Statement of Verification

BREG EN EPD No: 000827 Issue: 01

This is to verify that the Environmental Product Declaration provided by:

HEMPEL A/S

are in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:
1 kilogram of Hempafire Optima 515

Company Address

HEMPEL A/S
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HEMPEL

Signed for BRE Global Limited	Hayley Thomson Operator	
24 July 2026 Date of this Issue	24 July 2026 Date of First Issue	23 July 2031 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: 000827

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 Rev 3.2 (May 2025).
Commissioner of LCA study	**LCA consultant/Tool**
HEMPEL A/S Lundtoftegårdsvej 91 DK-2800 Kgs. Lyngby Denmark	ITeC - The Catalonia Institute of Construction Technology Wellington 19, 08018 Barcelona - Tel +34 933 093 404 www.itec.cat SimaPro Version 9.6.0.1 by PRé Sustainability BV.
Declared/Functional Unit	**Applicability/Coverage**
1 kilogram of Hempafire Optima 515	Product average EPD. Hempafire Optima 515 is not yet on the market at the time this EPD is developed (full-scale production is expected shortly). Results of this EPD shall be used with care.
EPD Type	**Background database**
Cradle to Gate with Module C and D	Ecoinvent v3.10 (2024) database CEPE Raw Material database v4.0

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b]) Third party verifier: Kim Allbury
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Hempel (Guangzhou) Coatings Ltd.
No. 3 Canghai 4th Road, Yonghe Zone,
Guangzhou Economic & Tech. Dev. Zone,
511356 Guangzhou.
China

Hempel Paints (Saudi Arabia) W.L.L.
Road Number - 45, 2nd Industrial City - South Jeddah,
Jizan Road - Jeddah Leith Street.
Kingdom of Saudi Arabia

Hempel Paints (Kuwait) K.S.C.C.
Shuaiba Western Industrial Area.
Plot No-51, Block-2. Al-Ahmadi, 65300.
Kuwait

Hempel Manufacturing (M) SDN. BHD.
Batu 6, Jalan Batu Pahat
86000 Kluang, Johor
Malaysia

Pinturas Hempel, S.A.U.
Avinguda de Sentmenat, 108
08213 Polinyà (Barcelona)
Spain

Hempel Paints (Emirates) L.L.C
Interchange No.08, Sajja Area, Plot No 698/G Al Dhaid Rd.,
P.O.Box 2000, Sharjah,
United Arab Emirates

Construction Product:

Product Description

This EPD is representative for Hempafire Optima 515.

It is a one-component, waterborne, physically drying intumescent coating for passive fire protection of structural steel against cellulosic fires. It has been tested and approved according to different international standards for fire protection from R15 to R120 fire durations and it is 3rd party certified by independent certification bodies.

It is fully compatible with the other waterborne intumescent products from Hempel and can be used in interior and semi-exposed environments with a wide range of approved primers and topcoats depending on service life conditions.

Technical Information

Property	Value, Unit
Relative density	1.4 kg/L
Solids by volume	71 – 79%
Dry film thickness	1500 micron
Wet film thickness	2000 micron
Theoretical spreading rate	0.75 m2/L
Coverage	1.96 kg/m2

Technical information and datasheets are available for consultation at www.hempel.com.

Main Product Contents

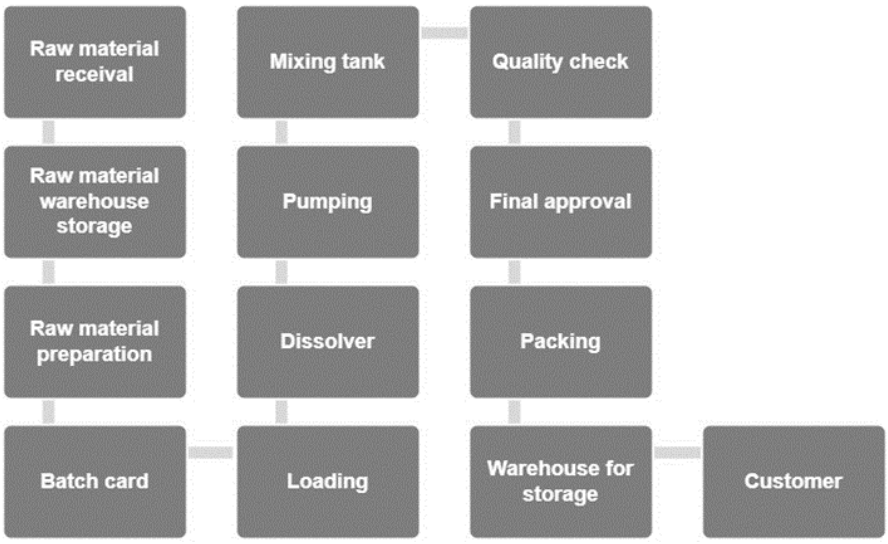
The material composition of the declared mixed product is presented below:

