

DAFTAR PUSTAKA

- ACI 318-14. (n.d.). *Building Code Requirements*. American Concrete Institute.
- ACI 318-14. (2014). *Building Code Requirements for Structural Concrete (ACI 318-14)*.
- Akbar, M., Umar, T., Hussain, Z., Pan, H., & Ou, G. (2022). Effect of Human Hair Fibers on the Performance of Concrete. *applied sciences*.
- Amelia, R., & Rosyad, F. (2020). ANALISIS PERBANDINGAN JENIS SEMEN (MERK SEMEN) TERHADAP KUAT TEKAN BETON .
- ASTM C469. (2009). Standard test method for static modulus of elasticity and poisson's ratio of concrete in compression. *American Standard Testing and Material*.
- ASTM C 136-01. (n.d.). *Standard Test Method For Sieve Analysis of Fine and Coarse Aggregates*. ASTM International.
- ASTM C 469-02. (n.d.). *Standard Test Method For Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression*. ASTM International.
- ASTM. (C136:2012). Jakarta: Badan Standardisasi Nasional.
- ASTM C496/C 496M-04. (n.d.). *Standard Test Method for Splitting Tensile Strength of Cylinder Concrete Specimens*. ASTM International.
- Balachandar, M., Vijaya Ramnath, B., Ashok Kumar, S., & Siva Sankar, G. (2019). Experimental evaluation on mechanical properties of natural fiber polymer composites with human hair. *Materials Today: Proceedings*, 16, 1304–1311. <https://doi.org/10.1016/j.matpr.2019.05.228>
- Bheel, N., Awoyera, P., Aluko, O., Mahro, S., Vilorio, A., & Sierra, C. A. S. (2020). Sustainable composite development: Novel use of human hair as fiber in concrete. *Case Studies in Construction Materials*, 13. <https://doi.org/10.1016/j.cscm.2020.e00412>
- BG, A. K., & R, D. R. (2019). Properties and Performance of Mortar and Concrete Made With Recycled Glass Powder as Binder and Aggregate. *Material Science and Engineering*, 4-6.



F., Costa, C., Gomes, A. C., Matamá, T., & Cavaco-Paulo, A. (2016). Human hair and the impact of cosmetic procedures: A review on cleansing and re-modulating cosmetics. *Cosmetics*, 3(3), 1–22.

<https://doi.org/10.3390/cosmetics3030026>

Hidayat, A. k., Mahdi, I., & Rahayu, A. F. (2020). PENGARUH PENAMBAHAN PYROPHYLLITE TERHADAP KUAT TEKAN . *Jurnal Ilmiah Teknik Sipil*.

Jaber, A., Gorgis, I., & Hassan, M. (2018). Relationship between splitting tensile and compressive strengths for self-compacting concrete containing nano- and micro silica. *MATEC Web of Conferences*, 162, 1–8.
<https://doi.org/10.1051/mateconf/201816202013>

Jing, G., Huang, G., & Zhu, W. (2020). An Experimental Study on Water Permeability of Architectural Mortar Using Waste Glass As Fine Aggregate. *Materials*.

Kathiresan, S., & Meenakshisundaram, O. (2022). Effect of alkali treated and untreated cellulose fibers and human hair on FTIR and tensile properties for composite material applications. *SN Applied Sciences*, 4(3).
<https://doi.org/10.1007/s42452-022-04946-9>

Khan, M. N., & Sarker, P. K. (2020). Effect of Waste Glass Fine Aggregate On The Strength, Durability and High Temperature Resistance of Alkali-Activated Fly Ash and GGBFS Blended Mortar. *Construction and Buildings Materials*.

Manaf, A., Adarsh, M. V., Jomichan, A., Varghese, G. M. (2017). Human Hair Fibre Reinforced Concrete. *International Journal of Engineering Research And*, V6(03), 460–465. <https://doi.org/10.17577/ijertv6is030528>

Manjunatha, M., Kvgd, B., Vengala, J., Manjunatha, L. R., Shankara, K., & Kumar Patnaikuni, C. (2021). Experimental study on the use of human hair as fiber to enhance the performance of concrete: A novel use to reduce the disposal challenges. *Materials Today: Proceedings*, 47(xxxx), 3966–3972.
<https://doi.org/10.1016/j.matpr.2021.04.039>

Meddah, M. S. (2019). Use of Waste Window Glass as Substitute of Natural Sand in Concrete Production. *Materials Science and Engineering*.

Meghwar, S. L., Khaskheli, G. B., & Kumar, A. (2020). Human Scalp Hair as Fiber Reinforcement in Cement Concrete.

o, T. (2017). *Perancangan Campuran Beton, Pengolahan dan Pengujian Beton*. Jakarta.



