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DAFTAR PUSTAKA

Abdillah, L. A., Mappanyompa, M., Sabtohadi, J., Darman, D., et al. (2024). *Metode penelitian kuantitatif.*

Admase, A. T., Mersha, D. A., & Kebede, A. Y. (2024). Cassava starch-based hot melt adhesive for textile industries. *Scientific Reports, 14.* https://doi.org/10.1038/s41598-024-70268-y

Advanced Architectural Products. (2023, August 1). *How to calculate R-value: A practical guide for architects.* GreenGirt.

Ahmad, M., Bontemps, A., Sallée, H., & Quenard, D. (2006). Thermal testing and numerical simulation of a prototype cell using light wallboards coupling vacuum isolation panels and phase change material. *Energy and Buildings, 38*(6), 673–681. https://doi.org/10.1016/j.enbuild.2005.11.002

AirGradient. (n.d.). *Monitor calibration.*

Akdağ, A. E., Koru, M., & Davraz, M. (2025). Numerical and experimental determination of thermal insulation performance of a composite block with different insulation materials. *Journal of Thermal Analysis and Calorimetry, 150,* 8977–8990. https://doi.org/10.1007/s10973-025-14241-5

Al-Absi, Z., Hafizal, M., & Ismail, M. (2022). Experimental study on the thermal performance of PCM-based panels developed for exterior finishes of building walls. *Journal of Building Engineering.* https://doi.org/10.1016/j.jobe.2022.104379

Al-Absi, Z., Hafizal, M., & Ismail, M. (2023). Innovative PCM-incorporated foamed concrete panels for walls' exterior cladding: An experimental assessment in real-weather conditions. *Energy and Buildings.* https://doi.org/10.1016/j.enbuild.2023.113003

Al-Absi, Z., Hafizal, M., Asif, M., Alabdullatief, A., & Ismail, M. (2024). Impacts of installation methods on the thermal performance of lightweight exterior cladding panels incorporating PCM: An experimental evaluation. *Building and Environment.* https://doi.org/10.1016/j.buildenv.2024.111964

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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Alfata, M. N. F. (2011). Studi kenyamanan termal adaptif rumah tinggal di Kota Malang: Studi kasus Perumahan Sawojajar 1 Kota Malang. *Jurnal Permukiman, 6*(1), 9–17. https://doi.org/10.31815/jp.2011.6.9-17

Alhawari, A. M., & Mukhopadhyaya, P. (2022). Construction and calibration of a unique hot box apparatus. *Energies, 15*(13), Article 4677. https://doi.org/10.3390/en15134677

Alhems, L., Ahmad, A., Ibrahim, M., Ali, M., & Barry, M. (2022). Thermal performance evaluation of two types of wall panels under dynamic weather conditions. *e-Journal of Nondestructive Testing*. https://doi.org/10.58286/27327

Al-Naghi, A., Rahman, M., Al-Amoudi, O., & Gondal, M. (2022). Energy conservation and thermal insulation performance of concrete block walls incorporating expanded polystyrene panels: Experimental and simulation study. *Journal of Architectural Engineering*. https://doi.org/10.1061/(ASCE)AE.1943-5568.0000555

Alsabry, A., Backiel-Brzozowska, B., Nikitsin, V. I., & Nikitsin, S. K. (2022). Equations for calculating the thermal conductivity of capillary-porous materials with oversorption moisture content. *Sustainability, 14*(10), 5796. https://doi.org/10.3390/su14105796

Alwan, N., Tarish, A., Yaqoob, S., Bajaj, M., & Zaitsev, I. (2025). Enhancing energy efficiency in buildings using sawdust-based insulation in hot arid climates. *Scientific Reports, 15*. https://doi.org/10.1038/s41598-025-92924-7

Andrade, C. (2021). A student's guide to the classification and operationalization of variables in the conceptualization and design of a clinical study: Part 1. *Indian Journal of Psychological Medicine, 43*(2), 177–179. https://doi.org/10.1177/0253717621994334

ANSYS, Inc. (2009). *ANSYS FLUENT 12.0 user's guide: Porous media conditions.*

Arminda, W., & Kamaruddin, M. (2021). Heat transfer through building envelope materials and their effect on indoor air temperatures in tropics. *Journal of Science and Applicative Technology*. https://doi.org/10.35472/jsat.v5i2.630

Arriazu-Ramos, A., Izquierdo, J., Ruiz, G., Sánchez-Ostiz, A., & Monge-Barrio, A. (2024). Facing climate change in a temperate European city: Urban-scale diagnosis of indoor overheating and adaptation strategies for residential buildings. *Buildings*. https://doi.org/10.3390/buildings14051423

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Arriazu-Ramos, A., Ruiz, G., Izquierdo, J., Gutiérrez, A., & Monge-Barrio, A. (2023). From urban microclimate to indoor overheating: Analysis of residential typologies during typical climate series and extreme warm summer. *Energy and Buildings*. https://doi.org/10.1016/j.enbuild.2023.113620

Arsandrie, Y., et al. (2020).

ASTM International. (2019). *Standard test method for steady-state heat flux measurements and thermal transmission properties by means of the guarded-hot-plate apparatus (ASTM C177-19)*. https://doi.org/10.1520/C0177-19

ASTM International. (2019). *Standard test method for thermal performance of building materials and envelope assemblies by means of a hot box apparatus (ASTM C1363-19)*. https://doi.org/10.1520/C1363-19

Ayrilmis, N., Benthien, J. T., & Thoemen, H. (2012). Effects of formulation variables on surface properties of wood plastic composites. *Composites Part B: Engineering, 43*(2), 325–331. https://doi.org/10.1016/j.compositesb.2011.07.011

Badan Standardisasi Nasional. (2020). *SNI 6390:2020 konservasi energi sistem tata udara pada bangunan gedung.*

Baetens, R. (2013). High performance thermal insulation materials for buildings. In *Nanotechnology in eco-efficient construction: Materials, processes and applications*. https://doi.org/10.1533/9780857098832.2.188

Bai, B., Wang, Y., Rao, D., & Bai, F. (2022). The effective thermal conductivity of unsaturated porous media deduced by pore-scale SPH simulation. *Frontiers in Earth Science, 10,* 943853. https://doi.org/10.3389/feart.2022.943853

Barbaresi, A., Bovo, M., Santolini, E., Barbaresi, L., Torreggiani, D., & Tassinari, P. (2020). Development of a low-cost movable hot box for a preliminary definition of the thermal conductance of building envelopes. *Building and Environment, 180,* 107034. https://doi.org/10.1016/j.buildenv.2020.107034

Basic properties of building decorative materials. (2011). In *Woodhead Publishing series in civil and structural engineering* (pp. 10–24). https://doi.org/10.1533/9780857092588.10

UNIVERSITAS
GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Basworo, B. B. (2026, 9 Juli). *8 model teras rumah yang tetap nyaman saat matahari sore, anti panas dan estetik*. Liputan6. https://www.liputan6.com/citizen6/read/8242477/8-model-teras-rumah-yang-tetap-nyaman-saat-matahari-sore-anti-panas-dan-estetik

Beckmann, S., Hiete, M., & Beck, C. (2021). Threshold temperatures for subjective heat stress in urban apartments: Analysing nocturnal bedroom temperatures during a heat wave in Germany. *Climate Risk Management.* https://doi.org/10.1016/J.CRM.2021.100286

Boruszewski, P., Borysiuk, P., Mamiński, M., & Czechowska, J. (2016). Mat compression measurements during low-density particleboard manufacturing. *BioResources, 11*(3), 6909–6919. https://doi.org/10.15376/biores.11.3.6909-6919

Borysiuk, P., Wikowski, J., Krajewski, K., Auriga, R., Skomorucha, A., & Auriga, A. (2020). Selected properties of flat-pressed wood-polymer composites for high humidity conditions. *BioResources, 15*(3), 5141–5155. https://doi.org/10.15376/biores.15.3.5141-5155

Building Orientation. (n.d.). *Building orientation.* Scribd.

