KRAFT PAINTS
DRIVEN BY INNOVATION

BUILDING INNOVATION
BIOCLIMA®
Advanced Energy Building Systems

ENVIRONMENTAL PRODUCT DECLARATION

According to ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Waterproofing Slurries & Mortars (1K)

DRUCKFARBEN GROUP

Owner of the Declaration: **DRUCKFARBEN HELLAS S.A.**
Programme: The International EPD® System
www.environdec.com
Programme operator: EPD International AB

Registration number	S-P-08831
Issue date	24.07.2023
Revision date	17.06.2024
Valid to	23.07.2028
Geographical scope	Europe

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ECO PLATFORM EPD VERIFIED

kraftpaints.com
bioclima.gr

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Company Description

Druckfarben Group S.A.

- Produces inks for flexography and rotogravure printing.
- In the coatings and mortars division, decorative and architectural products and cementitious putties are commercialized under the KRAFT Paints brand.
- Energy saving / external thermal insulation products are commercialized under the BIOCLIMA brand.

DRUCKFARBEN Group comprises of a group of companies with worldwide activities catering to the ink, coating, and energy saving sectors.

More specifically, **DF Hellas S.A.** produces inks for flexography and rotogravure printing under the **DRUCKFARBEN** brand name using sub-brands for the various applications in the food packaging, plastic bags, cartons, and related products.

In the coatings division it commercializes its decorative and architectural paints products under the **KRAFT PAINTS** brand and in the energy saving/external thermal insulation products under the **BIOCLIMA®** brand. The Group has an important and increasing international presence in Eastern and Central Europe through subsidiaries in Bulgaria, Romania, Serbia, and through representatives in Malta, Turkey, Tunisia, Lebanon, Hungary, Slovenia, Croatia, Albania and Western and North Africa, Israel, and the Gulf countries. In West Africa, the company operates in Nigeria through its own subsidiary and the neighboring countries of the Economic Community of West African States (ECOWAS). The company's strategy includes expanding its export activities to new countries supported by a strong network of local partners.

DRUCKFARBEN holds a significant position in the area of architectural paints, varnishes and mortars related to construction activities under the **KRAFT PAINTS** brand. Also, under the **BIOCLIMA®** brand, the company offers a wide range of certified thermal insulation systems for energy upgrading and aesthetic renovation of new and existing buildings.

CERTIFIED SYSTEMS
ISO 9001 ISO 140001 ISO 50001 ISO 45001

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General information Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.11

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat info@environdec.com

Life cycle assessment (LCA)

LCA accountability: Dr. Frank Werner

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

[X] EPD verification by accredited certification body

Third-party verifier:

Business Quality Verification P.C

Approved certification body accountable for the third-party verification.

The certification body is accredited by:
Hellenic Accreditation System with accreditation number 1218.

Procedure for follow-up of data during EPD validity involves third-party verifier.

[X] Yes [ ] No

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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+A2 and the building context, respectively the product-specific characteristics of performance, are taken into account.

Additional information:

“EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable.

For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
Additional information can be obtained under: https://**kraftpaints.com**

Gontact person

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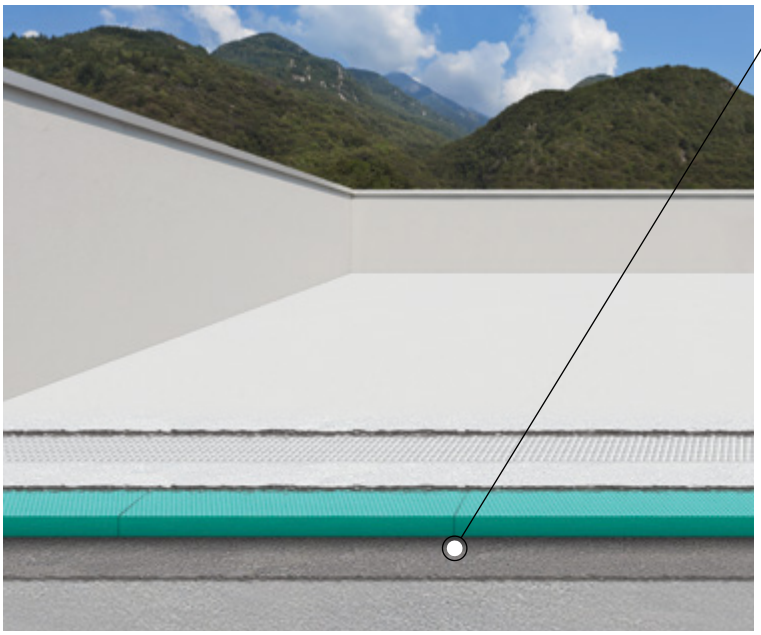
Specification of the products

The multiple products are one-component waterproofing slurries / mortars, declared as surface protection systems for concrete according to EN 1504-2, by DRUCKFARBEN HELLAS S.A. that are marketed under the brand KRAFT Paints or BIOCLIMA.
They are suitable for indoor and outdoor usage.

1. Waterproofing mortar Hydroguard One System (Hydroguard One 40 + water)



2. Waterproofing mortar ClimaRoof KF-1

UN CPC code: 375

Geographical scope: **Europe**

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1. Hydroguard One System:

Hydroguard One System (Hydroguard One 40 + water) by KRAFT Paints is a polymer-modified, cementitious, one-component waterproofing slurry. It contains a new generation of hydrophobic polymers and selected quartz aggregates, which provide high water insulation protection, mechanical strength and excellent adhesion to structural substrates.

It is classified as coating for surface protection of concrete according to Standards **EN 1504-2 & EN 1504-9:2008** (Principle MC - moisture control – Method 2.3, Principle IR – increasing resistivity by limiting moisture content –Method 8.3).

TECHNICAL DATA
(Measurement conditions 20°C and 50% Relative humidity)

Color	Grey, White
Mixing Ratio	4,65Lt water in 25Kg Hydroguard One 40
Maximum grain size	600μm
Bulk Density of dry mortar	1,35±0,05kg/Lt
Bulk Density of fresh mortar	2,00±0,05kg/Lt
Temperature application	From +5°C to +30°C
Maximum thickness per coat	1 mm thickness per coat
Pot life	60 min
Time for apply the second coat	6-24 hours after the first coat
Set to light foot traffic	8 hours after the second coat
Consumption	1,2-1,4kg/m^2 per mm coat

PRODUCT PERFORMANCES

Permeability to water vapour, EN ISO 7783-2	s_D ≤ 1m : Class I, permeable (grey, white)
Capillary absorption and permeability to water, EN 1062-3	w ≤ 0,05kg/m^{2}h ^{0,5}, grey w ≤ 0,07kg/m^{2}h ^{0,5}, white
Adhesion to concrete (Pull- off test) , EN 1542	≥ 0.90 N/mm^2, grey ≥ 1.00 N/mm^2, white
Reaction to fire after application, EN 13501-1	A2- s1, d0 (grey, white)

WATERPROOFING TECHNOLOGY
CE EN 1504-2 PI / MC / IR
GEV-EMICODE EC 1 PLUS very low emission

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2. ClimaRoof KF-1:

ClimaRoof® KF-1 by BIOCLIMA is a waterproofing, adhesive, leveling cementitious mortar of high strength, designed with new generation elastomeric and hydrophobic polymers as well as with selected quartz aggregates. It ideally combines excellent adhesive properties between different types of surfaces and at the same time protection against moisture penetration.

