Erklärung der Übereinstimmung mit einer Muster-EPD

Hiermit bestätigen wir, dass unser Produkt

MC-PowerFlow evo 610

mit der Muster-Umwelt-Produktdeklaration (Muster-EPD)

EPD-DBE-20230568-IBG2-EN

Concrete admixtures - Plasticizers and Superplasticizers for CO2 optimized concrete, group A
Betonzusatzmittel, Betonverflüssiger und Fließmittel für CO2 optimierten Beton, Gruppe A

gemäß ISO 14025 und EN 15804 übereinstimmen.

Der Industrieverband Deutsche Bauchemie e. V. ist Mitinhaber der zitierten Umwelt-Produktdeklaration („Muster-EPD“), die in seinem Auftrag vom Institut Bauen und Umwelt e. V. (IBU) aufgestellt wurde. Aus Mitglied der Deutschen Bauchemie e. V. ist die MC-Bauchemie Müller GmbH & Co. berechtigt, die Muster-EPD zu nutzen und hat verifiziert, dass die Zusammensetzung des Produkts unter die Rahmendaten der Muster-EPD fällt.

Das bedeutet, dass die Bewertungen und Ökobilanzdaten der Muster-EPD zur Bewertung der Nachhaltigkeit von Bauwerken herangezogen werden können, bei denen das Produkt eingebaut worden ist.

John van Diemen
Leiter Chemische Entwicklung und Qualitätswesen

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ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	European Federation of Concrete Admixtures Associations a.i.s.b.l. (EFCA) + Deutsche Ba
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-DBE-20230567-IBG2-EN
Issue date	06.03.2024
Valid to	05.03.2029

Concrete admixtures – Plasticizers and Superplasticizers for CO2 optimized c group A

DBC - Deutsche Bauchemie e.V. EFCA - European Federation of Concrete Admixtures Associations

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

www.ibu-epd.com | https://epd-online.com

1. General Information

DBC - Deutsche Bauchemie e.V. EFCA - European Federation of Concrete Admixtures Associations

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-DBE-20230567-IBG2-EN

This declaration is based on the product category rules:

Concrete admixtures, 19.10.2023
(PCR checked and approved by the SVR)

Issue date

06.03.2024

Valid to

05.03.2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Concrete admixtures – Plasticizers and Superplasticizers for CO2 optimized concrete, group A

Owner of the declaration

European Federation of Concrete Admixtures Associations a.i.s.b.l.
(EFCA) + Deutsche Bauchemie e.V.
Rue d'Arlon + Mainzer Landstr. 55 + 55
1040+60329 Brussels + Frankfurt
(Others)

Declared product / declared unit

1 kg of plasticizers and superplasticizers for CO_2 optimized Concrete group A, density: 1 - 1.6 kg/l

Scope:

This verified EPD entitles DBC and EFCA to bear the symbol of the Institut Bauen und Umwelt e.V. It exclusively applies for the product groups referred to for plants operated in Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Turkey and the United Kingdom by companies that are members of DBC and members of EFCA National Associations in these countries and for a period of five years from the date of issue. It involves a Model EPD where the product displaying the highest environmental impact in a group was selected for calculating the Life Cycle Assessment. Please refer to the EFCA website www.efca.info for a list of National Associations and the DBC website for a list of DBC member companies (www.deutsche-bauchemie.de).
The application of this EPD is only possible for member companies of DBC and member companies of EFCA's member associations and only for specific formulations with a total score below the declared maximum score for a product group according to the associated guidance document.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Matthias Schulz,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Admixtures are liquid or powdery agents that are introduced in small amounts (< 5 % by mass of the cement content) to concrete while it is being mixed and that enhance the properties of the fresh and/or hardened concrete. Plasticizers and superplasticizers are admixtures which reduce the water content of mixed concrete without detriment to its consistency or enhance its slump with or without change to the water content or cause both effects simultaneously. They can also display a retarding effect when used as combination products. This EPD was developed specifically for plasticisers and superplasticisers for use in CO_2-optimised concrete. It is one of three EPDs (groups A, B and C) with step-wise reduced Global Warming Potential (GWP). The results of the Life Cycle Assessment provided in this declaration have been selected from the product with the highest environmental impact (worst-case scenario). The product needs a declaration of performance taking into consideration *EN 934-2:2009+A1:2012, Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling* and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Concrete admixtures are used as constituent materials for the production of concrete, mortar and grout (unreinforced concrete, reinforced and prestressed concrete, site-mixed and ready-mixed concrete, precast concrete). Their application should be in line with the manufacturer's technical documents and Declaration of Performance.

