EPD®
THE INTERNATIONAL EPD® SYSTEM

Southeast Asia EPD

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

PC Spun Piles WIKA Beton

From

WIKA BETON

PT Wijaya Karya Beton Tbk

Programme
The International EPD® System,
www.environdec.com

EPD registered through the fully aligned regional hub
EPD Southeast Asia,
https://www.epd-southeastasia.com/

Programme operator
EPD International AB

Regional Hub
EPD Southeast Asia

EPD registration number
S-P-13859

Publication date
2024-05-17

Valid until
2029-05-14

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

This EPD covers multiple products of PC Spun Piles, based on average results of the product group for types 60 A1, 60 B0, 60 C0, 80 A1, 80 B0, and 80 C0.

Table of Contents

1 General information
1 Programme information

2 Company information
2 Description of the organisation
2 Product-related or management system-related certifications
2 Name and location of production site(s)

3 Product information
3 Product name
3 Product identification
3 Product description
4 UN CPC code
4 Geographical Scope

4 LCA information
4 Declared Unit
4 Reference service life
4 Time representativeness
4 Database(s) and LCA software used
4 Description of system boundaries
5 System diagram
5 More information
6 Key Assumptions and Limitations
6 Cut-off rules
6 Data Quality
6 Allocation
6 LCA Scenarios and Additional Technical Information
7 Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

8 Content Indormation

8 Results of the Environmental Performance Indicators
8 Mandatory impact category indicators according to 15804:2012+A2:2019
9 Additional impact category indicators according to EN 15804:2012+A2:2019
9 Additional mandatory and voluntary impact category indicators according to IPCC 2013 GWP 100a (Incl CO2 Uptake)
9 Resource use indicators
9 Waste production
10 Variability of Results Depending on PC Spun Piles Diameter and Type

10 Interpretation of results

11 Additional Environmental Information

11 Additional Social and Economic Information

12 Contact information
12 EPD owner
12 LCA Practitioner
12 Programme operator

12 References

General information

Programme information

Programme	**The International EPD ® System** EPD registered through the fully aligned regional hub: EPD Southeast Asia	
Address:	**EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden **EPD Southeast Asia** Kencana Tower Level M, Business Park Kebon Jeruk Jl. Raya Meruya Ilir No. 89, Jakarta Barat 11620, Indonesia	**Website** www.environdec.com www.epd-southeastasia.com **Email** info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product category rules (PCR): CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR) of Construction Products (PCR 2019:14 Version 1.3.4), c-PCR-003 Concrete and concrete elements (EN 16757:2022), and UN CPC 37550
PCR review was conducted by: The Technical Committee of the International EPD® System. **Review chair:** Claudia A. Peña, PINDA LCT SpA. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA) LCA accountability: PT Life Cycle Indonesia LCA practioner: Jessica Hanafi, Ph.D., Gloria FJ Kartikasari, Natalia Susanto Salim, Jonathan Aditya Halim, Samuel Billy
Third-party verification Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☑ EPD verification by individual verifier
Third party verifier: Leo Breedveld, 2B Srl, breedveld@to-be.it, https://to-be.it/en/ **Approved by:** The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☑ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Vision:

"To become a trusted global company that provides sustainable solutions in the concrete industry"

Mission :

1. To provide products and services on a global scale as a solution to customer needs;
2. To carry out operational excellence with global company qualifications based on risk management and digital technology with a sustainable environmental perspective to meet stakeholder aspirations;
3. To establish strategic collaboration with working partners that is mutually beneficial and provides benefits to the social environment;
4. To develop employee competency and welfare for continuous performance improvement;
5. To implement healthy and accountable financial management.

Owner of the EPD

PT Wijaya Karya Beton Tbk

Contact : sekper@wika-beton.co.id
Website : www.wika-beton.co.id
Instagram : @wikabeton

Facebook : PT Wijaya Karya Beton Tbk
Youtube : @PTWIKABeton
Phone : +6221 8192802 (hunting)
Fax : +6221 8590 3872

Description of the organisation

PT Wijaya Karya Beton Tbk (WIKA Beton) was established in 1997 as a Subsidiary of PT Wijaya Karya (Persero) Tbk. Its vision is to become the foremost precast concrete company in Engineering, Production, and Installation (EPI) in Southeast Asia. Since 2014, WIKA Beton increased its business scale by registering on the Indonesian Stock Exchange with the ticker of WTON. Currently, WIKA Beton holds the position of being the largest precast concrete producer in Indonesia and Southeast Asia, boasting 7 sales areas, 14 factories, 1 mobile plant, 3 quarries, and 3 jetties strategically located across the Indonesian archipelago.

WIKA Beton operates with 4 (four) subsidiaries: PT Wijaya Karya Komponen Beton, PT Wijaya Karya Krakatau Beton, PT Citra Lautan Teduh, and PT Wijaya Karya Pracetak Gedung.

Guided by the ethos of "Innovation and Trust," WIKA Beton is committed to continuously innovating in the concrete industry while upholding the trust of its stakeholders and consumers. In addition to manufacturing standard precast concrete products such as poles, piles, bridge components, railway sleepers, sheet piles, pipes, building components, marine structure parts, and more. WIKA Beton is dedicated to the development of new products and services including inner bore system installation, launching gantries, post-tensioning, ready mix concrete, precast concrete raw materials, and many other innovations.

WIKA Beton commits to the triple bottom line principle: People, Planet, Profit. WIKA Beton continues to innovate not only to be the market leader in the concrete industry, but we have a belief that every Company's actions must contribute positively to society and the environment.

