233{,}1\ g}\right) \times 100\% = \left(\frac{1{,}9\ g}{233{,}1\ g}\right) \times 100\% = 0{,}815\%$$

Kadar air jenuh SC-K3B $= \left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{204{,}4\ g - 202{,}8\ g}{202{,}8\ g}\right) \times 100\% = \left(\frac{1{,}6\ g}{202{,}8\ g}\right) \times 100\% = 0{,}789\%$$

Kadar air jenuh SC-K3C $= \left(\frac{W_w - W_o}{W_o}\right) \times 100\%$

$$= \left(\frac{89{,}4\ g - 88{,}8\ g}{88{,}8\ g}\right) \times 100\% = \left(\frac{0{,}6\ g}{88{,}8\ g}\right) \times 100\% = 0{,}676\%$$

D. Derajat kejenuhan

Perhitungan nilai derajat kejenuhan menggunakan Persamaan 2.8 diuraikan sebagai berikut.

Derajat kejenuhan PKK 1A =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{141{,}2\ g - 141{,}2\ g}{142{,}3\ g - 141{,}2\ g}\right) \times 100\% = 0\%$$

Derajat kejenuhan PKK 1B =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{82{,}9\ g - 82{,}9\ g}{83{,}6\ g - 82{,}9\ g}\right) \times 100\% = 0\%$$

Derajat kejenuhan PKK 1C =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{208{,}7\ g - 208{,}7\ g}{271{,}9\ g - 208{,}7\ g}\right) \times 100\% = 0\%$$

Derajat kejenuhan PKB 1A =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{108{,}1\ g - 107{,}3\ g}{108{,}1\ g - 107{,}3\ g}\right) \times 100\% = 100\%$$

Derajat kejenuhan PKB 1B =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{156{,}2\ g - 155\ g}{156{,}2\ g - 155\ g}\right) \times 100\% = 100\%$$

Derajat kejenuhan PKB 1C =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{178,2\ g - 176,9\ g}{178,2\ g - 176,9\ g}\right) \times 100\% = 100\%$$

Derajat kejenuhan SC-K1A =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{163,6\ g - 163,3\ g}{164,5\ g - 163,3\ g}\right) \times 100\% = 25\%$$

Derajat kejenuhan SC-K1B =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{96,6\ g - 96,4\ g}{97,2\ g - 96,4\ g}\right) \times 100\% = 25\%$$

Derajat kejenuhan SC-K1C =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{128,7\ g - 128,4\ g}{129,4\ g - 128,4\ g}\right) \times 100\% = 30\%$$

Derajat kejenuhan SC-K2A =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{141,5\ g - 141\ g}{142,1\ g - 141\ g}\right) \times 100\% = 45,46\%$$

Derajat kejenuhan SC-K2B =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{187,2\ g - 186,5\ g}{187,9\ g - 186,5\ g}\right) \times 100\% = 50\%$$

Derajat kejenuhan SC-K2C =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{180,6\ g - 179,9\ g}{181,3\ g - 179,9\ g}\right) \times 100\% = 50\%$$

Derajat kejenuhan SC-K3A =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{234,8\ g - 233,1\ g}{235\ g - 233,1\ g}\right) \times 100\% = 89,47\%$$

Derajat kejenuhan SC-K3B =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{203,3\ g - 202,8\ g}{204,4\ g - 202,8\ g}\right) \times 100\% = 93,75\%$$

Derajat kejenuhan SC-K3C =

$$\left(\frac{W_n - W_o}{W_w - W_o}\right) \times 100\% = \left(\frac{89,3\ g - 88,8\ g}{89,4\ g - 88,8\ g}\right) \times 100\% = 83,33\%$$

E. Porositas (n)

Perhitungan nilai porositas menggunakan Persamaan 2.9 diuraikan sebagai berikut.

Porositas PKK 1A =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{142{,}3\ g - 141{,}2\ g}{142{,}3\ g - 94{,}3\ g}\right) \times 100\% = \left(\frac{1{,}1\ g}{48\ g}\right) \times 100\% = 2{,}292\%$$

Porositas PKK 1B =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{83{,}6\ g - 82{,}9\ g}{83{,}6\ g - 52{,}7\ g}\right) \times 100\% = \left(\frac{0{,}7\ g}{30{,}9\ g}\right) \times 100\% = 2{,}265\%$$

Porositas PKK 1C =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{210{,}3\ g - 208{,}7\ g}{210{,}3\ g - 134{,}8\ g}\right) \times 100\% = \left(\frac{1{,}6\ g}{75{,}5\ g}\right) \times 100\% = 2{,}119\%$$

Porositas PKB 1A =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{108{,}1\ g - 107{,}3\ g}{108{,}1\ g - 73{,}1\ g}\right) \times 100\% = \left(\frac{0{,}8\ g}{35\ g}\right) \times 100\% = 2{,}286\%$$

Porositas PKB 1B =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{156{,}2\ g - 155\ g}{156{,}2\ g - 103{,}2\ g}\right) \times 100\% = \left(\frac{1{,}2\ g}{53\ g}\right) \times 100\% = 2{,}264\%$$

Porositas PKB 1C =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{178{,}2\ g - 176{,}9\ g}{178{,}2\ g - 117{,}9\ g}\right) \times 100\% = \left(\frac{1{,}3\ g}{60{,}3\ g}\right) \times 100\% = 2{,}156\%$$

Porositas SC-K1A =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{164{,}5\ g - 163{,}3\ g}{164{,}5\ g - 108{,}3\ g}\right) \times 100\% = \left(\frac{1{,}2\ g}{56{,}2\ g}\right) \times 100\% = 2{,}135\%$$

Porositas SC-K1B =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{97{,}2\ g - 96{,}4\ g}{97{,}2\ g - 62{,}8\ g}\right) \times 100\% = \left(\frac{0{,}8\ g}{34{,}4\ g}\right) \times 100\% = 2{,}326\%$$

Porositas SC-K1C =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{129{,}4\ g - 128{,}4\ g}{129{,}4\ g - 85{,}4\ g}\right) \times 100\% = \left(\frac{1\ g}{44\ g}\right) \times 100\% = 2{,}273\%$$

Porositas SC-K2A =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{142,1\ g - 141\ g}{142,1\ g - 92,3\ g}\right) \times 100\% = \left(\frac{1,1\ g}{49,8\ g}\right) \times 100\% = 2,209\%$$

Porositas SC-K2B =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{187,9\ g - 186,5\ g}{187,9\ g - 124,5g}\right) \times 100\% = \left(\frac{1,4\ g}{63,4\ g}\right) \times 100\% = 2,208\%$$

Porositas SC-K2C =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{181,3\ g - 179,9\ g}{181,3\ g - 119,7\ g}\right) \times 100\% = \left(\frac{1,4\ g}{61,6\ g}\right) \times 100\% = 2,273\%$$

Porositas SC-K3A =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{235\ g - 233,1\ g}{235\ g - 153,5\ g}\right) \times 100\% = \left(\frac{1,9\ g}{81,5\ g}\right) \times 100\% = 2,331\%$$

Porositas SC-K3B =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{204,4\ g - 202,8\ g}{204,4\ g - 136\ g}\right) \times 100\% = \left(\frac{1,6\ g}{68,4\ g}\right) \times 100\% = 2,339\%$$

Porositas SC-K3C =

$$\left(\frac{W_w - W_o}{W_w - W_s}\right) \times 100\% = \left(\frac{89,4\ g - 88,8\ g}{89,4\ g - 59,8\ g}\right) \times 100\% = \left(\frac{0,6\ g}{29,6\ g}\right) \times 100\% = 2,027\%$$

F. Nisbah pori (e)

Perhitungan nilai nisbah pori dengan menggunakan Persamaan 2.10 diuraikan sebagai berikut.

Nisbah pori PKK 1A =

$$\frac{n}{1-n} = \frac{0,023}{(1-0,023)} = 0,023$$

Nisbah pori PKK 1B =

$$\frac{n}{1-n} = \frac{0,023}{1-0,023} = 0,023$$

Nisbah pori PKK 1C =

$$\frac{n}{1-n} = \frac{0{,}021}{1-0{,}021} = 0{,}022$$

Nisbah pori PKB 1A =

$$\frac{n}{1-n} = \frac{0{,}023}{(1-0{,}023)} = 0{,}023$$

Nisbah pori PKB 1B =

$$\frac{n}{1-n} = \frac{0{,}023}{1-0{,}023} = 0{,}023$$

Nisbah pori PKB 1C =

$$\frac{n}{1-n} = \frac{0{,}022}{1-0{,}022} = 0{,}022$$

Nisbah pori SC-K1A =

$$\frac{n}{1-n} = \frac{0{,}021}{(1-0{,}022)} = 0{,}022$$

Nisbah pori SC-K1B =

$$\frac{n}{1-n} = \frac{0{,}023}{1-0{,}023} = 0{,}024$$

Nisbah pori SC-K1C =

$$\frac{n}{1-n} = \frac{0{,}023}{1-0{,}023} = 0{,}023$$

Nisbah pori SC-K2A =

$$\frac{n}{1-n} = \frac{0{,}022}{(1-0{,}022)} = 0{,}023$$

Nisbah pori SC-K2B =

$$\frac{n}{1-n} = \frac{0{,}022}{1-0{,}023} = 0{,}023$$

Nisbah pori SC-K2C =

$$\frac{n}{1-n} = \frac{0{,}023}{1-0{,}023} = 0{,}023$$

Nisbah pori SC-K3A =

$$\frac{n}{1-n} = \frac{0{,}023}{(1-0{,}023)} = 0{,}024$$

Nisbah pori SC-K3B =

$$\frac{n}{1-n} = \frac{0{,}023}{1-0{,}023} = 0{,}024$$

Nisbah pori SC-K3C =

$$\frac{n}{1-n} = \frac{0{,}020}{1-0{,}020} = 0{,}021$$

G. Hasil Perhitungan Nilai Sifat Fisik Batuan

Kondisi sampel	Kode	ρ_n (gr/cm3)	ρ_d (gr/cm3)	ρ_s (gr/cm3)	w_n (%)	w_s (%)	S	n	e
Kondisi Kering	PKK-1A	2,942	2,942	2,965	0,000	0,779	0,000	2,292	0,023
	PKK-1B	2,683	2,683	2,706	0,000	0,844	0,000	2,265	0,023
	PKK-1C	2,764	2,764	2,785	0,000	0,767	0,000	2,119	0,022
Kondisi Jenuh	PKB-1A	3,089	3,066	3,089	0,746	0,746	100,000	2,286	0,023
	PKB-1B	2,947	2,925	2,947	0,774	0,774	100,000	2,264	0,023
	PKB-1C	2,955	2,934	2,955	0,735	0,735	100,000	2,156	0,022
Natural Kering	SC-K1A	2,911	2,906	2,927	0,184	0,735	25,000	2,135	0,022
	SC-K1B	2,808	2,802	2,826	0,207	0,830	25,000	2,326	0,024
	SC-K1C	2,925	2,918	2,941	0,234	0,779	30,000	2,273	0,023
Natural Lembab	SC-K2A	2,841	2,831	2,853	0,355	0,780	45,455	2,209	0,023
	SC-K2B	2,953	2,942	2,964	0,375	0,751	50,000	2,208	0,023
	SC-K2C	2,932	2,920	2,943	0,389	0,778	50,000	2,273	0,023
Natural Basah	SC-K3A	2,881	2,860	2,883	0,729	0,815	89,474	2,331	0,024
	SC-K3B	2,987	2,965	2,988	0,740	0,789	93,750	2,339	0,024
	SC-K3C	3,017	3,000	3,020	0,563	0,676	83,333	2,027	0,021