- Mulyono, T. (2015). *Teknologi Beton*. Jakarta: Lembaga Pengembangan Pendidikan-UNJ.
- Olii, M. R., Poe, I. E., Ichsan, I., & Olii, A. (2020). Limbah Kaca Sebagai Pengganti Sebagian Agregat Halus Untuk Beton Ramah Lingkungan. *Teras Jurnal*.
- Olofinnade, O., Ndambuki, J., Ede, A., & Ngene, B. U. (2018). Strength and Microstructure of Eco-concrete produced using Waste Glass as Partial and Complete Replacement for Sand. *Cogent Engineering*.
- Oveas, M., & Singh, G. D. (2019). An Experimental Investigation on Hair Fibre as Fibre Reinforcement in Concrete.
- Putra, D. M., & Widjaja, D. (2015). Hubungan Kuat Tarik Belah Dengan Kuat Tekan Beton Ringan Dengan Crumb Rubber dan Pecahan Genteng. *Rekayasa Sipil*.
- S. A., & Sethuraman, V. S. (2020). Experimental Study on The Mechanical Properties of by Partial Replacement of Glass Powder as Fine Aggregate: An Environmental Friendly Approach. *Material Today : Proceedings*, 5-6.
- Safarizki, H. A., Gunawan, L. I., & Marwahyudi. (2020). Effectiveness of Glass Powder as a Partial Replacement of Sand in Concrete Mixtures. *Journal of Physics*.
- Sezign, H., & Enis, I. Y. (2018). *Human Hair Fiber as a Reinforcement Material in Composite Structures*.
- Siswanto, A. B., & Salim, M. A. (2018). *Rekayasa Gempa*. Yogyakarta: K-Media.
- SNI. (0302:2014). *Semen Portland Pozolan*. Jakarta: Badan Standardisasi Nasional.
- SNI. (2004:15-7064). *Semen Portland Komposit*. Jakarta: Badan Standardisasi Nasional.
- SNI. (2049:2015). *Semen Portland*. Jakarta: Badan Standardisasi Nasional.
- SNI. (2154:2014). *Metode Uji Kekuatan Lentur Beton*. Jakarta: Badan Standardisasi Indonesia.
- SNI. (7656:2012). *Tata Cara Pemilihan Campuran Untuk Beton Normal, Beton Berat dan Beton Massa*. Bandung: Badan Standardisasi Nasional.
- SNI 03-2834-2000. (2000). SNI 03-2834-2000: Tata cara pembuatan rencana campuran beton normal. *Jakarta: Badan Standardisasi Nasional*.
- 142-1996. (1996). Metode pengujian jumlah bahan dalam agregate yang saringan nomor 200. *Jakarta: Badan Standardisasi Nasional*.
- 804-1998. (1998). Metode Pengujian Bobot Isi dan Rongga Udara dalam



- Agregat. *Jakarta: Badan Standardisasi Nasional.*
- SNI 1969:2014. (2016). Cara Uji Berat Jenis dan Penyerapan Air Agregat Kasar. *Jakarta: Badan Standardisasi Nasional.*
- SNI 1970:2016. (2016). Metode Uji Berat Jenis Dan Penyerapan Air Agregat Halus. In *Jakarta: Badan Standardisasi Nasional* (pp. 1–22).
- SNI 1971:2011. (2011). Cara uji kadar air total agregat dengan pengeringan. *Jakarta: Badan Standardisasi Nasional.*
- SNI 1974:2011. (2011). Cara Uji Kuat Tekan Beton Dengan Benda Uji Silinder. *Jakarta: Badan Standardisasi Nasional.*
- SNI 2417:2008. (2008). Cara uji keausan agregat dengan mesin abrasi Los Angeles. *Jakarta: Badan Standardisasi Nasional.*
- SNI 2491:2014. (2014). Metode Uji Kekuatan Tarik Belah Spesimen Beton Silinder. *Jakarta: Badan Standardisasi Nasional.*
- SNI 2816:2014. (2014). Metode Uji Bahan Organik dalam Agregat Halus untuk Beton. *Jakarta: Badan Standardisasi Nasional.*
- SNI 2847:2019. (2019). Persyaratan Beton Struktural untuk Bangunan Gedung dan Penjelasan. *Jakarta: Badan Standardisasi Nasional.*
- SNI 4431-2011. (2011). Cara Uji Kuat Lentur Beton Normal dengan Dua Titik Pembebanan. *Jakarta: Badan Standardisasi Nasional.*
- SNI 7656:2012. (2012). Tata Cara Pemilihan Campuran untuk Beton Normal, Beton Berat dan Beton Massa. *Jakarta: Badan Standardisasi Nasional.*
- SNI ASTM C136:2012. (2012). Metode uji untuk analisis saringan agregat halus dan agregat kasar. *Jakarta: Badan Standardisasi Nasional.*
- Suryani, A., Dewi, S. H., & Harmiyati. (2018). *Korelasi Kuat Lentur Beton Dengan Kuat Tekan Beton*. Riau: Jurnal saint.
- Tjokrodinuljo, K. (2007). *Teknologi Beton*. Yogyakarta: KMTS FT UGM.
- Waas, R. M., & Ayub, E. (2022). EFFECT OF HUMAN HAIR FIBER ON MECHANICAL .
- Waqas, R. M., & Ayub, E. (2022). EFFECT OF HUMAN HAIR FIBER ON MECHANICAL .
- , L. (2003). *Human hair: Aunique physicochemical composite*. America.