WIKA Beton stands as a pioneer of innovation, committed to both quality and environment. The high-quality solutions meet evolving client needs. The company delivers value and trust through its dedication to product innovation, environmentally responsible practices, and good corporate governance, ensuring the best performance for all stakeholders.

Product-related or management system-related certifications

- Quality Management System – International Standard, ISO 9001:2015
- Safety Management System – Indonesian Standard, SMK3 PP No.50 2012, All factory of WIKA Beton has been certified by the Ministry of Manpower of Indonesia Republic
- Occupational Health and Safety Management System – International Standard, ISO 45001:2018
- Environmental Management System – International Standard, ISO 14001:2015
- Structural Concrete – Indonesian Standard, SNI 6880:2016
- Information Technology - International Standard, ISO 27001:2013
- Concrete Laboratory - National Accreditation of Indonesia, SNI 17025:2017

Name and location of production site(s)

Jl. Raya Narogong Km. 26 Kembang Kuning, Cileungsi, Klapanunggal, Bogor, West Java 16710, Indonesia

Product information

Product name

PC Spun Piles

Product identification

JIS A 5335 – 1987
and SNI 9136 - 2023,
PRESTRESSED SPUN
PILES

Product description

PC Piles are column elements in the foundation that function to withstand and carry the load from the superstructure. By WIKA Beton, PC Piles are designed with various sizes to withstand various types of structures.

The diameter of PC Spun Piles produced by WIKA Beton varies from 300 mm - 1200 mm and WIKA Beton is the first company in Indonesia that can produce a diameter of 1200mm. The strength for PC Spun Piles provides standard 80 MPa and below and can also provide strength for PHC (prestressed high-strength concrete) >80 MPa. The high level of concrete compactness as a result of centrifugal force causes WIKA PC Spun Piles to have durability and permeability to withstand certain environment condition. PC Spun Piles is designed to bear various types of structures. It is used among others on high-rise buildings, industrial buildings, marine structures, bridges, etc.

This EPD covers multiple products of PC Spun Piles, based on average results of the product group for the following types:

- 60A1
- 60B0
- 60C0
- 80A1
- 80B0
- 80C0

Here are the specifications for the PC Spun Piles product available at WIKA Beton

Material Specification:

Item	Reference	Description	Specification
Aggregate	• ASTM C 33 / • C 33M-18	Standard Specification for Concrete Aggregates	-
Cement	• SNI 2049 : 2015 • SNI 7064 : 2014	• Portland Cement • Portland Sement Composite	• Standard Product Type I • Special Order : Type II or V
Admixture	• ASTM C 494 / • C 494M - 19	Standard Specification for Chemical Admixture for Concrete	Type F: High Range Water Reducing Admixture
Concrete	• SNI 2834 : 2000 • SNI 2493 : 2011	Concrete Mix Design Making and Curing Concrete Sample	-
Rebar	SNI 2052 : 2017	Welded boilers	-
	• SNI 1154:2016 • ASTM A416/ A416M-21	• Standar Specification for Steel Strand • Uncoated Seven-Wire for Pre-stressed Concrete	-
	• SNI 1155-2016 • JIS G 3536 : 2014	Uncoated Stress-Relieved Steel Wires and Strand for Prestressed Concrete	-
	• SNI 7701 : 2016 • JIS G 3137 : 2008	Small Size-Deformed Steel Bar for Prestressed Concrete	-
Spiral Wire	JIS G 3532 : 2011	Low Carbon Steel Wire	SWM-P (Round Type) Cold-reduced steel wire for the reinforcement of concrete and manu-facture of welded fabric
Joint Plate	JIS G 3101 : 2004	Rolled Steel for General Structure	SS400 (Tensil Strength 400 N/mm2) Applica-ble steel product for steel plates and sheets, steel strip in coil, sections, flats and bars
Welding	ANDI / AWS D1.1:2015	Structural Welding Code Steel	• AWS A5.1/E6013 • NIKKO STEEL RB 26/RD 260,LION 260 or equivalent

Technical Specification:

Concrete Compressive Strength fc' = 52 MPa (Cube 600 kg/cm2)

Size (mm)	Thickness Wall (t)	Cross Section (cm2)	Section Inertia (cm4)	Unit Weight (kg/m)	Class	Bending Moment		Allowable Compression (ton)	Decompression Tension (ton)	Length of Pile** (m)
						Crack* (ton.m)	Break (ton.m)			
600	100	1,570.80	510,508.81	393	A1	17.00	25.50	255.55	68.43	6 – 21
600	100	1,570.80	510,508.81	393	B0	25.00	45.00	237.50	135.43	6 – 25
600	100	1,570.80	510,508.81	393	C0	29.00	58.00	228.33	171.12	6 – 28
800	120	2,563.54	1,527,869.60	641	A1	40.00	60.00	414.54	121.15	6 - 24
800	120	2,563.54	1,527,869.60	641	B0	55.00	99.00	387.31	222.31	6 - 29
800	120	2,563.54	1,527,869.60	641	C0	65.00	130.00	370.08	289.21	6 – 30

Unit Conversion:
1 ton = 9.8060 kN

Note:

*) Crack Moment Based on JIS A 5335-1987 (Prestressed Spun Concrete Piles).