Bumanis, G., Vitola, L., Pundienė, I., Šinka, M., & Bajare, D. (2020). Gypsum, geopolymers, and starch—Alternative binders for bio-based building materials: A review and life-cycle assessment. *Sustainability.* https://doi.org/10.3390/su12145666

Busher, S., & Govindarajulu, K. (2023). Thermal performance and reduced carbon footprint of precast concrete sandwich wall panels (PCSWPs) with composite shear connector: An experimental assessment. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, 45,* 12201–12214. https://doi.org/10.1080/15567036.2023.2270497

Buso, T., Fabi, V., Andersen, R. K., & Corgnati, S. P. (2015). Occupant behaviour and robustness of building design. *Building and Environment, 94,* 694–703. https://doi.org/10.1016/j.buildenv.2015.11.003

Carmona, C., Muñoz, J., & Alorda-Ladaria, B. (2023). Ambient hot box: An instrument for thermal characterization of building elements and constructive materials. *Sensors, 23*(3), 1576. https://doi.org/10.3390/s23031576

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Çavuş, V., Şahin, S., Esteves, B., & Ayata, U. (2019). Determination of thermal conductivity properties in some wood species obtained from Turkey. *BioResources, 14*(3), 6709–6715. https://doi.org/10.15376/biores.14.3.6709-6715

Célino, A., Fréour, S., Jacquemin, F., & Casari, P. (2014). The hygroscopic behavior of plant fibers: A review. *Frontiers in Chemistry, 1,* 43. https://doi.org/10.3389/fchem.2013.00043

Çengel, Y. A., & Ghajar, A. J. (2015). *Heat and mass transfer: Fundamentals and applications.*

Chaiyaso, T., Rachtanapun, P., Thajai, N., et al. (2021). Sericin cocoon bio-compatibilizer for reactive blending of thermoplastic cassava starch. *Scientific Reports, 11,* 19945. https://doi.org/10.1038/s41598-021-99417-3

Chen, J., Hou, J., Wang, R., & Hui, Y. (2017). The effect of Knudsen diffusion and adsorption on shale transport in nanopores. *Advances in Mechanical Engineering, 9*(9). https://doi.org/10.1177/1687814017721858

Cherifi, B. I., Belbachir, M., & Rahmouni, A. (2021). Green anionic polymerization of vinyl acetate using Maghnite-Na+ (Algerian MMT): Synthesis characterization and reactional mechanism. *Discover Chemical Engineering, 1*. https://doi.org/10.1007/s43938-021-00005-8

Chinta, S., & Heeraman, J. (2025). Thermal conduction fundamentals and applications. In *Heat and mass transfer: From fundamentals to advanced applications.* IntechOpen. https://doi.org/10.5772/intechopen.1009788

Custom Materials. (2024, February 14). *Exploring the influence of moisture on thermal conductivity.*

Dabiri, S., Mehrpooya, M., & Nezhad, E. G. (2018). Latent and sensible heat analysis of PCM incorporated in a brick for cold and hot climatic conditions, utilizing computational fluid dynamics. *Energy, 159,* 160–171. https://doi.org/10.1016/j.energy.2018.06.074

De Ligne, L., Van Acker, J., Baetens, J. M., Omar, S., De Baets, B., Thygesen, L. G., Van den Bulcke, J., & Thybring, E. E. (2022). Moisture dynamics of wood-based panels and wood fibre insulation materials. *Frontiers in Plant Science, 13,* 951175. https://doi.org/10.3389/fpls.2022.951175

UNIVERSITAS GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

de Rubeis, T., Muttillo, M., Nardi, I., Pantoli, L., Stornelli, V., & Ambrosini, D. (2019). Integrated measuring and control system for thermal analysis of buildings components in hot box experiments. *Energies, 12*(11), 2053. https://doi.org/10.3390/en12112053

Dermawan, A., Syaiful, S., Alimuddin, A., & Fachruddin, F. (2022). Analisis stabilitas dinding penahan tanah (studi kasus: Desa Mekarjaya, Kecamatan Ciomas, Kabupaten Bogor). *Rona Teknik Pertanian.* https://doi.org/10.17969/rtp.v15i2.27778

Dewi, I., Johannes, A., Pingak, R., Bukit, M., & Sutaji, H. (2021). Pembuatan bioplastik berbahan dasar pati jagung dengan penambahan serat selulosa dari limbah kertas. *Jurnal Fisika: Fisika Sains dan Aplikasinya.* https://doi.org/10.35508/fisa.v6i2.6838

Dewi, S., Asfar, A., Asfar, A., Nurannisa, A., & Damayanti, W. (2024). Processing sawdust waste into innovative eco-substrate through upskilling Batulappa village women's group. *Transformasi: Jurnal Pengabdian Masyarakat.* https://doi.org/10.20414/transformasi.v20i2.10869

Dhawale, P., Vineeth, S., Gadhave, R., & Mahanwar, P. (2021). Cellulose stabilized polyvinyl acetate emulsion: Review. https://doi.org/10.4236/ojopm.2021.112002

Dhumane, R., Qiu, T., Ling, J., Aute, V., Hwang, Y., Radermacher, R., Kirkwood, A. C., & Esformes, J. (2021). Investigation of the variability in the measurement of cyclic degradation coefficient of air conditioning systems. *International Journal of Refrigeration, 128.* https://doi.org/10.1016/j.ijrefrig.2021.04.008

DSCBalances. (2026, May 2). *How to reduce vibration and airflow errors in analytical balances.*

Du, H., & Pilkington, A. (2026). Adapting ISO 9869-1 for post-retrofit low U-value walls: Evidence from 130 days of continuous in-situ monitoring. *Energy and Buildings.*

Duan, J., Li, N., Peng, J., Wang, C., & Liu, Q. (2022). Full-response model of transient heat transfer of building walls using thermoelectric analogy method. *Journal of Building Engineering.*

Elmoudnia, H., Millogo, Y., Faria, P., Jalal, R., Waqif, M., & Saâdi, L. (2025). Development of Doum Palm Fiber-Based Building Insulation Composites with Citric Acid/Glycerol Eco-Friendly Binder. *Journal of Composites Science, 9*(2), 67. https://doi.org/10.3390/jcs9020067

UNIVERSITAS GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Energy Systems Research Unit. (n.d.). *Thermal storage background information.*

Ergun, M. E., Ozen, E., Yildirim, N., Dalkilic, B., & Baysal, E. (2023). Mechanical and thermal properties of polyvinyl acetate foams reinforced with biopolymers. *Cellular Polymers, 42,* 156–173. https://doi.org/10.1177/02624893231193501

Etale, A., Onyianta, A. J., Turner, S. R., & Eichhorn, S. J. (2023). Cellulose: A review of water interactions, applications in composites, and water treatment. *Chemical Reviews, 123*(5), 2016–2048. https://doi.org/10.1021/acs.chemrev.2c00477

Fassbender, E., Pytlik, S., Rott, J., & Hemmerle, C. (2023). Impacts of rooftop photovoltaics on the urban thermal microclimate: Metrological investigations. *Buildings, 13*(9), 2339. https://doi.org/10.3390/buildings13092339

Final Advanced Materials. (n.d.). *Calcium silicate composite*. Dipetik dari https://www.final-materials.com/gb/433-calcium-silicate-board-1000c

Fourier, J. B. J. (2009). *The analytical theory of heat.* Cambridge University Press. https://doi.org/10.1017/CBO9780511693205

