Type III Environmental Product Declaration No. 105/2020

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REINFORCED CONCRETE PREFABRICATES

Owner of the EPD:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804 (see point 5.3 of the standard).

Life cycle analysis (LCA): modules A1-A3 in accordance with EN 15804 (Cradle-to-Gate)
The year of preparing the EPD: 2020
Product standard: EN 13369
Service Life: 50 years for standard product
PCR: ITB-PCR A (PCR based on EN 15804)
Declared unit: 1 m^3 of the reinforced concrete product
Reasons for performing LCA: B2B
Representativeness: Polish, European

MANUFACTURER

PB-M SCANBET Sp. z o.o. (Construction and Erection Company SCANBET Ltd.) was established in 1996. Since the very beginning the company has been dealing with the production of prefabricated reinforced concrete elements for residential, industry and engineering construction. The manufactured products are used in housing, industrial and engineering construction.
The manufacture does not produce standard elements; prefabricated elements are delivered for the needs of individual construction projects.

PRODUCTS DESCRIPTION AND APPLICATION

PB-M SCANBET Sp. z o. o. specializes in production of concrete and reinforced concrete prefabricates ranging from walls, ceilings, stairs to balconies (weight up to 20 Mg, dimensions up to 10m). The present production capabilities include reinforced concrete prefabricates (not pre-stressed) in the approx. amount of 98.9 m^3/day.
SCANBET reinforced concrete prefabricates produced in Chociwel factory cover 100% of whole factory production in analyzed period.

Diversity of reinforced concrete prefabricates produced in SCANBET:

BALCONIES AND LOGGIAS

Simply supported balconies produced in Chociwel factory do not need any insulation, cladding or concrete overlay after their assembling. There are different forms of balcony plates with diverse surfaces possible:

- smooth concrete surface
- anti-slippery surface
- surface prepared for tiling
- surface prepared for other systems

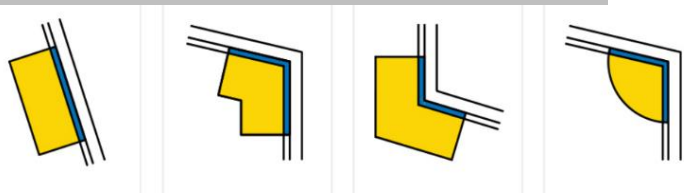


Figure. 1 Shapes for prefabricated concrete balconies and loggias from SCANBET

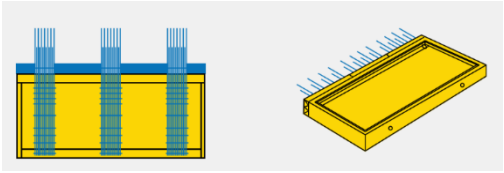


Figure. 2 Connection possibilities for balconies and loggias from SCANBET

REINFORCED CONCRETE WALLS AND FOUNDATIONS

Massive walls and sandwich walls with insulating layer of styrofoam, styrodur or mineral wool:

- outer surfaces of our walls can be homogenous or finished with different structures;
- prefabricated sandwich walls can have ready - made window or door openings;
- can be also equipped with electric installation, sanitary installation and accessories for connection the elements on the construction site;
- wide range of wall dimensions for residential buildings, public facilities, industry halls, etc.



ELEMENTS OF CONCRETE STAIRCASES - Prefabricated flights of stairs

Production for individual clients and project-related manufacturing for big construction projects in all types of size and shape according to the needs of customer.
Specific production where steps and risers of the stairs receive smooth concrete surfaces (from the formwork surface), resulting with high visual quality of the steps; the underside of stairs is rubbed fine and smooth. The passable side of stairs can be tiled. There are a few possibilities how staircases can be produced:

- flight of stairs with a landing at the top & bottom;
- flights of stairs and landings produced separately;
- stair runs supported on landings;
- spiral stairs 90º and 180 º.