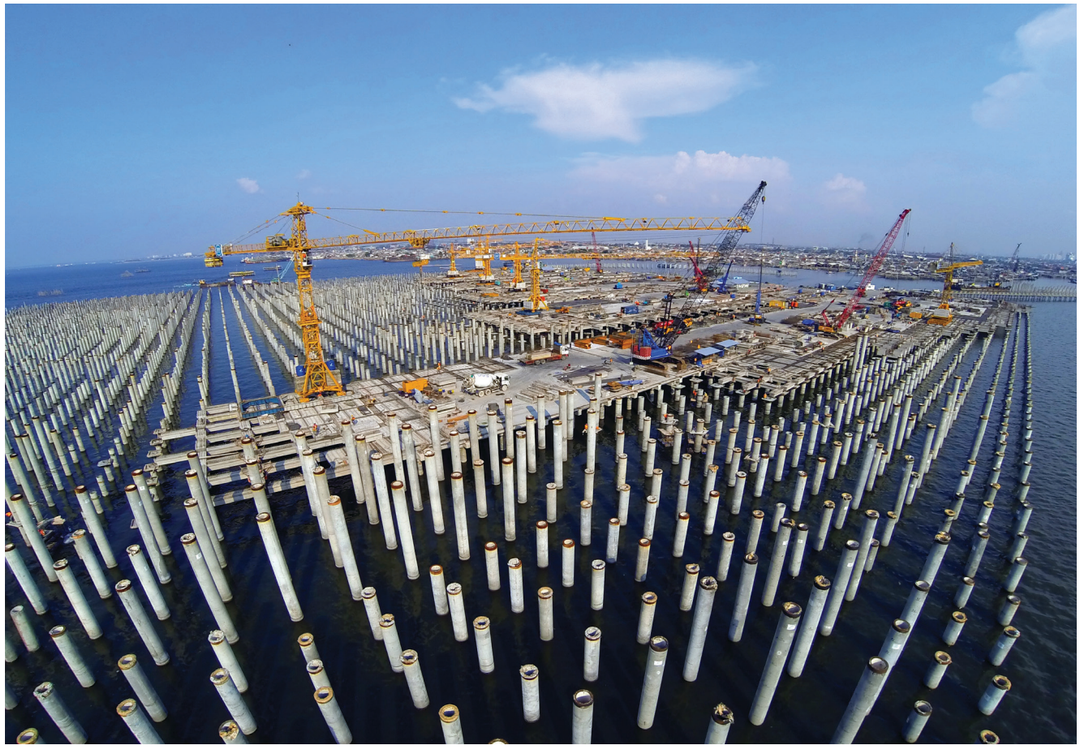
**) Length of pile may exceed usual standard whenever lifted in certain position

UN CPC code

UN CPC 37550 - Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone

Geographical Scope

Indonesia



Declared unit

1 meter of PC Spun Pile,

with a weight of

- D 600 mm : 343 kg/m
- D 800 mm : 641 kg/m

Reference service life

50 years

Time representativeness

Specific data for the manufacturing collected from 1 July 2022 - 30 June 2023. The 10-year age requirement for generic data has been met.

Database(s) and LCA software used

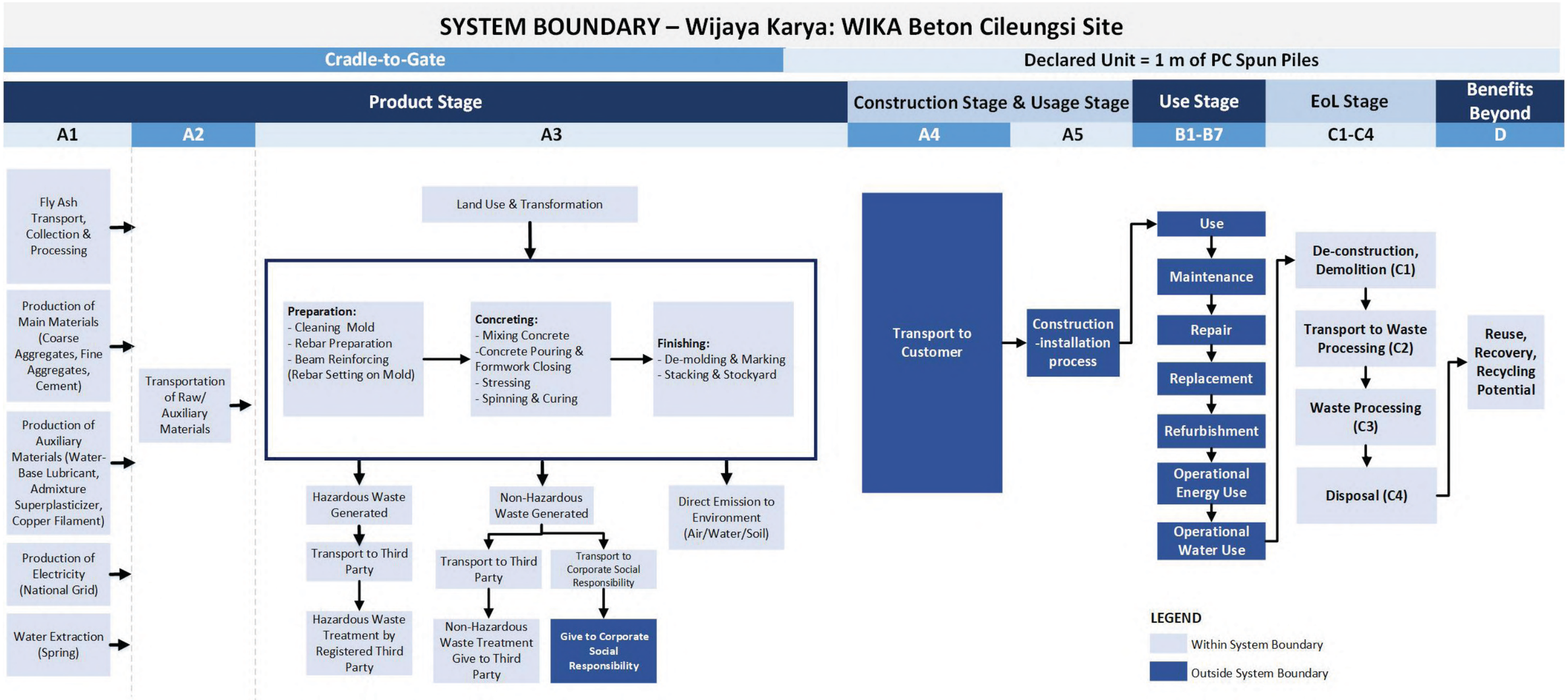
Generic data for module A1-A2 and module C1-C4, D use Ecoinvent 3.9.1 database and modelled by using SimaPro Developer software version 9.5.0.1. No datasets older than 10 years were used.