It is classified as coating for surface protection of concrete according to EN 1504-2 & EN 1504-9:2008 (Principle PI - protection against ingress - Method 1.3, Principle MC - moisture control - Method 2.3, Principle IR - increasing resistivity by limiting moisture content - Method 8.3) and as screed CT - C16 - F6, according to EN 13813.

TECHNICAL DATA
(Measurement conditions 20°C and 50% Relative humidity)

Color	Grey
Water ratio	4,1Lt water in 25kg ClimaRoof KF-1
Maximum grain size of mortar	1mm
Bulk Density of dry mortar	1,62±0,05kg/Lt
Bulk Density of fresh mortar	2,20±0,05kg/Lt
Temperature application	From +5°C to +30°C
Min/max layer thickness	3/15 mm per application layer
Pot life	60 min
Time for the 2nd layer of application	6-24 hours after the first coat
Mild walkability	8 hours after completed the application
Consumption	1,5-2,0kg/m²/mm

PRODUCT PERFORMANCES

Permeability to CO_2, EN 1062-6	s_D = 315m
Permeability to water vapor, EN ISO 7783-2	s_D =0,26m (Class I, permeable to water vapor)
Capillary absorption & permeability to water, EN 1062-3	w ≤ 0,057 kg/m² · h ^{0,5}
Pull-off test, EN 1542	≥1,25 N/mm²
Adhesion to XPS, EN 13494	≥0,327 N/mm²
Flexural strength, EN 13892-2	7,0 ± 1,0 N/mm²
Compressive strength, EN 13892-2	17,5 ± 1,5 N/mm²
Reaction to fire after application, EN 13501-1	A2- s1, d0 (grey, white)

RECYCLED GREEN TECHNOLOGY · CE EN 13813 (CT-C16-F6) · CE EN 1504-2 PI / MC / IR · WATERPROOFING TECHNOLOGY

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Application of the product

These products are suitable for waterproofing protection with enhanced properties (as described before).

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1. Hydroguard One System

FIELD OF APPLICATION:

Hydroguard One System (Hydroguard One 40 + water) by KRAFT Paints suitable for waterproofing horizontal or vertical surfaces subject to partial or continuous moisture, basement surfaces indoor and outdoor (before backfilling), wet spaces (bathrooms), walls, concrete, renderings and other structural elements.

Provides protection against carbonation of concrete. Suitable for positive and negative humidity pressures.

SUBSTRATE - PREPARATION:

To ensure good adhesion substrate should be sound, clean, free of dust, oil, lime, tar and loose elements. On absorbent substrates light soaking with water before use.

On substrates with high absorbency (eg brick, aerated concrete, old plasters, etc.) it is recommended to apply Eco Dur Aqua by KRAFT PAINTS diluted 1:1 to 1:2 with water. Caution! The primer must properly be diluted in order to be completely absorbed and avoid film formation to the substrate surface.

On non-absorbent substrates, it is recommended to use Epoxy Aqua Floor Primer by KRAFT PAITS with simultaneous application of quartz sand. Caution! The application of the waterproofing layer must be carried out between 24 – 48 hours after priming. This is not recommended when negative humidity pressures exist.

For necessary repairs before application (e.g. smoothing, leveling, grooves formations at wall-floor junctions, etc.) the appropriate repairing mortars from KRAFT PAINTS are selected.

MIXING:

In a clean container with pure water gradually empty the package content while stirring constantly with a low-speed electric mixer (4,65 lt water per 25Kg or 0,93 lt water per 5Kg Hydroguard One 40).

Mixing must be done carefully so that no amount of product remains on the walls or bottom of the container. The product is ready for use when the mixture becomes homogeneous without lumps.

APPLICATION:

Application of Hydroguard One System (Hydroguard One 40 + water) is carried out using a roller, brush or metal spatula, in 2 layers (at least, depending on water load) of 1mm/per layer maximum thickness. Each subsequent layer is applied crosswise after the previous one has dried sufficiently. If 24 hours pass after the last layer, light soaking with water is recommended before application of the next one.

On “demanding” substrates that are subject to intense stress and micro-cracks already exist - or may occur - (e.g. roofs, swimming pools, balconies, tanks, etc.) it is recommended to use Hydroguard Flex System (Hydroguard One 40 + Hydroguard Flex Resin) or Hydroguard Elastic System (Hydroguard One 40 + Hydroguard Elastic Resin), and while the 1st waterproofing layer is still fresh, to reinforce with anti-alkaline fiber mesh (Hydroguard Net 75 by KRAFT PAINTS). The mesh strips overlap each other by 10cm. Subsequent waterproofing layers must completely overlap the grid mesh.

At any case, in critical areas of application (e.g. construction junctions, grooves, wall-floor joints, gutters etc.) it is also recommended to reinforce the waterproofing layers locally by using fiber mesh or polyester fleece..

Composition of the product

The declared product consists of the following components:

		kg/kg	%
PRODUCT	Binders	0,2988	30,0%
	Fillers	0,6689	67,0%
	Additives	0,0278	3,0%
	Rheology modifier	0,0002	0,0%
PACKAGING	Paper	0,0035	0%
	Cardboard	0,004	0%
	PE film-LDPE	0.00016	0%

2. ClimaRoof KF-1

FIELD OF APPLICATION:

ClimaRoof® KF-1 by BIOCLIMA is used as an adhesive for ClimaRoof® KF-XPS, XPS Etics GF or ClimaRoof® KF-XPS Incline extruded polystyrene thermal insulation boards of the Lightweight Thermal & Water Insulation System ClimaRoof® by BIOCLIMA®, with additional leveling and waterproofing protection properties. Also, it can be used for waterproofing and leveling of horizontal surfaces of various types e.g. concrete, cementitious floors, cement boards, bathrooms, showers,terraces, etc. that will be covered with tiles, marbles, decorative microcement coatings, etc.