Gadhave, R. V. (2024). Polyvinyl acetate and vinyl acetate-ethylene hybrid adhesive: Synthesis, characterization, and properties. *Open Journal of Polymer Chemistry.* https://doi.org/10.4236/ojpchem.2024.141001

Galvin, Z. (2016, 28 Maret). *ATS' Standard Board Level Heat Sinks for PCB*. Advanced Thermal Solutions. https://www.qats.com/cms/category/heat-spreaders/

Gamal, E., & Saadi, A. (2022). Developing of lightweight concrete sandwich wall panels with good thermal insulation properties for sustainable buildings. *IOP Conference Series: Earth and Environmental Science, 1026.* https://doi.org/10.1088/1755-1315/1026/1/012014

Ghanbarian, B., & Daigle, H. (2016). Thermal conductivity in porous media: Percolation-based effective-medium approximation. *Water Resources Research, 52*(1), 295–314. https://doi.org/10.1002/2015WR017236

Gnecco, V., Kousis, I., Pigliautile, I., & Pisello, A. (2025). Decoding living lab sensing system through Bayesian networks: The preferrable working space targeting comfort and productivity. *Journal of Building Engineering.* https://doi.org/10.1016/j.jobe.2025.111913

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

GreenSpec. (n.d.). *Wood fibre insulation: Introduction.*

Guha, A., & Nayek, S. (2017). Thermo-fluid-dynamics of natural convection around a heated vertical plate with a critical assessment of the standard similarity theory. *Physics of Fluids, 29*(10), 103607. https://doi.org/10.1063/1.4990279

Hafila, K. Z., Jumaidin, R., Ilyas, R. A., Selamat, M. Z., & Yusof, F. A. (2021). Effect of palm wax on the mechanical, thermal, and moisture absorption properties of thermoplastic cassava starch composites. *International Journal of Biological Macromolecules.* https://doi.org/10.1016/j.ijbiomac.2021.11.139

Hagstrom, C., & Wengert, G. (2010). *Understanding moisture content and wood movement.*

Hampo, C., Schinasi, L., & Hoque, S. (2024). Surviving indoor heat stress in United States: A comprehensive review exploring the impact of overheating on the thermal comfort, health, and social economic factors of occupants. *Heliyon, 10.* https://doi.org/10.1016/j.heliyon.2024.e25801

Harvey, G., & Szentesi-Nejur, S. (2025). Field-based thermal performance analysis of a cement-stabilized, core-insulated rammed earth house in a cold climate. *Frontiers in Built Environment, 11.* https://doi.org/10.3389/fbuil.2025.1695449

Hernandez, P., & Estores, G. (2024). Finite element analysis on the effect of concrete bridging on thermal conductivity of sandwich (insulated) precast wall panels. *Civil Engineering and Architecture.* https://doi.org/10.13189/cea.2024.120128

Hou, S., Wang, J., Yin, F., Qi, C., & Mu, J. (2022). Moisture sorption isotherms and hysteresis of cellulose, hemicelluloses and lignin isolated from birch wood and their effects on wood hygroscopicity. *Wood Science and Technology, 56*(4). https://doi.org/10.1007/s00226-022-01393-y

International Organization for Standardization. (2014). *Thermal insulation — Building elements — In-situ measurement of thermal resistance and thermal transmittance — Part 1: Heat flow meter method* (ISO Standard No. 9869-1:2014). https://www.iso.org/standard/59873.html

Jankowska, A., Drożdżek, M., Sarnowski, P., & Horodeński, J. (2017). Effect of extractives on the equilibrium moisture content and shrinkage of selected tropical wood species. *BioResources, 12*(1), 597–607. https://doi.org/10.15376/biores.12.1.597-607

UNIVERSITAS
GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Jannat, N., Hussien, A., Abdullah, B., & Cotgrave, A. (2020). A comparative simulation study of the thermal performances of the building envelope wall materials in the tropics. *Sustainability.* https://doi.org/10.3390/su12124892

Janssen, H., Ford, K., Gascoyne, B., Hill, R., Roberts, M., Bellis, M., & Azam, S. (2023). Cold indoor temperatures and their association with health and well-being: A systematic literature review. *Public Health, 224,* 185–194. https://doi.org/10.1016/j.puhe.2023.09.006

Jarensungnen, C., Jetsrisuparb, K., Phanthanawiboon, S., Theerakulpisut, S., Hiziroglu, S., Knijnenburg, J. T. N., Okhawilai, M., & Kasemsiri, P. (2023). Development of eco-friendly antifungal and antibacterial adhesive derived from modified cassava starch waste/polyvinyl alcohol containing green synthesized nano-silver. *Scientific Reports, 13.* https://doi.org/10.1038/s41598-023-40305-3

Jegede, O., & Taki, A. (2021). Optimization of building envelopes using indigenous materials to achieve thermal comfort and affordable housing in Abuja, Nigeria. *International Journal of Building Pathology and Adaptation.* https://doi.org/10.1108/IJBPA-01-2021-0009

Jensen, M., & Alfieri, P. (2021). Design and manufacture of insulation panels based on recycled lignocellulosic waste. *Cleaner Engineering and Technology.* https://doi.org/10.1016/j.clet.2021.100111

Ji, R., Guo, S., & Wei, S. (2020). Evaluation of anchor bolt effects on the thermal performance of building insulation materials. *Journal of Building Engineering, 29.* https://doi.org/10.1016/j.jobe.2020.101200

Jones, N. E., & Allin, L. (2010). *Measuring stream temperature using data loggers: Laboratory and field techniques.*

Judawisastra, H., Sitohang, R. D. R., Marta, L., & Mardiyati. (2017). Water absorption and its effect on the tensile properties of tapioca starch/polyvinyl alcohol bioplastics. *IOP Conference Series: Materials Science and Engineering, 223,* 012066. https://doi.org/10.1088/1757-899X/223/1/012066

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Jumaidin, R., Diah, N. A., Ilyas, R. A., Alamjuri, R. H., & Yusof, F. A. (2021). Processing and characterisation of banana leaf fibre reinforced thermoplastic cassava starch composites. *Polymers, 13.* https://doi.org/10.3390/polym13091420

Kajjoba, D., Wesonga, R., Lwanyaga, J. D., et al. (2025). Assessment of thermal comfort and its potential for energy efficiency in low-income tropical buildings: A review. *Sustainable Energy Research, 12,* 25. https://doi.org/10.1186/s40807-025-00169-9

Kamal, M. A. (2011). The study of thermal mass as a passive design technique for building comfort and energy efficiency. *Journal of Civil Engineering and Architecture, 5*(1), 84–88. https://doi.org/10.17265/1934-7359/2011.01.009

Kamal, N. (n.d.). *Pengertian kalor: Rumus, kapasitas, jenis, perpindahan, dan contoh soalnya.*

Kamaruddin, Z. H., Jumaidin, R., Ilyas, R. A., Selamat, M. Z., Alamjuri, R. H., & Yusof, F. A. (2022). Biocomposite of cassava starch-Cymbopogan citratus fibre: Mechanical, thermal and biodegradation properties. *Polymers, 14.* https://doi.org/10.3390/polym14030514

Kamboj, G., Gaff, M., Smardzewski, J., Haviarova, E., Hui, D., Rezaei, F., & Sethy, A. K. (2022). Effect of cellulose nanofiber and cellulose nanocrystals reinforcement on the strength and stiffness of PVAc bonded joints. *Composite Structures, 295,* 115821. https://doi.org/10.1016/j.compstruct.2022.115821

Kang, S., Choi, J. Y., & Choi, S. (2019). Mechanism of heat transfer through porous media of inorganic intumescent coating in cone calorimeter testing. *Polymers, 11*(2), 221. https://doi.org/10.3390/polym11020221