Lampiran 1 Dokumentasi Persiapan Material



(a)



(b)



(c)



cucian Agregat; (b) Pencucian Limbah Rambut; (c) Penyiapan Agregat

Lampiran 2 Dokumentasi Pembuatan Benda Uji



(a)



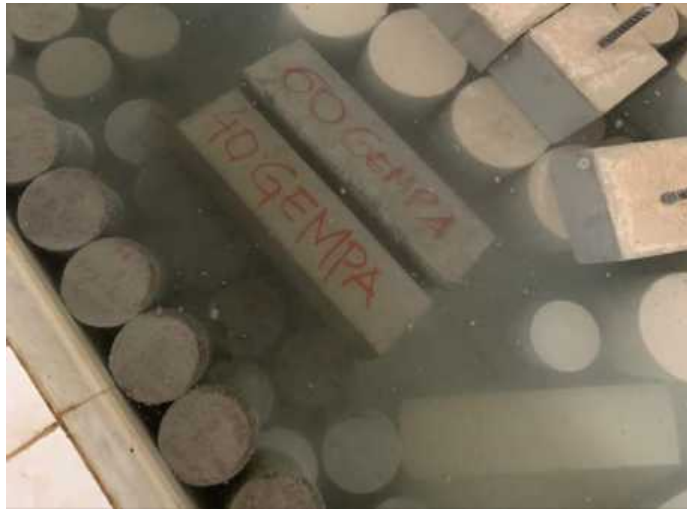
(b)



(c)

Pengadukan beton segar; (b) Pengujian *Slump* ; (c) Pencetakan Beton

Lampiran 3 Perawatan Benda Uji



(a)



(b)



(c)

(a) Perendaman Beton; (b) Perendaman Setelah 28 Hari ; (c) Persiapan Uji Beton

Lampiran 4 Dokumentasi Pengujian Benda Uji



(a)



(b)

(a) Pengujian Benda Uji; (b) *Data logger* dan komputer untuk merekam hasil pengujian



Lampiran 5 Tabel Modulus Elastisitas Beton

Sampel	Tegangan S1	Regangan E1	Tegangan S2	Regangan E2	Modulus Elastitas	Rata'' Modulus
0 MM S1	1.78935	0.00005	11.11896	0.00044	23769.70	22727.24
0 MM S2	1.16732	0.00005	11.54588	0.00056	20194.75	
0 MM S3	1.66041	0.00005	11.34731	0.00045	24217.27	

Sampel	Tegangan S1	Regangan E1	Tegangan S2	Regangan E2	Modulus Elastitas	Rata-Rata Modulus
20 MM S1	1.75637	0.00005	11.71419	0.00045	24596.56	23634.65
20 MM S2	0.74158	0.00005	11.08949	0.00050	23180.59	
20 MM S3	1.29818	0.00005	10.67562	0.00046	23126.79	

Sampel	Tegangan S1	Regangan E1	Tegangan S2	Regangan E2	Modulus Elastitas	Rata-Rata Modulus
40 MM S1	1.65455	0.00005	11.07275	0.00055	18668.21	22982.91
40 MM S2	1.82085	0.00005	10.56095	0.00040	24638.66	
40 MM S3	1.71474	0.00005	10.34038	0.00039	25641.86	

Sampel	Tegangan S1	Regangan E1	Tegangan S2	Regangan E2	Modulus Elastitas	Rata-Rata Modulus
60 MM S1	1.45739	0.00005	10.38978	0.00047	21193.59	20408.39
60 MM S2	0.93668	0.00005	9.79024	0.00047	21012.37	
60 MM S3	1.23625	0.00005	9.31942	0.00048	19019.22	



Perbandingan Antara Eksperimental dan Teori

Sampel	Eksperimental	Teori
0 MM S1	23769.70	25270.66
0 MM S2	20194.75	25751.23
0 MM S3	24217.27	25528.84
Rata-Rata	22727.24	25516.91
20 MM S1	24596.56	25938.25
20 MM S2	23180.59	25237.15
20 MM S3	23126.79	24761.74
Rata-Rata	23634.65	25312.38
40 MM S1	18668.21	24343.01
40 MM S2	24638.66	24543.31
40 MM S3	25641.86	25248.00
Rata-Rata	22982.91	24711.44
60 MM S1	21193.59	24483.20
60 MM S2	21012.37	23529.60
60 MM S3	19019.22	23300.17
Rata-Rata	20408.39	23770.99