Keterangan

W_n = Berat normal (gram)

W_w = Berat jenuh (gram)

W_s = Berat gantung (gram)

W_o = Berat kering (gram)

ρ_n = Bobot isi natural (gram/cm^3)

ρ_s = Bobot isi jenuh (gram/cm^3)

ρ_d = Bobot isi kering (gram/cm^3)

γ_t = Berat jenis asli

γ_a = Berat jenis semu

w_n = Kadar air asli (%)

w_s = Kadar air jenuh (%)

S = Derajat kejenuhan (%)

n = Porositas (%)

e = Nisbah pori

LAMPIRAN E

HASIL UJI KUAT TEKAN UNIAKSIAL

A. Hasil pengukuran tinggi dan diameter sampel batuan uji

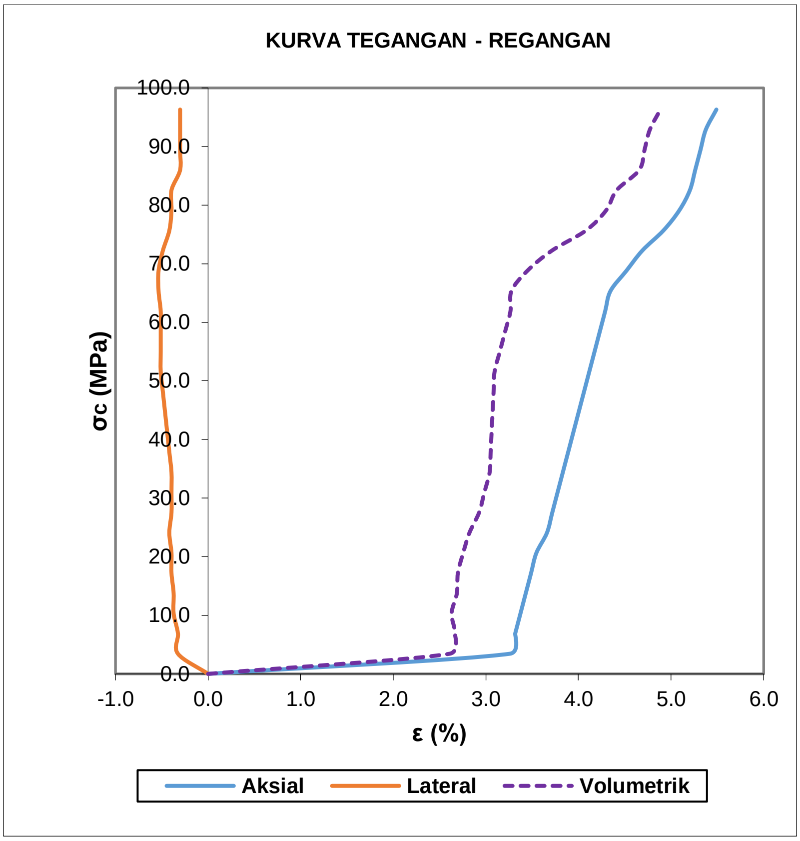
No.	Kode	Litologi	Length (mm)				Diameter (mm)				L/D	Luas penaMPang (mm2)	2D/L
			1	2	3	Rata-rata	1	2	3	Rata-rata			
1	PKK 1A	Basal	87,42	87,39	87,51	87,44	43,1	42,95	42,99	43,01	2,03	1453,69	0,98
2	PKK 1B	Basal	86,66	86,64	86,63	86,64	43,05	43,11	43,09	43,08	2,01	1458,42	0,99
3	PKK 1C	Basal	85,1	85,12	85,14	85,12	42,99	42,97	42,98	42,98	1,98	1451,43	1,01
4	PKB 1A	Basal	84,21	84,27	84,45	84,31	43,1	43,06	43,05	43,07	1,96	1457,52	1,02
5	PKB 1B	Basal	86,73	86,7	86,67	86,70	43,05	43,1	43,11	43,09	2,01	1458,65	0,99
6	PKB 1C	Basal	86,13	86,02	86,15	86,10	43,03	43,11	43,05	43,06	2,00	1457,07	1,00
7	SC-K1A	Basal	87,02	86,96	86,91	86,96	42,88	42,86	42,76	42,83	2,03	1441,55	0,99
8	SC-K1B	Basal	86,78	87,04	86,95	86,92	42,88	42,92	42,88	42,89	2,03	1445,59	0,99
9	SC-K1C	Basal	86,81	86,96	87,03	86,93	42,81	42,93	42,72	42,82	2,03	1440,65	0,99
10	SC-K2A	Basal	87,25	87,4	87,31	87,32	43,03	43,02	42,98	43,01	2,03	1453,46	0,99
11	SC-K2B	Basal	86,42	86,67	86,6	86,56	42,99	43,08	43,02	43,03	2,01	1454,81	0,99
12	SC-K2C	Basal	87,54	87,45	87,49	87,49	43,11	43,1	43,11	43,11	2,03	1460,00	0,99
13	SC-K3A	Basal	87,45	87,43	87,62	87,50	43,03	42,97	42,93	42,98	2,04	1451,21	0,98
14	SC-K3B	Basal	86,84	86,68	86,78	86,77	42,97	42,94	42,9	42,94	2,02	1448,51	0,99
15	SC-K3C	Basal	86,36	86,26	86,32	86,31	42,87	42,82	42,91	42,87	2,01	1443,79	0,99

B. Sampel PKK 1A

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKK 1A

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σ_C (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	285	28	-14	3,44	3,26	-0,33	2,61
10	290	28	-14	6,88	3,32	-0,33	2,67
15	295	30	-14	10,32	3,37	-0,37	2,63
20	300	30	-14	13,76	3,43	-0,37	2,69
25	305	32	-15	17,20	3,49	-0,40	2,70
30	310	32	-15	20,64	3,55	-0,40	2,75
35	320	33	-15	24,08	3,66	-0,42	2,82
40	325	33	-16	27,52	3,72	-0,40	2,93
45	330	34	-17	30,96	3,77	-0,40	2,98
50	335	34	-17	34,40	3,83	-0,40	3,04
55	340	36	-18	37,83	3,89	-0,42	3,05
60	345	38	-19	41,42	3,95	-0,44	3,06
65	350	39	-19	44,71	4,00	-0,46	3,07
70	355	40	-19	48,15	4,06	-0,49	3,08
75	360	42	-20	51,59	4,12	-0,51	3,09
80	365	42	-20	55,03	4,17	-0,51	3,15
85	370	42	-20	58,47	4,23	-0,51	3,21
90	375	42	-20	61,91	4,29	-0,51	3,27
95	380	48	-25	65,35	4,35	-0,53	3,28
100	395	48	-25	68,79	4,52	-0,53	3,45
105	410	48	-27	72,23	4,69	-0,49	3,71
110	430	45	-27	75,67	4,92	-0,42	4,08
115	445	45	-28	79,11	5,09	-0,40	4,30
120	455	45	-28	82,55	5,20	-0,40	4,41
125	460	43	-30	85,99	5,26	-0,30	4,66
130	465	43	-30	89,43	5,32	-0,30	4,71
135	470	43	-30	92,87	5,38	-0,30	4,77
140	480	43	-30	96,31	5,49	-0,30	4,89

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKK 1A



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 96,31 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{65{,}35\ \text{MPa} - 3{,}44\ \text{MPa}}{4{,}35\% - 3{,}26\ \%} = \frac{61{,}91\ \text{MPa}}{0{,}0109} = 5.698{,}47\ \text{MPa}$$

c. Nisbah Poisson (υ)

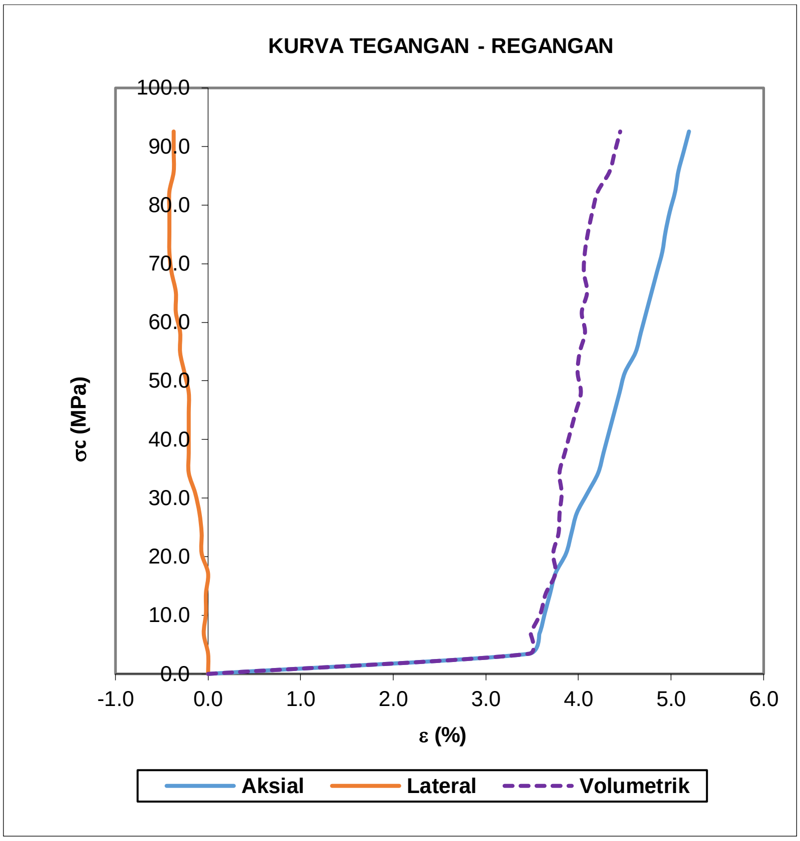
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}53)\% - (-0{,}33)\%}{4{,}35\% - 3{,}26\ \%}\right) = -\left(\frac{-0{,}0020}{0{,}0109}\right) = 0{,}19$$

C. Sampel PKK 1B

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKK 1B

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0
5	300	-30	30	3,43	3,46	0,00	3,46
10	310	-30	32	6,86	3,58	-0,05	3,49
15	315	-31	32	10,29	3,64	-0,02	3,59
20	320	-31	32	13,71	3,69	-0,02	3,65
25	325	-35	35	17,14	3,75	0,00	3,75
30	335	-35	38	20,57	3,87	-0,07	3,73
35	340	-35	38	24,00	3,92	-0,07	3,78
40	345	-35	39	27,43	3,98	-0,09	3,80
45	355	-33	39	30,86	4,10	-0,14	3,82
50	365	-33	42	34,28	4,21	-0,21	3,79
55	370	-33	42	37,71	4,27	-0,21	3,85
60	375	-33	42	41,14	4,33	-0,21	3,91
65	380	-38	47	44,57	4,39	-0,21	3,97
70	385	-38	47	48,00	4,44	-0,21	4,03
75	390	-38	49	51,43	4,50	-0,26	3,99
80	400	-42	55	54,85	4,62	-0,30	4,01
85	405	-42	55	58,28	4,67	-0,30	4,07
90	410	-40	55	61,71	4,73	-0,35	4,04
95	415	-40	55	65,14	4,79	-0,35	4,09
100	420	-40	57	68,57	4,85	-0,39	4,06
105	425	-49	67	72,00	4,91	-0,42	4,07
110	428	-49	67	75,42	4,94	-0,42	4,10
115	432	-49	67	78,85	4,99	-0,42	4,15
120	437	-49	67	82,28	5,04	-0,42	4,21
125	440	-59	75	85,71	5,08	-0,37	4,34
130	445	-59	75	89,14	5,14	-0,37	4,39
135	450	-59	75	92,57	5,19	-0,37	4,45