ELEMENTS OF REINFORCED CONCRETE STRUCTURES

Prefabricated beams

Concrete beams of rectangular, trapezoid cross-sections, T-shaped, L-shaped beams with different dimension. The length of the beams is about 12m. The offered elements can be joined with the construction by means of placing on the columns support (using thorns, steel anchor plates) or by using screw connectors.

Prefabricated poles

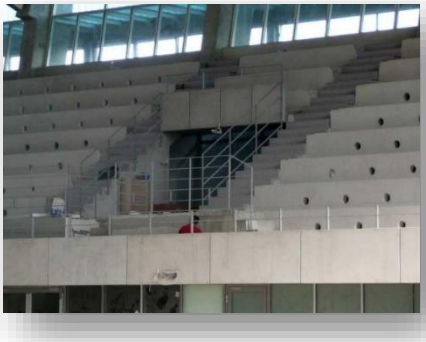
Poles in specific sizes with square, rectangular and circular cross-sections. Their length can be fixed or variable. Poles are equipped with joining accessories (such as connectors, braces, steel anchor plates etc.). It is possible to produce poles with supports in all directions which serve as support for beams and joists.

Lift shafts

Lift shafts tailored to the needs of clients. The height of the elements depends on the height of each storey in a house. A lift shaft consists of the following elements:

- watertight shaft bottom
- bottom element*
- upper element*
- shaft top plate

**the upper and bottom storey elements can be produced as separate side walls; they can also be manufactured as one unit - as spatial element*



ENGINEERING PREFABRICATED ELEMENTS

Prefabricated L-shape, as well T-shaped retaining walls with symmetrical or asymmetrical footing. Their aim is to transfer the pressure of a secured construction and are used when building ramps, channels and tunnels.


In SCANBET quality control is carried out on the basis of the Factory Quality Control System. It consists in controlling operations on every stage of production. System of Quality Control was accepted by Polish certification authority “CWB”. The mentioned authority granted the company SCANBET the Certification of Factory Quality Control System No. 2767-CPR-0146 which applies to compliance with the following standards:

- EN 13225:2013 Precast Concrete Elements: Bar-shaped construction elements.
- EN 13747:2005 + A2:2010 Precast concrete products - Floor plates for floor systems
- EN 14843:2007 Precast Concrete Elements: Stairs.
- EN 14991:2007 Precast concrete products - Foundation elements
- EN 14992:2007 + A1:2012 Precast concrete products - Wall elements
- EN 15258:2008 Precast concrete products - Retaining wall elements

Certificate granted by Certification Authority Nordcert confirms that a company established and implemented its production system for precast reinforced concrete elements according to the Standards EN 13369:2004 + EN 13369:2004/A1:2006 – Common Requirements for Precast Concrete Elements with supplementary Swedish requirements.

The Production Control System of the company SCANBET fulfils also the requirements of the standards confirmed by Certificate of Conformity (Übereinstimmungszertifikat) granted by Brandenburgische Technische Universität Cottbus:

- DIN EN 206-1:2001-07
- DIN 1045-1-3 2008-08
- DIN 1045-4:2001-7.

The above certificates authorize SCANBET to sell prefabricated elements in the European Union using the CE mark.

SCANBET is also labelled with BVB (Byggvarubedömningen) mark. The BVB quality mark aims to assess the quality of building materials used in the construction process and to promote product development towards a non-toxic and good environment.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A and EN 13369. The reinforced concrete production is a line process with multiple co-products located in one factory based in Chociwel (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of PB-M SCANBET Sp. z o.o. were inventoried and 100% were allocated to the prefabricated concrete elements production. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were takien into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3 (cradle-to-gate) in accordance with EN 15804+A1 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all

impact categories. In accordance with EN 15804+A1, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: ***Raw materials supply and transport***

A1 module includes raw materials used in the production of the reinforced concrete product such as water, cement CEM II/A-M (S-LL) 52.5 N, aggregates, steel in coils, bars and meshes (RIVA Stahl, CMC; steel scrap content > 95%), and additives. Raw materials for prefabricated concrete elements production come from local suppliers and from more distant locations. Means of transport include lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: ***Production***

The figure 3 show the working process during the production of reinforced concrete product. The raw materials: aggregates, cement, cement additives, steel and other inserts (e.g. EPS insulation) and water are distributed to forms made of wood and plywood, which is reused as energy carrier for heat production. Prefabricated elements are stored in forms until concrete reaches its utility parameters. The 221,94 kg of waste from every declared unit (1 m^m of the reinforced concrete product) is being recycled. Ready-to-use prefabricated elements are packed and distributed.