Kariuki, S., Muthengia, J., Erastus, M., Leonard, G., & Marangu, J. (2020). Characterization of composite material from the copolymerized polyphenolic matrix with treated cassava peels starch. *Heliyon, 6.* https://doi.org/10.1016/j.heliyon.2020.e04574

Kempton, L., Kokogiannakis, G., Green, A., & Cooper, P. (2021). Evaluation of thermal bridging mitigation techniques and impact of calculation methods for lightweight steel frame external wall systems. *Journal of Building Engineering, 43.* https://doi.org/10.1016/j.jobe.2021.102893

Kenny, G., Tetzlaff, E., Journeay, W., Henderson, S., & O'Connor, F. (2024). Indoor overheating: A review of vulnerabilities, causes, and strategies to prevent adverse human

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

health outcomes during extreme heat events. *Temperature, 11,* 203–246. https://doi.org/10.1080/23328940.2024.2361223

Kersken, M. (2021). Method for the climate-independent determination of the solar heat gain coefficient (SHGC; g-value) of transparent façade and membrane constructions from in situ measurements. *Energy and Buildings.*

Khan, U., May, P., Porwal, H., Nawaz, K., & Coleman, J. N. (2013). Improved adhesive strength and toughness of polyvinyl acetate glue on addition of small quantities of graphene. *ACS Applied Materials & Interfaces, 5*(4), 1423–1428. https://doi.org/10.1021/am302864f

Khayal, O. M. E. S., Elmahi, F. A., Tagelsir, A., Ahmed, A., & Mohammed, A. A. M. (2025). Transient state heat conduction: A review. *Excellence Journal for Engineering Sciences, 2*(2), 78–95.

Knauss, W. G., & Kenner, V. H. (1980). On the hygrothermomechanical characterization of polyvinyl acetate. *Journal of Applied Physics, 51*(10), 5131–5136. https://doi.org/10.1063/1.327458

Koh, C. H., & Brouwers, H. J. H. (2024). A simple two-phase approach to predict moisture-dependent thermal conductivity for porous materials. *International Journal of Heat and Mass Transfer, 234,* 126138. https://doi.org/10.1016/j.ijheatmasstransfer.2024.126138

Kol, H. S., & Gündüz Vaydoğan, K. (2023). Thermal conductivity temperature dependence of heat-treated wood at different moisture content levels. *BioResources, 18*(3), 5253–5268. https://doi.org/10.15376/biores.18.3.5253-5268

Kondo, K., & Asawa, T. (2023). Experimental study on sleep quality in naturally ventilated rooms under moderate climate conditions. *Indoor Air.* https://doi.org/10.1155/2023/8853643

Kontoleon, K. J., & Giarma, C. (2016). Dynamic thermal response of building material layers in aspect of their moisture content. *Applied Energy, 170,* 76–91. https://doi.org/10.1016/j.apenergy.2016.01.106

Košir, M., Kunič, R., Hudobivnik, B., & Pajek, L. (2016). Transient thermal response analysis of opaque building envelopes for energy efficient construction.

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Kośny, J., Kossecka, E., & Yarbrough, D. W. (2022). Dynamic thermal performance of insulation combined in different formations with thermally massive components. In J. Kośny & D. W. Yarbrough (Eds.), *Thermal insulation and radiation control technologies for buildings.* Springer. https://doi.org/10.1007/978-3-030-98693-3_14

Lakatos, Á., Csontos, M., & Csík, A. (2024). Investigation of both thermal parameters and applications of closed-cell plastic thermal insulation foams with building energetic aspects. *Journal of Thermal Analysis and Calorimetry, 149,* 11171–11182. https://doi.org/10.1007/s10973-023-12789-8

Lee, M., Lee, S.-M., & Kang, E.-C. (2019). Changes in characteristics of wood fiber insulation board according to density. *BioResources, 14*(3), 6529–6543. https://doi.org/10.15376/biores.14.3.6529-6543

Lee, Y. J., Ko, M. J., & Choi, D. S. (2026). Evaluation of the applicability of the extended average method for non-destructive in-situ measurement of thermal transmittance in highly insulated walls. *Case Studies in Thermal Engineering*, 106374. https://doi.org/10.1016/j.csite.2026.106374

Lee, Y., Amran, M., Lee, Y., Kueh, A., Kiew, S., Fediuk, R., Vatin, N., & Vasilev, Y. (2021). Thermal behavior and energy efficiency of modified concretes in the tropical climate: A systemic review. *Sustainability.* https://doi.org/10.3390/su132111957

Lefevre, A., Malet-Damour, B., & Rivière, G. (2026). Development of a metrological framework based on irradiance and ventilation for the characterization and correction of low-cost radiation shield errors. *Metrology, 6*(3), 50. https://doi.org/10.3390/metrology6030050

Lesiecki, M., Kawalerczyk, J., Derkowski, A., Wieruszewski, M., Dziurka, D., & Mirski, R. (2023). Properties of lightweight insulating boards produced from triticale straw particles. *Materials, 16*(15), 5272. https://doi.org/10.3390/ma16155272

Li, M.-E., Zhao, H., Cheng, J.-B., Wang, T., Fu, T., Zhang, A.-N., & Wang, Y. (2022). An effective green porous structural adhesive for thermal insulating, flame-retardant, and smoke-suppressant expandable polystyrene foam. *Engineering.* https://doi.org/10.1016/j.eng.2020.08.032

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Li, X., Peng, C., & Liu, L. (2020). Experimental study of the thermal performance of a building wall with vacuum insulation panels and extruded polystyrene foams. *Applied Thermal Engineering.* https://doi.org/10.1016/j.applthermaleng.2020.115801

Liffman, K. (2016). Evaluation of photovoltaic panel temperature in realistic scenarios. *Energy Conversion and Management.* https://doi.org/10.1016/J.ENCONMAN.2015.10.065

Linseis. (n.d.). *Thermal conductivity of porous carbon materials.*

Liu, G., Chen, H., Yuan, Y., & Song, C. (2024). Indoor thermal environment and human health: A systematic review. *Renewable and Sustainable Energy Reviews.* https://doi.org/10.1016/j.rser.2023.114164

Liu, K., Takagi, H., & Yang, Z. M. (2011). Effect of lumen size on transverse thermal conductivity of unidirectional natural fiber-polymer composite via finite element method. *Materials Science Forum, 675–677,* 431–434. https://doi.org/10.4028/www.scientific.net/MSF.675-677.431

Liu, X., & Xu, M. (2024). Thermal performance study of buildings and their corresponding scale models with identical constructions and geometrical similarity. *Journal of Engineering Research (Kuwait), 12*(4), 599–609. https://doi.org/10.1016/j.jer.2023.10.022

Liuzzi, S., Rubino, C., Martellotta, F., & Stefanizzi, P. (2023). Sustainable materials from waste paper: Thermal and acoustical characterization. *Applied Sciences.* https://doi.org/10.3390/app13084710

Lohtander, T., Herrala, R., & Österberg, M. (2022). Lightweight lignocellulosic foams for thermal insulation. *Cellulose*, 29(3), 1855–1871. https://doi.org/10.1007/s10570-021-04385-6

Lopez Hurtado, P., Rouilly, A., Vandenbossche Maréchal, V., & Raynaud, C. (2016). A review on the properties of cellulose fibre insulation. *Building and Environment, 96,* 170–177. https://doi.org/10.1016/j.buildenv.2015.09.031

López-Pérez, L. A., Flores-Prieto, J. J., & Ríos-Rojas, C. (2019). Adaptive thermal comfort model for educational buildings in a hot-humid climate. *Building and Environment, 150,* 181–194. https://doi.org/10.1016/j.buildenv.2018.12.011