Also, due to special formulation of selected aggregates, ClimaRoof® KF-1 can be applied as repairing and leveling repairing mortar for horizontal surfaces of terraces with additional waterproofing properties, before application of final coatings. In this way, the need for application of extra repairing products is minimized.

SUBSTRATE - PREPARATION:

To ensure better adhesion, the surface is required to be flat, solid, dry, clean and free of dust, oils, salts, rust, loose paint and residues, swollen paints, etc. ClimaRoof® KF-1 has very good adhesion to standard structural surfaces (eg concrete, cement mortar, brick, cement board). Light soaking with water before use is recommended.

On highly absorbent surfaces priming is recommended, using micromolecular acrylic primer Eco Dur Aqua by KRAFT PAINTS. On demanding substrates of asphalt sealants, acrylic or polyurethane sealing membranes, decorative tiles, etc... which are well anchored and without surface alteration, priming is recommended with Epoxy Aqua Floor Primer by KRAFT PAINTS with simultaneous application of quartz aggregates.

MIXING:

In a clean container add 4.1-4.5 lt of clean water and gradually empty the contents of a 25Kg bag of ClimaRoof® KF-1 product. Stirring constantly with a low speed mixer so

that a homogeneous paste is obtained. Allow the mixture to rest for about 5 minutes and repeat stirring for a while.

The mixture is ready for use for the next 60 minutes (at 25°C). It is forbidden to add extra water to correct the workability of the mortar. This will reduce strength and increase shrinkage.

APPLICATION:

Application as part of ClimaRoof® System: For adhesion of extruded polystyrene thermal insulation boards ClimaRoof® KF-XPS or XPS Etics GF apply ClimaRoof® KF-1 to the substrate, with a metal spatula (with pole or without), covering the entire surface without gaps. Minimum application thickness should be from 3mm and maximum thickness up to 15mm (locally up to 40mm). Thermal insulation boards are then pressed onto

the substrate to ensure universal contact with the mixture, following the substrate incline. The final surface of the thermal insulation boards must be completely flat, without gaps between them (<1mm) and in the form of intersecting joints.

In case of ClimaRoof® Incline System, for adhesion of thermal insulation boards ClimaRoof® KF-XPS Incline on to ClimaRoof® KF-XPS or XPS Etics GF thermal insulation boards, ClimaRoof® KF-1 is applied with a metal spatula covering the entire surface without gaps. Then, ClimaRoof® KF-XPS Incline boards are pressed to ensure universal contact with the mixture.

Application as waterproofing, levelling or/ and repairing material: Apply ClimaRoof® KF-1 to the selected substrate surface using a smooth or serrated metal spatula (with a pole or without), covering the selected surface. If necessary, level using a smooth metal spatula.

The material should be coated with overlying layers (e.g. tiles, marbles, decorative microcemento coverings etc.) after 3-7 days, depending on the environmental conditions and after the material is dried in depth.

Composition of the product

The declared product consists of the following components:

		kg/kg	%
PRODUCT	Binders	0,2191	22%
	Fillers	0,7487	75%
	Additives	0,0269	3%
	Rheology modifier	0,0012	0%
PACKAGING	Paper	0,0036	0%
	Cardboard	0,0004	0%
	PE film-LDPE	0,0002	0%

Content of substances of very high concern

The product does not contain any substances on the candidate list for substances of very high concern (SVHC) according to REACH (Annex XIV) (list accessed 26.02.2023).

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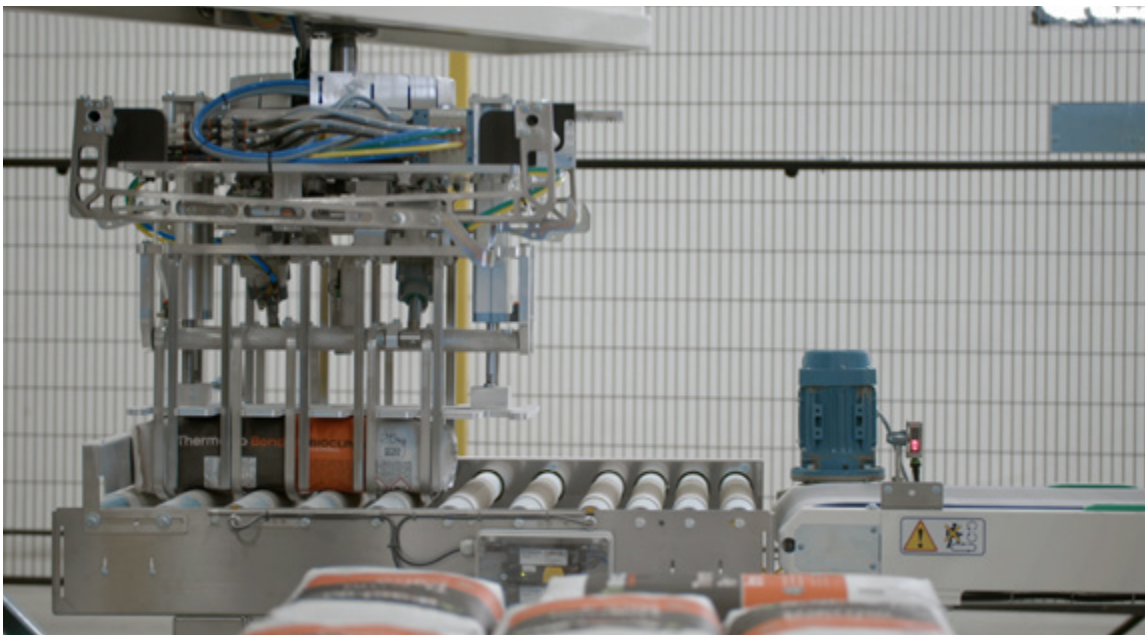
Production Stages



