EFCA Doc: 847 EPD: Déclaration de conformité des adjuvants pour béton aux EPD types (Déclarations Environnementales de Produit) de l'EFCA

La Fédération Européenne des Associations d'Adjuvants pour Béton (EFCA) a développé des déclarations environnementales de produit (EPD) types pour six catégories d'adjuvants. Ces EPD types sont conformes aux normes EN 15804 et ISO 14025 et ont été publiées par l'Institut allemand Bauen und Umwelt (IBU). Ces EPD types peuvent également être téléchargées sur le site de l'EFCA.

CHRYSO est membre du SYNAD, Syndicat National des Adjuvants pour bétons et mortiers, association affiliée à l'EFCA. Les adjuvants cités ci-dessous répondent aux spécifications établies par l'IBU pour la catégorie d'adjuvants dans laquelle ils sont déclarées. Ceci confère à l'entreprise le droit de déclarer qu'un EPD type est applicable pour les adjuvants cités. Les informations contenues dans l'EPD type sont applicables pour les adjuvants cités et peuvent être utilisés pour l'analyse du cycle de vie des produits de construction dans lesquels ils sont incorporés.

A noter que les EPD sont disponibles uniquement en anglais.

EPD type de l'EFCA	Dénomination commerciale du produit
Adjuvant du Béton – Accélérateur de prise Réf. EPD-EFC-20210194-IBG1-EN	CHRYSO®Xel 650

Pour tout complément d'information, contactez-nous via www.chryso.fr

Date : 19 mai 2025

Signature

Jean-Philippe Bigas



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)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-EFC-20210194-IBG1-EN
Issue date	16.12.2021
Valid to	15.12.2026

Concrete admixtures – Set Accelerators

European Federation of Concrete Admixtures Associations a.i.s.b.l. (EFCA)

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



1. General Information

European Federation of Concrete Admixtures Associations a.i.s.b.l. (EFCA)	Concrete admixtures – set accelerators
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** European Federation of Concrete Admixtures Associations a.i.s.b.l. (EFCA) Rue d'Arlon 55 BE-1040 Brussels, Belgium
Declaration number EPD-EFC-20210194-IBG1-EN	**Declared product / declared unit** 1 kg of set accelerators, density: 1 - 1.6 kg/l
This declaration is based on the product category rules: Concrete admixtures, 11.2017 (PCR checked and approved by the SVR)	**Scope:** This verified EPD entitles 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 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. 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. 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*.
Issue date 16.12.2021	
Valid to 15.12.2026	
 Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
 Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	 Matthias Schulz (Independent verifier)

2. Product

2.1 Information about the enterprise

EFCA (European Federation of Concrete Admixtures Associations) was formed in 1984 as a partnership between national admixture associations in order to promote the interests of the industry at European level. For more information (such as membershiplist) see: www.efca.info

2.2 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.
Set accelerators in accordance with *EN 934-2:2009+A1:2012* are admixtures which reduce the time required by the mixture to transfer from a plastic to a solid state.

Set accelerators for shotcrete in accordance with *EN 934-5:2007* are admixtures which permit very early setting of the shotcrete and, unlike products in line with *EN 934-2:2009+ A1:2012* can be added to concrete with max. 12 % by mass, whereby set accelerators for shotcrete and so-called non-alkali set accelerators with a maximum alkali content of 1.0 % (indicated as a Na2O equivalent) (in relation to the admixture mass) are specified for shotcrete.
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).

Set accelerators for concrete 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.
Set accelerators for shotcrete needs a declaration of performance taking into consideration *EN 934-5:2007, Admixtures for concrete, mortar and grout – Part 5: Admixtures for sprayed concrete – Definitions, requirements, conformity, marking and labelling* and the CE-marking.

For the application and use the respective national provisions apply.

2.3 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.