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKK 1B



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 92,57 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{92{,}57\ \text{MPa} - 3{,}43\ \text{MPa}}{5{,}19\ \% - 3{,}46\ \%} = \frac{88{,}48\ \text{MPa}}{0{,}0195} = 5.148{,}78\ \text{MPa}$$

c. Nisbah Poisson (υ)

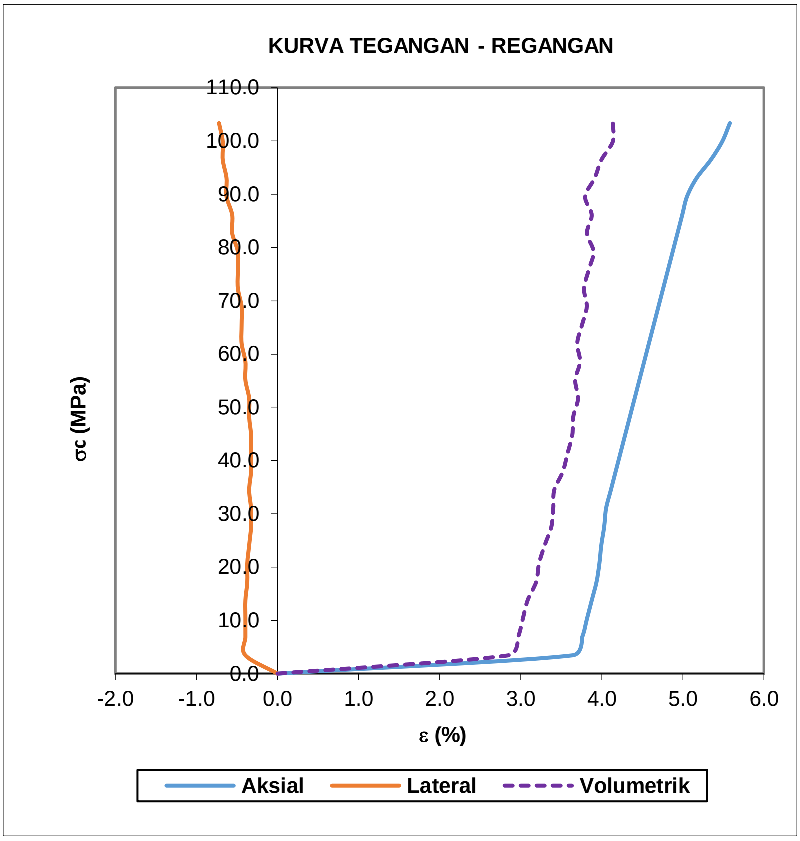
$$\upsilon = -\frac{\varepsilon_{\text{lateral}}}{\varepsilon_{\text{aksial}}} = -\left(\frac{(-0{,}37)\% - (-0{,}00)\%}{5{,}19\ \% - 3{,}46\ \%}\right) = -\left(\frac{-0{,}0037}{0{,}0195}\right) = 0{,}21$$

D. Sampel PKK 1C

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKK 1C

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σ_C (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	310	42	-25	3,44	3,64	-0,40	2,85
10	320	42	-25	6,89	3,76	-0,40	2,97
15	325	42	-25	10,33	3,82	-0,40	3,03
20	330	42	-25	13,78	3,88	-0,40	3,09
25	335	42	-26	17,22	3,94	-0,37	3,19
30	338	42	-26	20,67	3,97	-0,37	3,23
35	340	42	-27	24,11	3,99	-0,35	3,30
40	343	42	-28	27,56	4,03	-0,33	3,38
45	345	42	-28	31,00	4,05	-0,33	3,40
50	350	43	-28	34,45	4,11	-0,35	3,41
55	355	43	-29	37,89	4,17	-0,33	3,52
60	360	43	-29	41,34	4,23	-0,33	3,58
65	365	44	-30	44,78	4,29	-0,33	3,64
70	370	45	-30	48,23	4,35	-0,35	3,65
75	375	45	-30	51,67	4,41	-0,35	3,71
80	380	46	-29	55,12	4,46	-0,40	3,67
85	385	46	-29	58,56	4,52	-0,40	3,73
90	390	47	-28	62,01	4,58	-0,44	3,70
95	395	47	-28	65,45	4,64	-0,44	3,76
100	400	47	-28	68,90	4,70	-0,44	3,82
105	405	48	-27	72,34	4,76	-0,49	3,78
110	410	48	-27	75,79	4,82	-0,49	3,84
115	415	48	-27	79,23	4,88	-0,49	3,90
120	420	50	-26	82,68	4,93	-0,56	3,82
125	425	50	-26	86,12	4,99	-0,56	3,88
130	430	51	-24	89,57	5,05	-0,63	3,80
135	440	51	-24	93,01	5,17	-0,63	3,91
140	455	53	-24	96,46	5,35	-0,67	4,00
145	467	53	-24	99,90	5,49	-0,67	4,14
150	475	55	-24	103,35	5,58	-0,72	4,14

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKK 1C



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 103,35 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{89{,}57\ \text{MPa} - 3{,}44\ \text{MPa}}{5{,}05\ \% - 3{,}64\ \%} = \frac{86{,}13\ \text{MPa}}{0{,}0141} = 6.108{,}90\ \text{MPa}$$

c. Nisbah Poisson (υ)

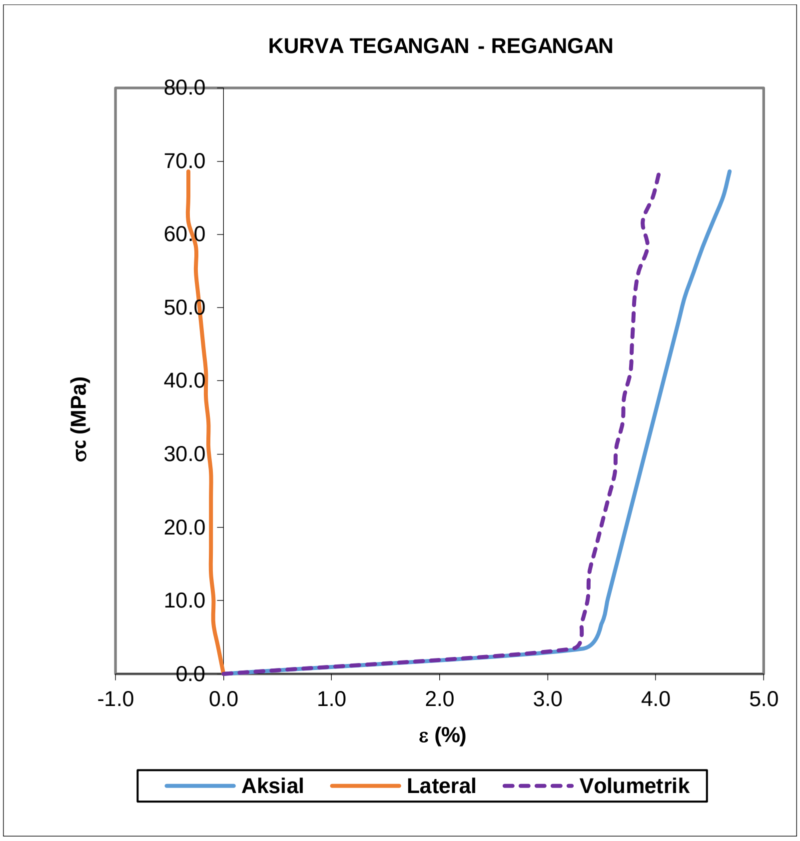
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}63)\% - (-0{,}40)\%}{5{,}05\ \% - 3{,}64\ \%}\right) = -\left(\frac{-0{,}0023}{0{,}0141}\right) = 0{,}17$$

E. Sampel PKB 1A

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKB 1A

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	280	4	-2	3,43	3,32	-0,05	3,23
10	295	6	-2	6,86	3,50	-0,09	3,31
15	300	6	-2	10,29	3,56	-0,09	3,37
20	305	8	-3	13,72	3,62	-0,12	3,39
25	310	8	-3	17,15	3,68	-0,12	3,44
30	315	8	-3	20,58	3,74	-0,12	3,50
35	320	9	-4	24,01	3,80	-0,12	3,56
40	325	9	-4	27,44	3,85	-0,12	3,62
45	330	10	-4	30,87	3,91	-0,14	3,64
50	335	11	-5	34,30	3,97	-0,14	3,69
55	340	12	-5	37,74	4,03	-0,16	3,71
60	345	12	-5	41,17	4,09	-0,16	3,77
65	350	13	-5	44,60	4,15	-0,19	3,78
70	355	14	-5	48,03	4,21	-0,21	3,79
75	360	15	-5	51,46	4,27	-0,23	3,81
80	367	19	-8	54,89	4,35	-0,26	3,84
85	374	19	-8	58,32	4,44	-0,26	3,93
90	382	22	-8	61,75	4,53	-0,33	3,88
95	390	22	-8	65,18	4,63	-0,33	3,98
100	395	22	-8	68,61	4,69	-0,33	4,03

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKB 1A



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 68,61 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{61{,}75 \text{ MPa} - 3{,}43 \text{ MPa}}{4{,}53\ \% - 3{,}32\ \%} = \frac{58{,}32 \text{ MPa}}{0{,}0121} = 4.820{,}40 \text{ MPa}$$

c. Nisbah Poisson (υ)

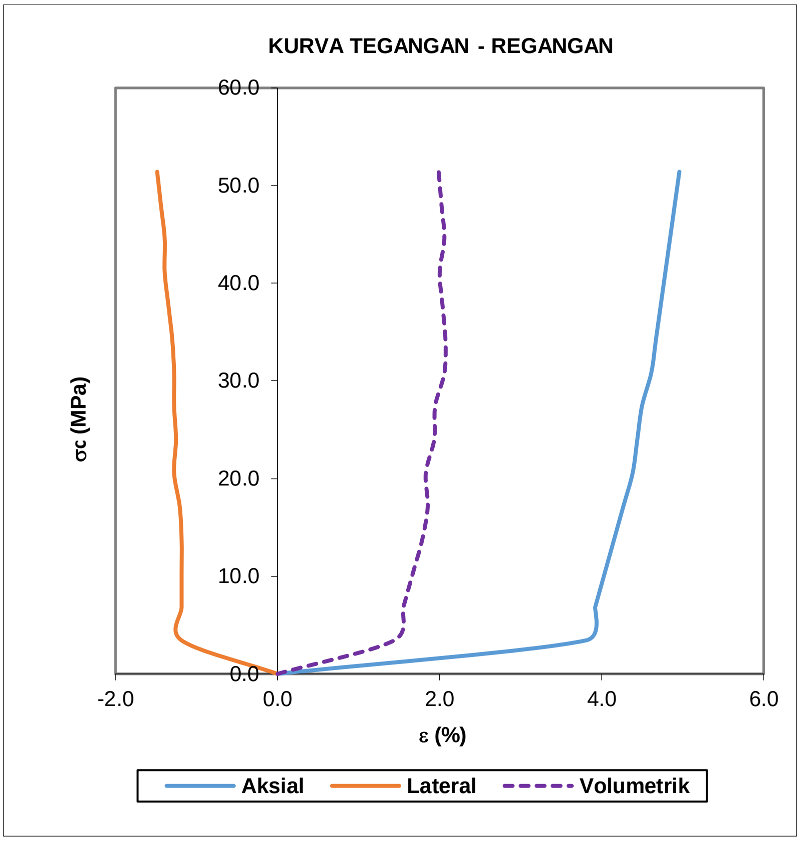
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}33)\% - (-0{,}05)\%}{4{,}53\ \% - 3{,}32\ \%}\right) = -\left(\frac{-0{,}0028}{0{,}0121}\right) = 0{,}23$$

