Type III Environmental Product Declaration No. 275/2021

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Precast concrete structures:

massive walls, triple-layered walls, stairs and balconies

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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): A1-A3, C3, C4 and D modules in accordance with EN 15804
(Cradle-to-Gate with options)
The year of preparing the EPD: 2021
Product standard: PN-EN 13369:2018-05; PN-EN 14992+A1:2012; PN-EN 14843:2009
Service Life: 50 years for standard product
PCR: ITB-PCR A (PCR based on EN 15804)
Declared unit: 1 ton
Reasons for performing LCA: B2B
Representativeness: Polish, European

MANUFACTURER

HM Factory Sp. z o.o. is a Polish producer of precast elements and a contractor of prefabricated structures with a factory located in Sochaczew. The company manufactures elements for housing, industrial, office and public utility construction. We offer a complete scope of services from design through production, delivery and assembly on site. HM Factory is part of the Grupa Inwest – project developer based in Warsaw. As part of a long-term strategy, Grupa Inwest in 2018 decided to purchase a factory in Sochaczew. From that moment, HM Factory began implementing prefabrication technologies on the domestic residential business, both for its own development projects and by cooperating with external clients.

Fig. 1 Visualization of HM Factory Sp. z o.o. production hall in Sochaczew.

PRODUCT DESCRIPTION AND APPLICATION

Triple-layered walls (sandwich walls) are comprehensive solution for the facade of any building. Consisting of an inner load bearing layer, thermal insulation and an external facade layer, they are delivered to the construction site as one element.

Massive walls are single-layer walls made of structural concrete, which are mainly used as internal walls, but also as external elements insulated at the site.

Balconies are massive slabs equipped with thermal insulated connector, dripedge and possible nice rolled top surface or other additional accessories as railings fasteners.

Stairs are external and internal elements with a wide scope of finishing options. HM Factory Sp. z o.o. offers gray concrete stairs with a non-slip surface or a terrazzo finish made in the factory.

Precast concrete structures can be used for housing, industrial, office and public utility construction.

LIFE CYCLE ASSESSMENT (LCA)

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the precast concrete structures such as massive walls, triple-layered walls, stairs and balconies is a line process conducted in the factory of HM Factory Sp. z o.o. located in Sochaczew (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 HM Factory Sp. z o.o. were inventoried and 74.43% were allocated to the production of of the precast concrete structures such as massive walls, triple-layered walls, stairs and balconies. 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, end of life – modules C3, C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) 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*

Raw materials such as cement, sand, gravel, lime, reinforcing steel components, insulation materials (i.a. mineral wool, styrofoam, PIR), additives, ancillary materials and packaging materials come from both local and foreign suppliers. Means of transport include lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: *Production*

The production of concrete elements (Fig. 2) starts by manufacturing of custom-made molds. At the same time, the reinforcement is prepared by bending and cutting meshes and bars into the designed dimensions. The casting table is cleaned before the molds are assembled. Reinforcement and cast-in-materials are mounted, form oil applied and the elements casted. As the concrete sets and reaches the right consistency, the surface treatment is applied. After curing the concrete reaches the designed demoulding strength and the elements can be lifted to an intermediate storage area for quality control

and finishing before they are finally transported out into the storage yard ready for delivery to the construction site.