2.4 Technical Data

Set accelerators for concrete must comply with the general requirements of *EN 934-1:2008* and the additional requirements of *EN 934-2:2009 + A1:2012*.
Set accelerators for shotcrete must comply with the general requirements of *EN 934-1:2008* and the additional requirements of *EN 934-5:2007*.
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/	Maximum value to be declared by the manufacturer	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/cm²
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/mm²
Water reduction /EN 12350-2/, /EN 12350-5/ Plasticizer	-[4]	mm
Increasing / maintaining of consistence /EN 12350-2/, /EN 12350-5/ Superplasticizer	-[4]	mm
Setting time /EN 480-2/ Accelerator/Retarder	Start of setting process: At 20 °C: Test mixture ≥ 30 min. At 5 °C: Test mixture ≤ 60% of the control mixture Shotcrete accelerator: Start of setting process: ≤ 10 min. End of setting process: ≤ 60 min.	min
Air void Characteristics in hardened concrete /EN 480-11/ Air entrainer	-[4]	mm
Capillary water absorption /EN 480-5/ Densifier	-[4]	g/mm²

[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 SiO2 percentage by mass > 5 %
[4] Details not relevant for this type of admixture

[5]
At 28 days: Test mix ≥ 80 % of control mix

At 90 days: Test mix ≥ control test mix at 28 days
Shotcrete accelerator:
At 28 days: Test mix ≥ 75 % of control mix
or (for non-alkali set accelerators)
At 28 days: Test mix ≥ 90 % of control mix
At 90 days: Test mix ≥ test mix at 28 days

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 (for set accelerators for concrete*)*
EN 934-5:2007, Admixtures for concrete, mortar and grout – Part 5: Admixtures for sprayed concrete – Definitions, requirements, conformity, marking and labelling (for set accelerators for shotconcrete*)*

2.5 Delivery status

Set accelerators 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.

2.6 Base materials/Ancillary materials

The main raw materials used for set accelerators are aluminium sulphate, formates, fluorides, aluminates, amorphous aluminium hydroxide, carbonates, silicates and ethanolamines. These raw materials are used on their own or in mixtures, in powder form or in aqueous solutions or as dispersions or suspensions. Apart from the raw materials referred to above, nitrates, nitrites and thiocyanates are also used.
Active substance concentration lies between 10 and 100% by mass. The typical dosage volumes for use in concrete are between 1 and 3% by mass, in terms of the cement weight. Shotcrete accelerators are used in doses of 3 to 12% by mass in relation to the cement weight.
The products covered by this EPD typically contain the following proportions by mass of constituent materials and auxiliaries referred to:

Aluminium sulphate*:	max. 70 %
Formates*:	max. 15 %
Aluminates*:	max. 50 %
Amorphous aluminium hydroxides*:	max. 20 %
Citrates*:	max. 50 %
Silicates*:	max. 2 %
Sulfates*:	max. 10 %
Ethanolamines*:	max. 10 %
Nitrates*:	max. 50 %
Org. acids*:	max. 10 %
Thiocyanates*:	max. 25 %
Additives:	max. 5 %
Water:	approx. 30 - 90 %

**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 – Set Accelerators 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 Set Accelerators) 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 - Set Accelerators) 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 - Set Accelerators) contain small amounts (< 0.5% by mass) of biocides of the product type "in-can preservatives".

The information 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 - Set Accelerators) 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.

2.7 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*.

2.8 Environment and health during manufacturing

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

2.9 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.

2.10 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.

2.11 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.

2.12 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.

2.13 Reference service life
Not relevant as this declaration relates to a preliminary product.

2.14 Extraordinary effects

Fire
Not relevant as this declaration relates to a preliminary product.

Fire protection
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.

2.15 Re-use phase
Not relevant as this declaration relates to a preliminary product.

2.16 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..

2.17 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 www.efca.info and https://www.ibu-epd.com

3. LCA: Calculation rules

3.1 Declared Unit
This EPD refers to the declared unit of 1 kg concrete admixture applied into the building with a density of 1-1.6 kg/l in accordance with the *IBU PCR* 11.2017 Part B for concrete admixtures.
The maximum dosage of Set Accelerators is 12% by mass related to the cement content in the concrete.
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).
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 C1–C4, and module D.