F. Sampel PKB 1B

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKB 1B

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	330	138	-87	3,43	3,81	-1,18	1,44
10	340	142	-91	6,86	3,92	-1,18	1,55
15	350	145	-94	10,28	4,04	-1,18	1,67
20	360	147	-96	13,71	4,15	-1,18	1,78
25	370	152	-100	17,14	4,27	-1,21	1,85
30	380	155	-100	20,57	4,38	-1,28	1,83
35	385	157	-103	23,99	4,44	-1,25	1,93
40	390	159	-104	27,42	4,50	-1,28	1,95
45	400	161	-106	30,85	4,61	-1,28	2,06
50	405	162	-106	34,28	4,67	-1,30	2,07
55	410	163	-105	37,71	4,73	-1,35	2,04
60	415	164	-104	41,13	4,79	-1,39	2,00
65	420	166	-106	44,56	4,84	-1,39	2,06
70	425	168	-106	47,99	4,90	-1,44	2,02
75	430	170	-106	51,42	4,96	-1,49	1,99

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKB 1B



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 51,42 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{51{,}42\ \text{MPa} - 3{,}43\ \text{MPa}}{4{,}96\ \% - 3{,}81\ \%} = \frac{47{,}99\ \text{MPa}}{0{,}0115} = 4.160{,}70\ \text{MPa}$$

c. Nisbah Poisson (υ)

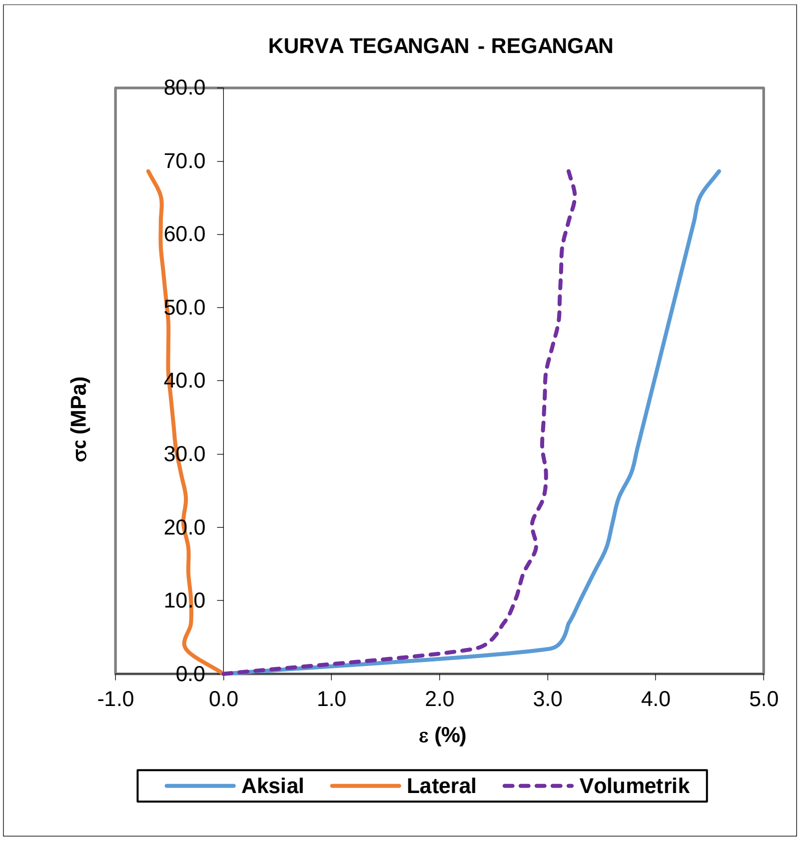
$$\upsilon = -\frac{\varepsilon_{\text{lateral}}}{\varepsilon_{\text{aksial}}} = -\left(\frac{(-1{,}49)\% - (-1{,}18)\%}{4{,}96\ \% - 3{,}81\ \%}\right) = -\left(\frac{-0{,}0031}{0{,}0115}\right) = 0{,}26$$

G. Sampel PKB 1C

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel PKB 1C

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	260	-50	65	3,43	3,02	-0,35	2,32
10	275	-53	66	6,86	3,19	-0,30	2,59
15	285	-53	66	10,29	3,31	-0,30	2,71
20	295	-53	67	13,73	3,43	-0,33	2,78
25	305	-53	67	17,16	3,54	-0,33	2,89
30	310	-54	70	20,59	3,60	-0,37	2,86
35	315	-61	76	24,02	3,66	-0,35	2,96
40	325	-61	78	27,45	3,77	-0,39	2,99
45	330	-61	80	30,88	3,83	-0,44	2,95
50	335	-63	83	34,32	3,89	-0,46	2,96
55	340	-63	84	37,75	3,95	-0,49	2,97
60	345	-63	85	41,18	4,01	-0,51	2,99
65	350	-63	85	44,61	4,07	-0,51	3,04
70	355	-63	85	48,04	4,12	-0,51	3,10
75	360	-64	87	51,47	4,18	-0,53	3,11
80	365	-64	88	54,90	4,24	-0,56	3,12
85	370	-64	89	58,34	4,30	-0,58	3,14
90	375	-65	90	61,77	4,36	-0,58	3,19
95	380	-65	90	65,20	4,41	-0,58	3,25
100	395	-65	95	68,63	4,59	-0,70	3,19

2. Kurva tegangan-regangan hasil uji kuat tekan sampel PKB 1C



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 68,63 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{65{,}20 \text{ MPa} - 6{,}86 \text{ MPa}}{4{,}41\ \% - 3{,}19\ \%} = \frac{58{,}34 \text{ MPa}}{0{,}0122} = 4.783{,}58 \text{ MPa}$$

c. Nisbah Poisson (υ)

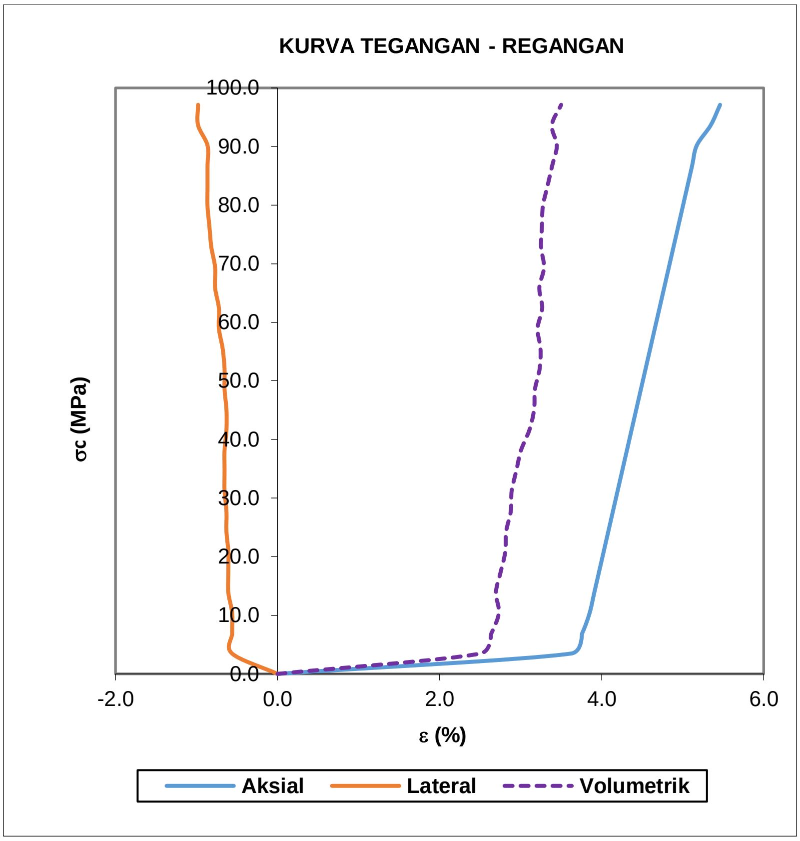
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}58)\% - (-0{,}30)\%}{4{,}41\ \% - 3{,}19\ \%}\right) = -\left(\frac{-0{,}0028}{0{,}0122}\right) = 0{,}23$$

H. Sampel SC-K1A

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K1A

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	315	16	8	3,47	3,62	-0,56	2,50
10	327	16	8	6,94	3,76	-0,56	2,64
15	335	16	8	10,41	3,85	-0,56	2,73
20	340	17	9	13,87	3,91	-0,61	2,70
25	345	17	9	17,34	3,97	-0,61	2,75
30	350	17	9	20,81	4,02	-0,61	2,81
35	355	17	10	24,28	4,08	-0,63	2,82
40	360	17	10	27,75	4,14	-0,63	2,88
45	365	17	11	31,22	4,20	-0,65	2,89
50	370	17	11	34,68	4,25	-0,65	2,95
55	375	17	11	38,15	4,31	-0,65	3,00
60	380	16	11	41,62	4,37	-0,63	3,11
65	385	15	12	45,09	4,43	-0,63	3,17
70	390	15	13	48,56	4,48	-0,65	3,18
75	395	14	14	52,03	4,54	-0,65	3,23
80	400	13	16	55,50	4,60	-0,68	3,25
85	405	13	18	58,96	4,66	-0,72	3,21
90	410	13	18	62,43	4,71	-0,72	3,27
95	415	13	20	65,90	4,77	-0,77	3,23
100	420	13	20	69,37	4,83	-0,77	3,29
105	425	14	21	72,84	4,89	-0,82	3,25
110	430	13	23	76,31	4,94	-0,84	3,26
115	435	14	23	79,78	5,00	-0,86	3,27
120	440	14	23	83,24	5,06	-0,86	3,33
125	445	14	23	86,71	5,12	-0,86	3,39
130	450	14	23	90,18	5,17	-0,86	3,45
135	465	15	27	93,65	5,35	-0,98	3,39
140	475	15	27	97,12	5,46	-0,98	3,50

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K1A



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 97,12 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{90{,}18\ \text{MPa} - 3{,}47\ \text{MPa}}{5{,}17\ \% - 3{,}62\ \%} = \frac{62{,}48\ \text{MPa}}{0{,}0097} = 5.585{,}78\ \text{MPa}$$

c. Nisbah Poisson (υ)