Description of system boundaries

The system boundary was chosen based on the goal and scope of the study and in accordance with EN 15804:2012+A2:2019, Product Category Rules (PCR) of Construction Products Product Category Rules 2019-14 PCR Construction products v1.3.4 and c-PCR-003 Concrete and concrete elements (EN 16757:2022), i.e. “Cradle-to-Gate” (A1-A3) with options the end of life stage as well as the benefits and loads beyond the system boundary (C1-C4, D). The processes below are included in the product system to be studied:

1. **Upstream (A1-A2)**
   a. Production of raw materials (e.g., coarse aggregates, fine aggregates, cement)
   b. Production of auxiliary materials (e.g., water-based lubricant, admixture superplasticizer, copper filament etc.)
   c. Production of electricity and fuel (i.e., diesel)
   d. Transportation of raw/auxiliary materials from the supplier to manufacturing plant
   e. Extraction of water (i.e., spring water)
2. **Core (A3)**
   c. Cleaning Mold: cleaning, oiling the mold
   d. Rebar Preparation: wire caging the reinforcing steel (rebar)
   e. Mixing Concrete
   f. Beam Reinforcing (Rebar Setting on Mold)
   g. Concrete Pouring & Formwork Closing
   h. Stressing: pull tension the reinforcing steel (rebar)
   i. Spinning & Curing: compacting and curing the concrete
   j. De-molding & Marking: de-molded, color-marked
   k. Stacking & Stockyard: pencil shoe and joint plate installment, stacking, stocking
   l. Hazardous and Non-hazardous waste generated (used oil, waste wood stopper & sediment)
   m. Transport to waste processing unit
   n. Waste processing including waste treatment process by a third party
   o. Direct emission to environment
3. **Downstream (C1-C4, D)**
   d. Deconstruction & Demolition
   e. Transport to waste processing unit
   f. Waste processing including waste treatment process by a registered third party for hazardous waste
   g. Disposal
   h. Reuse/Recovery/Recycling of the end of life of the products

System diagram



More information

Relevant website for more information regarding the manufacturing process: **www.wika-beton.co.id**

Key Assumptions and Limitations

- Production process of materials in upstream (module A1) taken from Ecoinvent database reflects average or generic production and therefore does not correspond to actual suppliers. For raw material production i.e. rebar, cement, coarse aggregates, fine aggregates, the Ecoinvent database is used where some data are modified to available WIKA Beton's specific supplier country (Indonesia) databases, i.e. for input water, natural gas, coal, electricity, wastewater, etc.
- The impact of transportation for raw materials and supporting materials are calculated based on the amount of load, distance, and transportation type by using generic data from Ecoinvent. Due to limited information, there is no adjustment made as the suppliers mostly use another third party to transport the products to WIKA Beton.
- Electricity grid in module A3 was based on Ecoinvent database for Indonesia that was modified to represent JAMALI (Java-From 1 July 2022 to 30 June 2023, the manufacturing process of PC Spun Piles involved a combination of six different specifications (i.e., 60 A1, 60 B0, 60 C0, 80 A1, 80 B0, and 80 C0), varying in diameter and class. The calculation of the manufacturing process will be calculated as aggregated total data for all specifications produced.
- In this study period, the generator set status is standby condition. However, diesel was occasionally used for warm-up maintenance. There is no direct measurement for emissions that comes from the generator sets. They are calculated based on the sampling every 1 year and then extrapolated to obtain the total emissions for one year in mass units. The air emission from stack (generator sets) is calculated based on the air velocity, cross-sectional area of stack, and the running hour of the stack.
- There is no water discharge to the environment. Water turns into a product and is also used in a closed-loop system for maintenance and cleaning machine. Therefore, the water consumption is calculated from the amount of water used as product and makeup water to compensate for the losses due to water evaporation. There is no measurement for the makeup water, hence the data is calculated based on total water used in the closed-loop system minus total recycled water.
- The calculation of material consumption for producing pencil shoes was included within the overall PC Spun Piles line, even though the pencil shoes were manufactured in a separate workshop.
- Data for oil and grease usage for maintenance are cumulative from all machines and processes.
- The impact of land use changes are considered immaterial and have not been included because the land use change was done more than 15 years ago.

Cut-off rules

In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module, e.g., per module A1-A3, C1-C4, and module D shall be a maximum of 5 % of energy usage and mass. In this study, all data in the product system is included. If there is missing specific data, generic data from the database or literature will be used.