Material/Chemical Input	%
Binder	30 – 40
Filler	< 10
Pigments	50 – 60
Additives	< 10
Water	< 10

Manufacturing Process

The manufacturing process involves the controlled mixing and dispersion of multiple chemical substances and materials to obtain a homogeneous final product, which is subsequently packaged and prepared for distribution.

Process flow diagram



Note: The manufacturing process generates various types of waste, each managed as described below:

- Clean or contaminated packaging (e.g., IBCs, plastic and metal drums and cans) is sent for recycling.
- Contaminated cleaning solvents are sent for recycling.
- Paint and raw material residues are disposed of via incineration.
- Sludge is either incinerated or landfilled.
- Demolition waste is partially recycled and partially landfilled.
- Water contaminated with oil undergoes recycling.
- Dirty paper, cardboard, and plastic are treated through incineration.
- Clean paper, cardboard, and plastic are sent for recycling.
- General and organic waste is sent to landfill.
- Metal scrap is recycled.

End of Life

The product is disposed of together with the substrate to which it is applied. End-of-life treatments may include recycling, incineration, or landfill, as the coating is unlikely to be separated during waste processing.

Additional information

Hempafire Optima 515 is not yet on the market – Results of this EPD shall be used with care as the LCI data for Hempafire Optima 515 is based on production data for existing products which have a consistent manufacturing process, and therefore may result in increased uncertainty.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 kilogram of Hempafire Optima 515.

System boundary

The declared product system is Cradle to Gate with Modules C and D, meaning that the Life Cycle Assessment covers the manufacturing of the product up to the factory gate, while also considering the end-of-life stages (Module C) and the potential benefits and loads beyond the system boundary (Module D).

Data sources, quality and allocation

All data used for the inventory of the manufacturing stage are primary data obtained directly from Hempel A/S.

The primary data for factory operations—including consumption, yield, and waste materials—raw material transport distances, and final product packaging data (transport distances and packaging type) were collected through a detailed sensitivity analysis, compiling all primary data from Hempel's factories worldwide for the reference year January–December 2024. Following a worst-case scenario approach, the data used as the baseline model for the LCA were selected, except for raw material quantities, raw material packaging types, and reference shades, which are specified individually for each studied product.

The background databases used are Ecoinvent v3.10 (2024) cut-off by classification for the general model, and CEPE Raw Material database v4.0 for raw materials; and the characterization factors of the EN 15804 + A2 method (2019) v1.01 / EF 3.1 normalization and weighting set, Cumulative Energy Demand (2024) v1.12 and EDIP 2003 (2018) v1.07.

For the product manufacturing, the allocation of environmental impacts has been performed in accordance with the requirements of the applicable PCR. The following approach has been applied:

- Raw material inputs: Allocated on a mass basis, adjusted by the factory yield factor.
- Energy consumption: Allocated on a mass basis, distributed per kilogram of finished product.
- Manufacturing waste: Allocated on a mass basis, with all process waste directed to the appropriate treatment facility.
- Packaging materials: Allocated on a mass basis, included in the product system.

A location-based approach was applied for the electricity mix. The emission factor was derived from Ember Electricity Data Explorer - 2024 (ember-climate.org), based on the country-specific grid electricity mix of the manufacturing site (0,652 kg CO_2e/kWh). This factor was used to model electricity-related emissions at the Hempel production facility chosen for the assessment.

The quality of the data and the uncertainties associated with the inventories of each input are also analysed in accordance to Table E.1 of Annex E - Schemes to be applied for data quality assessment of generic and specific data of the EN 15804:2012+A2:2019 standard. The assessment considers three criteria: geographical representativeness, technical representativeness, and temporal representativeness, using a scale from 1 (very good quality) to 5 (very poor quality). Summary of data quality:

- Geographical representativeness: most datasets (≈77,5%) are level 1, around 21% are level 2, and 1,5% are level 3.
- Technical representativeness: all datasets (100 %) are level 1.
- Temporal representativeness: all datasets (100 %) are level 1.

