Statement of Verification

BREG EN EPD No.: 000486 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Profine GmbH

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

1 m² of KömaCel Interior wall cladding panel

Company Address

Profine GmbH,
Zweibrückerstraße 200,
66954 Pirmasens,
Germany

Kömmerling® TODAY FOR TOMORROW

Signed for BRE Global Ltd	Emma Baker Operator	11 May 2023 Date of this Issue
11 May 2023 Date of First Issue		10 May 2028 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: 000486

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 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Profine GmbH, Zweibrückerstraße 200, 66954 Pirmasens, Germany	Bala Subramanian, BRE LINA 2.0
Declared Unit	**Applicability/Coverage**
1 m² of KömaCel Interior wall cladding panel	Product Average.
EPD Type	**Background database**
Cradle to Gate with options	ecoinvent

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: Nigel Jones
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+A1:2013. 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+A1:2013 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)

Profine GmbH

Pirmasens
Zweibrückerstraße 200,
66954 Pirmasens,
Germany

Construction Product

Product Description

KömaCel is an integral skin-foam sheet made of rigid PVC with a sandwich-like structure. manufactured through the Celuka process in one single operation, and it consists of two solid layers and a cellular core, both made of the same materials. KömaCel is available in various thicknesses ranging from 4 mm to 30 mm; this EPD represents 1 m² of internal wall cladding KömaCel panel. This is to enable the impacts on the range of KömaCel panels to be calculated for the available thicknesses.

Some of the applications of KömaCel are:

Building sector: KömaCel can play out its advantages in the building sector because it is an integral skin foam sheet that exhibits extremely low thermal conductivity and good insulation and sound insulation values. Therefore, it is used on door and window elements, cladding, roller shutter boxes, and opaque panel infills. Its suitability extends to wet rooms, shop and interior fittings, and exhibition stands.

Industry: KömaCel's flexural strength and low weight make it therefore ideal for structured parts, chemicals, laboratories, furniture, industry, and ship, container, and vehicle fittings.

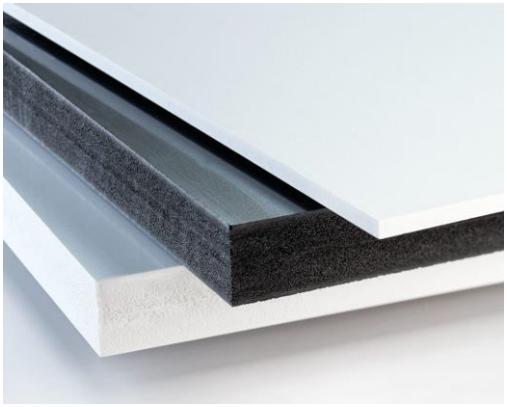
Advertising sector: KömaCel is ideal for signs, banners, inscription panels, displays, and large lettering. They can also be used as design elements in exhibition stands and shop windows.