Data Quality

- Time related coverage: specific data were collected from 2022-07-01 to 2023-06-30, and generic data are representative of the year 2023.
- Geographic coverage: specific data were collected from the area under study, i.e., Cileungsi, Bogor, West Java, Indonesia. Electricity production as a key input are sourced from JAMALI network. Therefore, data that has been adjusted to represent JAMALI network was used. Another key input is that no specific data was available for raw material production (rebar, cement, coarse aggregates, and fine aggregates). Therefore, rest-of-world data with some adjustments to the available Indonesia Ecoinvent databases was used.
- Technological coverage: specific data were collected from current PC Spun Piles making process under study. There is no specific data for module A1-A2, C1-C4; therefore generic data from the global average was used with similar technology aspects to describe the process under study.

Data quality for both specific and generic data were sufficient to conduct life cycle assessment in accordance with the defined goal and scope.

Allocation Rules:

In this study, allocation is not applied in the manufacturing phase since no by-products exist.

LCA Scenarios and Additional Technical Information

- Electricity grid in module A3 was based on Ecoinvent database for Indonesia that was modified to represent JAMALI (Java-Madura-Bali) electricity network. The composition of electricity mixed for JAMALI and the amount of electricity losses were adjusted based on Statistic from Directorate General of Electricity (2019) which is highly reliant on coal (66%), gas fired (27.5%), hydropower (4%), geothermal (2%), and diesel (<1%). The climate impact of the electricity is 1.31 kg CO2 eq./kWh.
- Transportation using truck in Indonesia use EURO3 to represent the current condition.
- The mass of wood stopper uses the generic density conversion value of 697 kg per m3 (cubic meter) of average hardwood density.
- WIKA Beton focuses its emissions measurements on the three parameters mandated by the government for generator sets, i.e., CO, NO2, and SO2. To complete the data for other emissions resulting from diesel combustion in the generator set, the information from the Ecoinvent database, specifically referencing, "Diesel, burned in diesel-electric generating set, 10MW {GLO}| diesel, burned in diesel-electric generating set, 10MW | Cut-off, U" is used.
- The transportation to waste processing and disposal area (Module C) is calculated based on the average truck travelled per day in Indonesia (i.e., 136.99 km).
- Amount of diesel used for construction and demolition process was modelled using Ecoinvent database (Waste reinforced concrete {RoW}| treatment of waste reinforced concrete, recycling | Cut-off, U) for global data, i.e., 0.0612 MJ diesel/kg reinforced concrete. Air emissions generated from this process is 0.16 g particulates/kg reinforced concrete.
- Amount of diesel and electricity consumption for waste processing was modeled using the Ecoinvent database for global data on sorting reinforced concrete, along with sorting and pressing iron scrap. For sorting reinforced concrete, the consumption is 0.0037 kWh/kg reinforced concrete. For sorting and pressing iron scrap, the consumption is 0.1 MJ diesel/kg steel and 0.01 kWh/kg steel.
- Module C electricity was modelled using Ecoinvent database for Indonesia.
- Average recycling rate for construction and demolition waste in Indonesia is 15.00% according to Ministry of National Development Planning of the Republic of Indonesia (2021). Around 85.00% of the steel scrap and waste concrete were considered as material losses that will go to landfill.
- In this LCA environmental assessment, long-term emissions have not been considered.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource re-covery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	ID	ID	ID	-	-	-	-	-	-	-	-	-	ID	ID	ID	ID	ID
Specific data used	13%[1]				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-32%/+37%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] *Based on GWP-GHG of stage A3 divided by GWP-GHG for stages A1-A3. Data for A3 is specific to WIKA Beton Plant Line 8*

Content Information

Results of the Environmental Performance Indicators

Material content for 1 m PC Spun Piles						
Product content		Weight, kg*	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg	Function	CAS No.
Steel		18.18	0.92%	-	Provides greater resistance	12597-69-2
Concrete	Cement	93.86	-	-	Provides adherent properties	65997-15-1
	Fly Ash	10.27	2.04%	-	Improves concrete workabilty	68131-74-8
	Sand	154.01	-	-	Reduces crack in concrete	14808-60-7
	Gravel	200.44	-	-	Contributes to compressive strength	1317-65-3
	Water	26.89	-	-	Hydrate and set concrete	7732-18-5
	Polycarboxylate	0.76	-	-	Water reducing, High Range admixtures	27599-56-0
TOTAL		**504.41**	**2.96%**	**-**		

** The content declaration represents the weighted average of PC Spun Piles types 60 A1, 60 B0, 60 C0, 80 A1, 80 B0, and 80 C0*

Packaging materials for 1 m PC Spun Piles
No packaging materials. PC Spun Piles are distributed directly without using any packaging materials.

Dangerous substances from the candidate list of SVHC for Authorisation
No dangerous substances

Mandatory impact category indicators according to 15804:2012+A2:2019

Results for 1 meter of PC Spun Piles							
Impact Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	1.50E+02	3.02E+00	1.31E+01	7.16E+00	2.57E+00	3.61E+00
GWP-biogenic	kg CO_2 eq.	1.81E-01	4.19E-04	3.75E-03	1.37E-02	1.12E-03	-1.48E-03
GWP-luluc	kg CO_2 eq.	7.17E-02	3.41E-04	6.75E-03	7.03E-03	1.55E-03	5.08E-04
GWP-total	kg CO_2 eq.	1.50E+02	3.02E+00	1.31E+01	7.18E+00	2.57E+00	3.61E+00
ODP	kg CFC 11 eq.	1.32E-06	4.79E-08	1.97E-07	9.27E-08	7.43E-08	7.72E-08
AP	mol H^+ eq.	5.77E-01	2.80E-02	7.74E-02	5.39E-02	1.93E-02	1.57E-02
EP-freshwater	kg P eq.	9.65E-03	1.09E-05	1.24E-04	4.98E-04	2.50E-05	-7.77E-05
EP-marine	kg N eq.	1.47E-01	1.29E-02	3.13E-02	1.98E-02	7.38E-03	4.63E-03
EP-terrestrial	mol N eq.	1.64E+00	1.41E-01	3.40E-01	2.16E-01	7.96E-02	5.47E-02
POCP	kg NMVOC eq.	5.49E-01	4.17E-02	1.07E-01	6.46E-02	2.77E-02	2.26E-02
ADP-minerals & metals[1]	kg Sb eq.	5.70E-04	1.05E-06	4.18E-05	4.06E-05	3.56E-06	2.31E-05
ADP-fossil[1]	MJ	1.17E+03	3.95E+01	1.86E+02	9.23E+01	6.40E+01	4.10E+01
WDP[1]	m^3 world eq· deprived	1.77E+01	8.52E-02	8.18E-01	1.14E+00	2.83E+00	6.76E-01