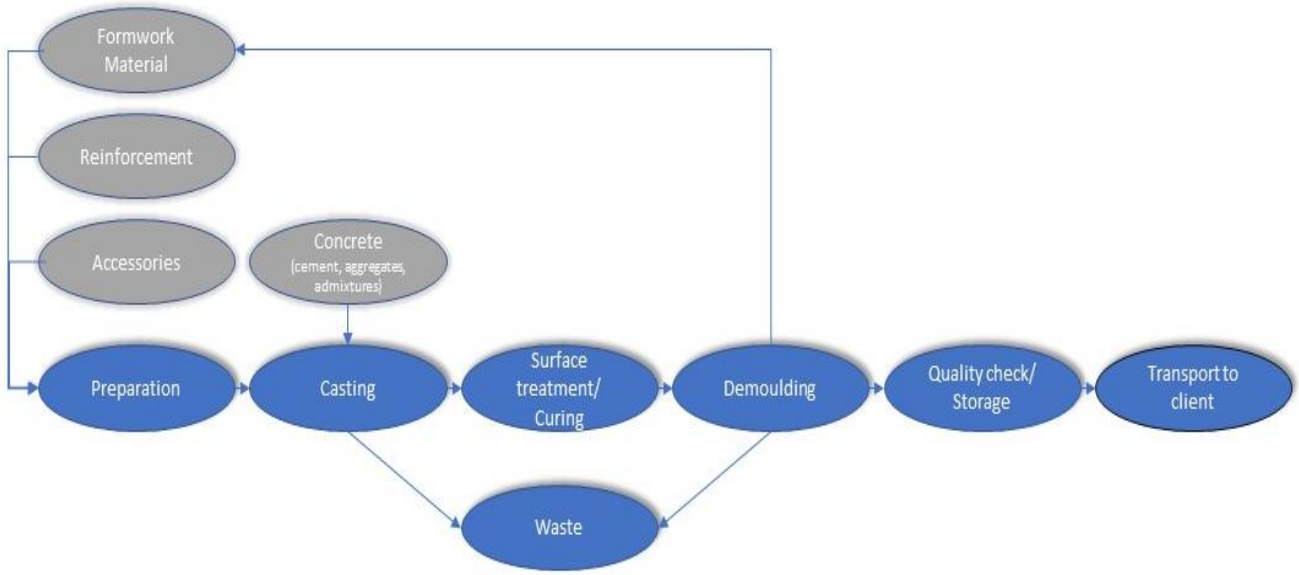

Fig. 2. Production process of the precast concrete structures: massive walls, triple-layered walls, stairs and balconies by HM Factory Sp. z o. o.

Modules *C3, C4 and D: End-of-life (EoL) and benefits and loads beyond the system boundaries*

At the end-of-life the precast concrete structures: massive walls, triple-layered walls, stairs and balconies can be deconstructed with the use of heavy machinery. Recovered materials undergo recycling and landfilling according to the Polish treatment practice of industrial wastes - Table 1. The remaining materials are classified as inert wastes in the European list of waste products and are forwarded to a landfill in the form of mixed construction and demolition wastes. Environmental impacts declared in module C4 are associated with exchanges to process-specific burdens. Module D presents potential credits resulting from the use of crushed concrete wastes as aggregates for road foundation or ballast and the recycling of the steel scrap. Impacts of materials that constitute less than 1.0% of the total system flows were not taken into consideration.

Table 1. End-of-life scenario for the precast concrete structures: massive walls, triple-layered walls, stairs and balconies produced by HM Factory Sp. z o.o.

Material	Material recovery	Recycling	Landfilling
concrete waste	100%	95%	5%
steel scrap	100%	95%	5%

Data quality

The values determined to calculate the LCA originate from verified HM Factory Sp. z o.o. inventory data.

Data collection period

The data for manufacture of the declared products refer to period between 01.09.2020 – 31.08.2021 (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 precast concrete structures: massive walls, triple-layered walls, stairs and balconies were aggregated using weighted average. Impacts were inventoried and calculated for all the precast concrete structures.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent, specific EPDs, ITB-Database. Specific data quality analysis was a part of external ISO 14001 audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the precast concrete structures: massive walls, triple-layered walls, stairs and balconies based on CEM II, produced by HM Factory Sp. z o. o.

Table 2. System boundaries for the environmental characteristic of the precast concrete structures: massive walls, triple-layered walls, stairs and balconies produced by HM Factory Sp. z o.o.

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	MD	MD	MD

Table 3. Life cycle assessment (LCA) results of the precast concrete massive walls produced by HM Factory Sp. z o.o.

Environmental impacts: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1.53E+02	2.72E+00	1.44E+01	1.70E+02	5.59E+00	2.55E-01	-3.21E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	5.92E-06	0.00E+00	2.59E-07	6.18E-06	9.52E-07	8.23E-08	-6.00E-07
Acidification potential of soil and water	kg SO_2 eq.	5.51E-01	3.75E-02	5.66E-04	5.89E-01	4.17E-02	1.84E-03	-1.33E-01
Formation potential of tropospheric ozone	kg Ethene eq.	1.52E-01	2.73E-03	0.00E+00	1.54E-01	9.11E-04	7.69E-05	-1.62E-02
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	7.93E-02	6.61E-03	9.84E-05	8.60E-02	9.62E-03	3.92E-04	-2.45E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	3.42E-01	0.00E+00	5.33E-05	3.42E-01	2.89E-06	5.84E-07	-7.18E-05
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.14E+03	3.71E+01	1.47E+02	1.33E+03	7.52E+01	6.98E+00	-3.18E+02
Environmental aspects on resource use: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5.09E+02	2.60E+00	1.90E+01	5.31E+02	4.35E-01	6.25E-02	3.35E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.45E+03	3.89E+01	1.54E+02	1.64E+03	7.52E+01	7.63E+00	-3.41E+02
Use of secondary material	kg	2.99E+01	0.00E+00	0.00E+00	2.99E+01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	9.55E+01	1.95E+00	0.00E+00	9.74E+01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	1.38E+02	0.00E+00	0.00E+00	1.38E+02	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	3.30E+00	1.72E-05	6.41E-02	3.37E+00	1.36E-03	2.81E-04	-1.55E-02
Other environmental information describing waste categories: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.99E-02	1.26E-10	0.00E+00	1.99E-02	2.11E-04	1.09E-05	-2.33E-04
Non-hazardous waste disposed	kg	9.58E+00	5.62E-08	2.05E+00	1.16E+01	1.03E-01	5.00E+01	-2.19E+00
Radioactive waste disposed	kg	5.94E-03	3.25E-10	0.00E+00	5.94E-03	5.33E-04	4.71E-05	3.25E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	8.43E-02	0.00E+00	1.62E-01	2.46E-01	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 4. Life cycle assessment (LCA) results of the precast concrete triple-layered walls produced by HM Factory Sp. z o.o.