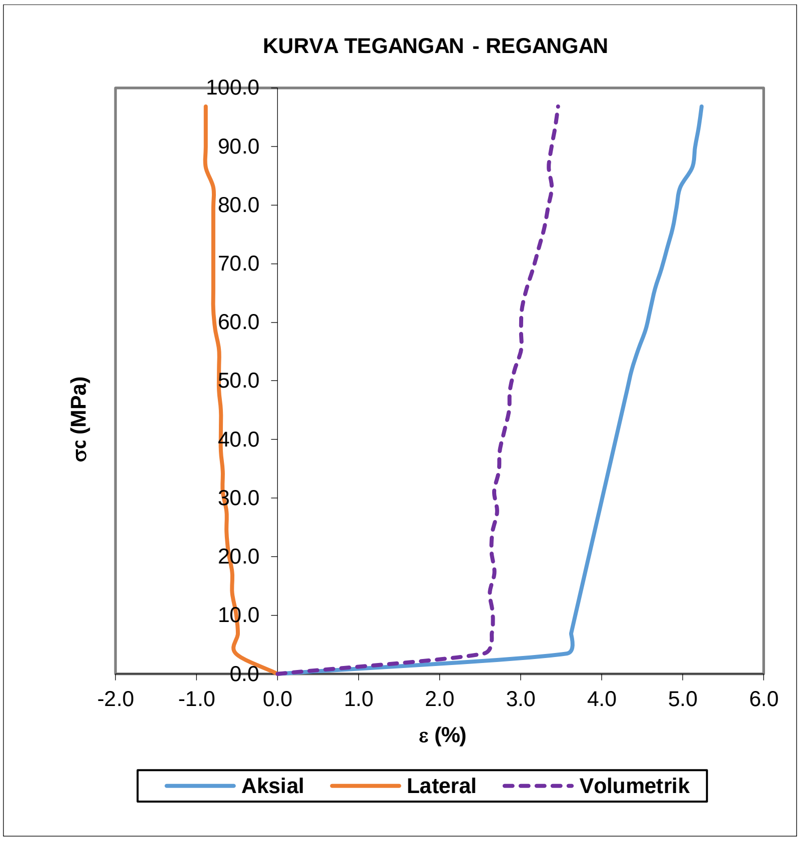
$$\upsilon = -\frac{\varepsilon_{\text{lateral}}}{\varepsilon_{\text{aksial}}} = -\left(\frac{(-0{,}86)\% - (-0{,}56)\%}{5{,}17\ \% - 3{,}62\ \%}\right) = -\left(\frac{-0{,}003}{0{,}0155}\right) = 0{,}20$$

I. Sampel SC-K1B

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K1B

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	310	22	0	3,46	3,57	-0,51	2,54
10	315	22	-1	6,92	3,62	-0,49	2,64
15	320	23	-1	10,38	3,68	-0,51	2,66
20	325	25	-1	13,84	3,74	-0,56	2,62
25	330	25	-1	17,29	3,80	-0,56	2,68
30	335	28	-2	20,75	3,85	-0,61	2,64
35	340	29	-2	24,21	3,91	-0,63	2,65
40	345	29	-2	27,67	3,97	-0,63	2,71
45	350	32	-3	31,13	4,03	-0,68	2,67
50	355	32	-3	34,59	4,08	-0,68	2,73
55	360	34	-4	38,05	4,14	-0,70	2,74
60	365	34	-4	41,51	4,20	-0,70	2,80
65	370	34	-4	44,96	4,26	-0,70	2,86
70	375	36	-5	48,42	4,31	-0,72	2,87
75	380	36	-5	51,88	4,37	-0,72	2,93
80	387	36	-5	55,34	4,45	-0,72	3,01
85	395	38	-5	58,80	4,54	-0,77	3,01
90	400	40	-6	62,26	4,60	-0,79	3,02
95	405	40	-6	65,72	4,66	-0,79	3,07
100	412	40	-6	69,18	4,74	-0,79	3,15
105	418	40	-6	72,63	4,81	-0,79	3,22
110	424	40	-6	76,09	4,88	-0,79	3,29
115	428	40	-6	79,55	4,92	-0,79	3,34
120	432	40	-6	83,01	4,97	-0,79	3,38
125	445	44	-6	86,47	5,12	-0,89	3,35
130	448	44	-6	89,93	5,15	-0,89	3,38
135	452	44	-6	93,39	5,20	-0,89	3,43
140	455	44	-6	96,85	5,23	-0,89	3,46

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K1B



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 96,85 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{83{,}01 \text{ MPa} - 3{,}46 \text{ MPa}}{4{,}97\ \% - 3{,}57\ \%} = \frac{79{,}55 \text{ MPa}}{0{,}0140} = 5.668.78 \text{ MPa}$$

c. Nisbah Poisson (υ)

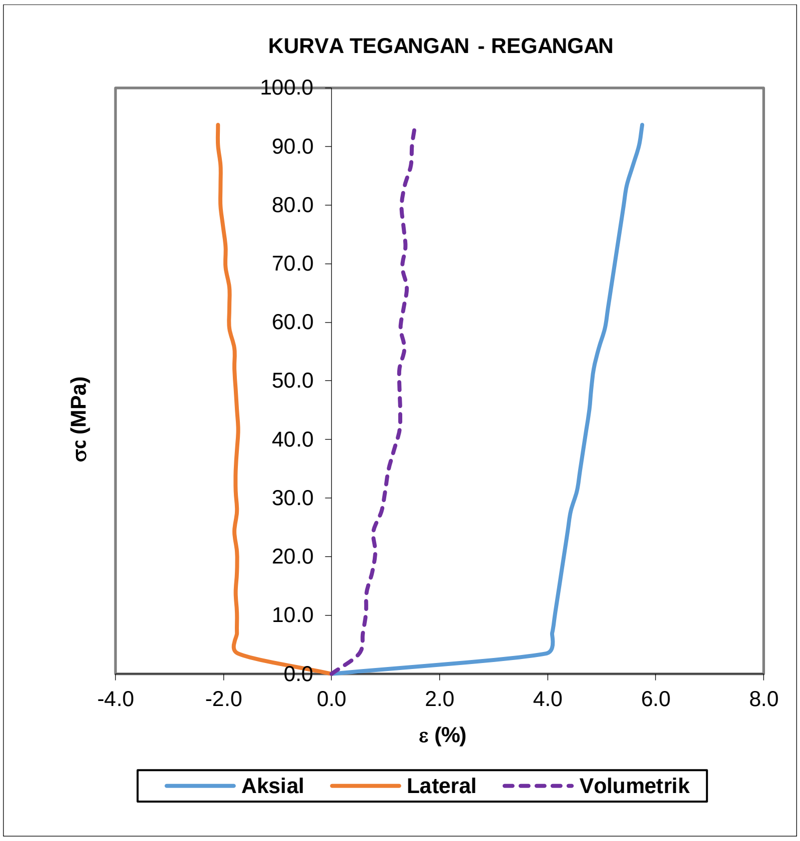
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}79)\% - (-0{,}51)\%}{4{,}79\ \% - 3{,}57\ \%}\right) = -\left(\frac{-0{,}0028}{0{,}0140}\right) = 0{,}20$$

J. Sampel SC-K1C

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K1C

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σ_C (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	345	-60	134	3,47	3,97	-1,73	0,51
10	355	-60	135	6,94	4,08	-1,75	0,58
15	360	-60	135	10,41	4,14	-1,75	0,64
20	365	-60	136	13,88	4,20	-1,77	0,65
25	370	-61	136	17,35	4,26	-1,75	0,75
30	375	-61	136	20,82	4,31	-1,75	0,81
35	380	-61	138	24,29	4,37	-1,80	0,77
40	385	-63	138	27,77	4,43	-1,75	0,93
45	395	-63	139	31,24	4,54	-1,77	0,99
50	400	-63	139	34,71	4,60	-1,77	1,05
55	405	-65	140	38,18	4,66	-1,75	1,16
60	410	-68	142	41,65	4,72	-1,73	1,26
65	415	-68	143	45,12	4,77	-1,75	1,27
70	418	-69	145	48,59	4,81	-1,77	1,26
75	422	-69	146	52,06	4,85	-1,80	1,26
80	430	-70	147	55,53	4,95	-1,80	1,35
85	440	-72	153	59,00	5,06	-1,89	1,28
90	445	-72	153	62,47	5,12	-1,89	1,34
95	450	-72	153	65,94	5,18	-1,89	1,39
100	455	-72	156	69,41	5,23	-1,96	1,31
105	460	-72	156	72,88	5,29	-1,96	1,37
110	465	-72	158	76,35	5,35	-2,01	1,33
115	470	-72	160	79,83	5,41	-2,06	1,30
120	475	-72	160	83,30	5,46	-2,06	1,35
125	485	-72	160	86,77	5,58	-2,06	1,47
130	495	-72	162	90,24	5,69	-2,10	1,49
135	500	-72	162	93,71	5,75	-2,10	1,55

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K1C



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 93,71 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{93{,}71 \text{ MPa} - 3{,}47 \text{ MPa}}{5{,}75\ \% - 3{,}97\ \%} = \frac{39{,}78 \text{ MPa}}{0{,}0178} = 5.061{,}04 \text{ MPa}$$

c. Nisbah Poisson (υ)

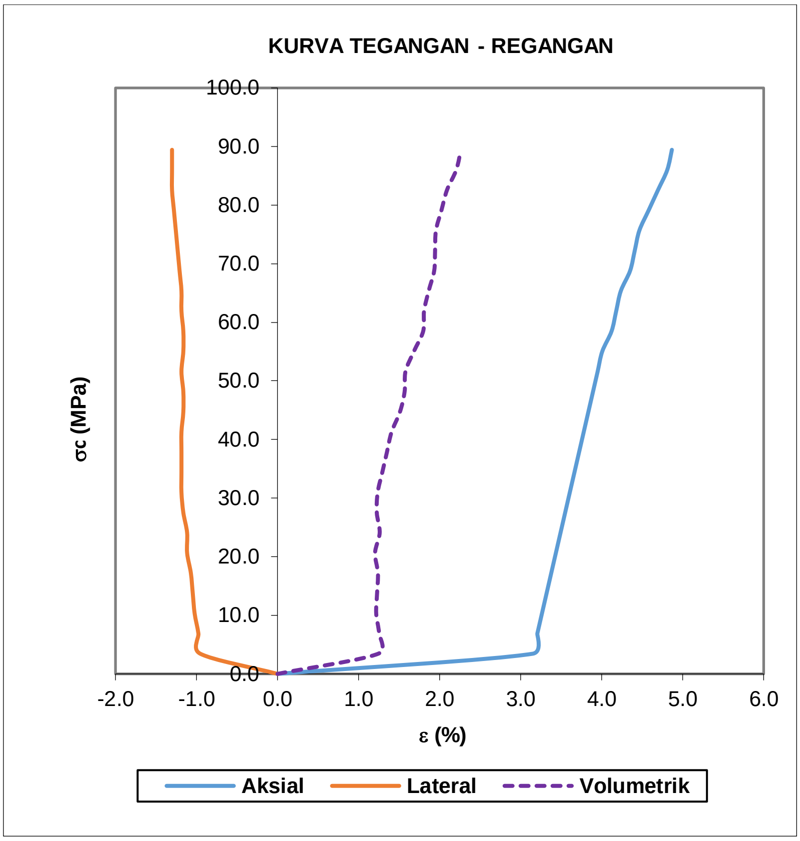
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-2{,}10)\% - (-1{,}73)\%}{5{,}75\ \% - 3{,}97\ \%}\right) = -\left(\frac{-0{,}0037}{0{,}0178}\right) = 0{,}21$$