[1] *The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

Acronyms

- **GWP-fossil** : Global Warming Potential fossil fuels
- **GWP-biogenic** : Global Warming Potential biogenic
- **GWP-luluc** : Global Warming Potential land use and land use change
- **ODP** : Depletion potential of the stratospheric ozone layer
- **AP** : Acidification potential, Accumulated Exceedance
- **EP-freshwater**: Eutrophication potential, fraction of nutrients reaching freshwater end compartment
- **EP-marine** : Eutrophication potential, fraction of nutrients reaching marine end compartment
- **EP-terrestrial** : Eutrophication potential, Accumulated Exceedance
- **POCP** : Formation potential of tropospheric ozone
- **ADP-minerals&metals** : Abiotic depletion potential for non-fossil resources
- **ADP-fossil** : Abiotic depletion for fossil resources potential
- **WDP** : Water (user) deprivation potential, deprivation-weighted water consumption

Additional impact category indicators according to EN 15804:2012+A2:2019

Results for 1 meter of PC Spun Piles							
Impact Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	8.39E-06	4.47E-06	1.40E-06	4.77E-06	4.23E-07	2.64E-07
IRP[2]	kBq U235 eq.	5.13E-01	8.02E-03	6.52E-02	2.54E-02	1.69E-02	2.19E-02
ETP-fw[1]	CTUe	5.63E+02	1.89E+01	1.04E+02	4.48E+01	3.00E+01	6.16E+00
HTP-c[1]	CTUh	3.76E-07	9.24E-10	8.67E-09	3.16E-09	1.09E-09	-4.44E-09
HTP-nc[1]	CTUh	1.76E-06	6.43E-09	1.64E-07	7.53E-08	1.37E-08	-7.44E-08
SQP[1]	dimensionless	5.58E+02	2.66E+00	1.10E+02	6.22E+01	1.27E+02	1.94E+01

[1]The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/ capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

[2] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from random and from some construction materials is also not measured by this indicator.

Acronyms

- **PM**: Particulate Matter emissions
- **IRP**: Ionizing radiation - human healt
- **ETP-fw**: Eco-toxicity – freshwater
- **HTP-c**: Human toxicity - cancer effects
- **HTP-nc**: Human toxicity - non-cancer effects
- **SQP**: Land use related impacts / soil quality

Additional mandatory and voluntary impact category indicators according to IPCC 2013 GWP 100a (Incl CO2 Uptake)

Results for 1 meter of PC Spun Piles							
Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO2 eq.	1.50E+02	3.02E+00	1.31E+01	7.18E+00	2.57E+00	3.61E+00

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

Resource use indicators

Results for 1 meter of PC Spun Piles							
Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.01E+02	2.24E-01	2.35E+00	2.27E+00	5.47E-01	2.46E+00
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0
PERT	MJ	1.01E+02	2.24E-01	2.35E+00	2.27E+00	5.47E-01	2.46E+00
PENRE	MJ	1.17E+03	3.95E+01	1.86E+02	9.23E+01	6.40E+01	4.10E+01
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	1.17E+03	3.95E+01	1.86E+02	9.23E+01	6.40E+01	4.10E+01
SM	kg	4.43E-03	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m^3	4.61E+00	2.05E-02	1.63E-01	2.07E-01	1.01E-01	-4.75E-02

Acronyms

- **PERE** : Use of renewable primary energy excluding renewable primary energy resources used as raw materials
- **PERM** : Use of renewable primary energy resources used as raw materials
- **PERT** : Total use of renewable primary energy resources
- **PENRE** : Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
- **PENRM** : Use of non-renewable primary energy resources used as raw materials
- **PENRT** : Total use of non-renewable primary energy re-sources
- **SM** : Use of secondary material
- **RSF** : Use of renewable secondary fuels
- **NRSF** : Use of non-renewable secondary fuels
- **FW** : Use of net fresh water

Waste production

Results for 1 meter of PC Spun Piles							
Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	7.09E-02	1.56E-02	0	1.60E-02	0	5.22E-03
Non-hazardous waste disposed	kg	7.14E+00	0	0	1.86E+02	4.22E+02	8.80E+00
Radioactive waste disposed	kg	0	0	0	0	0	0

Results for 1 meter of PC Spun Piles							
Parameter	**Unit**	**Total A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	1.22E+00	0	0	0	0	0
Material for recycling	kg	0	0	0	7.45E+01	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0