Cut-off criteria

For the present analysis, more than 99% of the mass and energy inputs and outputs of the system have been considered, leaving out diffuse emissions in the factory and the production of manufacturing infrastructure such as industrial machinery and equipment.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2,60E+00	2,57E+00	3,11E-02	4,21E-03	1,65E-07	1,92E-02	1,92E-04
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0	0
	Transport	C2	4,56E-03	4,55E-03	1,49E-06	1,12E-07	9,29E-11	5,31E-06	3,82E-09
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	9,25E-02	9,24E-02	1,22E-05	3,84E-06	2,59E-10	6,79E-05	5,90E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0	0

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts

			EP-marine	EP-terrestrial	POCP	ADP-mineral& metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2,51E-03	2,86E-02	9,72E-03	3,68E-05	5,00E+01	2,64E+00	1,52E-07
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0	0
	Transport	C2	1,18E-06	1,29E-05	1,15E-05	1,50E-10	6,01E-02	2,56E-05	2,69E-10
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	2,71E-05	2,96E-04	1,25E-04	9,33E-10	2,22E-01	1,01E-02	1,60E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0	0

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts

			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	7,84E-02	2,67E+01	2,52E-08	5,15E-08	2,69E+01
Construction process stage	Transport	A4	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0	0
	Transport	C2	8,19E-06	2,06E-03	3,17E-13	3,02E-11	1,35E-04
	Waste processing	C3	0	0	0	0	0
	Disposal	C4	4,44E-05	1,72E-02	5,17E-12	1,51E-10	5,43E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2,26E+00	0,00E+00	2,26E+00	5,40E+01	9,43E+00	6,35E+01
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0
	Transport	C2	2,13E-04	0	2,13E-04	6,39E-02	0	6,39E-02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	1,54E-03	0	1,54E-03	2,36E-01	0	2,36E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0	0	0	6,47E-02
Construction process stage	Transport	A4	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0
	Transport	C2	0	0	0	1,54E-06
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	2,40E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	1,86E-04	1,70E-02	2,13E-05
Construction process stage	Transport	A4	MND	MND	MND
	Construction	A5	MND	MND	MND
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0
	Transport	C2	3,99E-07	1,83E-06	5,65E-09
	Waste processing	C3	0	0	0
	Disposal	C4	1,47E-06	1,00E+00	2,71E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (Residual+GO)	A1-3	1,10E-02	3,03E-02	1,22E-03	8,08E-03	0	0
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Module not declared		
A5 – Installation in the building	Module not declared		
B2 – Maintenance	Module not declared		
B3 – Repair	Module not declared		
B4 – Replacement	Module not declared		
B5 – Refurbishment	Module not declared		
Reference service life	Module not declared		
B6 – Use of energy; B7 – Use of water	Module not declared		
C1 to C4 End of life,	Waste for final disposal: Landfill	%	100
	Transport to waste processing: Truck, fuel consumption	kgkm	4.56E-03
	Transport to waste processing: Distance	km	30
	Transport to waste processing: Capacity utilisation	%	85
Module D	No loads or benefits associated with module D		

The product is commercialized on a global scale; end-of-life scenario: assumed to occur globally, without geographic restriction.

Interpretation

The results presented in Figure 1 correspond to 1 kilogram of Hempafire Optima 515. The figure illustrates the relative contributions of the assessed modules to various environmental impact categories and to primary energy use. Most impacts are associated with the raw materials used in the product (Module A1–A3).