Technical Information

Technical properties of all products assessed within this average EPD

Mechanical Property		Test method	Thickness (mm) 4, 5, 6	Thickness (mm) 8, 10, 13	Thickness (mm) 15, 17, 19, 24, 28, 30
Density for thickness from 4mm to 30mm – g/m3		DIN EN ISO 1183	0.50 – 0.70	0.50 – 0.55	0.50 – 0.55
Yield stress (tensile strength) MPa		DIN EN ISO 527	≥ 20	≥ 13	≥ 6
Elongation at tear (%)		DIN EN ISO 527	≥ 30	≥ 15	≥ 13
Flexural strength		DIN EN ISO 178	≥ 30	≥ 20	≥ 20
Compressive strength (Hooke's range) (MPa)		DIN EN ISO 844	> 8	> 3	> 3
Compressive stress at 30 % compress (MPa)		DIN EN ISO 844	> 14	> 7	> 7
Modulus of elasticity (MPa)		DIN EN ISO 527-2 / 1A / 50	~ 1100	~ 800	~ 800
Ball indentation hardness (132 N / 30 s) (MPa)		DIN EN ISO 2039-1	> 10	> 10	> 15-20
Shore hardness D		DIN EN ISO 868	~ 55	~ 75	~ 77
Impact strength	+20 °C	DIN EN ISO 179	MW 15*	MW 20*	MW 25*
	0 °C		MW 13*	MW 15*	MW 20*
	-20 °C		MW 10*	MW 10*	MW 15*
Thermal properties		**Test method**	**Thickness (mm) 4, 5, 6**	**Thickness (mm) 8, 10, 13**	**Thickness (mm) 15, 17, 19, 24, 28, 30**
Vicat softening temperature (°C)		DIN EN ISO 306 (process A50)	≥ 75	≥ 75	77
Deflection temperature (°C)		DIN EN ISO 75 (process Ae)	~ 56	~ 63	-
Coefficient of linear thermal expansion (from -30 °C to +50 °C) - mm / mK		DIN EN ISO 11359-2	≤ 0.08	≤ 0.08	≤ 0.08
Thermal conductivity (from 0 °C to +60 °C) - W / mK		DIN EN ISO 22007	0.10	0.05-0.07	0.05-0.07
U-value* (Heat transfer coefficient) W / m2K		based on DIN EN 674	8 (mm): 3,1; 10 (mm): 2,6; 13 (mm): 2,4; 19 (mm): 2,0; 24 (mm): 1,7; 30 (mm): 1,4		
Electrical properties		**Test method**	**Thickness (mm) 4, 5, 6**	**Thickness (mm) 8, 10, 13**	**Thickness (mm) 15, 17, 19, 24, 28, 30**
Surface resistance Ω		DIN VDE 0303 T3 / DIN IEC 93	10^{14}	10^{14}	10^{14}
Volume resistivity Ω * m		DIN VDE 0303 T3 / DIN IEC 93	10^{15}	10^{15}	10^{15}
Dielectric strength (Sample thickness 4 mm) kV/ mm		DIN VDE 0303 T21	≥ 12		
Comparative figure for tracking		DIN IEC 112	CTI 600	CTI 600	CTI 600

Other properties		Test method	Thickness (mm) 4, 5, 6	Thickness (mm) 8, 10, 13	Thickness (mm) 15, 17, 19, 24, 28, 30
Weighted sound reduction index RW1P		DIN EN ISO 10848	10 mm: 27; 19 mm: 29; 13 mm: 28; 24 mm: 30; 15 mm: 28; 30 mm: 32		
Water absorption after 7 days		DIN EN ISO 62	< 0.2	Ca. 0.2	Ca. 0.2
Fire behaviour	Colour 654: B-s3d0	DIN EN 13501-1 (EU)	4-6	8+10	-
	M1	NF P 92-501 (FR)	4-6	8+10	-
	M2		-	652: 8, 10, 13; 654: 13	15, 17, 19, 24, 28, 30
	Class 1	BSE 476: Part 7 (GB)	4-6	8+10	-
	V0	UL 94 (USA)	4-6	652:10	-
	V0/5VB		-	10	-



Main Product Contents

Material composition of all products assessed within this average EPD

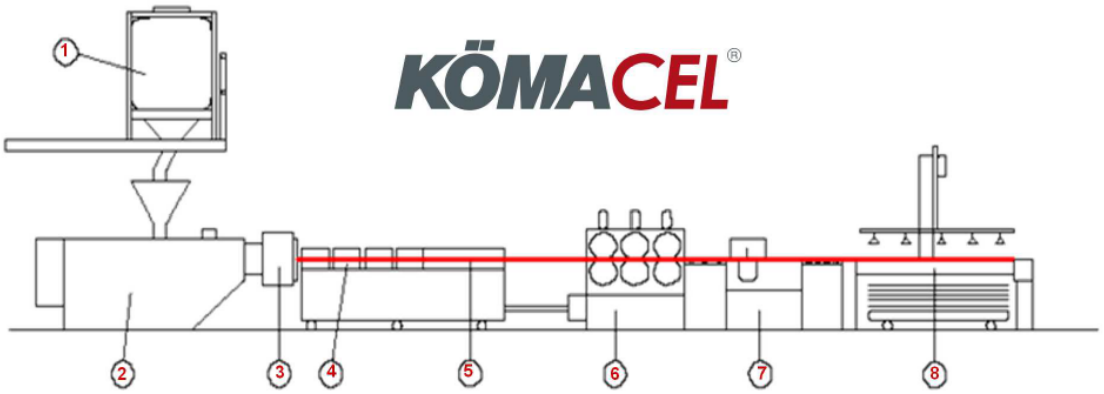
Material/Chemical Input	%
PVC	60-66
Chalk	5-10
CaZn stabilizer	1-5
Acrylic Polymer	1-10
Other	1-10

Manufacturing Process

An integral PVC foam sheet is created with relatively high density near the surface and low density at the core. During the forming process inside the die and the calibration, the cells of the sheet at the surface are smoothed out. The interior foaming process (Celuka) utilises a torpedo inside the die. The torpedo generates a hollow section as the profile exits the die, which encourages the foaming action to fill this hollow by inward foaming. The cooling of the surfaces that encounter the calibrator walls creates a very strong, glossy outer

skin on the part's surface while inwardly filling the foam part. Simultaneous calibration prevents further enlargement of the profile's cross-section. In this process, foaming takes place mainly toward the core. By achieving optimal interaction between the PVC compound, foaming agent, and foam calibration, excellent product quality can be achieved.