2.3 Technical Data

Plasticizers and superplasticizers must comply with the general requirements of *EN 934-1:2008* and the additional requirements of *EN 934-2:2009+A1:2012*. The corresponding requirements in line with *EN 934-1:2008* and *EN 934-2:2009+A1:2012* must be maintained.

Constructional data

Name	Value	Unit
Density (ISO 758)	1 - 1.6	g/ml
Solids content (EN 480-8)	-[1]	M.-%
pH value (ISO 4316)	-[1]	$-\log_{10}(a_{H+})$
Chloride content (EN 480-10)	Chloride content (EN 480-10) Maximum value to bedeclared by themanufacturer	M.-%
Alkali content (EN 480-12)	Maximum value to be declared by the manufacturer	M.-%
Corrosion behavior (EN 934-1 / EN 480-14)	-[2]	µ A/cm^2
SiO2 content (EN 192-2)	-[3]	M.-%
Air content of fresh concrete (EN 12350-7)	Test mix ≤ 2% by volume above control mix unless stated otherwise by the manufacturer	Vol.-%
Compressive strength (EN 12390-3)	-[5]	N/mm^2
Water reduction (EN 12350-2 / EN 12350-5) Plasticizer	Test mix ≥ 5% compared to control mix Superplasticizer: Test mix ≥ 12% com-pared to control mix	mm
Increasing / maintaining of consistence (EN 12350-2 / EN 12350-5) Superplasticizer	-[6]	mm
Setting time (EN 480-2) Accelerator/Retarder	-[4]	min
Air void Characteristics in hardened concrete (EN 480-11) Air entrainer	-[4]	mm
Capillary water absorption (EN 480-5)	-[4]	g/mm^2

[1] Value will be made available to user on request
[2] No corrosion behaviour test is required for admixtures which only contain active substances in the list of approved substances to EN 934-1, Annexe A.1 and in the list of declared substances to EN 934-1, Annexe A.2.
[3] Maximum value must only be indicated when SiO_2 percentage by mass > 5 %
[4] Details not relevant for this type of admixture
[5] Concrete plasticizer:
At 7 and 28 days: Test mix ≥ 110 % of control mix
Superplasticizer (tested at equal consistency):
At 1 day:
Test mix ≥ 140 % of control mix
At 28 days:
Test mix ≥ 115 % of control mix
Superplasticizer (tested at equal w/c ratio): At 28 days:
Test mix ≥ 90 % of control mix
[6] Increase in consistency
Increase in slump ≥ 120 mm from initial (30 ± 10) mm
or
Increase in flow ≥ 160 mm from initial (350 ± 20) mm
Retention of consistency 30 min after the addition:
the consistency of test mix ≥ initial consistency of the control mix

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 934-2:2009+A1:2012, Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling*.

2.4 Delivery status

Plasticizers and superplasticizers are usually supplied in liquid, paste or powder form in containers made of steel or plastic. Typical container sizes are canisters containing approx. 25 kg, drums with approx. 200 kg or Intermediate Bulk Containers (IBC) with 1000 kg. The containers are shipped on wooden pallets. For larger applications, loose deliveries in tank trucks with a capacity in excess of 1 tonne are also used.