1. Weighing binders and other raw materials
2. Mixing 60-120 sec
3. Packaging

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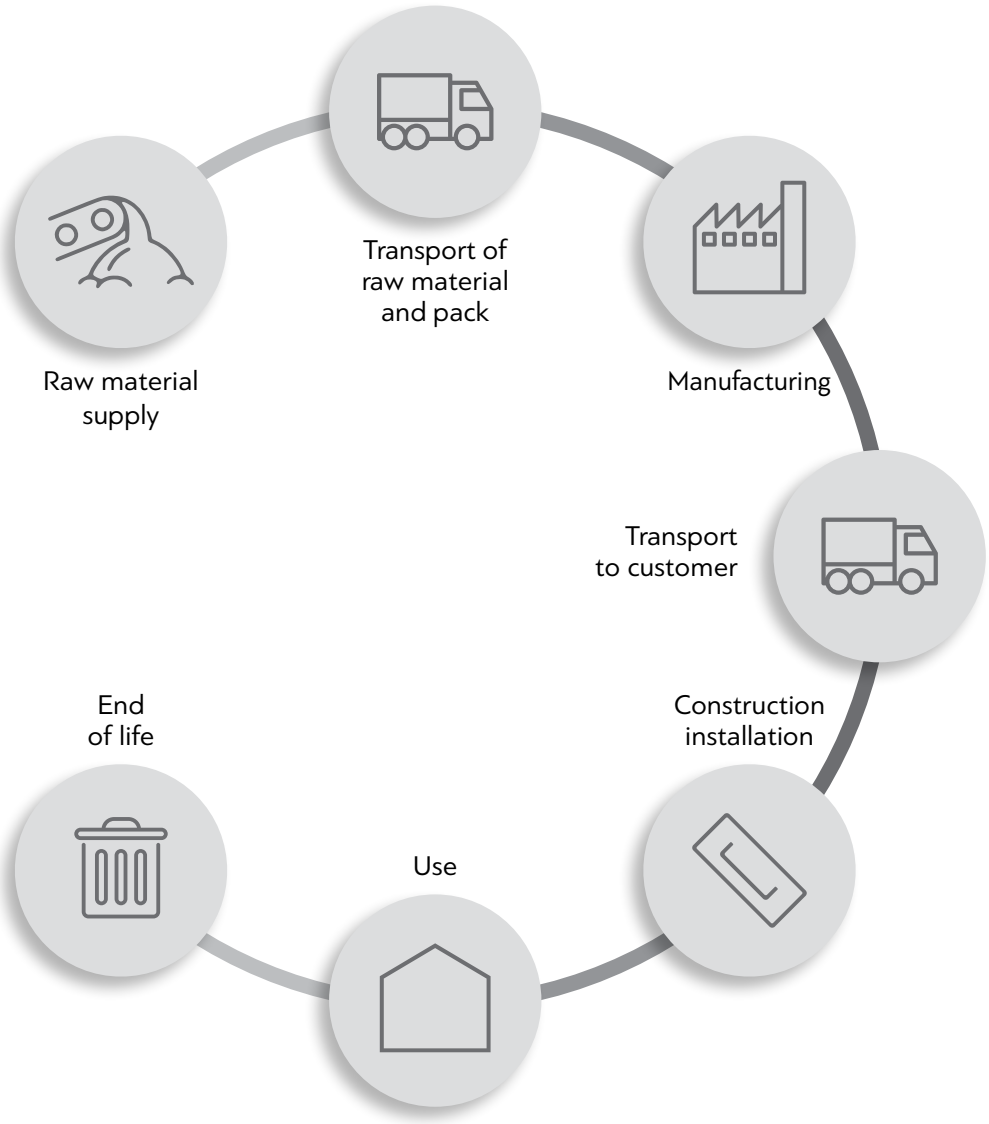
LCA: Calculation rules



Declared unit: The declared unit is 1kg and the declared values represent each product based on the annual production in 2022.
Type of EPD: Cradle to gate with options, modules C1-C4, and module D (A1-A3, C, D, and additional modules A4 and A5).
Data base: The LCA was calculated in the latest version of the LCA sofrware SimaPro (version 9.4)

Scenarios and additional technical information

The product does not contain significant quantities of biogenic carbon. The carbon content of multi-use pallets used for transport packaging and paper bats is disregarded.

Information describing the biogenic carbon content at the factory gate		
Name	**Value**	**Unit**
Biogenic Carbon Content in product	0	kg C
Biogenic Carbon Content in accompanying packaging	0	kg C

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment.

Transport to the construction site (A4): Module A4 contains the average transport scenario from the production site to the construction site. An average transport distance of 500 km is assumed.

Parameter	**Parameter unit expressed per functional/declared unit**
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat etc.	Used dataset: Transport, freight, lorry >32 metric ton, EURO5 {RER}| transport, freight, lorry >32 metric ton, EURO5 | Cut-off, U
Distance	500 km
Capacity utilisation (including empty returns)	as in ecoinvent 3.7.1 database
Weight of transported products	**Hydroguard One 40 Grey:** 1 kg (packaging: 0.0030 kg/kg) **Hydroguard One 40 White:** 1 kg (packaging: 0.0030 kg/kg) **ClimaRoof KF-1:** 1 kg (packaging: 0.0031 kg/kg)
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	Not applicable

Installation in the building (A5)

The products are delivered to the construction site. There, water is added to dilute slurries to make it ready for use.

Manual application is assumed, eventual further inputs (e.g., electricity consumption for the mixing), are disregarded.

No losses of putties during application are taken into account.

The packaging material (paper bags, cardboard underlayer, PE-foil and wooden pallet) is as sumed to be transported 50 km with a lorry 16-32 metric ton, EURO5 to a landfill.

For the multi-way pallets, a reuse rate of 20 times is taken into account in the disposal scenario.

Parameter	**Parameter unit expressed per functional / declared unit**
Ancillary materials for installation (specified by material);	Water is added (see below)
Water use	**Hydroguard One 40 Grey:** 0.1582 l/kg **Hydroguard One 40 White:** 0.1582 l/kg **ClimaRoof KF-1:** 0.1416 l/kg
Other resource use	0 kg
Quantitative description of energy type (regional mix) and consumption during the installation process	0 kWh (manual installation)
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	kg

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Parameter	Parameter unit expressed per functional / declared unit
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	**Hydroguard One 40 Grey:** Graphical paper to landfill: 0.00302 kg/kg Cardboard to landfill: 0.000324 kg/kg PE-foil to landifill: 0.000135 kg/kg Wooden pallet to landfill: 0.001465 kg/kg **Hydroguard One 40 White:** Graphical paper to landfill: 0.00302 kg/kg Cardboard to landfill: 0.000324 kg/kg PE-foil to landifill: 0.000135 kg/kg Wooden pallet to landfill: 0.01465 kg/kg **ClimaRoof KF-1:** Graphical paper to landfill: 0.00308 kg/kg Cardboard to landfill: 0.000331 kg/kg PE-foil to landifill: 0.000137 kg/kg Wooden pallet to landfill: 0.01494 kg/kg
Direct emissions to ambient air, soil and water	**Not relevant**

End-of-life (C1 - C4)

Putties are not removed from the wall material during de-construction. Thus, no environmental impacts are declared in module C1.

A landfilling scenario is assumed for Greece, similar to a disposal scenario for bricks or concrete. A default distance of 50 km is assumed between the de-construction site and the landfill.