Environmental impacts: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	2.59E+02	2.90E+00	1.44E+01	2.76E+02	5.59E+00	2.55E-01	-3.42E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	6.98E-06	0.00E+00	2.59E-07	7.24E-06	9.52E-07	8.22E-08	-5.99E-07
Acidification potential of soil and water	kg SO_2 eq.	8.77E-01	3.76E-02	5.66E-04	9.16E-01	4.17E-02	1.84E-03	-1.41E-01
Formation potential of tropospheric ozone	kg Ethene eq.	2.83E-01	2.74E-03	0.00E+00	2.86E-01	9.11E-04	7.68E-05	-1.73E-02
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	1.85E-01	6.63E-03	9.84E-05	1.92E-01	9.62E-03	3.92E-04	-2.51E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	1.53E+00	0.00E+00	5.33E-05	1.53E+00	2.89E-06	5.83E-07	-7.16E-05
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	3.46E+03	3.96E+01	1.47E+02	3.64E+03	7.52E+01	6.96E+00	-3.37E+02
Environmental aspects on resource use: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.33E+02	2.77E+00	1.90E+01	2.55E+02	4.35E-01	6.24E-02	4.56E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	3.89E+03	4.16E+01	1.54E+02	4.08E+03	7.52E+01	7.62E+00	-3.60E+02
Use of secondary material	kg	2.92E+01	0.00E+00	0.00E+00	2.92E+01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	9.76E+01	2.08E+00	0.00E+00	9.97E+01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	1.40E+02	0.00E+00	0.00E+00	1.40E+02	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	3.48E+00	1.84E-05	6.41E-02	3.54E+00	1.36E-03	2.80E-04	-1.23E-02
Other environmental information describing waste categories: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	3.03E-02	1.34E-10	0.00E+00	3.03E-02	2.11E-04	1.09E-05	-2.32E-04
Non-hazardous waste disposed	kg	1.24E+01	6.00E-08	2.05E+00	1.44E+01	1.03E-01	5.00E+01	-2.21E+00
Radioactive waste disposed	kg	6.18E-03	3.47E-10	0.00E+00	6.18E-03	5.33E-04	4.70E-05	3.57E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	3.58E-01	0.00E+00	1.62E-01	5.20E-01	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 5. Life cycle assessment (LCA) results of the precast concrete stairs produced by HM Factory Sp. z o.o.