Declared unit

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

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 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, admixture is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered. For precautionary principle and as worst-case scenario, disposal is the only end-of-life scenario considered. This is modelled by landfill process (module C4) where admixtures end their life cycle. Module D accounts for benefits that are beyond the defined system boundaries. Credits 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 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 *GaBi* database SP40 (2020) was used as background data.

3.6 Data quality
Representative products were applied for this EPD and the product in the group displaying the highest environmental impact was selected for calculating the LCA results. 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 2019 under consideration of data from 2011.

3.8 Allocation
Mass allocation have been applied when primary data have been used and implemented into the LCA model

3.9 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 *GaBi* database SP40 (2020) has been used. .

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon

The packaging material contains biogenic carbon content which has been presented below.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic Carbon Content in product	0	kg C
Biogenic Carbon Content in accompanying packaging	0.00071	kg C

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

Assembly (A5)

Name	Value	Unit
Other resources for packaging material	0.008	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 module A5 phase. This admixture percentage is considered as waste to disposal and related impacts have been considered into 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 et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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	ND	X	ND	ND	MNR	MNR	MNR	ND	ND	X	X	ND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg set accelerator

Core Indicator	Unit	A1-A3	A5	C1	C2	C4	D
Global warming potential - total	[kg CO_2-Eq.]	1.34E+0	4.55E-2	2.79E-4	1.24E-2	1.53E-2	-1.41E-2
Global warming potential - fossil fuels	[kg CO_2-Eq.]	1.32E+0	3.65E-2	2.66E-4	1.18E-2	1.52E-2	-1.40E-2
Global warming potential - biogenic	[kg CO_2-Eq.]	2.58E-2	9.03E-3	1.24E-5	5.42E-4	4.80E-5	-3.27E-5
GWP from land use and land use change	[kg CO_2-Eq.]	2.60E-4	3.09E-6	6.39E-9	2.79E-7	4.37E-5	-9.62E-6
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.82E-15	3.30E-17	2.84E-20	1.24E-18	5.62E-17	-1.43E-16
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	2.27E-3	3.03E-5	3.60E-6	3.73E-5	1.09E-4	-1.94E-5
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg PO_4-Eq.]	2.34E-6	2.46E-8	5.75E-11	2.51E-9	2.61E-8	-1.77E-8
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	6.58E-4	9.16E-6	1.63E-6	1.72E-5	2.80E-5	-5.05E-6
Eutrophication, accumulated exceedance	[mol N-Eq.]	5.51E-3	9.17E-5	1.79E-5	1.89E-4	3.08E-4	-5.41E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	1.77E-3	2.46E-5	4.91E-6	3.39E-5	8.48E-5	-1.45E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	5.94E-8	6.69E-10	8.06E-12	3.52E-10	1.36E-9	-2.27E-9
Abiotic depletion potential for fossil resources	[MJ]	2.97E+1	3.05E-1	3.81E-3	1.66E-1	1.99E-1	-2.38E-1
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	1.84E-1	5.54E-3	5.27E-7	2.30E-5	1.59E-3	-1.42E-3

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg set accelerator

Indicator	Unit	A1-A3	A5	C1	C2	C4	D
Renewable primary energy as energy carrier	[MJ]	1.17E+0	3.95E-2	1.20E-5	5.25E-4	2.61E-2	-5.09E-2
Renewable primary energy resources as material utilization	[MJ]	2.60E-2	-2.60E-2	ND	ND	ND	ND
Total use of renewable primary energy resources	[MJ]	1.20E+0	1.35E-2	1.20E-5	5.25E-4	2.61E-2	-5.09E-2
Non-renewable primary energy as energy carrier	[MJ]	2.18E+1	5.65E-1	3.81E-3	1.67E-1	1.99E-1	-2.38E-1
Non-renewable primary energy as material utilization	[MJ]	7.87E+0	-2.60E-1	ND	ND	ND	ND
Total use of non-renewable primary energy resources	[MJ]	2.97E+1	3.05E-1	3.81E-3	1.67E-1	1.99E-1	-2.38E-1
Use of secondary material	[kg]	0.00E+0	ND	ND	ND	ND	ND
Use of renewable secondary fuels	[MJ]	0.00E+0	ND	ND	ND	ND	ND
Use of non-renewable secondary fuels	[MJ]	0.00E+0	ND	ND	ND	ND	ND
Use of net fresh water	[m^3]	4.76E-3	1.35E-4	2.16E-8	9.41E-7	5.02E-5	-5.89E-5

