Statement of Verification

BREG EN EPD No.: 000381 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

HEMPEL A/S

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1 kilogram of water-borne PFP (Passive Fire Protection) paint

Company Address

HEMPEL A/S
Lundtoftegårdsvej 91
DK-2800 Kgs. Lyngby
Denmark

Signed for BRE Global Ltd	Emma Baker Operator	01 October 2021 Date of this Issue
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BRE Global Ltd., Garston, Watford WD25 9XX.
T: +44 (0)333 321 8811 F: +44 (0)1923 664603 E: Enquiries@breglobal.com

Environmental Product Declaration

EPD Number: 000381

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.0
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 - ES08018 Barcelona - Tel 933 093 404 www.itec.cat SimaPro Version 9.1.1 by PRé Sustainability BV.
Declared/Functional Unit	**Applicability/Coverage**
1 kilogram of water-borne PFP (Passive Fire Protection) paint	Product Average.
EPD Type	**Background database**
Cradle to Gate with Modules C and D	Ecoinvent v3.6 (2019) database.

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: Pat Hermon
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 sites

The transport distances were adapted to both factories, specific transport distances for each provider were used for raw material transport. The manufacturing sites included in this EPD are:

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 Road, P.O.Box 2000, Sharjah, United Arab Emirates.

Construction Product:

Product Description

This EPD is representative for 2 products:

Hempacore AQ and Hempafire Optima 500.

Both products are one-component, waterborne, physically drying intumescent coatings for passive fire protection of structural steel against cellulosic fires. Tested and approved according to different international standards for fire protection and 3rd party certified by independent certification bodies. Suitable for I section beams, H columns, hollow sections and cellular beams. Other type of steel sections may be approved depending on the local regulations. 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	67-70 ± 3%
Dry film thickness (per coat) - Hempacore AQ	200 - 700 µm
Dry film thickness (per coat) - Hempafire Optima 500	200 - 900 µm
Wet film thickness (per coat) - Hempacore AQ	300-1050 µm

Property	Value, Unit
Wet film thickness (per coat) - Hempafire Optima 500	285-1285 µm
Theoretical spreading rate - Hempacore AQ (at 670 µm DFT)	1 m²/l
Theoretical spreading rate - Hempafire Optima 500 (at 700 µm DFT)	1 m²/l

Any technical information is superseded by the information stated in product data sheets, Hempel technical notes or third party accreditations for fire protection.

The coverage of intumescent (passive fire protection) coatings largely differs from project to project and country to country. The total dry film thickness (DFT) required to protect a specific steel section depends on the relationship between exposed surface and mass of steel, type of section, orientation and the critical core temperature applicable according to local regulations. Calculations have to be done by experts properly qualified according to local regulations. For project specific data, please contact your Hempel PFP representative.

The service life of applied the product is highly dependent on the conditions of application, end use environment and the paint system used in combination of other Hempel's approved primers and topcoats. Depending on the specified system, the end use conditions, inspections and maintenance the service life can reach the service life of the building.

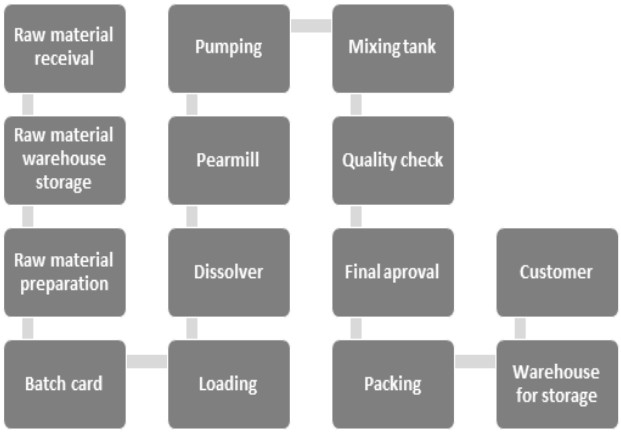
Main Product Contents

Material/Chemical Input	%
Filler	40-70
Binder	10-25
Pigments	10-25
Water	20-45
Additives	<15

Manufacturing Process

The manufacturing process for coatings involves combining and mixing multiple chemicals and materials into a homogenous product, which is then packaged and distributed.
The manufacturing processes for each of the products are identical.

Process flow diagram



End of Life

Coatings are typically disposed of with the substrate they are painted on. This can be through recycling, incineration or landfill, but the coating itself is unlikely to be separated from the substrate during the disposal process.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 kilogram of water-borne PFP (Passive Fire Protection) paint.