2.5 Base materials/Ancillary materials

Plasticizers and superplasticizers essentially contain either lignosulphonate, naphthalene sulphonate, melamine sulphonate and polycarboxylate/polycarboxylic or mixtures thereof. Defoaming agents and preservatives are added as minor components and auxiliaries.
Active substance concentration lies between 10 and 40% by mass. The typical dosage of plasticizers lies between 0.2 and 1.6% (referred to the finished product) by mass in relation to the cement weight. The typical dosage of superplasticizers lies between 0.4 and 2.0% by mass in relation to the cement weight.
Products covered by this EPD typically contain the mass proportions of constituent materials and auxiliaries shown in the table below.

Main component

Name	Value	Unit
Lignosulphonate*	max. 40	%
Naphthalene sulphonate*	max. 40	%
Melamine sulphonate*	max. 40	%
Polycarboxylate*	max. 40	%
Polyarylether	max. 35	%
Na-gluconate	max. 35	%
Additives	max. 5	%
Water	approx. 55 - 75	%

*Solid content

These volumes are average values and the composition of products complying with the EPD can deviate from these concentration levels in individual cases.
Note: For companies to declare their products within the scope of this EPD it is not sufficient to simply comply with the product composition shown above. The application of this EPD is only possible for member companies of EFCA's member associations and only for specific formulations with a total score below the declared maximum score for a product group according to the associated guidance document.
Concrete admixtures – Plasticizers and Superplasticizers are mixtures under the chemical legislation (*REACH* and Classification, Labelling and Packaging CLP).

1. substances from the 'Candidate List of Substances of Very High Concern for Authorisation' (SVHC)
If this product contains substances listed in *the candidate list* (latest version) exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD.
If the construction product (concrete admixture Plasticizers and Superplasticizers) contains SVHC exceeding 0.1 percentage by mass, the respective SVHC, its CAS number, information on the concentration and / or concentration range together with information on their hazardous properties are listed in the safety data sheet of the respective product.

2. CMR substances in categories 1A and 1B
If this product contains other carcinogenic, mutagenic, reprotoxic (*CMR*) substances in categories 1A or 1B which are not on *the candidate list*, exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD. If the construction product (concrete admixture – Plasticizers and Superplasticizers) contains CMR substances in categories 1A or 1B exceeding 0.1 percentage by mass, the respective CMR substances, information on the concentration and/or concentration range together with information on their hazardous properties are listed in the safety data sheet of the respective product.

3. Biocide products added to the construction product
Biocide products were added to this construction product, or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products No. 528/2012*).
Usually the construction product (concrete admixture - Plasticizers and Superplasticizers) contain small amounts (< 0.5 % by mass) of biocides of the product type 'in-can preservatives'.
The information on which active substances are contained in the product can be found in the safety data sheet of the relevant product covered by this model EPD. If the construction product (concrete admixture – Plasticizers and Superplasticizers) contains biocide products, the active substances, information on the concentration and/or concentration range, the product type together with information on their hazardous properties are listed in the safety data sheet of the respective product.

2.6 Manufacture

Concrete admixtures are usually manufactured by mixing ingredients (together) in batch mode and filling containers for dispatch. The process follows quality standards outlined in *EN 934-6:2019*.

2.7 Environment and health during manufacturing

As a general rule, no environmental or health protection measures other than those specified by law are necessary.

2.8 Product processing/Installation

During concrete manufacture, concrete admixtures are usually added along with the mixing water or included in premixed concrete.
Health and safety measures (eye protection, hand protection, possibly respiratory equipment and body protection) are to be taken and consistently adhered to in accordance with the information on the safety data sheet and conditions on site.

2.9 Packaging

Reusable containers are, where practicable taken back by the manufacturer and redirected into the production circuit. Empty plastic or steel containers which can no longer be used are recyclable.
Wooden reusable pallets are, where practicable taken back by the manufacturer or building material trader who returns them to the building product manufacturer redirecting them into the production process.

2.10 Condition of use

During the use phase, concrete admixtures are firmly bound into the cement matrix in hardened concrete. Concrete admixtures make an essential contribution towards optimizing

the physical and chemical properties of concrete enhancing its performance, durability, economic value and sustainability.