UNIVERSITAS
GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Lou, F., Dong, S., Zhu, K., Chen, X., & Ma, Y. (2023). Thermal insulation performance of aerogel nano-porous materials: Characterization and test methods. *Gels, 9*(3), 220. https://doi.org/10.3390/gels9030220

Lucchi, E., Roberti, F., & Troi, A. (2018). Definition of an experimental procedure with the hot box method for the thermal performance evaluation of inhomogeneous walls. *Energy and Buildings*, 179, 292–305. https://doi.org/10.1016/j.enbuild.2018.08.049

Luo, M., Wang, C., Zhao, J., & Liu, L. (2022). Characteristics of effective thermal conductivity of porous materials considering thermal radiation: A pore-level analysis. *International Journal of Heat and Mass Transfer, 188,* 122597. https://doi.org/10.1016/j.ijheatmasstransfer.2022.122597

Mabrouk, R., Naji, H., Benim, A. C., & Dhahri, H. (2022). A state of the art review on sensible and latent heat thermal energy storage processes in porous media: Mesoscopic simulation. *Applied Sciences, 12*(14), 6995. https://doi.org/10.3390/app12146995

Mahardika, M., Asrofi, M., Amelia, D., Syafri, E., Rangappa, S., & Siengchin, S. (2021). Tensile strength and moisture resistance properties of biocomposite films based on polyvinyl alcohol (PVA) with cellulose as reinforcement from durian peel fibers. *E3S Web of Conferences.* https://doi.org/10.1051/e3sconf/202130202001

Mamatha, B. S., Sujatha, D., Uday, D. N., & Kiran, M. C. (2023). Properties of flyash based wood geopolymer composite. *Low-Carbon Materials and Green Construction, 1*(1), 29. https://doi.org/10.1007/s44242-023-00030-6

Marin-Calvo, N., González-Serrud, S., & James-Rivas, A. (2023). Thermal insulation material produced from recycled materials for building applications: Cellulose and rice husk-based material. *Frontiers in Built Environment.* https://doi.org/10.3389/fbuil.2023.1271317

Mathews, J. M., Vivek, B., & Charde, M. (2023). Thermal insulation panels for buildings using recycled cardboard: Experimental characterization and optimum selection. *Energy and Buildings, 281,* 112747. https://doi.org/10.1016/j.enbuild.2022.112747

Mazaherifar, M. H., Timar, M. C., Georgescu, S. V., & Cosereanu, C. (2025). Sustainable thermal and acoustic insulating panels from recycled cardboard. *BioResources, 20*(2), 4115–4135. https://doi.org/10.15376/biores.20.2.4115-4135

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

McClements, D., & Keane, P. (2026, Februari 17). *Heat spreader: Components, types, applications, and factors that affect its performance*. Xometry. https://www.xometry.com/resources/3d-printing/what-is-a-heat-spreader/

Meier, E. (2014). *Wood and moisture.*

Meira, A. M., Nolasco, A. M., Souza, E. C., et al. (2024). Integrated municipal management of waste from tree pruning and removal. *Urban Forestry & Urban Greening, 94,* 128238. https://doi.org/10.1016/j.ufug.2024.128238

Mensah, P., De Melo, R. R., Mitchual, S., et al. (2024). Ecological adhesive based on cassava starch: A sustainable alternative to replace urea-formaldehyde (UF) in particleboard manufacture. *Matéria (Rio de Janeiro).* https://doi.org/10.1590/1517-7076-RMAT-2023-0373

Merzlyakov, M., & Schick, C. (2001). Thermal conductivity from dynamic response of DSC. *Thermochimica Acta*, 380(2), 187–194. https://doi.org/10.1016/S0040-6031(01)00553-6

Mizumachi, H., Tsujita, A., & Daito, H. (1980). Interaction between wood and polymers—Part V. Thermodynamic properties of polymers filled with cellulose powders. *Holzforschung, 34*(2), 61–63. https://doi.org/10.1515/hfsg.1980.34.2.61

Mobaraki, B., Castilla Pascual, F. J., García, A. M., Mellado Mascaraque, M. Á., Vázquez, B. F., & Alonso, C. (2023). Studying the impacts of test condition and nonoptimal positioning of the sensors on the accuracy of the in-situ U-value measurement. *Heliyon*, *9*(7), e17282. https://doi.org/10.1016/j.heliyon.2023.e17282

Moezzipour, B., & Moezzipour, A. (2021). Thermal behavior of insulation fiberboards made from MDF and paper wastes. *Drvna Industrija.* https://doi.org/10.5552/drvind.2021.2019

Mohammadpourkarbasi, H., Jackson, I., Nukpezah, D., Addo, I., & Oppong, R. (2022). Evaluation of thermal comfort in library buildings in the tropical climate of Kumasi, Ghana. *Energy and Buildings.* https://doi.org/10.1016/j.enbuild.2022.112210

Molina, J., Horn, M., & Gómez, M. (2020). Design of a “test cell” to be located at 4500 masl in a high Andean region of Peru and dynamic simulation of the thermal performance of housing wall materials. *Journal of Physics: Conference Series, 1433*. https://doi.org/10.1088/1742-6596/1433/1/012002

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Monroy, Y., Cabezas, D., Rivero, S., & García, M. (2023). Structural analysis and adhesive capacity of cassava starch modified with NaOH:Urea mixtures. *International Journal of Adhesion and Adhesives.* https://doi.org/10.1016/j.ijadhadh.2023.103470

Moore, T. V., Cruickshank, C. A., et al. (2021). Thermal evaluation of a highly insulated steel stud wall with vacuum insulation panels using a guarded hot box apparatus. *Journal of Building Physics, 45*(3). https://doi.org/10.1177/1744259120980030

Morsi, S. M. M., Hussein, A. I., Zhou, X., Abd El-Sayed, E., & Essawy, H. A. (2024). Improving the adhesion strength and moisture resistance of poly(vinyl acetate) latex as wood adhesive via blending with gelatin. *International Journal of Adhesion and Adhesives, 132.* https://doi.org/10.1016/j.ijadhadh.2024.103675

Nafis, D., Yaman, A., & Allaily, A. (2021). Pengaruh lama fermentasi pada pembuatan kompos dari bahan liter ayam, limbah serbuk kayu pinus dan eceng gondok terhadap kualitas fisik. *Jurnal Ilmiah Mahasiswa Pertanian.* https://doi.org/10.17969/JIMFP.V6I3.18307

National University. (2026, March 18). *Developing the quantitative research design.*

Nave, R. (n.d.). *Heat transfer.* HyperPhysics.