Processes	**Parameter unit expressed per functional / declared unit of components, products or materials (specified by type of material)**
Collection process specified by type	Hydroguard One 40 Grey: 0.8418 kg/kg collected separately Hydroguard One 40 White: 0,8418 kg/kg collected separately ClimaRoof KF-1: 0,8584 kg/kg collected separately
	0 kg/m^2 collected with mixed construction waste
Recovery system specified by type	0 kg for re-use
	0 kg for recycling
	0 kg for energy recovery
Disposal specified by type	Hydroguard One 40 Grey: 0,8418 kg/kg going to landfill Hydroguard One 40 White: 0.8418 kg/kg going to landfill ClimaRoof KF-1: 0.8584 kg/kg going to landfill
Assumptions for scenario development, (e.g. transportation)	see above

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Reuse, recovery and recycling potential (D)

Not relevant for the declared product

Results for Waterproofing Slurries & Mortars (1K)

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

	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
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	**GR**			**South-East Europe**									**South-East Europe**				-
Specific data used	**> 90%**			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation products	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation sites	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-

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RESULTS OF THE LCA - ENVIRONMENTAL IMPACTS according to EN 15804+A2: 1kg of Hydroguard One 40 Grey

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP total	kg CO_2 eq	3.48E-01	4.55E-02	1.58E-03	0	8.29E-03	0	7.66E-03	0
GWP fossil	kg CO_2 eq	3.49E-01	4.55E-02	2.50E-04	0	8.28E-03	0	7.66E-03	0
GWP biogenic	kg CO_2 eq	-1.33E-03	0.00E+00	1.33E-03	0	0.00E+00	0	0.00E+00	0
GWP luluc	kg CO_2 eq	1.07E-04	1.63E-05	2.83E-07	0	3.25E-06	0	2.40E-06	0
GWP-GHG	kg CO_2 eq	3,49E-01	4,55E-02	2,51E-04	0	8,29E-03	0	7,66E-03	0
ODP	kg CFC11 eq	1.46E-08	1.09E-08	3.44E-11	0	1.92E-09	0	2.89E-09	0
AP	mol H^+ eq	1.04E-03	1.90E-04	1.73E-06	0	3.36E-05	0	6.10E-05	0
EP freshwater	kg P eq	6.95E-06	3.11E-07	1.13E-08	0	5.81E-08	0	5.33E-08	0
EP-marine	kg N eq	2.33E-04	5.73E-05	9.55E-06	0	1.00E-05	0	2.26E-05	0
EP terrestrial	mol N eq	2.75E-03	6.33E-04	4.24E-06	0	1.11E-04	0	2.49E-04	0
POCP	kg NMVOC eq	7.72E-04	2.04E-04	3.29E-06	0	3.39E-05	0	7.13E-05	0
ADPE	kg Sb eq	1.10E-06	1.04E-07	8.77E-10	0	2.88E-08	0	2.03E-08	0
ADPF	MJ	3.39E+00	7.08E-01	3.80E-03	0	1.25E-01	0	1.90E-01	0
WDP	m^3 depriv.	1.12E-01	2.44E-03	8.14E-03	0	3.75E-04	0	6.19E-04	0

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non- fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

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RESULTS OF THE LCA - ENVIRONMENTAL IMPACTS according to EN 15804+A2: 1kg of Hydroguard One 40 White

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP total	kg CO_2 eq	4.32E-01	4.55E-02	1.58E-03	0	8.29E-03	0	1.07E-03	0
GWP fossil	kg CO_2 eq	4.33E-01	4.55E-02	2.50E-04	0	8.28E-03	0	1.07E-03	0
GWP biogenic	kg CO_2 eq	-1.33E-03	0.00E+00	1.33E-03	0	0.00E+00	0	0.00E+00	0
GWP luluc	kg CO_2 eq	1.35E-04	1.63E-05	2.83E-07	0	3.25E-06	0	3.35E-07	0
GWP-GHG	kg CO_2 eq	4,34E-01	4,55E-02	2,51E-04	0	8,29E-03	0	1,07E-03	0
ODP	kg CFC11 eq	1.35E-08	1.09E-08	3.44E-11	0	1.92E-09	0	4.03E-10	0
AP	mol H^+ eq	1.44E-03	1.90E-04	1.73E-06	0	3.36E-05	0	8.50E-06	0
EP freshwater	kg P eq	8.69E-06	3.11E-07	1.13E-08	0	5.81E-08	0	7.43E-09	0
EP-marine	kg N eq	3.86E-04	5.73E-05	9.55E-06	0	1.00E-05	0	3.15E-06	0
EP terrestrial	mol N eq	4.42E-03	6.33E-04	4.24E-06	0	1.11E-04	0	3.47E-05	0
POCP	kg NMVOC eq	1.17E-03	2.04E-04	3.29E-06	0	3.39E-05	0	9.93E-06	0
ADPE	kg Sb eq	1.17E-06	1.04E-07	8.77E-10	0	2.88E-08	0	2.82E-09	0
ADPF	MJ	3.56E+00	7.08E-01	3.80E-03	0	1.25E-01	0	2.65E-02	0
WDP	m^3 depriv.	1.41E-01	2.44E-03	8.14E-03	0	3.75E-04	0	8.61E-05	0
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non- fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential								

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RESULTS OF THE LCA - ENVIRONMENTAL IMPACTS according to EN 15804+A2: 1kg of ClimaRoof KF-1

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP total	kg CO_2 eq	2.31E-01	4.57E-02	1.57E-03	0	8.33E-03	0	7.70E-03	0
GWP fossil	kg CO_2 eq	2.32E-01	4.57E-02	2.41E-04	0	8.33E-03	0	7.70E-03	0
GWP biogenic	kg CO_2 eq	-1.33E-03	0.00E+00	1.33E-03	0	0.00E+00	0	0.00E+00	0
GWP luluc	kg CO_2 eq	1.06E-04	1.64E-05	2.68E-07	0	3.27E-06	0	2.42E-06	0
GWP-GHG	kg CO_2 eq	2,32E-01	4,57E-02	2,42E-04	0	8,33E-03	0	7,70E-03	0
ODP	kg CFC11 eq	1.38E-08	1.09E-08	3.37E-11	0	1.93E-09	0	2.91E-09	0
AP	mol H^+ eq	8.11E-04	1.91E-04	1.67E-06	0	3.38E-05	0	6.14E-05	0
EP freshwater	kg P eq	5.85E-06	3.13E-07	1.06E-08	0	5.84E-08	0	5.36E-08	0
EP-marine	kg N eq	1.70E-04	5.76E-05	9.41E-06	0	1.01E-05	0	2.28E-05	0
EP terrestrial	mol N eq	2.00E-03	6.36E-04	4.12E-06	0	1.11E-04	0	2.51E-04	0
POCP	kg NMVOC eq	5.94E-04	2.05E-04	3.22E-06	0	3.41E-05	0	7.17E-05	0
ADPE	kg Sb eq	1.01E-06	1.05E-07	8.36E-10	0	2.90E-08	0	2.04E-08	0
ADPF	MJ	3.08E+00	7.12E-01	3.65E-03	0	1.26E-01	0	1.91E-01	0
WDP	m^3 depriv.	1.12E-01	2.45E-03	7.19E-03	0	3.77E-04	0	6.22E-04	0
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non- fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential								