K. Sampel SC-K2A

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K2A

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	275	-50	91	3,44	3,15	-0,95	1,24
10	280	-50	92	6,88	3,21	-0,98	1,25
15	285	-50	94	10,32	3,26	-1,02	1,22
20	290	-51	96	13,76	3,32	-1,05	1,23
25	295	-51	97	17,20	3,38	-1,07	1,24
30	300	-51	99	20,64	3,44	-1,12	1,20
35	305	-52	100	24,08	3,49	-1,12	1,26
40	310	-53	103	27,52	3,55	-1,16	1,23
45	315	-54	105	30,96	3,61	-1,19	1,24
50	320	-54	105	34,40	3,66	-1,19	1,29
55	325	-56	107	37,84	3,72	-1,19	1,35
60	330	-56	107	41,28	3,78	-1,19	1,41
65	335	-58	108	44,72	3,84	-1,16	1,51
70	340	-59	109	48,16	3,89	-1,16	1,57
75	345	-59	110	51,60	3,95	-1,19	1,58
80	350	-60	110	55,04	4,01	-1,16	1,68
85	360	-60	110	58,48	4,12	-1,16	1,80
90	365	-60	111	61,92	4,18	-1,19	1,81
95	370	-60	111	65,36	4,24	-1,19	1,87
100	380	-60	112	68,80	4,35	-1,21	1,93
105	385	-59	112	72,24	4,41	-1,23	1,94
110	390	-59	113	75,68	4,47	-1,26	1,96
115	400	-59	114	79,12	4,58	-1,28	2,02
120	410	-59	115	82,56	4,70	-1,30	2,09
125	420	-59	115	86,00	4,81	-1,30	2,21
130	425	-59	115	89,44	4,87	-1,30	2,26

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K2A



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 89,44 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{89{,}44\ \text{MPa} - 3{,}44\ \text{MPa}}{4{,}87\ \% - 3{,}15\ \%} = \frac{86\ \text{MPa}}{0{,}0172} = 5.006{,}44\ \text{MPa}$$

c. Nisbah Poisson (υ)

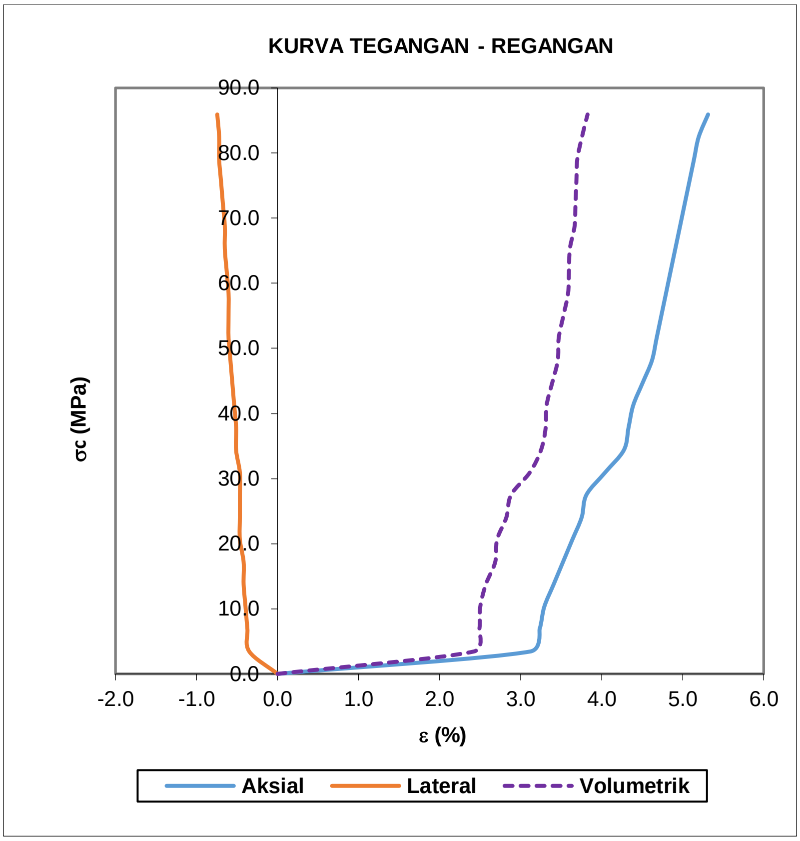
$$\upsilon = -\frac{\varepsilon_{\text{lateral}}}{\varepsilon_{\text{aksial}}} = -\left(\frac{(-1{,}30)\% - (-0{,}95)\%}{4{,}87\ \% - 3{,}15\ \%}\right) = -\left(\frac{-0{,}0035}{0{,}0172}\right) = 0{,}20$$

L. Sampel SC-K2B

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K2B

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	270	-50	65	3,44	3,12	-0,35	2,42
10	280	-50	66	6,87	3,23	-0,37	2,49
15	285	-49	66	10,31	3,29	-0,40	2,50
20	295	-49	67	13,75	3,41	-0,42	2,57
25	305	-49	67	17,18	3,52	-0,42	2,69
30	315	-49	69	20,62	3,64	-0,46	2,71
35	325	-49	69	24,06	3,75	-0,46	2,82
40	330	-49	69	27,49	3,81	-0,46	2,88
45	350	-49	69	30,93	4,04	-0,46	3,11
50	370	-48	70	34,37	4,27	-0,51	3,25
55	375	-49	71	37,81	4,33	-0,51	3,31
60	380	-49	72	41,24	4,39	-0,53	3,32
65	390	-49	73	44,68	4,51	-0,56	3,39
70	400	-49	74	48,12	4,62	-0,58	3,46
75	405	-49	75	51,55	4,68	-0,60	3,47
80	410	-51	77	54,99	4,74	-0,60	3,53
85	415	-51	77	58,43	4,79	-0,60	3,59
90	420	-51	78	61,86	4,85	-0,63	3,60
95	425	-50	78	65,30	4,91	-0,65	3,61
100	430	-50	78	68,74	4,97	-0,65	3,67
105	435	-49	78	72,17	5,03	-0,67	3,68
110	440	-48	78	75,61	5,08	-0,70	3,69
115	445	-48	79	79,05	5,14	-0,72	3,70
120	450	-48	79	82,48	5,20	-0,72	3,76
125	460	-47	79	85,92	5,31	-0,74	3,83

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K2B



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 85,92 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{85{,}92 \text{ MPa} - 34{,}37 \text{ MPa}}{5{,}31\ \% - 4{,}27\ \%} = \frac{51{,}55 \text{ MPa}}{0{,}0104} = 4.958{,}44 \text{ MPa}$$

c. Nisbah Poisson (υ)

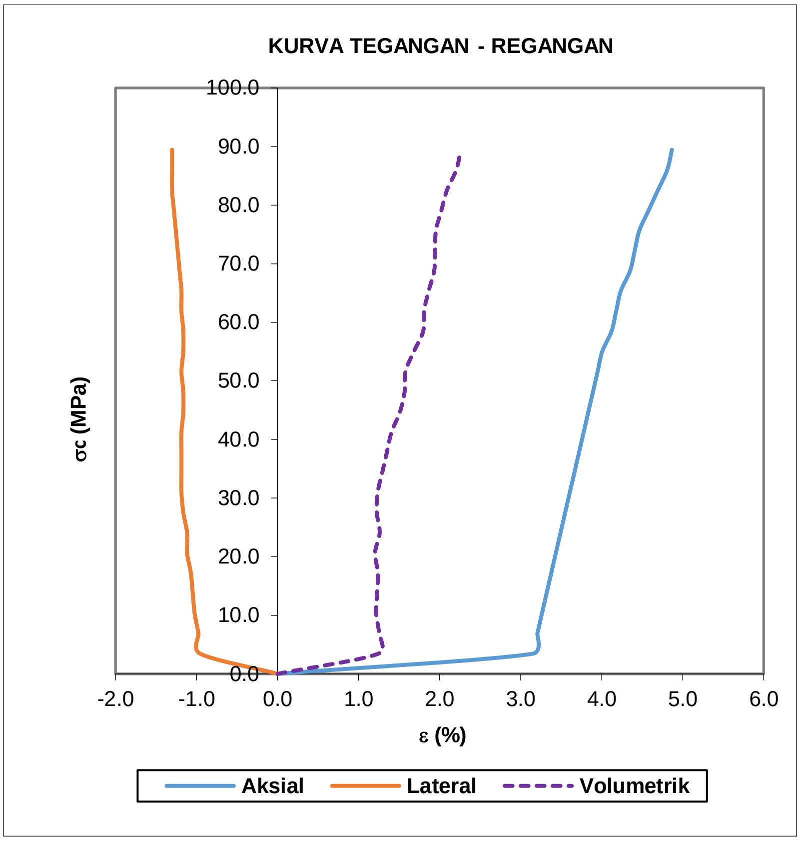
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}74)\% - (-0{,}51)\%}{5{,}31\ \% - 4{,}27\ \%}\right) = -\left(\frac{-0{,}0023}{0{,}0104}\right) = 0{,}22$$

M. Sampel SC-K2C

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K2C

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	305	-20	36	3,42	3,49	-0,37	2,74
10	310	-20	37	6,85	3,54	-0,39	2,75
15	320	-20	39	10,27	3,66	-0,44	2,78
20	325	-20	40	13,70	3,71	-0,46	2,79
25	330	-20	40	17,12	3,77	-0,46	2,84
30	335	-21	40	20,55	3,83	-0,44	2,95
35	340	-21	41	23,97	3,89	-0,46	2,96
40	350	-21	41	27,40	4,00	-0,46	3,07
45	355	-21	41	30,82	4,06	-0,46	3,13
50	365	-21	42	34,25	4,17	-0,49	3,20
55	375	-21	43	37,67	4,29	-0,51	3,27
60	380	-22	44	41,10	4,34	-0,51	3,32
65	390	-20	44	44,52	4,46	-0,56	3,34
70	395	-20	45	47,95	4,51	-0,58	3,35
75	400	-20	45	51,37	4,57	-0,58	3,41
80	405	-20	46	54,79	4,63	-0,60	3,42
85	410	-20	47	58,22	4,69	-0,63	3,43
90	415	-20	47	61,64	4,74	-0,63	3,49
95	420	-20	47	65,07	4,80	-0,63	3,55
100	425	-22	49	68,49	4,86	-0,63	3,60
105	430	-22	51	71,92	4,91	-0,67	3,57
110	435	-24	55	75,34	4,97	-0,72	3,53
115	445	-24	55	78,77	5,09	-0,72	3,65
120	450	-24	56	82,19	5,14	-0,74	3,66

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K2C



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 82,19 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{75{,}34 \text{ MPa} - 3{,}42 \text{ MPa}}{4{,}97\ \% - 3{,}49\ \%} = \frac{39{,}78 \text{ MPa}}{0{,}0178} = 4.840{,}25 \text{ MPa}$$

c. Nisbah Poisson (υ)