Neya, I., Yamegueu, D., Coulibaly, Y., Messan, A., & Ouedraogo, A. (2021). Impact of insulation and wall thickness in compressed earth buildings in hot and dry tropical regions. *Journal of Building Engineering, 33,* 101612. https://doi.org/10.1016/j.jobe.2020.101612

Niemz, P. (2007). Thermal conductivity and water vapour transmission properties of wood-based materials. *Holz als Roh- und Werkstoff.* https://doi.org/10.1007/S00107-008-0304-Y

Nurmayanti, D., Rusmiati, R., Suprijandani, S., & Setiawan, M. (2024). Peningkatan pengetahuan dan pelaksanaan keselamatan kesehatan kerja tenaga kerja di lingkungan panas home industri aksesoris. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM).* https://doi.org/10.33024/jkpm.v7i5.14139

O'Hegarty, R., Reilly, A., West, R., & Kinnane, O. (2020). Thermal investigation of thin precast concrete sandwich panels. *Journal of Building Engineering, 27,* 100937. https://doi.org/10.1016/j.jobe.2019.100937

UNIVERSITAS GADJAH MADA
Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Olaiya, B., Lawan, M., & Olonade, K. (2023). Utilization of sawdust composites in construction—A review. *SN Applied Sciences, 5,* 1–25. https://doi.org/10.1007/s42452-023-05361-4

Olomo, V. (2022). Influence of processing variables on some physico-chemical properties and quality of manioc starch-based adhesives. *Open Journal of Polymer Chemistry.* https://doi.org/10.4236/ojpchem.2022.121001

Othman, H., Sieves, G., Guimarães, T., & Azari, R. (2026). A calibration chamber framework for low-cost indoor air quality sensor validation. *Building and Environment, 287*(Part A), 113856. https://doi.org/10.1016/j.buildenv.2025.113856

Pagliano, L., Cattarin, G., Causone, F., & Kindinis, A. (2017). Improved methods for the calorimetric determination of the solar factor in outdoor test cell facilities. *Energy and Buildings, 153.* https://doi.org/10.1016/j.enbuild.2017.07.028

Palani, H., & Karatas, A. (2023). Innovative environmental chamber construction for accurate thermal performance evaluation of building envelopes in varied climates. *Buildings.* https://doi.org/10.3390/buildings13051259

Palani, H., & Karatas, A. (2023). Investigating the disparities between experimental and computational analyses of thermal performance in prefabricated wall panels. *Applied Thermal Engineering.* https://doi.org/10.1016/j.applthermaleng.2023.121568

Pan, Z., Zhang, S., & Jane, J. (1998). Effects of extrusion variables and chemicals on the properties of starch-based binders and processing conditions. *Cereal Chemistry, 75*(4), 541–546. https://doi.org/10.1094/CCHEM.1998.75.4.541

Pásztory, Z., Kókai, P., Adamik, P., Halász, K., & Börcsök, Z. (2021). Investigation of thermal insulation panels made of wood shavings. *Drewno, 64*(207), 73–86. https://doi.org/10.12841/wood.1644-3985.357.11

Pekař, L. (Ed.). (2020). *Advanced analytic and control techniques for thermal systems with heat exchangers.* Elsevier.

Pereira, A., Hirashima, S., & Oliveira, R. (2020). Thermal comfort assessment in a naturally ventilated university dormitory in tropical climate zone. *Brazilian Journal of Development.* https://doi.org/10.34117/bjdv6n7-145

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Petcu, C., Hegyi, A., Stoian, V., Dragomir, C., Ciobanu, A., Lăzărescu, A., & Florean, C. (2023). Research on thermal insulation performance and impact on indoor air quality of cellulose-based thermal insulation materials. *Materials, 16.* https://doi.org/10.3390/ma16155458

Pfundstein, M., Gellert, R., Spitzner, M., & Rudolphi, A. (2008). *Insulating materials: Principles, materials, applications.* DETAIL. https://doi.org/10.11129/detail.9783034614757

Polezhaev, Y. V. (2011, February 7). Porous medium. *Thermopedia.* https://doi.org/10.1615/AtoZ.p.porous_medium

Pujari, S., Kolli, H. K., & Rao, M. G. (2026). Combined experimental and numerical evaluation of heat loss from natural fiber composites used as thermal insulation. *Scientific Reports*, 16, Article 18507. https://doi.org/10.1038/s41598-026-45474-5

Qahtan, A. M. (2019). Thermal performance of a double-skin façade exposed to direct solar radiation in the tropical climate of Malaysia: A case study. *Case Studies in Thermal Engineering*, *14*, 100419. https://doi.org/10.1016/j.csite.2019.100419

Qahtan, A. M., & Almawgani, A. H. M. (2022). Experimental evaluation of thermal and lighting performance using double dynamic insulated glazing. *Buildings, 12*(8), 1249. https://doi.org/10.3390/buildings12081249

Qiao, J. H., Bolot, R., Liao, H. L., & Coddet, C. (2013). Knudsen effect on the estimation of the effective thermal conductivity of thermal barrier coatings. *Journal of Thermal Spray Technology, 22*(2–3), 175–182. https://doi.org/10.1007/s11666-012-9878-3

Quintero, A., Nieto, A., Orduña, F., Sánchez, S., & Marin-Calvo, N. (2025). Acoustic and thermal study of coconut fiber agglomerated with cassava starch. *Journal of Applied Research and Technology.* https://doi.org/10.22201/icat.24486736e.2025.23.1.2669

Ramadhan, T., Paramita, B., & Srinivasan, R. (2022). Study of cost and construction speed of cladding wall for lightweight steel frame (LSF). *Buildings.* https://doi.org/10.3390/buildings12111958

Randy. (2023, February 11). *The diminishing return of insulation.* Northern Built. https://www.northernbuilt.pro/the-diminishing-return-of-insulation/

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Raydan, N., Charrier, B., Kowaluk, G., & Robles, E. (2024). Preparation and characterization of particleboard made from industrial-type wood particles and discarded duck feathers. *Journal of Composites Science.* https://doi.org/10.3390/jcs8070241

Raza, M., Abdallah, H., Abdullah, A., & Abu-Jdayil, B. (2022). Date palm surface fibers for green thermal insulation. *Buildings.* https://doi.org/10.3390/buildings12060866

Raza, M., Farhan, A., & Abu-Jdayil, B. (2024). Lignocellulose-based insulation materials: A review of sustainable and biodegradable solutions for energy efficiency. *International Journal of Thermofluids, 24,* 100844. https://doi.org/10.1016/j.ijft.2024.100844

Reeb, J. E. (1995). *Wood and moisture relationships* (EM 8600). Oregon State University Extension Service. https://extension.oregonstate.edu/catalog/em-8600-wood-moisture-relationships

Rencz, M., Farkas, G., & Poppe, A. (Eds.). (2022). *Theory and practice of thermal transient testing of electronic components.* Springer. https://doi.org/10.1007/978-3-030-86174-2

Rendu, M., Le Dréau, J., Salagnac, P., & Doya, M. (2024). Influence of boundary conditions on the estimation of thermal properties in insulated building walls. *Buildings, 14*(12), 3706. https://doi.org/10.3390/buildings14123706

Reotutar, A. M. R., Mamuad, R. Y., & Choi, A. E. S. (2024). Production of chemically modified bio-based wood adhesive from camote and cassava peels. *Polymers, 16.* https://doi.org/10.3390/polym16040523

Rivera-Salinas, J. E., Gregorio-Jáuregui, K. M., Fonseca-Florido, H. A., Ávila-Orta, C. A., Ramírez-Vargas, E., Romero-Serrano, J. A., Cruz-Ramírez, A., Gutiérrez-Pérez, V. H., Olvera-Vazquez, S. L., & Rosales-Marines, L. (2021). Numerical study using microstructure based finite element modeling of the onset of convective heat transfer in closed-cell polymeric foam. *Polymers, 13*(11), 1769. https://doi.org/10.3390/polym13111769

Robeson, L. M., & Pickering, T. L. (1998). *Process for making paper of increased wet and dry strength* (European Patent No. EP 0 617 166 B1). European Patent Office.