Process flow diagram



1) Charge
2) Twin-screw extruder
3) Flat sheet die
4) Calibration
5) Water bath
6) Draw-off roll
7) Cutting-out saw
8) Stack / pallet type conveyor

Life Cycle Assessment Calculation Rules

Declared unit description

1 m² of KömaCel Interior wall cladding panel

System boundary

This is a cradle-to-gate with options LCA study that follows the modular design defined in EN 15804:2012+A1:2013 and includes the production stage modules, A1 to A3; and construction stages A4 Transport and A5 Installation.

Data sources, quality and allocation

Datasets are derived from Ecoinvent v3.2 (2015) and the LCA tool used was BRE LINA v2.0. The LCA models and reports the production stage modules, A1 to A3 and construction stages A4 and A5. No inputs or outputs have been excluded, all the ancillary materials, energy, and water use are included. Only exemptions are emissions to air, water, and soil are not measured during the data collection period. The quantity used in the data collection for this EPD is for the total quantity of KömaCel manufacturing as a proportion of the total manufactured during the data collection period (01-01-2021 to 31-12-2021), which was calculated at 7.2%.

Profine GmbH manufactures KömaCel in thicknesses from 4 mm to 30 mm with densities from 0.4 to 0.7 kg/m³, however, the composition of each thickness from 4-19mm is the same and there is some change in the formulation between 24-30mm thickness, though the composition is within a range, i.e., 5%, so to provide the average EPD, the impacts are analysed by using total production data of the KömaCel for 1 kg/m² to enable

the impacts for the different thicknesses. Further the impacts are calculated for the lowest thickness panel - 4mm and the highest thickness panel - 30.8mm, and the most selling thickness panel - 10mm.

Profine GmbH manufactures other products in addition to KömaCel products; therefore, an allocation of fuel consumption, water consumption, and discharge is required, and this has been done according to the provisions of the BRE PCR PN514 and EN 15804. Waste and Electricity consumption was determined by measuring the consumption on the manufacturing site for all production lines and weighted proportionally by production of KömaCel.

Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e., raw material production) from the ecoinvent 3.2 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804.

Specific European datasets have been selected from the ecoinvent LCI for this LCA. For grid electricity, the following dataset was used: “Electricity, Germany (kWh) (Ecoinvent 3.2). The quality levels of geographical and technical representativeness are therefore very good. The quality level of time representativeness is fair as the background LCI datasets are based on ecoinvent v3.2 which was compiled in 2015. Therefore, there is approximately 5-6 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Cut-off criteria

All the raw materials, ancillary materials, process energy, general energy, water use/discharge and production waste have been included. Only emission to water, land, and soil was not covered.

LCA Results

The results per declared unit (1 kg/m²) of the KömaCel Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	2.50E+00	8.79E-08	1.14E-02	5.99E-03	2.63E-03	6.54E-04	5.13E+01
	Transport	A2	1.22E-01	2.25E-08	4.23E-04	1.09E-04	7.21E-05	3.20E-07	1.85E+00
	Manufacturing	A3	2.61E-01	2.81E-08	7.89E-04	1.28E-03	1.36E-04	1.11E-06	6.22E+00
	Total (of product stage)	A1-3	2.88E+00	1.38E-07	1.26E-02	7.38E-03	2.84E-03	6.55E-04	5.94E+01
Construction process stage	Transport	A4	1.00E-01	1.85E-08	3.35E-04	8.85E-05	5.85E-05	2.64E-07	1.52E+00
	Construction	A5	4.91E+00	2.02E-07	2.22E-02	1.05E-02	4.87E-03	7.94E-05	8.11E+01