2.11 Environment and health during use

During the use phase, concrete admixtures are firmly bound into the cement matrix in hardened concrete. No relevant risks are known for water, air and soil if the products are used as designated.

2.12 Reference service life

Not relevant as this declaration relates to a preliminary product.

2.13 Extraordinary effects

Fire

Not relevant as this declaration relates to a preliminary product.

Water

Not relevant as this declaration relates to a preliminary product.

Mechanical destruction

Not relevant as this declaration relates to a preliminary product.

2.14 Re-use phase

Not relevant as this declaration relates to a preliminary product.

2.15 Disposal

Empty, dried containers are directed to the recycling process where practicable.
Packaging residue must be directed to proper waste disposal taking local guidelines into consideration.
Admixture residues, during the installation phase into the building, are directed to landfill. Admixture applied into the building and dismantled at the end of the product service life cannot be separated anymore from concrete. For this reason, this admixture is sent directly to landfill along with concrete. The *European Waste Code (EWC)* applicable for the declared product can be assimilated to the concrete *EWC 170101*.

2.16 Further information

More information is available in the manufacturers' product or safety data sheets on the manufacturers' Web sites or on request.
An electronic version of this declaration is available at https://muster-epd.deutsche-bauchemie.de/ , www.efca.info and www.ibu-epd.com

3. LCA: Calculation rules

3.1 Declared Unit

This EPD refers to the declared unit of 1 kg of installed concrete admixture for optimized concrete (group A) with a density of 1-1.6 kg/l in accordance with the *Concrete admixtures, 10/2023* (PCR checked and approved by the SVR). The maximum dosage of Plasticizers and Superplasticizers is 2 % by mass related to the cement content in the concrete. Depending on the application, a corresponding conversion factor such as the density to convert volumetric use to mass must be taken into consideration.
The Declaration type is according to *EN 15804*: Cradle to gate with options, modules A5, C1–C4 and D.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	kg
Gross density	1000 - 1600	kg/m^3

3.2 System boundary

Modules A1, A2, and A3 are taken into consideration in the LCA:

- A1 Production of preliminary products;
- A2 Transport to the plant;
- A3 Production incl. provision of energy, production of packaging as well as auxiliaries and consumables, and waste treatment;
- A5 Installation, admixtures applied into the building during A5 phase operations and packaging disposal;
- C1 - C2 - C4 - D

The building deconstruction (demolition process) takes place in the C1 module which considers energy production and consumption in terms of diesel and all the emissions connected with the fuel-burning process. After the demolition, the admixture is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered.
For the precautionary principle and as the worst-case scenario, disposal is the only end-of-life scenario considered. This is modeled by the landfill process (module C4) where admixtures end their life cycle.
Module D accounts for benefits that are beyond the defined system boundaries. Benefits are generated during the incineration of wastes in module A5, which are declared in module D.

3.3 Estimates and assumptions

For this EPD formulation and production data defined by EFCA were considered. Production waste was assumed to be disposed of to landfill without credits as a worst case. An average of plastic containers and wooden pallets was considered in the LCA.

3.4 Cut-off criteria

All raw materials submitted for the formulations and production data were taken into consideration. The manufacture of machinery, plant, and other infrastructure required for the production of the products under review was not taken into consideration in the LCA. Transport of packaging materials is excluded.

3.5 Background data

Data from the Managed LCA Content (*GaBi database 10 SP 40 (2020)*) database was used as background data.

3.6 Data quality

Representative products for the use in CO_2-optimised concretes were applied for this EPD.

The background data sets used are no more than 4 years old. Production data and packaging are based on details provided by the manufacturer. The formulation used for evaluation refers to a specific product. The data quality of the background data is considered to be good.