Rojas-Herrera, C., Martínez-Soto, A., Avendaño-Vera, C., & Cárdenas-R, J. (2024). Characterization and utilization of sawdust waste generated from advanced manufacture

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

for its application as a thermal insulation in sustainable buildings using the blowing technique. *Journal of Building Engineering.* https://doi.org/10.1016/j.jobe.2024.109217

Romero-Gómez, M. I., Silva, R. V., Costa-Pereira, M. F., & Flores-Colen, I. (2022). Thermal and mechanical performance of gypsum composites with waste cellulose acetate fibres. *Construction and Building Materials, 356,* Article 129308. https://doi.org/10.1016/j.conbuildmat.2022.129308

Ruiz-Valero, L., Faxas-Guzmán, J., Ferreira, J., González, V., Guerrero, N., & Ramírez, F. (2021). Thermal performance of facades based on experimental monitoring of outdoor test cells in tropical climate. *Civil Engineering Journal.* https://doi.org/10.28991/cej-2021-03091773

Rulianah, S., P., Sindhuwati, C., Ayu, D., & Sa'diyah, K. (2020). Penurunan kadar lignin pada fermentasi limbah kayu mahoni menggunakan *Phanerochaete chrysosporium*. *Jurnal Teknologi dan Kejuruan Lingkungan, 4,* 81–89. https://doi.org/10.33795/JTKL.V4I1.139

Sah, S. K., Murugesan, K., & Rajasekar, E. (2023). Time lag characteristics of building envelop materials on peak energy demand in typical hot and humid climate of India. *Journal of Engineering for Sustainable Buildings and Cities, 4*(2), 021002. https://doi.org/10.1115/1.4062510

Sala Lizarraga, J. M. P., & Picallo-Perez, A. (2020). Exergy analysis of heat transfer in buildings. In *Exergy analysis and thermoeconomics of buildings* (pp. 263–343). Elsevier. https://doi.org/10.1016/B978-0-12-817611-5.00004-7

Sánchez-Calderón, I., Rojo-Fuente, A., Martín-de-León, J., Rodríguez-Pérez, M. Á., & Bernardo, V. (2026). Reduced-scale hot box design and validation for rapid thermal conductivity evaluation of insulating materials. *Polymer Testing.* https://www.sciencedirect.com/science/article/pii/S0142941826000589

Sandia National Laboratories. (2025). *Porous flow equations—Aria user manual* (v5.26). https://www.sandia.gov/files/sierra/Aria_Users_5_26/theory/gov_eq/porous_flow_eqs.html

Santamouris, M. (2020). Recent progress on urban overheating and heat island research. Integrated assessment of the energy, environmental, vulnerability and health impact.

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Synergies with the global climate change. *Energy and Buildings.* https://doi.org/10.1016/j.enbuild.2019.109482

Sarbin, I., Zarta, A. R., Noorhamsyah, & Rajab, A. (2021). Limbah kayu dan kertas bekas untuk pulp kertas. *Buletin Poltanesa, 22*(2), 197–203. https://doi.org/10.51967/tanesa.v22i2.894

Sari, T. W., Rafliansyah, M. D., Nurwidyaningrum, D., Febrianti, Q., Sujito, S., & Saputra, J. (2025). Pengaruh radiasi panas area bukaan terhadap kenyamanan termal pada gedung Sekolah X. *Jurnal Pendidikan dan Ilmu Fisika*, 5(2). https://garuda.kemdiktisaintek.go.id/documents/detail/5771219

Sarmin, S. N., Zakaria, S. A. K. Y., Kasim, J., & Shafie, A. (2013). Influence of resin content and density on thickness swelling of three-layered hybrid particleboard composed of sawdust and *Acacia mangium*. *BioResources, 8*(4), 4864–4872. https://doi.org/10.15376/biores.8.4.4864-4872

Satya, T. P., & Puspasari, F. (2019). Kajian ketidakpastian pengukuran suhu dan kelembaban udara pada sensor DHT22 berbasis Arduino Uno. *Jurnal Ilmu Fisika, 11*(2), 102–110. https://doi.org/10.25077/jif.11.2.102-110.2019

Schlegel, E., Haeussler, K., & Seifert, H. (1999). Microporosity and its use in highly efficient thermal insulating materials. In *CFI Ceramic Forum International* (Vol. 76, No. 8).

Sekino, N. (2016). Density dependence in the thermal conductivity of cellulose fiber mats and wood shavings mats: Investigation of the apparent thermal conductivity of coarse pores. *Journal of Wood Science, 62,* 20–26. https://doi.org/10.1007/s10086-015-1523-6

Shakir, M.A. and Ahmad, M.I. (2026), Sustainable thermal insulation panels from lignocellulosic agricultural residues for green building applications. Biofuels, Bioprod. Bioref., 20: 733-746. https://doi.org/10.1002/bbb.70094

Sharma, P., Krishnaraj, L., Brindha, A., & Kumar, V. (2024). Thermal performance assessment of sandwich wall panel fabricated with polyurethane foam and natural husk. *Construction and Building Materials.* https://doi.org/10.1016/j.conbuildmat.2024.138054

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box
Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Siciliano, A., Fedderwitz, R., Ramakrishnan, K., Dai, J., Gong, A., Zhu, J., Kośny, J., & Hu, L. (2023). Sustainable wood-waste-based thermal insulation foam for building energy efficiency. *Buildings.* https://doi.org/10.3390/buildings13040840

Silva, D. (2022). Modeling the transient response of thermal circuits. *Applied Sciences, 12*(24), 12555. https://doi.org/10.3390/app122412555

Simangunsong, B. C., Silalahi, G. S., Maulana, M. D., Manurung, E. G., Sitanggang, V. J., & Tambunan, A. H. (2017). Analisis levelized cost of energy pelet kayu (*Levelized cost of energy analysis of wood pellet*). *Jurnal Ilmu dan Teknologi Kayu Tropis.*

Simões, N., Moghaddam, S. A., & da Silva, M. G. (2023). Review of the experimental methods for evaluation of windows' thermal transmittance: From standardized tests to new possibilities. *Buildings, 13*(3), 703. https://doi.org/10.3390/buildings13030703

Sivakumar, A. A., Canales, C., Roco-Videla, Á., & Chavez, M. (2022). Development of thermoplastic cassava starch composites with banana leaf fibre. *Sustainability.* https://doi.org/10.3390/su141912732

Sivamani, S., & Raja, T. (2023). Preparation of adhesive from cassava starch and evaluation of its physicochemical properties. *Sustainable Chemical Engineering.* https://doi.org/10.37256/sce.4220232288

Sobota, T. (2014). Fourier's law of heat conduction. In R. B. Hetnarski (Ed.), *Encyclopedia of thermal stresses.* Springer. https://doi.org/10.1007/978-94-007-2739-7_384

Söderback, I. (2024, June 28). *Is your energy bill skyrocketing? Moist insulation could be to blame.* Vilpe. https://www.vilpe.com/usa/2024/06/28/is-your-energy-bill-skyrocketing-moist-insulation-could-be-to-blame/

Sridach, W., Jonjankiat, S., & Wittaya, T. (2013). Effect of citric acid, PVOH, and starch ratio on the properties of cross-linked poly(vinyl alcohol)/starch adhesives. *Journal of Adhesion Science and Technology, 27*(15), 1727–1738. https://doi.org/10.1080/01694243.2012.753394

Staahl, J. (2024, August 12). *Creating sustainable tropical buildings through passive design strategies*. Design with Forma. https://blogs.autodesk.com/forma/2024/08/12/passive-design-strategies-for-sustainable-tropical-buildings/

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Strimling, J. (2017). *Cellulose-based insulation and methods of making the same* (WIPO Patent No. WO2017066728A1). World Intellectual Property Organization.

Sulaiman, M. K. A. M., Jamil, M., & Zain, M. F. M. (2013, November). Solar radiation transmission of green façade in the tropics. In *Kongres Penyelidikan & Inovasi UKM2013*. Universiti Kebangsaan Malaysia.