Variability of Results Depending on PC Spun Piles Diameter and Type

Results for 1 meter of PC Spun Piles Total A1-A3, C1-C4						
Impact Indicator	**Unit**	**60 A1 (minimum)**	**Variation (%)**	**Baseline**	**80 C0 (maximum)**	**Variation (%)**
GWP-fossil	kg CO_2 eq.	1.20E+02	-31.78%	1.76E+02	2.40E+02	36.53%
GWP-biogenic	kg CO_2 eq.	1.20E+02	-31.79%	1.76E+02	2.40E+02	36.55%
GWP-luluc	kg CO_2 eq.	1.53E-01	-23.80%	2.00E-01	2.50E-01	24.89%
GWP-total	kg CO_2 eq.	5.83E-02	-33.26%	8.74E-02	1.20E-01	36.77%
ODP	kg CFC 11 eq.	1.07E-06	-38.45%	1.73E-06	2.50E-06	44.05%
AP	mol H^+ eq.	5.11E-01	-32.35%	7.56E-01	1.04E+00	37.03%
EP-freshwater	kg P eq.	6.85E-03	-33.50%	1.03E-02	1.41E-02	36.73%
EP-marine	kg N eq.	1.53E-01	-29.85%	2.19E-01	2.94E-01	34.59%
EP-terrestrial	mol N eq.	1.70E+00	-29.78%	2.41E+00	3.25E+00	34.53%
POCP	kg NMVOC eq.	5.32E-01	-32.65%	7.90E-01	1.09E+00	37.67%
ADP-minerals & metals[1]	kg Sb eq.	3.88E-04	-41.02%	6.57E-04	9.67E-04	47.13%
ADP-fossil[1]	MJ	1.03E+03	-33.73%	1.55E+03	2.14E+03	38.54%
WDP[1]	m^3 world eq· deprived	1.64E+01	-27.10%	2.26E+01	2.97E+01	31.63%
PM	Disease incidence	1.36E-05	-30.12%	1.95E-05	2.63E-05	35.02%
IRP[2]	kBq U235 eq.	3.54E-01	-43.57%	6.28E-01	9.40E-01	49.68%
ETP-fw[1]	CTUe	4.99E+02	-34.38%	7.60E+02	1.06E+03	39.49%
HTP-c[1]	CTUh	1.78E-07	-54.26%	3.90E-07	6.29E-07	61.21%
HTP-nc[1]	CTUh	1.21E-06	-39.99%	2.02E-06	2.93E-06	45.54%
SQP[1]	dimensionless	7.22E+02	-16.08%	8.60E+02	1.05E+03	22.50%

[1] The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

[2] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from random and from some construction materials is also not measured by this indicator.

- From overall life cycle stages, module A1 contributes significantly to the impact generated by the whole life cycle. Rebar production process being the contributor that causes the largest potential impact for 19 impact categories. Apart from rebar production process, PCC cement production, electricity production, fine aggregate production, coarse aggregate production, hydraulic cement production, plasticiser production, and wood stoppers production are contributors that has significant impact for the PC Spun Piles products.
- From the transportation of raw materials and supporting materials (module A2), the emission from transportation of raw materials using lorry 16-32 metric ton capacity contributes to 16 impact categories. However, its contribution is only around 38% of total impact transportation of module A2 and C2.
- From the production activities carried out in the WIKA Beton area (module A3), there is no significant impact on the production activities process. However, the end-of-life disposal of waste wood stoppers used in stacking & stockyard activities that are sent to landfills contributes to 1 impact category, i.e., global warming potential - biogenic.
- Activities carried out on the end-of-life of the PC Spun Piles life cycle (module C1-C4) also have a significant impact on the overall PC Spun Piles life cycle studied. Transportation of end-of-life waste products to waste processing and disposal in Indonesia using lorry 16-32 metric ton capacity (module C2 and C4) contributes to 16 impact categories and carries 62% of the total impact transportation of module A2 and C2. De-construction and demolition processes contribute to 1 impact category i.e., particulate matters. Concrete waste processing (module C3) and concrete disposal processes (module C4) contribute to 4 and 2 impact categories, respectively.

Additional Environmental Information

WIKA Beton has made significant strides in reducing its carbon footprint by operating two factories powered by solar energy from photovoltaic power plants in Bogor and Majalengka, West Java. WIKA Beton's initiative aims to harness renewable solar energy for its precast concrete production processes.

Solar panels, installed in October 2023, are strategically placed on the roofs of the main production lines, generating a total electrical power of 682 kWP to support the factories' primary activities. This adoption of photovoltaic power plants is projected to annually decrease carbon dioxide (CO_2) emissions by approximately 532,812 kg and save up to 15 percent of electricity consumption from the electricity energy mix (PLN).

In addition, WIKA Beton's comprehensive environmental initiatives are not only limited to the utilization of solar energy but also include the use of processed production wastewater, the utilization of fly ash waste as a concrete mix, and environmentally responsible operational practices.

With a commitment to environmental responsibility, WIKA Beton aims to continue growing, developing, and delivering value to all stakeholders, ensuring benefits for both present and future generations.

(Liputan 6, 2023)

Additional Social and Economic Information

Departing from the vision and mission of WIKA Beton related to the social environment of the community, namely to become a globally trusted company providing solutions in the concrete industry with a commitment to environmental responsibility.