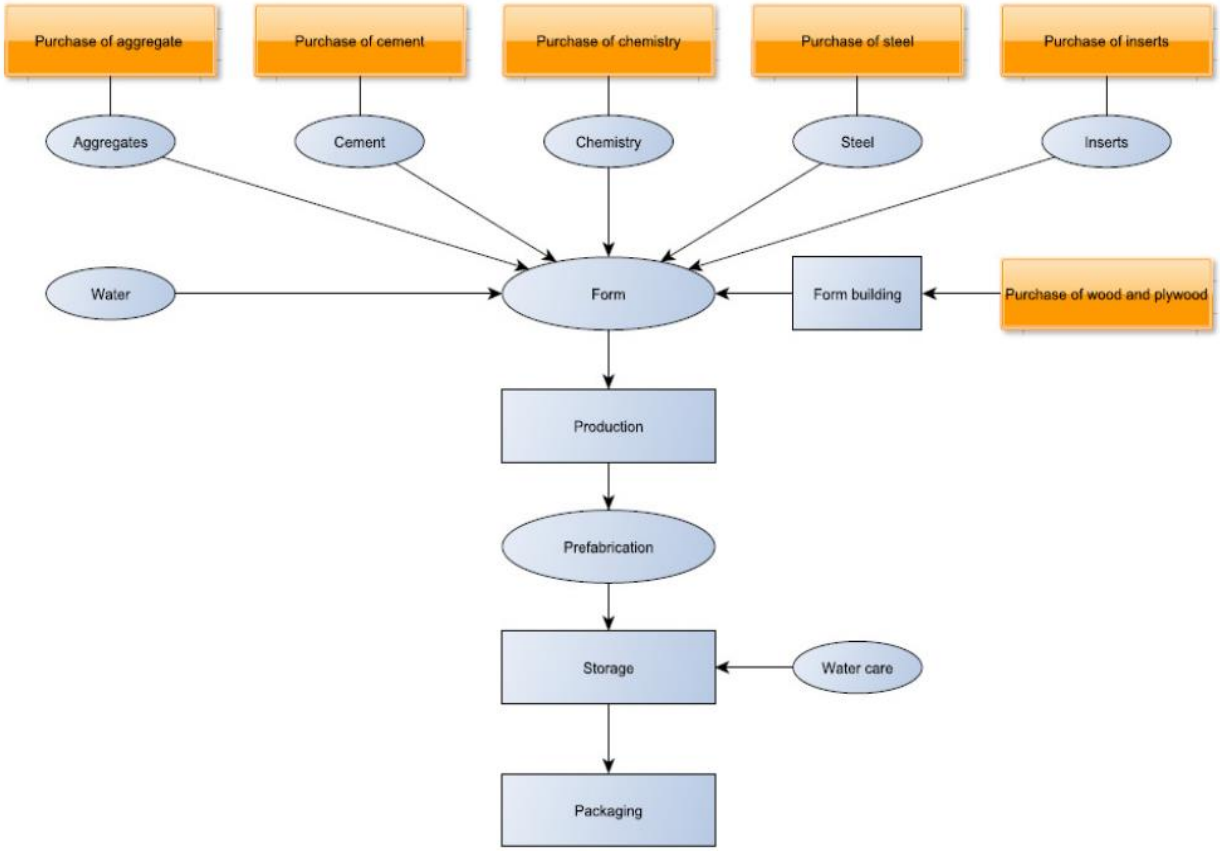


Fig. 3. The scheme of the reinforced concrete product produced by PB-M SCANBET Sp. z o. o.