Suryandono, A. R., Hariyadi, A., & Fukuda, H. (2021). Economic assessment of L-shaped minilouvers for reducing cooling energy and improving daylight condition in offices: A simulation study in Jakarta. *Sustainability, 13*(7), 4021. https://doi.org/10.3390/su13074021

Szymczak-Graczyk, A., Gajewska, G., Laks, I., & Kostrzewski, W. (2022). Influence of variable moisture conditions on the value of the thermal conductivity of selected insulation materials used in passive buildings. *Energies, 15*(7), 2626. https://doi.org/10.3390/en15072626

Tebe, D. (Ed.). (2025, April 19). *Kalor jenis zat, definisi, rumus & contoh soal.* Media Indonesia.

Tempsens. (2025, August 30). *7 kesalahan kalibrasi yang harus dihindari: Dapatkan akurasi sensor suhu yang andal.* https://tempsens.com/id/blog/7-kesalahan-kalibrasi-yang-harus-dihindari-untuk-mendapatkan-akurasi-sensor-suhu-yang-andal/

The Engineering ToolBox (2008). *Calcium Silicate Insulation*. https://www.engineeringtoolbox.com/calcium-silicate-insulation-k-values-d_1171.html

The Engineering ToolBox. (2003). *Specific heat of common materials – Engineering reference.* https://www.engineeringtoolbox.com/specific-heat-capacity-d_391.html

Thybring, E. E., & Fredriksson, M. (2021). Wood modification as a tool to understand moisture in wood. *Forests, 12*(3), 372. https://doi.org/10.3390/f12030372

Tiberio Cardoso, G., & Vecchia, F. (2014). Comparison of thermal performance between test cells with different coverage systems for experimental typical day of heat in Brazilian southeastern. *Frontiers of Architectural Research, 3*(3), 271–282. https://doi.org/10.1016/j.foar.2014.04.007

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Toghraei, M. (2022). Chapter 6: Concepts of process equipment. In *A practical approach to chemical engineering for non-chemical engineers.* Elsevier. https://doi.org/10.1016/B978-0-12-823900-1.00008-4

Tripathi, J., & Rice, R. W. (2017). Thermal conductivity values for laminated strand lumber and spruce for use in hybrid cross-laminated timber panels. *BioResources, 12*(4), 8827–8837. https://doi.org/10.15376/biores.12.4.8827-8837

Tye, R. P. (1974). Heat transmission in cellulosic fiber insulation materials. *Journal of Testing and Evaluation, 2*(3), 176–179. https://doi.org/10.1520/JTE10095J

Underwriters Laboratories. (2026). *Cellulose insulation.* Fire Safety Research Institute. https://materials.fsri.org/materialdetail/cellulose-insulation

Wang, Y., Zhang, S., Wang, D., & Liu, Y. (2023). Experimental study on the influence of temperature and humidity on the thermal conductivity of building insulation materials. *Energy and Built Environment, 4*(4), 386–398. https://doi.org/10.1016/j.enbenv.2022.02.008

Watcharakitti, J., Nimnuan, J., Krusong, K., Nanan, S., & Smith, S. M. (2023). Insight into the molecular weight of hydrophobic starch laurate-based adhesives for paper. *Polymers, 15.* https://doi.org/10.3390/polym15071754

Watcharakitti, J., Win, E. E., Nimnuan, J., & Smith, S. M. (2022). Modified starch-based adhesives: A review. *Polymers, 14.* https://doi.org/10.3390/polym14102023

Wilk, J., Nowoświat, A., Marchacz, M., Bochen, J., Belok, J., & Pokorska-Silva, I. (2025). Influence of solar radiation on the thermal load of an external wall taking into account its material properties. *Energies, 18*(17), 4741. https://doi.org/10.3390/en18174741

Wolkoff, P., Azuma, K., & Carrer, P. (2021). Health, work performance, and risk of infection in office-like environments: The role of indoor temperature, air humidity, and ventilation. *International Journal of Hygiene and Environmental Health, 233,* 113709. https://doi.org/10.1016/j.ijeh.2021.113709

Wong, P. (2025, 20 April). *Ultimate guide to aluminum heat sinks: Top cooling solutions for electronics*. PTSMAKE. https://www.ptsmake.com/ultimate-guide-to-aluminum-heat-sinks-top-cooling-solutions-for-electronics/

Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
GIGIH DUTYMA FIDDIEN, composite insulation panel, lignocellulosic waste, thermal performance, experimental test
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Wu, J. (2018). Chapter 5: Material interface of pantograph and contact line. In *Pantograph and contact line system: High-speed railway* (pp. 165–191). Elsevier. https://doi.org/10.1016/B978-0-12-812886-2.00005-7

Xu, C., Shao, S., Wei, W., Qin, Y., & Li, N. (2025). A study on optimum insulation thickness of building walls in hot summer and warm winter zone in China. *Scientific Reports, 15,* 10307. https://doi.org/10.1038/s41598-025-93945-y

Young Architect Academy. (2026). *Building orientation for every climate zone*. Dipetik 22 September 2026, dari https://academy2.youngarchitect.com/building-orientation/

Yousefi, F., Gholipour, Y., & Yan, W. (2017). A study of the impact of occupant behaviors on energy performance of building envelopes using occupants' data. *Energy and Buildings, 148,* 182–198. https://doi.org/10.1016/j.enbuild.2017.04.085

Yu, Z.-T., Xu, X., Fan, L., et al. (2011). Experimental measurements of thermal conductivity of wood species in China: Effects of density, temperature, and moisture content. *Forest Products Journal, 61*(2), 130–135. https://doi.org/10.13073/0015-7473-61.2.130

Yuan, J. (2018). Impact of insulation type and thickness on the dynamic thermal characteristics of an external wall structure. *Sustainability*, *10*(8), Artikel 2835. https://doi.org/10.3390/su10082835

Yue, J., Lu, J., Yue, Y., & Pan, Y. (2025). Heat loss evaluation for heating building envelope based on relevance vector machine. *PLOS ONE, 20*(6), e0314822. https://doi.org/10.1371/journal.pone.0314822

Zachara, T., Šedivka, P., Borůvka, V., Kubista, K., Holeček, T., Lexa, M., Sahula, L., & Sikora, A. (2026). Cold-pressed insulation boards from recycled cotton fibers using a water-borne PVAc–starch binder: Processing, structure and properties. *Materials, 19.* https://doi.org/10.3390/ma19061097

Zhao, J., Chen, B., Lv, J., Yi, J., Yuan, L., Liu, Y., Cai, Y., & Chi, X. (2025). A comprehensive evaluation of simulating thermal conductivity in oak wood using XCT imaging. *Forests, 16*(5), 834. https://doi.org/10.3390/f16050834

Zhao, Z., Yang, X., Qu, X., Zheng, J., & Mai, F. (2021). Thermal insulation performance evaluation of autoclaved aerated concrete panels and sandwich panels based on

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Evaluasi Kinerja Panel Insulasi Komposit Limbah Kertas Koran, Karton, dan Serbuk Kayu pada Test Box Eksperimental
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

temperature fields: Experiments and simulations. *Construction and Building Materials, 303,* 124560. https://doi.org/10.1016/J.CONBUILDMAT.2021.124560

Zhu, Z., & Qian, K. (2007). Effects of the molecular structure of polyvinyl alcohol on the adhesion to fibre substrates. *Fibres and Textiles in Eastern Europe, 15*(1), 82–85.

Zinzi, M., Agnoli, S., Burattini, C., & Mattoni, B. (2020). On the thermal response of buildings under the synergic effect of heat waves and urban heat island. *Solar Energy, 211,* 1270–1282. https://doi.org/10.1016/j.solener.2020.10.050

Zuraida, S., & Pratiwi, S. (2020). Panel komposit limbah serbuk kayu sebagai alternatif komponen bangunan ramah lingkungan. *Journal of Applied Science (JAPPS).* https://doi.org/10.36870/japps.v2i1.162