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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1kg of Hydroguard One 40 Grey

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ (Hu)	2.63E-01	8.88E-03	2.68E-04	0	1.74E-03	0	4.62E-03	0
PERM	MJ (Hu)	1.42E-02	0	0	0	0	0	0	0
PERT	MJ (Hu)	2.77E-01	8.88E-03	2.68E-04	0	1.74E-03	0	4.62E-03	0
PENRE	MJ (Hu)	3.39E+00	7.09E-01	3.81E-03	0	1.25E-01	0	1.90E-01	0
PENRM	MJ (Hu)	6.95E-03	0	0	0	0	0	0	0
PENRT	MJ (Hu)	3.40E+00	7.09E-01	3.81E-03	0	1.25E-01	0	1.90E-01	0
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ (Hu)	0	0	0	0	0	0	0	0
NRSF	MJ (Hu)	0	0	0	0	0	0	0	0
FW	m^3	2.30E-03	7.42E-05	1.70E-06	0	1.31E-05	0	2.21E-05	0

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

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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1kg of Hydroguard One 40 White

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ (Hu)	3.01E-01	8.88E-03	2.68E-04	0	1.74E-03	0	6.43E-04	0
PERM	MJ (Hu)	1.42E-02	0	0	0	0	0	0	0
PERT	MJ (Hu)	3.15E-01	8.88E-03	2.68E-04	0	1.74E-03	0	6.43E-04	0
PENRE	MJ (Hu)	3.57E+00	7.09E-01	3.81E-03	0	1.25E-01	0	2.65E-02	0
PENRM	MJ (Hu)	6.95E-03	0	0	0	0	0	0	0
PENRT	MJ (Hu)	3.57E+00	7.09E-01	3.81E-03	0	1.25E-01	0	2.65E-02	0
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ (Hu)	0	0	0	0	0	0	0	0
NRSF	MJ (Hu)	0	0	0	0	0	0	0	0
FW	m^3	2.52E-03	7.42E-05	1.70E-06	0	1.31E-05	0	3.08E-06	0

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

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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1kg of ClimaRoof KF-1

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ (Hu)	2.60E-01	8.93E-03	2.49E-04	0	1.75E-03	0	4.64E-03	0
PERM	MJ (Hu)	1.43E-02	0	0	0	0	0	0	0
PERT	MJ (Hu)	2.75E-01	8.93E-03	2.49E-04	0	1.75E-03	0	4.64E-03	0
PENRE	MJ (Hu)	3.08E+00	7.13E-01	3.66E-03	0	1.26E-01	0	1.91E-01	0
PENRM	MJ (Hu)	6.99E-03	0	0	0	0	0	0	0
PENRT	MJ (Hu)	3.09E+00	7.13E-01	3.66E-03	0	1.26E-01	0	1.91E-01	0
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ (Hu)	0	0	0	0	0	0	0	0
NRSF	MJ (Hu)	0	0	0	0	0	0	0	0
FW	m^3	2.07E-03	7.47E-05	1.57E-06	0	1.32E-05	0	2.22E-05	0

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

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RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: Hydroguard One 40 Grey

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.99E-06	1.71E-06	6.38E-09	0	3.27E-07	0	2.86E-07	0
NHWD	kg	2.07E-02	6.65E-02	6.00E-03	0	6.48E-03	0	1.00E+00	0
RWD	kg	1.73E-05	1.03E-05	4.29E-08	0	1.81E-06	0	2.75E-06	0
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

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RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: Hydroguard One 40 White

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.41E-06	1.71E-06	6.38E-09	0	3.27E-07	0	3.98E-08	0
NHWD	kg	4.35E-02	6.65E-02	6.00E-03	0	6.48E-03	0	1.39E-01	0
RWD	kg	1.84E-05	1.03E-05	4.29E-08	0	1.81E-06	0	3.83E-07	0
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

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RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: ClimaRoof KF-1

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.15E-06	1.72E-06	6.13E-09	0	3.29E-07	0	2.88E-07	0
NHWD	kg	3.23E-02	6.69E-02	5.92E-03	0	6.52E-03	0	1.01E+00	0
RWD	kg	1.47E-05	1.03E-05	4.13E-08	0	1.82E-06	0	2.77E-06	0
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

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RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: 1kg of Hydroguard One 40 Grey

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Desease incidences	7.52E-09	5.34E-09	1.99E-11	0	7.13E-10	0	1.30E-09	0
IR	kBq U-235 eq	7.78E-03	3.07E-03	1.89E-05	0	5.44E-04	0	8.24E-04	0
ETP-fw	CTUe	3.35E+00	5.53E-01	3.83E-02	0	9.77E-02	0	1.18E-01	0
HTP-c	CTUh	1.34E-10	1.53E-11	3.76E-13	0	3.17E-12	0	3.53E-12	0
HTP-nc	CTUh	2.77E-09	6.06E-10	1.76E-11	0	1.02E-10	0	8.46E-11	0
SQP	-	1.39E+00	8.11E-01	4.29E-03	0	8.60E-02	0	3.50E-01	0

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: 1kg of Hydroguard One 40 White

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Desease incidences	9.89E-09	5.34E-09	1.99E-11	0	7.13E-10	0	1.81E-10	0
IR	kBq U-235 eq	9.15E-03	3.07E-03	1.89E-05	0	5.44E-04	0	1.15E-04	0
ETP-fw	CTUe	3.81E+00	5.53E-01	3.83E-02	0	9.77E-02	0	1.65E-02	0
HTP-c	CTUh	1.58E-10	1.53E-11	3.76E-13	0	3.17E-12	0	4.92E-13	0
HTP-nc	CTUh	3.21E-09	6.06E-10	1.76E-11	0	1.02E-10	0	1.18E-11	0
SQP	-	1.64E+00	8.11E-01	4.29E-03	0	8.60E-02	0	4.87E-02	0

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: 1kg of ClimaRoof KF-1

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Desease incidences	7.42E-09	5.37E-09	1.94E-11	0	7.17E-10	0	1.30E-09	0
IR	kBq U-235 eq	6.52E-03	3.09E-03	1.79E-05	0	5.47E-04	0	8.29E-04	0
ETP-fw	CTUe	2.86E+00	5.57E-01	3.76E-02	0	9.83E-02	0	1.19E-01	0
HTP-c	CTUh	1.21E-10	1.54E-11	3.44E-13	0	3.18E-12	0	3.55E-12	0
HTP-nc	CTUh	2.13E-09	6.09E-10	1.70E-11	0	1.03E-10	0	8.51E-11	0
SQP	-	1.57E+00	8.15E-01	4.22E-03	0	8.65E-02	0	3.52E-01	0