Data quality
The values determined to calculate the LCA originate from verified PB-M SCANBET Sp. z o.o. inventory data.

Data collection period
The data for manufacture of the declared products refer to period between 01.01.2018 – 31.12.2018 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates
The impacts of the representative of the reinforced concrete product were aggregated using weighted average. Impacts were inventoried and calculated for all products of the reinforced concrete product.

Calculation rules
LCA was done in accordance with ITB PCR A document.

Databases
The data for the processes comes from the following databases: Ecoinvent, specific EPDs, ITB-Database. Specific data quality analysis was a part of an external audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit
The declaration refers to declared unit (DU) – 1 m^3 of the reinforced concrete product produced by PB-M SCANBET Sp. z o.o.

Table 1. System boundaries for the environmental characteristic of the reinforced concrete product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	**Transport**	**Manufacturing**	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	**A2**	**A3**	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	**MD**	**MD**	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Table 2. Life cycle assessment (LCA) results of the reinforced concrete product by PB-M SCANBET Sp. z o.o.

Environmental impacts: (DU) 1 m^3					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	kg CO_2 eq.	3.03E+02	1.27E+01	4.50E+01	3.61E+02
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	1.40E-05	0.00E+00	0.00E+00	1.40E-05
Acidification potential of soil and water	kg SO_2 eq.	7.64E-01	1.25E-02	6.09E-02	8.37E-01
Formation potential of tropospheric ozone	kg Ethene eq.	2.36E-01	5.24E-03	0.00E+00	2.41E-01
Eutrophication potential	kg PO_4^- eq.	3.45E-02	1.56E-03	3.60E-03	3.96E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	5.58E-01	0.00E+00	1.67E-04	5.58E-01
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	7.66E+02	1.23E+02	4.65E+02	1.35E+03
Environmental aspects on resource use: (DU) 1 m^3					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	4.25E+02	1.49E-01	1.99E+02	6.24E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	7.77E+02	1.36E+02	5.11E+02	1.42E+03
Use of secondary material	kg	2.52E+01	0.00E+00	0.00E+00	2.52E+01
Use of renewable secondary fuels	MJ	INA	INA	INA	INA
Use of non-renewable secondary fuels	MJ	INA	INA	INA	INA
Net use of fresh water	m^3	INA	INA	INA	INA
Other environmental information describing waste categories: (DU) 1 m^3					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	kg	5.27E-01	0.00E+00	0.00E+00	5.27E-01
Non-hazardous waste disposed	kg	1.13E+01	4.84E+00	1.28E+01	2.89E+01
Radioactive waste disposed	kg	1.22E-02	0.00E+00	0.00E+00	1.22E-02
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.70E+01	0.00E+00	2.22E+02	2.39E+02
Materials for energy recover	kg	2.07E+00	0.00E+00	0.00E+00	2.07E+00
Exported energy	MJ per energy carrier	5.86E-01	0.00E+00	0.00E+00	5.86E-01

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ external ☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCA, LCI audit and input data verification: MSc Dominik Bekierski (LCA), PhD. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl (A1 revision) Verification of LCA: PhD. Eng. Michał Piasecki, m.piasecki@itb.pl

Normative references

- ITB PCR A- General Product Category Rules for Construction Products
- EN 13369 - Common rules for precast concrete products
- ISO 14025:2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services
- ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets -- Service life planning -- Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets -- Service-life planning -- Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15942:2011 Sustainability of construction works - Environmental product declarations - Communication format business-to-business

KIEROWNIK
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dr inż. Agnieszka Winkler-Skalna

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00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE № 105/2020
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Reinforced concrete prefabricates

Manufacturer:

Przedsiębiorstwo Budowlano - Montażowe SCANBET Sp. z o.o.

Fabryczna 1, 73-120 Chociwel, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN-EN 15804+A1:2014-04

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued for the first time on 7th January 2020 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Barbara Pietruszka, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, January 2020