System boundary

The chosen system has been Cradle to Gate with Modules C and D, which means that the Life Cycle Assessment is contemplated from the manufacturing of the paints until they leave the factory, considering the end-of-life stage and the benefits and loads beyond the system boundary.

Data sources, quality and allocation

To carry out this study, 2020 (January 1, 2020 - December 31, 2020) has been considered as the reference year.
The background database is Ecoinvent v3.6 (2019) Database.
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.

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. On the other hand, those suppliers or manufacturers of raw materials that supply less than 5% of the total raw material consumption have been omitted. The remaining suppliers have been adjusted proportionally to 100% to balance this deficit.

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	2.01E+00	1.99E+00	1.49E-02	4.81E-03	5.25E-07	1.31E-02	7.80E-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	4.08E-03	4.07E-03	1.61E-06	3.76E-08	9.39E-10	8.18E-06	3.76E-08
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	1.14E-01	1.14E-01	9.89E-05	2.07E-06	9.55E-10	4.99E-05	6.55E-07
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	2.87E-03	3.76E-02	8.59E-03	4.05E-05	3.67E+01	1.89E+00	1.73E-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	1.37E-06	1.52E-05	5.35E-06	5.31E-10	5.77E-02	-3.52E-06	2.34E-10
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	2.06E-05	2.24E-04	8.73E-05	2.54E-09	7.17E-02	1.86E-04	1.23E-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	2.39E-01	2.96E+01	3.23E-09	1.22E-07	9.29E+00
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	2.56E-04	2.40E-02	3.08E-13	3.63E-11	1.82E-04
	Waste processing	C3	0	0	0	0	0
	Disposal	C4	4.29E-04	7.03E-02	7.17E-12	8.47E-11	1.75E-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)

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	2.41E+00	0	2.41E+00	3.96E+01	0	3.96E+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	7.76E-05	0	7.76E-05	6.12E-02	0	6.12E-02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	1.81E-03	0	1.81E-03	7.61E-02	0	7.61E-02
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)

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	4.82E-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	4.47E-07
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	9.35E-06
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)

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	1.79E-02	5.46E-01	1.11E-04
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	1.53E-07	6.71E-06	4.15E-07
	Waste processing	C3	0	0	0
	Disposal	C4	1.51E-07	1.00E+00	4.51E-07
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)

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 (of product stage)	A1 -3	0	4.25E-02	0	0	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	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	3.66E-05
	Transport to waste processing: Distance	km	30
	Transport to waste processing: Capacity utilisation	%	100
Module D	Module declared		

Interpretation

The results displayed in Figure 1 apply to 1 kilogram of water-borne Passive Fire Protection (PFP) paints. It illustrates the relative contributions of the different modules assessed to various environmental impact categories and to primary energy use. Most impacts relate to the raw materials that compose the paint (included in Module A1-A3).