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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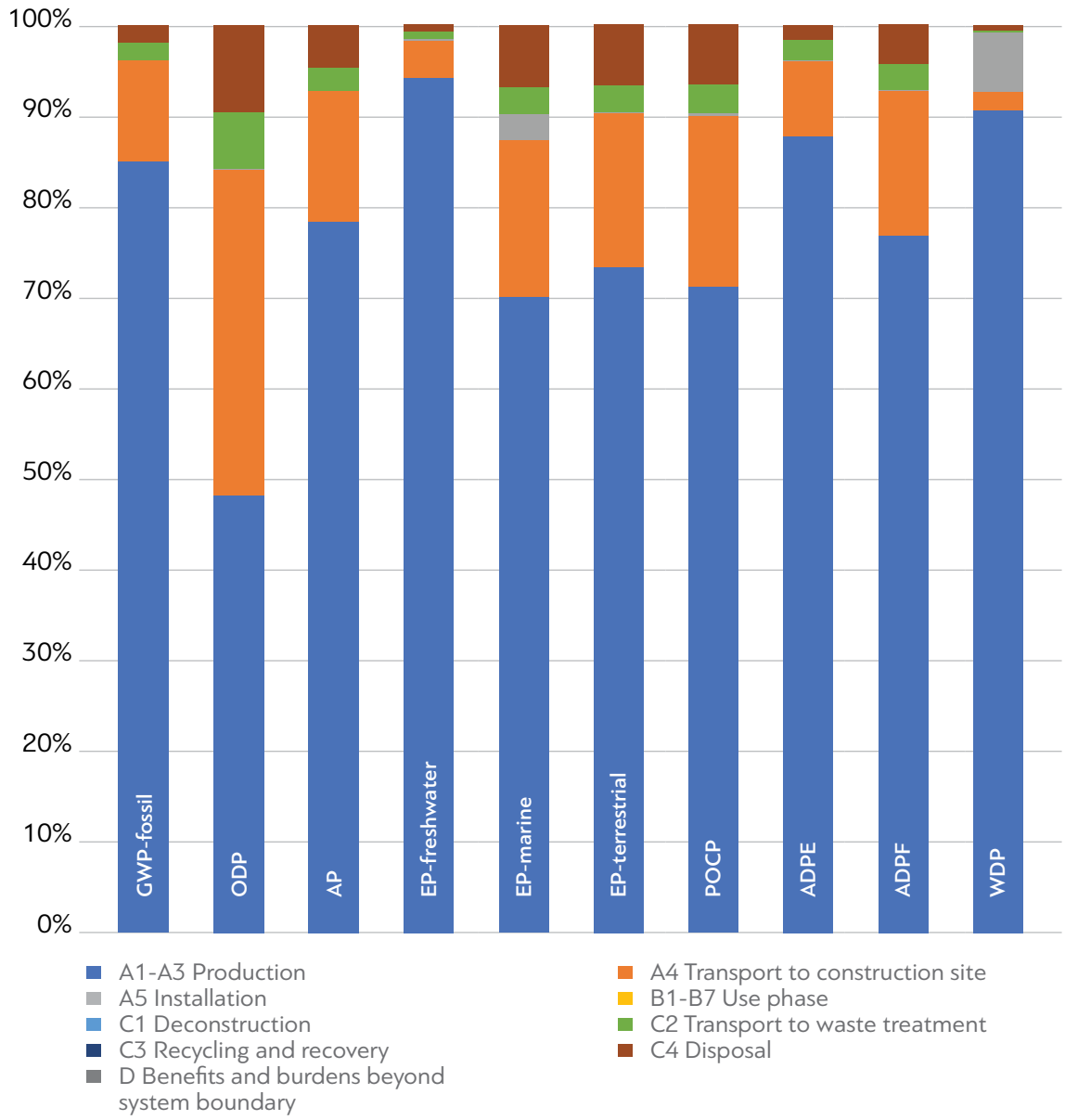
Relative contributions to the life cycle impacts of: Hydroguard One 40 Grey



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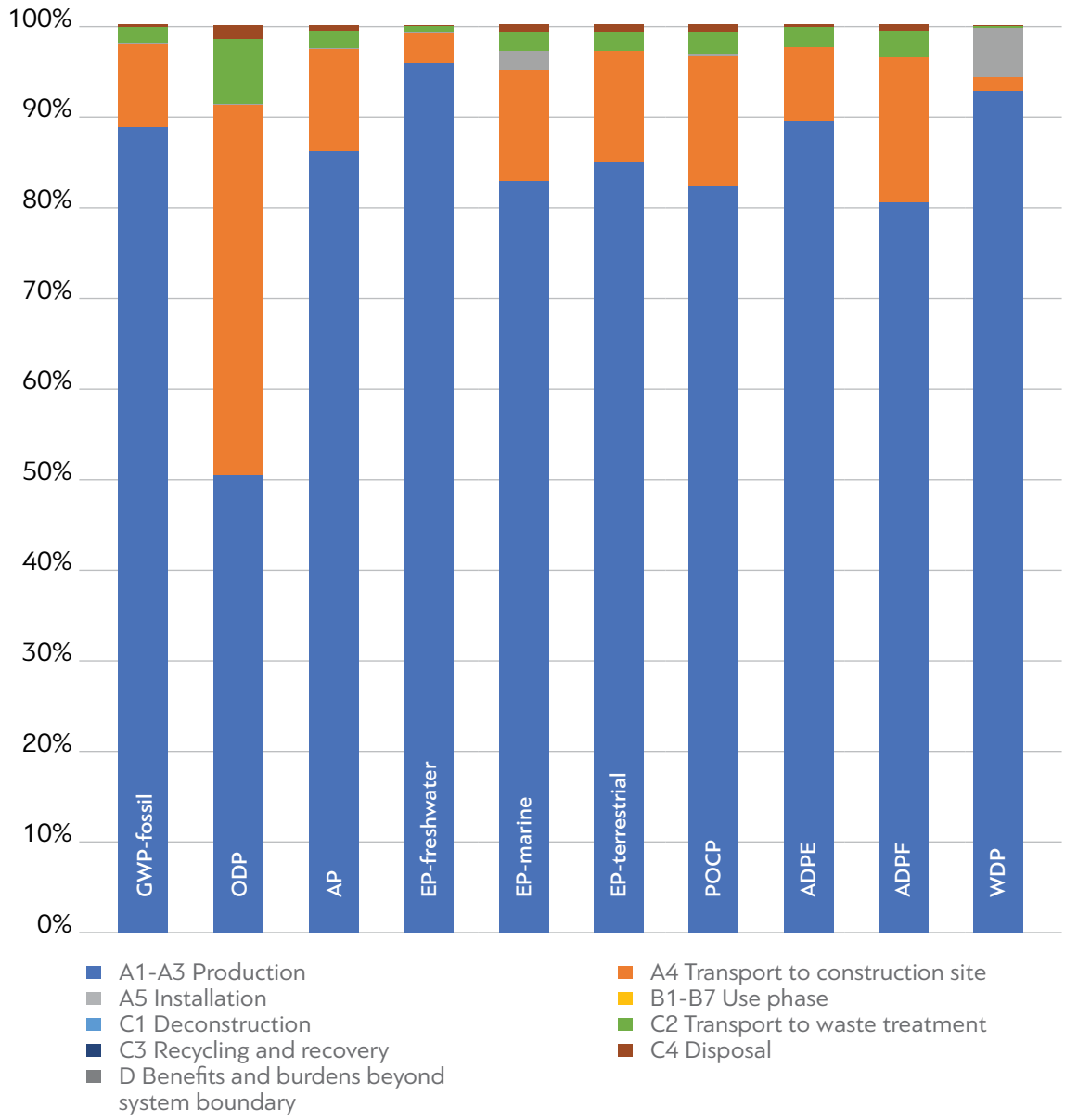
Relative contributions to the life cycle impacts of: Hydroguard One 40 White