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg set accelerator

Indicator	Unit	A1-A3	A5	C1	C2	C4	D
Hazardous waste disposed	[kg]	2.35E-4	2.35E-6	3.70E-13	1.62E-11	3.03E-9	-9.48E-11
Non-hazardous waste disposed	[kg]	2.38E-2	1.70E-3	3.90E-7	1.70E-5	1.00E+0	-1.09E-4
Radioactive waste disposed	[kg]	3.94E-4	4.37E-6	4.09E-9	1.79E-7	2.27E-6	-1.74E-5
Components for re-use	[kg]	0.00E+0	ND	ND	ND	ND	ND
Materials for recycling	[kg]	0.00E+0	ND	ND	ND	ND	ND
Materials for energy recovery	[kg]	0.00E+0	ND	ND	ND	ND	ND
Exported electrical energy	[MJ]	0.00E+0	5.81E-2	ND	ND	ND	ND
Exported thermal energy	[MJ]	0.00E+0	1.10E-1	ND	ND	ND	ND

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg set accelerator

Indicator	Unit	A1-A3	A5	C1	C2	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND	ND

Potential Human exposure efficiency relative to U235, Disclaimer 1 – 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 radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and (from) some construction materials is also not measured by this indicator.

ADP minerals & metals, ADP fossil, WDP, ETF-fw, HTP-c, HTP-nc, SQP, Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Additional environmental impact indicators (suggested by EN15804+A2, table 4) are not declared in the EPD. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high and as there is limited experience with the indicator (see ILCD classification in EN 15804, table 5). For this reason, results based on these indicators are not considered suitable for decision-making process and are thus not declared in the EPD.

6. LCA: Interpretation

When considering upstream production and transport of pre-products as well as manufacturing of the concrete admixture (modules A1-A3), the main driver of impacts in almost all categories is the production of pre-products (module A1), generally more than 55 %.

For global warming potential (GWP) about 88% the impacts are from pre-products production processes and related chemical precursors. The manufacturing process is the second contributor (less than 8 % of the total GWP). Important contributors to this indicator during the manufacturing process are electricity production consumed during the admixture production process (module A3) and the thermal energy consumed and produced from natural gas combustion. In the category of ozone depletion potential, electricity has 45 % of the impacts, the other remaining part is mainly connected with pre-products production. Pre-products production have most of the impacts for all the other indicators, 86 % for acidification, 75 % for eutrophication freshwater, 87 % for eutrophication marine and 84 % for eutrophication terrestrial. Photochemical ozone formation is influenced by pre-products for 86 %. Renewable primary energy demand (PERT) is influenced by electricity production (about 37 %) and for the rest by pre-products production. Non-renewable primary energy demand (PENRT) is influenced almost only by pre-products production (about 93%). Treatment of production waste has negligible contribution to impacts in all categories except eutrophication potential for fresh water, where landfilling of production waste has an influence (about 16 %).
The other life cycle phases have minor influence, generally lower than 8 %.

A5 module: It is mainly dominated by the incineration process of packaging wastes, in particular the incineration of plastic (HDPE) is the main contributor for all indicators followed by incineration of wood packaging. This module accounts also for the calorific value of the packaging considered as an output and therefore with a negative value. This influence PENRM, non-renewable energy content by plastic packaging and PERM, renewable energy content by wood packaging.