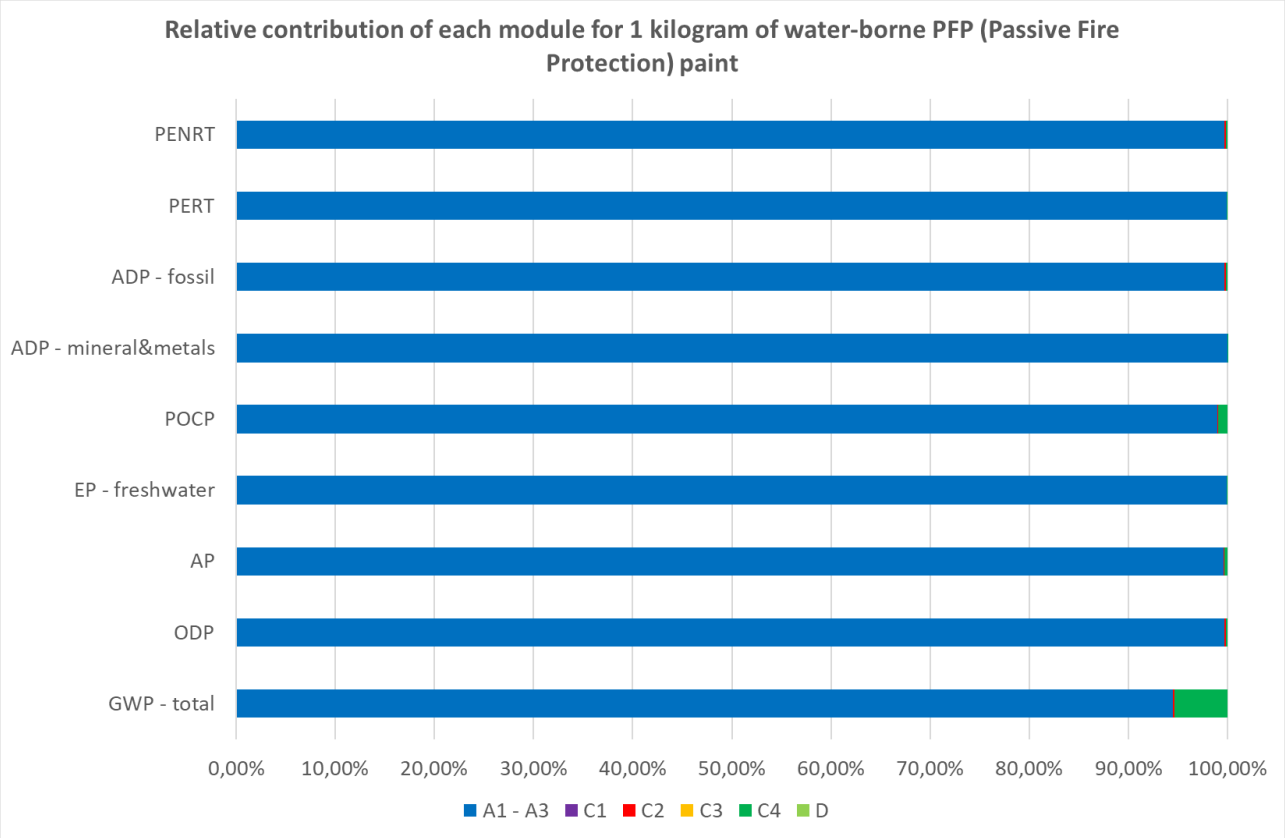


Figure 1*: Relative contribution of each module for 1 kilogram of water-borne PFP (Passive Fire Protection) paint.*

Raw material manufacturing and transport (71%), production (0.05%) and packaging (29%) account for the total of the use of renewable primary energy resources (PERT). The manufacturing of raw materials and its transport (94%) has the greatest impact on the use of non-renewable primary energy resources (PENRT), while the impact of the production process (due to fuel consumption and product packaging) measures 6%.
The pre-product manufacturing (raw materials and its distribution) is the main contributor in all impact categories for Module A1-A3 with at least 78% in each case.

In this EPD two different products are studied: Hempacore AQ and Hempafire Optima 500. Depending on the product, the raw materials vary and thus the environmental impacts and primary energy use (Figure 2 displays the variation for Global Warming Potential (GWP) for declared unit).

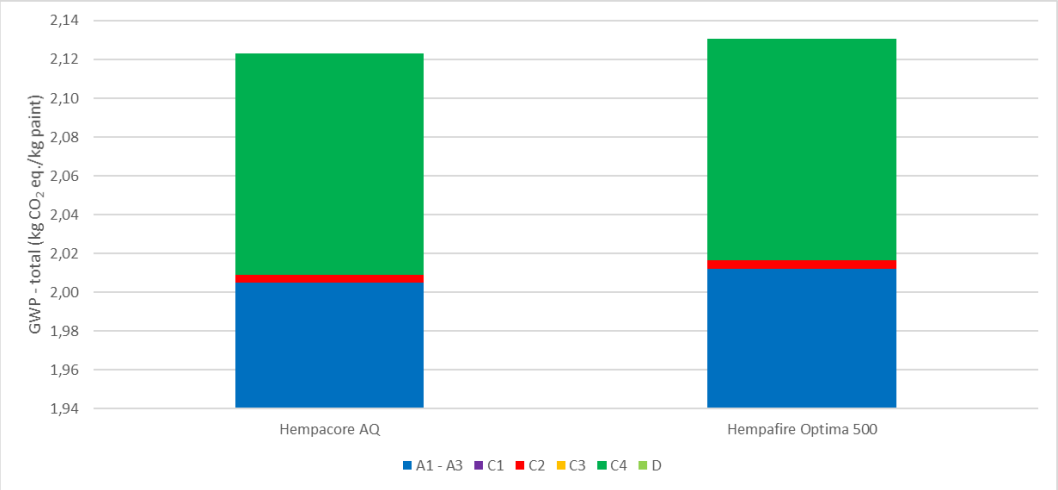


Figure 2*: Variation of Global Warming Potential (GWP – total) of each product within the declared unit, 1 kilogram of water-borne PFP (Passive Fire Protection) paint.*

References

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