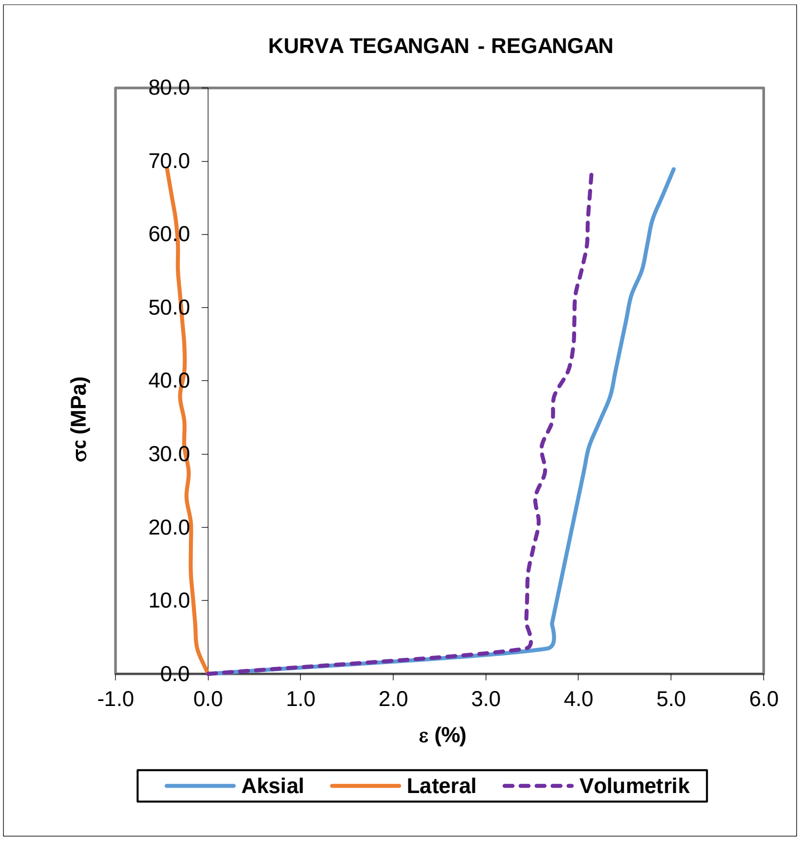
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}72)\% - (-0{,}37)\%}{4{,}97\ \% - 3{,}49\ \%}\right) = -\left(\frac{-0{,}0035}{0{,}0148}\right) = 0{,}23$$

N. Sampel SC-K3A

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K3A

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	320	26	-21	3,45	3,66	-0,12	3,42
10	325	27	-21	6,89	3,71	-0,14	3,44
15	330	29	-22	10,34	3,77	-0,16	3,45
20	335	30	-22	13,78	3,83	-0,19	3,46
25	340	31	-23	17,23	3,89	-0,19	3,51
30	345	32	-24	20,67	3,94	-0,19	3,57
35	350	35	-25	24,12	4,00	-0,23	3,53
40	355	35	-26	27,56	4,06	-0,21	3,64
45	360	38	-27	31,01	4,11	-0,26	3,60
50	370	41	-30	34,45	4,23	-0,26	3,72
55	380	43	-30	37,90	4,34	-0,30	3,74
60	385	43	-32	41,34	4,40	-0,26	3,89
65	390	43	-32	44,79	4,46	-0,26	3,95
70	395	45	-33	48,24	4,51	-0,28	3,96
75	400	46	-33	51,68	4,57	-0,30	3,97
80	410	47	-33	55,13	4,69	-0,33	4,03
85	415	48	-34	58,57	4,74	-0,33	4,09
90	420	49	-34	62,02	4,80	-0,35	4,10
95	430	51	-34	65,46	4,91	-0,40	4,12
100	440	53	-34	68,91	5,03	-0,44	4,14

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K3A



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 68,91 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{68{,}91\ \text{MPa} - 3{,}45\ \text{MPa}}{5{,}03\ \% - 3{,}66\ \%} = \frac{65{,}46\ \text{MPa}}{0{,}0137} = 4.773{,}32\ \text{MPa}$$

c. Nisbah Poisson (υ)

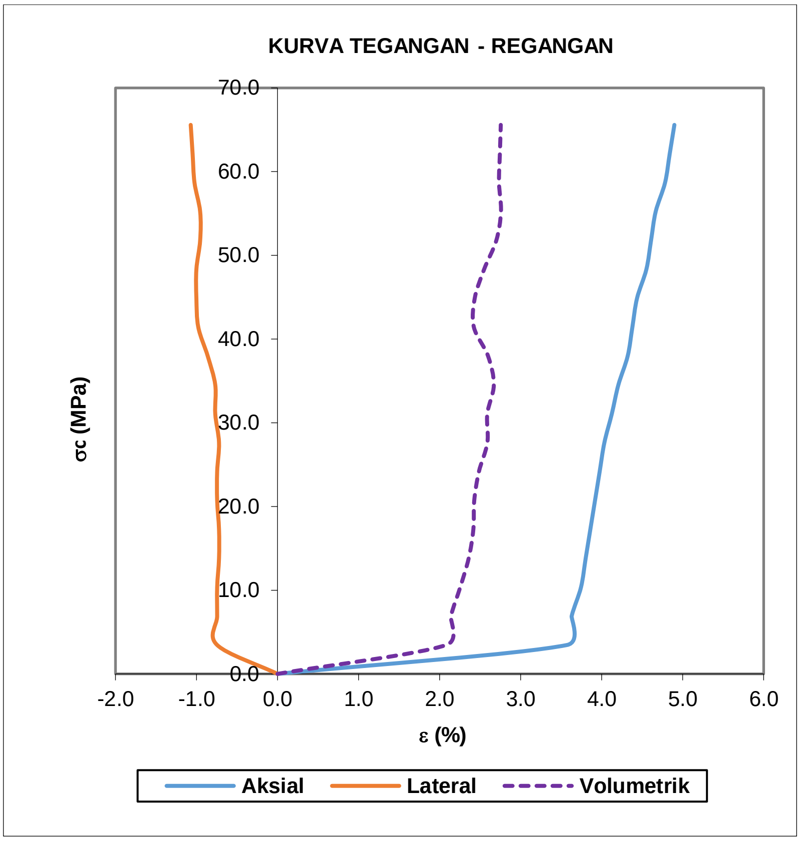
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-0{,}44)\% - (-0{,}12)\%}{5{,}03\ \% - 3{,}66\ \%}\right) = -\left(\frac{-0{,}0037}{0{,}0137}\right) = 0{,}24$$

O. Sampel SC-K3B

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K3B

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	310	-38	70	3,45	3,57	-0,75	2,08
10	315	-38	70	6,90	3,63	-0,75	2,14
15	325	-40	72	10,36	3,75	-0,75	2,26
20	330	-41	72	13,81	3,80	-0,72	2,36
25	335	-42	73	17,26	3,86	-0,72	2,42
30	340	-42	74	20,71	3,92	-0,75	2,43
35	345	-42	74	24,16	3,98	-0,75	2,49
40	350	-45	76	27,61	4,03	-0,72	2,59
45	358	-45	78	31,07	4,13	-0,77	2,59
50	365	-45	78	34,52	4,21	-0,77	2,67
55	375	-45	82	37,97	4,32	-0,86	2,60
60	380	-45	87	41,42	4,38	-0,98	2,42
65	385	-46	89	44,87	4,44	-1,00	2,43
70	395	-46	89	48,33	4,55	-1,00	2,55
75	400	-48	89	51,78	4,61	-0,95	2,70
80	405	-48	89	55,23	4,67	-0,95	2,76
85	415	-48	92	58,68	4,78	-1,02	2,73
90	420	-48	93	62,13	4,84	-1,05	2,74
95	425	-48	94	65,58	4,90	-1,07	2,76

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K3B



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 65,58 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{65{,}58\ \text{MPa} - 3{,}45\ \text{MPa}}{4{,}90\ \% - 3{,}57\ \%} = \frac{62{,}13\ \text{MPa}}{0{,}0133} = 4.687{,}88\ \text{MPa}$$

c. Nisbah Poisson (υ)

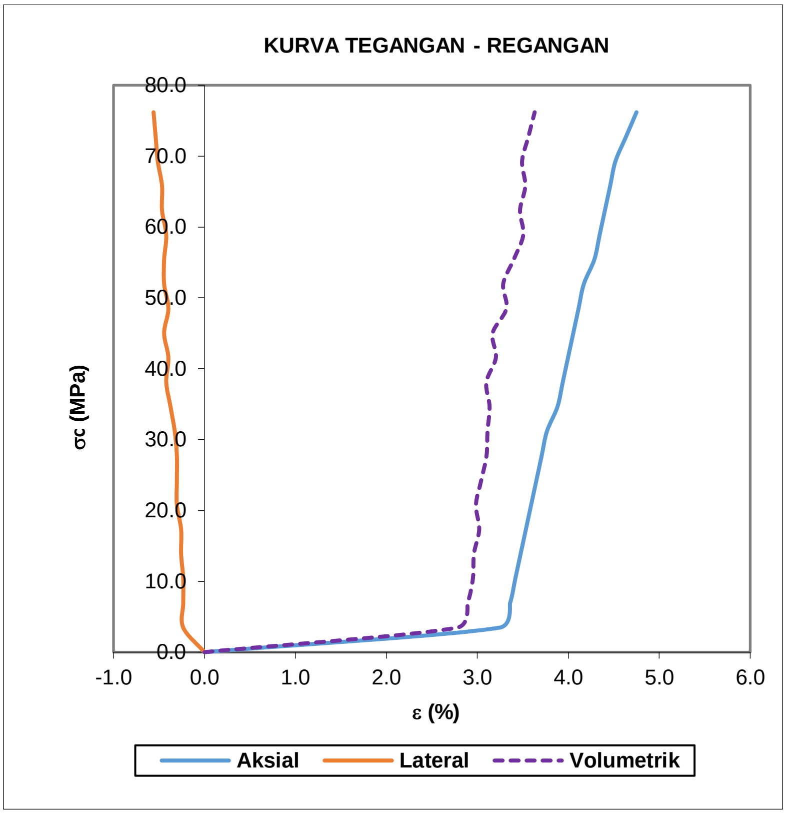
$$\upsilon = -\frac{\varepsilon_{lateral}}{\varepsilon_{aksial}} = -\left(\frac{(-1{,}07)\% - (-0{,}75)\%}{4{,}90\ \% - 3{,}57\ \%}\right) = -\left(\frac{-0{,}0032}{0{,}0133}\right) = 0{,}25$$

P. Sampel SC-K3C

1. Tabel hasil pengukuran deformasi dan pengolahan data sampel SC-K3C

Gaya Tekan (kN)	Aksial	Lateral 1	Lateral 2	σc (MPa)	ε Aksial (%)	ε Lateral (%)	ε Volumetrik (%)
0	0	0	0	0,00	0,00	0,00	0,00
5	280	-5	15	3,46	3,24	-0,23	2,78
10	290	-5	15	6,93	3,36	-0,23	2,89
15	295	-5	15	10,39	3,42	-0,23	2,95
20	300	-7	18	13,85	3,48	-0,26	2,96
25	305	-7	18	17,32	3,53	-0,26	3,02
30	310	-7	20	20,78	3,59	-0,30	2,99
35	315	-7	20	24,24	3,65	-0,30	3,04
40	320	-7	20	27,70	3,71	-0,30	3,10
45	325	-7	21	31,17	3,77	-0,33	3,11
50	335	-7	23	34,63	3,88	-0,37	3,13
55	340	-7	25	38,09	3,94	-0,42	3,10
60	345	-10	27	41,56	4,00	-0,40	3,20
65	350	-10	29	45,02	4,05	-0,44	3,17
70	355	-12	29	48,48	4,11	-0,40	3,32
75	360	-13	32	51,95	4,17	-0,44	3,28
80	370	-13	32	55,41	4,29	-0,44	3,40
85	375	-14	32	58,87	4,34	-0,42	3,50
90	380	-14	34	62,34	4,40	-0,47	3,47
95	385	-16	36	65,80	4,46	-0,47	3,53
100	390	-16	38	69,26	4,52	-0,51	3,49
105	400	-16	39	72,73	4,63	-0,54	3,56
110	410	-16	40	76,19	4,75	-0,56	3,63