Considering the entire end of life modules, landfill for construction wastes is the main contributor for all the impact considered, followed by the truck used for transporting 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 contributor for all impacts considered.
C3 module: landfill process and in particular energy consumed for landfill management and operation is the main contributor for all the impacts considered.

D module: It is influenced by the credits generated during implementation 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).

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

Candidate list
Candidate list List of those eligible for approval substances of very high concern to the European Chemicals Agency, as of July 2021.

CLP
Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures, as of Febrary 03-2021

CPR
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EN ISO 9001:2015, Quality management systems – Requirements (ISO 9001:2015)

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EN 196-2:2013, Test methods for cement – Part 2: Chemical analysis of cement

EN 206:2013+A1:2016
EN 206:2013+A1:2016, Concrete – Part 1: Specification, performance, production and conformity

EN 480-1:2014
EN 480-1:2014, Admixtures for concrete, mortar and grout – Test methods – Part 1: Reference concrete and reference mortar for testing

EN 480-2:2006
EN 480-2:2006, Admixtures for concrete, mortar and grout – Test methods – Part 2: Determination of setting time

EN 480-4:2005
EN 480-4:2005, Admixtures for concrete, mortar and grout – Test methods – Part 4: Determination of bleeding of concrete

EN 480-5:2005
EN 480-5:2005, Admixtures for concrete, mortar and grout – Test methods – Part 5: Determination of capillary absorption

EN 480-6:2005
EN 480-6:2005, Admixtures for concrete, mortar and grout – Test methods – Part 6: Infra red analysis

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EN 480-8:2012, Admixtures for concrete, mortar and grout – Test methods – Part 8: Determination of the conventional dry material content

EN 480-10:2009
EN 480-10:2009, Admixtures for concrete, mortar and grout – Test methods – Part 10: Determination of water-soluble chloride content

EN 480-11:2005
EN 480-11:2005, Admixtures for concrete, mortar and grout – Test methods - Part 11: Determination of air void characteristics in hardened concrete

EN 480-12:2005
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EN 934-1:2008
EN 934-1:2008, Admixtures for concrete, mortar and grout – Part 1: Common requirements

EN 934-2:2009+A1:2012
EN 934-2:2009+A1:2012, Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling

EN 934-5:2007
EN 934-5:2007, Admixtures for concrete, mortar and grout – Part 5: Admixtures for sprayed concrete – Definitions, requirements, conformity, marking and labelling

EN 934-6:2019
EN 934-6:2019, Admixtures for concrete, mortar and grout – Part 6: Sampling, assessment and verification of the constancy of performance

EN 12350-2:2019
EN 12350-2:2019, Testing fresh concrete – Part 2: Slump test

EN 12350-5:2019
EN 12350-5:2019, Testing fresh concrete – Part 5: Flow table test

EN 12350-7:2019
EN 12350-7:2019, Testing fresh concrete – Part 7: Air content – Pressure methods

EN 12390-3:2019
EN 12390-3:2019, Testing hardened concrete – Part 3: Compressive strength of test specimens

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EN 14487-1:2005, Sprayed concrete – Part 1: Definitions, specifications and conformity

EN 15804: 2012+A2:2019
EN 15804: 2012+A2:2019, Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products

EU Biocidal Products Regulation (No. 528/2012)
The EU Biocidal Products Regulation (No. 528/2012) Guidance document for ASD industries (January 2016)

EWC/AVV waste code
Directive governing introduction of the European Waste Catalogue
http://www.ngs-mbh.de/zs/eak.html

GaBi 10 software & documentation
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ISO 4316:1977
ISO 4316:1977, Surface active agents; Determination of the pH value of aqueous solutions; Potentiometric method

PCR Part A
Product Category Rules for Building-Related Products and Services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project report, Version 1.1, Institut Bauen und Umwelt e.V., 2021-01

PCR Part B
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REACH Regulation
Regulation (EU) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

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