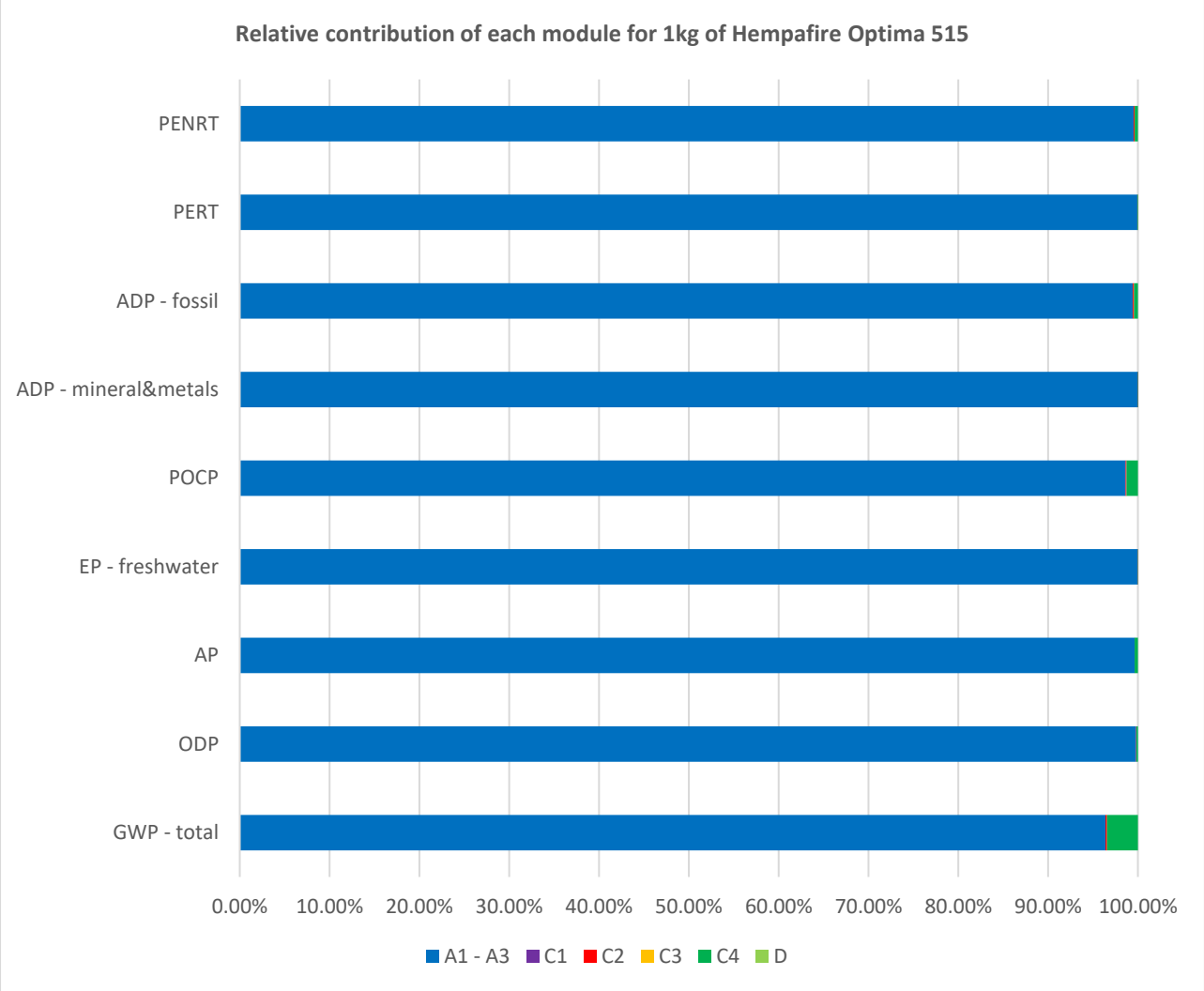


Figure 1*: Relative contribution of each module for 1 kilogram of Hempafire Optima 515.*

Raw materials and transport (21,75%), packaging (61,49%) and manufacturing consumption (16,76%) account for the total use of renewable primary energy resources (PERT). Raw materials and transport (89,77%) have the greatest impact on the use of non-renewable primary energy resources (PENRT), while the impact of the production process (due to plant consumption and product packaging) accounts for 10,23%. Electricity accounts for more than 30 % of the total energy use in the manufacturing process. Pre-product manufacturing (raw materials and transport) is the main contributor in all impact categories for A1-A3 modules, with an average of 69,57%.

GWP-biogenic indicator emissions are mainly caused by the packaging of raw materials, whose waste management is carried out in A1-A3 modules (fabrication stage). This explains why biogenic emissions do not follow “-1+1” biogenic CO2 sequestration flow, as the product itself does not contain biogenic carbon.

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework.
BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines.
BS EN ISO 14044:2006. London, BSI, 2006.

Ecoinvent Version 3.10: Database for Life Cycle Assessment. Swiss Centre for Life Cycle Inventories (Ecoinvent Centre), 2024.

CEPE Raw Material database v4.0: Raw materials LCI database for the European coatings and printing ink industries. The European Council of the Paint, Printing Ink, and Artist's Colours Industry (CEPE).

Life Cycle Assessment: Hempafire Optima 515. LCA report by The Catalonia Institute of Construction Technology (ITeC), 2026.