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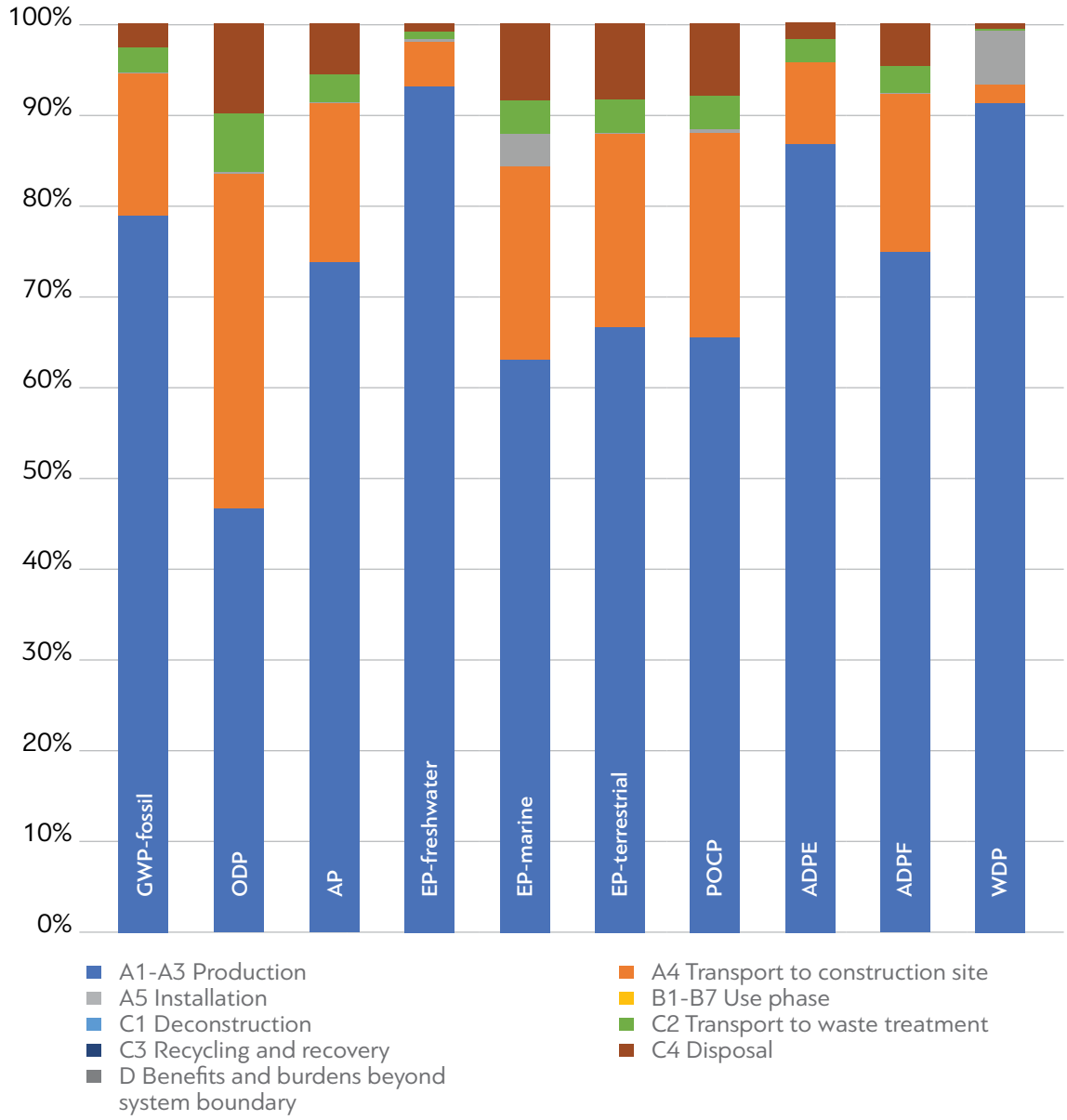
Relative contributions to the life cycle impacts of: ClimaRoof KF-1



Disclaimer 1: for the indicator IR

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

Disclaimer 2: for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP

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 experienced with the indicator.

Revision Details: Addition of GWP-GHG indicators and new product certificates

References

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ISO 14025: 2006: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

ISO 15686-(several parts): Buildings and constructed assets - Service life planning.

ISO 14020:2000: Environmental labels and declarations - General principles.

ISO 14040:2006: Environmental management - Life cycle assessment - Principles and framework.

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Waste Framework Directive: COUNCIL REGULATION (EU) No 333/2011 of 31 March 2011 establishing criteria determining when certain types of scrap metal cease to be waste under Directive 2008/98/EC of the European Parliament and of the Council.

ECHA: The Candidate List of substances of very high concern, available via https://echa.europa.eu/nl/-/four-newsubstances-added-to-the-candidate-list.

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ENVIRONMENTAL PRODUCT DECLARATION

According to ISO 14025 and EN 15804+A2

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Publisher	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com
Registration number	S-P-08831
Issue date	24.07.2023
Valid to	23.07.2028

Third-party verifier:

BUSINESS QUALITY VERIFICATION BQV

Business Quality Verification P.C.

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