3.7 Period under review

Representative formulations are valid for 2023.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation

Mass allocation has been applied when primary data have been used and implemented into the LCA model.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The Managed LCA Content (*GaBi database SP40 (2020)*) has been used.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The product and packaging materials contain biogenic carbon which has been presented below.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0.0072	kg C
Biogenic carbon content in accompanying packaging	0.0032	kg C

Note: kg of biogenic carbon is equivalent to 44/12 kg of CO_2

For the preparation of building life cycle assessments, it must be taken into account that:

- in module A5 (installation in the building) the biogenicamount of CO2(0.0032 kg C *3.67 = 0.012 kg CO2-eq.)of the packaging bound in module A1-A3 ismathematically booked out.
- in module C4 (disposal on landfill) the biogenic amountof CO2 (0.0072 kg C *3.67 = 0.026 kg CO2-eq.) of the product bound in module A1-A3 is mathematically booked out.

Modules A1-A3, A5, C1, C2, C4 and D are declared.

Assembly (A5)

Name	Value	Unit
Other resources	0.0311	kg
Material loss	0.01	kg

Material loss regards the amount of admixture not used during the application phase into the building. This amount is 1 % of the admixture which is considered to come into the module A5 phase. This admixture percentage is considered as waste to disposal and related impacts have been considered in the LCA model and allocated to A5.

End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	1	kg
Landfilling	1	kg

5. LCA: Results

Disclaimer:
EP-freshwater: This indicator has been calculated as 'kg P eq' as required in the characterization model (*EUTREND* model, Struijs etal., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction 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**
X	X	X	MND	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of plasticizers and superplasticizers for CO2 optimized concrete, group A

Parameter	Unit	A1-A3	A5	C1	C2	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	5.14E-01	9.82E-02	2.79E-04	1.24E-02	2.62E-02	-4.4E-02
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	5.22E-01	7.69E-02	2.66E-04	1.18E-02	1.52E-02	-4.39E-02
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	-9.97E-03	2.11E-02	1.24E-05	5.42E-04	1.1E-02	-1.03E-04
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	1.75E-03	1.08E-04	6.39E-09	2.79E-07	4.37E-05	-3.06E-05
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	3.61E-15	1.69E-11	2.84E-20	1.24E-18	5.62E-17	-4.57E-16
Acidification potential of land and water (AP)	mol H^+ eq	1.21E-03	2.09E-05	3.6E-06	3.73E-05	1.09E-04	-6.13E-05
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	7.47E-06	6.43E-08	5.75E-11	2.51E-09	2.61E-08	-5.64E-08
Eutrophication potential aquatic marine (EP-marine)	kg N eq	3.22E-04	5.97E-06	1.63E-06	1.72E-05	2.8E-05	-1.59E-05
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	3.49E-03	8.79E-05	1.79E-05	1.89E-04	3.08E-04	-1.7E-04
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	1.39E-03	1.71E-05	4.91E-06	3.39E-05	8.48E-05	-4.56E-05
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.04E-07	1.22E-09	8.06E-12	3.52E-10	1.36E-09	-7.19E-09
Abiotic depletion potential for fossil resources (ADPF)	MJ	1.52E+01	7.72E-02	3.81E-03	1.66E-01	1.99E-01	-7.44E-01
Water use (WDP)	m^3 world eq deprived	2.07E-01	1.1E-02	5.27E-07	2.3E-05	1.59E-03	-4.54E-03

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of plasticizers and superplasticizers for CO2 optimized concrete, group A

Parameter	Unit	A1-A3	A5	C1	C2	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.35E+00	1.34E-01	1.2E-05	5.25E-04	2.61E-02	-1.62E-01
Renewable primary energy resources as material utilization (PERM)	MJ	4.57E-01	-1.17E-01	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.81E+00	1.74E-02	1.2E-05	5.25E-04	2.61E-02	-1.62E-01
Non renewable primary energy as energy carrier (PENRE)	MJ	9.52E+00	1.03E+00	3.81E-03	1.67E-01	1.99E-01	-7.44E-01
Non renewable primary energy as material utilization (PENRM)	MJ	5.69E+00	-9.57E-01	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	1.52E+01	7.3E-02	3.81E-03	1.67E-01	1.99E-01	-7.44E-01
Use of secondary material (SM)	kg	0	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	6.78E-03	2.8E-04	2.16E-08	9.41E-07	5.02E-05	-1.88E-04