Environmental impacts: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	1.69E+02	2.67E+00	1.44E+01	1.86E+02	5.59E+00	2.55E-01	-3.79E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	5.90E-06	0.00E+00	2.59E-07	6.16E-06	9.52E-07	8.19E-08	-5.96E-07
Acidification potential of soil and water	kg SO_2 eq.	5.55E-01	3.74E-02	5.66E-04	5.93E-01	4.17E-02	1.84E-03	-1.55E-01
Formation potential of tropospheric ozone	kg Ethene eq.	1.29E-01	2.73E-03	0.00E+00	1.32E-01	9.11E-04	7.66E-05	-1.94E-02
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	6.53E-02	6.60E-03	9.84E-05	7.20E-02	9.62E-03	3.91E-04	-2.61E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	3.41E-01	0.00E+00	5.33E-05	3.41E-01	2.89E-06	5.80E-07	-7.12E-05
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	9.04E+02	3.64E+01	1.47E+02	1.09E+03	7.52E+01	6.94E+00	-3.72E+02
Environmental aspects on resource use: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.30E+02	2.55E+00	1.90E+01	1.52E+02	4.35E-01	6.22E-02	6.74E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.31E+03	3.82E+01	1.54E+02	1.50E+03	7.52E+01	7.59E+00	-3.93E+02
Use of secondary material	kg	3.70E+01	0.00E+00	0.00E+00	3.70E+01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	9.52E+01	1.91E+00	0.00E+00	9.71E+01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	1.38E+02	0.00E+00	0.00E+00	1.38E+02	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	3.12E+00	1.69E-05	6.41E-02	3.19E+00	1.36E-03	2.79E-04	-6.56E-03
Other environmental information describing waste categories: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.84E-02	1.23E-10	0.00E+00	1.84E-02	2.11E-04	1.09E-05	-2.31E-04
Non-hazardous waste disposed	kg	8.30E+00	5.51E-08	2.05E+00	1.03E+01	1.03E-01	5.00E+01	-2.26E+00
Radioactive waste disposed	kg	6.40E-03	3.18E-10	0.00E+00	6.40E-03	5.33E-04	4.68E-05	4.16E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.44E-02	0.00E+00	1.62E-01	2.26E-01	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 6. Life cycle assessment (LCA) results of the precast concrete balconies produced by HM Factory Sp. z o.o.

Environmental impacts: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	2.13E+02	6.15E+00	1.44E+01	2.33E+02	5.59E+00	2.52E-01	-5.28E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	6.91E-06	0.00E+00	2.59E-07	7.17E-06	9.44E-07	8.05E-08	-5.84E-07
Acidification potential of soil and water	kg SO_2 eq.	7.84E-01	8.81E-02	5.66E-04	8.72E-01	4.17E-02	1.81E-03	-2.12E-01
Formation potential of tropospheric ozone	kg Ethene eq.	1.95E-01	6.43E-03	0.00E+00	2.01E-01	9.02E-04	7.55E-05	-2.77E-02
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	1.16E-01	1.55E-02	9.84E-05	1.32E-01	9.53E-03	3.86E-04	-3.02E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	4.43E-01	0.00E+00	5.33E-05	4.43E-01	2.86E-06	5.70E-07	-6.95E-05
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1.24E+03	8.39E+01	1.47E+02	1.47E+03	7.45E+01	6.82E+00	-5.11E+02
Environmental aspects on resource use: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	5.19E+02	5.87E+00	1.90E+01	5.44E+02	4.31E-01	6.11E-02	1.54E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.90E+03	8.81E+01	1.54E+02	2.15E+03	7.45E+01	7.46E+00	-5.26E+02
Use of secondary material	kg	5.43E+01	0.00E+00	0.00E+00	5.43E+01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	1.23E+02	4.41E+00	0.00E+00	1.27E+02	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	1.78E+02	0.00E+00	0.00E+00	1.78E+02	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	3.45E+00	3.90E-05	6.41E-02	3.52E+00	1.35E-03	2.74E-04	1.63E-02
Other environmental information describing waste categories: (DU) 1 ton								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4.73E-02	2.85E-10	0.00E+00	4.73E-02	2.09E-04	1.07E-05	-2.27E-04
Non-hazardous waste disposed	kg	9.21E+00	1.27E-07	2.05E+00	1.13E+01	1.02E-01	4.95E+01	-2.43E+00
Radioactive waste disposed	kg	9.45E-03	7.35E-10	0.00E+00	9.45E-03	5.28E-04	4.60E-05	6.50E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.97E-01	0.00E+00	1.62E-01	3.60E-01	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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: PhD. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: PhD. DSc. Eng. Michał Piasecki, m.piasecki@itb.pl

Normative references

- ITB PCR A General Product Category Rules for Construction 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+A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- PN-EN 13369:2018-05 Wspólne wymagania dla prefabrykatów z betonu
- PN-EN 14992+A1:2012 Prefabrykaty z betonu -- Elementy ścian
- PN-EN 14843:2009 Prefabrykaty z betonu -- Schody
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2020

Dokument podpisany przez Agnieszka Winkler-Skalna; ITB
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dr inż. Agnieszka Winkler-Skalna
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02-656 Warsaw, Ksawerów 21

CERTIFICATE № 275/2021
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Precast concrete structures:
massive walls, triple-layered walls, stairs and balconies

Manufacturer:

HM Factory Sp. z o.o.
ul. Fabryczna 5, 00-446 Warsaw, 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

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

This certificate, issued for the first time on 13th December 2021 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director
for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, December 2021