2. Kurva tegangan-regangan hasil uji kuat tekan sampel SC-K3C



Berdasarkan kurva tegangan-regangan di atas, dapat ditentukan nilai kuat tekan, modulus Young, dan nisbah Poisson sebagai berikut.

a. Kuat tekan uniaksial (σ_c) = 76,19 MPa

b. Modulus Young (E)

$$E = \frac{\Delta\sigma}{\Delta\varepsilon_a} = \frac{76{,}19\ \text{MPa} - 3{,}46\ \text{MPa}}{4{,}75\ \% - 3{,}24\ \%} = \frac{72{,}73\ \text{MPa}}{0{,}0151} = 4.828{,}58\ \text{MPa}$$

c. Nisbah Poisson (υ)

$$\upsilon = -\frac{\varepsilon_{\text{lateral}}}{\varepsilon_{\text{aksial}}} = -\left(\frac{(-2{,}10)\% - (-1{,}73)\%}{4{,}75\ \% - 3{,}24\ \%}\right) = -\left(\frac{-0{,}0033}{0{,}0151}\right) = 0{,}22$$

Q. Hasil Uji Kuat Tekan Uniaksial

Kondisi Sampel	Kode Sampel	Kuat Tekan (MPa)	Modulus Young (MPa)	Nisbah Poisson	Kuat Tekan Rata-Rata (MPa)	Modulus Young Rata-Rata (MPa)	Nisbah Poisson Rata-Rata
Kondisi Kering	PKK 1A	92,57	5.148,78	0,21	97,41	5.652,05	0,19
	PKK 1B	96,31	5.698,47	0,19			
	PKK 1C	103,35	6.108,90	0,17			
Natural Kering	PKB 1A	68,61	4.820,40	0,23	62,89	4.588,23	0,24
	PKB 1B	51,42	4.160,70	0,26			
	PKB 1C	68,63	4.783,58	0,23			
Natural Lembab	SC-K1A	97,12	5.585,28	0,20	95,89	5.438,28	0,20
	SC-K1B	96,85	5.668,00	0,20			
	SC-K1C	93,71	5.061,04	0,21			
Natural Basah	SC-K2A	89,44	5.006,44	0,20	85,85	4.935,04	0,22
	SC-K2B	85,92	4.958,44	0,22			
	SC-K2C	82,19	4.840,25	0,23			
Kondisi Jenuh	SC-K3A	68,91	4.773,32	0,24	70,23	4.763,26	0,23
	SC-K3B	65,58	4.687,88	0,25			
	SC-K3C	76,19	4.828,58	0,22			

LAMPIRAN F

HASIL ANALISIS REGRESI LINEAR

A. Regresi linear pengaruh kadar air terhadap indeks kekerasan *Schmidt hammer*

Descriptive Statistics

	Mean	Std. Deviation	N
Schmidt Hammer	42.1267	7.38753	3
Kadar Air	.4193	.23791	3

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	103.588	1	103.588	18.620	.145[b]
	Residual	5.563	1	5.563		
	Total	109.151	2			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.974[a]	.949	.898	2.35868	.949	18.620	1	1	.145

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	54.812	3.240		16.918	.038					
	Kadar Air	-30.250	7.010	-.974	-4.315	.145	-.974	-.974	-.974	1.000	1.000

B. Regresi linear pengaruh kadar air terhadap kuat tekan uniaksial

Descriptive Statistics

	Mean	Std. Deviation	N
UCS	82.2260	15.33960	5
Kadar Air	.4020	.31552	5

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	896.414	1	896.414	60.028	.004[b]
	Residual	44.800	3	14.933		
	Total	941.214	4			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.976[a]	.952	.937	3.86435	.952	60.028	1	3	.004

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	101.299	3.008		33.679	.000					
	Kadar Air	-47.446	6.124	-.976	-7.748	.004	-.976	-.976	-.976	1.000	1.000

C. Regresi linear pengaruh kadar air terhadap modulus Young

Descriptive Statistics

	Mean	Std. Deviation	N
Modulus Young	5083.8560	466.11130	5
Kadar Air	.4020	.31552	5

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	820331.029	1	820331.029	50.526	.006[b]
	Residual	48707.928	3	16235.976		
	Total	869038.958	4			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.972[a]	.944	.925	127.42047	.944	50.526	1	3	.006

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	5660.844	99.178		57.078	.000					
	Kadar Air	-1435.293	201.923	-.972	-7.108	.006	-.972	-.972	-.972	1.000	1.000

D. Regresi linear pengaruh kadar air terhadap nisbah Poisson

Descriptive Statistics

	Mean	Std. Deviation	N
Nisbah Poisson	.2160	.02074	5
Kadar Air	.4020	.31552	5

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.002	1	.002	79.393	.003[b]
	Residual	.000	3	.000		
	Total	.002	4			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.982[a]	.964	.951	.00457	.964	79.393	1	3	.003

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.190	.004		53.445	.000					
	Kadar Air	.065	.007	.982	8.910	.003	.982	.982	.982	1.000	1.000

E. Regresi linear pengaruh kadar air terhadap indeks kekerasan *Schmidt hammer* dan kuat tekan uniaksial

Descriptive Statistics

	Mean	Std. Deviation	N
UCS	83.9900	11.70522	9
Kadar Air	.4196	.21249	9
Schmidt Hammer	42.1256	8.06680	9

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1089.550	2	544.775	499.275	.000[b]
	Residual	6.547	6	1.091		
	Total	1096.097	8			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.997[a]	.994	.992	1.04457	.994	499.275	2	6	.000

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	88.633	4.923		18.004	.000					
	Kadar Air	-43.950	3.311	-.798	-13.274	.000	-.990	-.983	-.419	.276	3.629
	Schmidt Hammer	.328	.087	.226	3.755	.009	.905	.838	.118	.276	3.629

LAMPIRAN G

VALIDASI DATA

HASIL UJI INDEKS KEKERASAN *SCHMIDT HAMMER* PADA BASAL

Sampel Batuan	Kadar Air (%)	Schmidt Hammer	Y	Y'	IY-Y'I	$IY-Y'I^2$	$\frac{IY-Y'I}{Y}$	AAREP	RMSE	VAF
SC-K1A	0,184	53,90	97,12	98,20	1,08	1,16	0,01			
SC-K1B	0,207	50,65	96,85	96,12	0,73	0,53	0,01			
SC-K1C	0,234	44,70	93,71	92,99	0,72	0,52	0,01			
SC-K2A	0,355	48,05	89,44	88,77	0,67	0,45	0,01			
SC-K2B	0,375	39,73	85,92	85,16	0,76	0,57	0,01			
SC-K2C	0,389	37,10	82,19	83,69	1,50	2,24	0,02	0,92	0,85	99,90
SC-K3A	0,729	36,80	68,91	68,65	0,26	0,07	0,00			
SC-K3B	0,740	27,80	65,58	65,21	0,37	0,13	0,01			
SC-K3C	0,563	40,40	76,19	77,12	0,93	0,87	0,01			
	Total		755,91	755,91	7,01	6,55	0,08			
	Varians		137,01	136,19	0,14	0,43	0,00			

Keterangan

Y = Nilai UCS

Y' = Nilai prediksi UCS

AAREP = *Absolute Average Relative Error Percentage*

RMSE = *Root Mean Square Error*

VAF = *Varians Accounted For*

1. Perhitungan statistik dengan metode AAREP

$$AAREP = \frac{1}{N}\sum_{i=1}^{N}\left|\frac{(Y\text{-}Y^{l})}{(Y)}\right| x\ 100\%$$

$$= \frac{1}{9} x\ 0{,}08\ x\ 100\%$$

$$= 0{,}92\%$$

2. Perhitungan statistik dengan metode RMSE

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(Y\text{-}Y^{l}\right)^{2}}$$

$$= \sqrt{\frac{1}{9}\ x\,6{,}55}$$

$$= \sqrt{0{,}728}$$

$$= 0{,}85$$

3. Perhitungan statistik dengan metode VAF

$$VAF = \left(1 - \frac{Var\left(Y\text{-}Y^{l}\right)}{Var(Y)}\right) x\ 100$$

$$= \left(1 - \frac{0{,}14}{137{,}01}\right) x\ 100$$

$$= (1 - 0{,}001) x\ 100$$

$$= 99{,}90$$

LAMPIRAN

KARTU KONSULTASI TUGAS AKHIR

KARTU KONSULTASI TUGAS AKHIR

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: ANALISIS PENGARUH KADAR AIR TERHADAP NILAI INDEKS KEKERASAN SCHMIDT HAMMER DAN KUAT TEKAN UNIAKSIAL PADA BASAL

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
2/3/2022	- Asistensi Latar Belakang Penelitian - Asistensi Bagan Alir Penelitian - Asistensi Metode Penelitian.	[paraf]
9/3/2022	- Asistensi perbaikan Bagan Alir Penelitian - Penambahan Metode Analisis data dan Validasi Data	[paraf]
23/3/2022	- Tujuan Ubah jadi 2 saja - Rumusan Masalah perbaiki - Type perbaiki. terutama Schmidt Hammer dimiringkan. - Judul Ubah sedikit. - Latar Belakang bahas terlebih dahulu tentang curah hujan. potensi basal → keterkaitan dengan tambang → geoteknik → pengujian	[paraf]
1/4/2022	- Bab 1 dan Judul di Acc pembimbing - Tambahkan rumusan masalah di Bagan Alir - Tukar tujuan point 1 dan 2 - Perbaiki sedikit Bagan Alir (Perjelas) - Pelajari parameter RMR terkhusus dengan kondisi Air Tanah.	[paraf]

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
8/4/2022	- Perbaiki standar pengujian schmidt Hammer terutama pengujian di laboratorium dan lapangan - Perbaiki susunan Bab II - Tambahkan penelitian terdahulu terkait judul penelitian. - Perbaiki penulisan yang typo.	[paraf]
15/4/2022	- Acc penulisan Bab II - Asistensikan data pengujian	[paraf]
29/5/2022	- Asistensi penyusunan Bab III - Perbaiki Bagan Alir - Judul penelitian hilangkan kata Batuan. - Tambahkan standar pengujian yang digunakan pada masing-masing uji yang dilakukan.	[paraf]
5/7/2022	- Asistensi Laporan Lengkap - Paparkan lebih jelas metode pengujian yang dilakukan pada Bab III. - Tambahkan kekurangan yang ada pada persamaan matematis yang direkomendasikan.	[paraf]
7/7/2022	- Asistensi perbaikan laporan Lengkap - Asistensi Artikel Ilmiah - Asistensi poster.	[paraf]
18/7/2022	- Acc laporan Lengkap untuk Seminar Hasil.	[paraf]

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
29/8/2022	- Revisi Laporan Lengkap - Perbaikan Flowchart - Perbaikan Poster	
6/10/2022	- Revisi Laporan Lengkap - Perbaikan Poster	