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of plasticizers and superplasticizers for CO2 optimized concrete, group A

Parameter	Unit	A1-A3	A5	C1	C2	C4	D
Hazardous waste disposed (HWD)	kg	5.7E-09	1.86E-07	3.7E-13	1.62E-11	3.03E-09	-2.97E-10
Non hazardous waste disposed (NHWD)	kg	2.66E-02	1.98E-03	3.9E-07	1.7E-05	1E+00	-3.43E-04
Radioactive waste disposed (RWD)	kg	4.1E-04	3.1E-06	4.09E-09	1.79E-07	2.27E-06	-5.54E-05
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	1.85E-01	0	0	0	0
Exported thermal energy (EET)	MJ	0	3.36E-01	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of plasticizers and superplasticizers for CO2 optimized concrete, group A

Parameter	Unit	A1-A3	A5	C1	C2	C4	D
Incidence of disease due to PM emissions (PM)	Disease	ND	ND	ND	ND	ND	ND

	incidence						
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND
Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

The additional and optional impact categories according to EN 15804+A2 are not declared, as the uncertainty of these indicators is to be classified as high.
Disclaimer – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

When considering upstream production and transport of raw materials and manufacturing of the concrete admixture (modules A1-A3), the main driver of impacts in almost all categories is pre-product production (module A1). The only exception is the ODP indicator, where the dominant phase is installation (A5).
For Global Warming Potential (GWP), 57 % of the contribution is due to the A1 module, and circa 79 % is due to the whole upstream production (modules A1-A3). The main influence on the impact is given by the chemical precursors of the formulation (for A1). The manufacturing process (module A3) is a significant contributor (circa 18% of the total GWP) due to the plastic usage for the final product packaging.
Renewable primary energy demand (PERT) is influenced by electricity production (about 24 %) and the rest by pre-product production. Non-renewable primary energy demand (PENRT) is influenced almost entirely by pre-products production (about 80%) and electricity for 6 %.
Treatment of production waste has negligible contribution to impacts in all categories except eutrophication freshwater (5 %), where production waste landfills have an influence.
Packaging production has an impact of 11 % on Abiotic Depletion Potential Fossils and about 7 % on Acidification Potential, and Eutrophication (terrestrial). Raw Materials transport only influences Eutrophication (marine and terrestrial) with a respective 7 % and 8 %.
Other life cycle phases have a minor influence, mostly below 5 %.
A5 module is mainly dominated by the incineration process of packaging wastes, in particular, the incineration of plastic is the main contributor for all indicators followed by the incineration of wood packaging.
This module also accounts for the calorific value of the packaging considered as output and therefore with a negative value. This influences PENRM, non-renewable energy content by plastic packaging, and PERM, renewable energy content by wood packaging.
Considering the entire end-of-life modules (C1-C2-C4), the total of their contribution is always below 13 %. Landfill for construction wastes is the main contributor to all the impacts, followed by the truck used to transport the waste from the building site to the landfill.
C1 module: the combustion of fuel occurring during demolition processes is the main contributor for this module and for all the impacts considered.
C2 module: trucks used for waste transport and related combustion emissions are the main contributors to all impacts considered.
C4 module: the landfill process is the main contributor to all the impacts considered.
D module is influenced by the potential benefits generated during installation module (A5), thanks to the energy produced by the incineration processes used for packaging disposal and secondly by the incineration of the admixture residue when this material can be incinerated (thanks to its calorific value). If the admixture has a calorific value, it can be sent to incineration because, during this phase, the residual admixture is not melted with concrete.

7. Requisite evidence

As this involves a declaration of preliminary products, special tests and evidence within the framework of drawing up this Model Environmental Product Declaration have not been carried out or provided.

8. References

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ISO 758:1976
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Further References

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CLP
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