WIKA BETON encourages 13 SDGs. Of these goals, we also support 8 Priority SDGs of Ministry of SOEs, namely SDGs 2, 4, 8, 9, 11, 13, 15 and 16. We also participate in realizing the initiatives along with the 2022 targets and achievements. The supports given for the SDGs are integrated with the implementation of the Company's CSR program, includes :

a. Planted 200 Moringa trees
b. Produced semprong (Asian egg roll) from Moringa leaves, which contributed to the 5% average increase in the community's income
c. No employees were involved in narcotics and alcohol abuse, thus medical rehabilitation service was not required
d. Reached 100 beneficiaries, 20 elementary students 20 middle school students 60 high school students receiving assistance 1-year CSR Scholarship of Brain Academy Online for employees' children and the community
e. There were 20 female employees occupied the Company's managerial positions, or 1.55% of the total employees and 28.17% of the total female employees. In overall, this number represented 5.33% of the total employees
f. 9 factories have applied zero waste (Spun pile product)
g. Obtained 26 MSMEs' fostered partners for CSR activities that encouraged formalization and growth in the MSMEs
h. Created train tracks using the precast concrete innovation for infrastructure innovations in train tracks constructions
i. Green space in Subang and Karawang Factories for Constructed green open space that could encourage the community's productivity
j. Operating electric vehicle units
k. Succeeded installing segmental infiltration wells in 840 points throughout DKI Jakarta, as product creation that improve the ability of land in water absorption
l. The socialization of Anticorruption Policy was presented to 1,283 employees

(WIKA Beton Sustainability Report, 2023)

Contact information

Owner of the EPD

PT Wijaya Karya Beton Tbk

WIKA Tower 1 Lt. 2-5

Jl. D.I. Panjaitan Kav. 9-10 Jakarta 13340

Contact
sekper@wika-beton.co.id

Website
www.wika-beton.co.id

Instagram
@wikabeton

Facebook
PT Wijaya Karya Beton Tbk

Youtube
@WTONTV

Phone
+6221 8192802
(hunting)

Fax
+6221 8590 3872

LCA Practitioner

PT Life Cycle Indonesia

Kencana Tower Lvl. Mezzanine, Business Park Kebon Jeruk, Jl. Meruya Ilir No. 88, Jakarta Barat – 11620 Indonesia

Phone +62-21-3042-0634

Email admin@lifecycleindonesia.com

Corresponding practitioner

Jessica Hanafi, Ph.D.

Gloria FJ Kartikasari

Natalia Susanto Salim

Jonathan Aditya Halim

Samuel Billy

Programme operator

EPD International AB

Box 210 60

SE-100 31 Stockholm

Sweden

EPD Southeast Asia

Kencana Tower Level M, Business Park Kebon Jeruk,
Jl Raya Meruya Ilir No. 88,
Jakarta Barat 11620,Indonesia

https://www.epd-southeastasia.com/

Contact
admin@epd-southeastasia.com

References

Directorate General of Electricity. (2019). Electricity Statistics. Jakarta: Ministry of Energy and Mineral Resources Indonesia

EPD International. (2023). C-PCR-003 Concrete and Concrete Elements (EN 16757:2022). EPD International.

EPD International. (2023). Draft General Programme Instructions of the International EPD® System. Version 5.0. EPD International.

EPD International. (2021). General Programme Instructions of the International EPD® System. Version 4.0. EPD International.

EPD International. (2021). Product Category Rules PCR 2019:14. Construction Products. Version 1.3.4. EPD International.

European Commission. (2010). ILCD Handbook: General guide for Life Cycle Assessment - Detailed guidance. Luxembourg: European Union.

European Committee for Standardization. (2019). Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products (EN 15804:2012+A2:2019). European Committee for Standardization

European Committee for Standardization. (2022). Sustainability of Construction Works - Environmental Product Declarations - Product Category Rules for Concrete and Concrete Elements (EN 16757:2022). European Committee for Standardization

GIZ TRANSfer III. (2021). Truck Fleet Modernization in Indonesia Mitigation Action Outline. Retrieved October 26, 2023, from Changing Transport: https://changing-transport.org/publications/truck-fleet-modernization-in-indonesia/

Indonesian Standards Agency. (2004). Planning of concrete structures for bridges. RSNI (Draft Indonesian National Standard) T-12-2004

International Organization for Standardization. (2006). Environmental management. Life cycle assessment. Principles and framework (ISO 14040:2006). International Organization for Standardization.

International Organization for Standardization. (2006). Environmental management. Life cycle assessment. Requirements and guidelines (ISO 14044:2006). International Organization for Standardization.

Life Cycle Indonesia. (2023). Life Cycle Assessment of PC Spun Piles for Environmental Product Declaration. Indonesia: PT Wijaya Karya Beton Tbk. PT Wijaya Karya Beton Tbk.

Liputan6. (2023, October 5). Genjot Turunkan Emisi Karbon, WIKA Beton Mulai Pasang PLTS Atap di Dua Pabrik. Retrieved from https://www.liputan6.com/saham/read/5415243/genjot-turunkan-emisi-karbon-wika-beton-mulai-pasang-plts-atap-di-dua-pabrik?page=3

Matmatch. (2023). Density of wood in kg/m3, g/cm3, lb/ft3 – the ultimate guide. Retrieved from https://matmatch.com/learn/property/density-of-wood

Ministry of National Development Planning of the Republic of Indonesia. (2021). The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia. Retrieved October 31, 2023 from lcdi-indonesia: https://lcdi-indonesia.id/wp-content/uploads/2021/02/Full-Report-The-Economic-Social-and-Environmental-Benefits-of-a-Circular-Economy-in-Indonesia.pdf

WIKA Beton. (2023). Sustainability Report Wijaya Karya Beton Tbk (WTON) Tahun 2022. Retrieved from https://www.wika-beton.co.id/en/laporan-keberlanjutan/

Southeast Asia EPD

Environmental Product Declaration

PT Wijaya Karya Beton Tbk

Head Office

WIKA Tower 1 Lt. 2-5
Jl. D.I. Panjaitan Kav. 9-10 Jakarta 13340

Telephone | +6221 8192802
Fax. | +6221 8590 3872
Website | www.wika-beton.co.id