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	2.55E+00	3.41E-02	2.58E+00	5.88E+01	0.00E+00	5.88E+01
	Transport	A2	2.47E-02	9.11E-08	2.47E-02	1.84E+00	0.00E+00	1.84E+00
	Manufacturing	A3	2.00E+00	1.05E-05	2.00E+00	6.77E+00	5.05E-02	6.82E+00
	Total (of product stage)	A1-3	4.57E+00	3.41E-02	4.61E+00	6.74E+01	5.05E-02	6.75E+01
Construction process stage	Transport	A4	2.01E-02	7.49E-08	2.01E-02	1.51E+00	0.00E+00	1.51E+00
	Construction	A5	4.59E+00	7.48E-03	4.60E+00	6.86E+01	1.87E+01	8.73E+01

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	0.00E+00	0.00E+00	0.00E+00	1.59E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	4.01E-04
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	4.37E-03
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	1.63E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	3.28E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.46E-01

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

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	7.06E-02	2.11E-01	4.86E-05
	Transport	A2	7.74E-04	8.56E-02	1.27E-05
	Manufacturing	A3	2.39E-03	2.21E-02	2.16E-05
	Total (of product stage)	A1-3	7.38E-02	3.19E-01	8.30E-05
Construction process stage	Transport	A4	6.35E-04	7.06E-02	1.04E-05
	Construction	A5	7.87E-01	3.23E-01	1.12E-04

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

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	6.46E-02	1.17E-03	2.38E-04	0.00E+00
	Total (of product stage)	A1-3	6.46E-02	1.17E-03	2.38E-04	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	3.23E-03	5.87E-05	1.19E-05	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results - 4mm Thickness

The results per declared unit (2.876 kg/m²) of the KömaCel Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	7.24E+00	2.54E-07	3.29E-02	1.73E-02	7.65E-03	1.88E-03	1.49E+02
	Transport	A2	3.55E-01	6.54E-08	1.23E-03	3.17E-04	2.09E-04	9.31E-07	5.36E+00
	Manufacturing	A3	7.26E-01	8.15E-08	2.26E-03	3.68E-03	3.83E-04	3.19E-06	1.79E+01
	Total (of product stage)	A1-3	8.32E+00	4.01E-07	3.64E-02	2.13E-02	8.25E-03	1.88E-03	1.72E+02
Construction process stage	Transport	A4	2.89E-01	5.31E-08	9.65E-04	2.55E-04	1.68E-04	7.60E-07	4.36E+00
	Construction	A5	4.01E+01	2.56E-06	1.89E-01	1.18E-01	4.18E-02	6.04E-04	5.41E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	7.39E+00	9.80E-02	7.49E+00	1.71E+02	0.00E+00	1.71E+02
	Transport	A2	7.16E-02	2.64E-07	7.16E-02	5.33E+00	0.00E+00	5.33E+00
	Manufacturing	A3	5.76E+00	3.01E-05	5.76E+00	1.95E+01	1.45E-01	1.97E+01
	Total (of product stage)	A1-3	1.32E+01	9.80E-02	1.33E+01	1.96E+02	1.45E-01	1.96E+02
Construction process stage	Transport	A4	5.79E-02	2.15E-07	5.79E-02	4.33E+00	0.00E+00	4.33E+00
	Construction	A5	4.33E+01	1.08E-02	4.33E+01	5.62E+02	1.87E+01	5.81E+02

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	0.00E+00	0.00E+00	0.00E+00	4.61E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.16E-03
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	1.18E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	4.74E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	9.45E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.18E+00

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

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	2.04E-01	6.11E-01	1.41E-04
	Transport	A2	2.25E-03	2.49E-01	3.70E-05
	Manufacturing	A3	7.63E-03	6.40E-02	6.26E-05
	Total (of product stage)	A1-3	2.14E-01	9.23E-01	2.40E-04
Construction process stage	Transport	A4	1.83E-03	2.03E-01	3.01E-05
	Construction	A5	1.04E+01	4.21E+00	1.36E-03

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

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	1.89E-01	1.52E-05	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	1.89E-01	1.52E-05	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	6.35E-02	1.75E-01	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results - 10 mm Thickness

The results per declared unit (5.020 kg/m²) of the KömaCel Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	1.25E+01	4.41E-07	5.70E-02	3.01E-02	1.32E-02	3.29E-03	2.58E+02
	Transport	A2	6.14E-01	1.13E-07	2.12E-03	5.47E-04	3.62E-04	1.61E-06	9.27E+00
	Manufacturing	A3	1.35E+00	2.45E-07	4.81E-03	6.61E-03	8.04E-04	5.62E-06	3.92E+01
	Total (of product stage)	A1-3	1.45E+01	7.99E-07	6.40E-02	3.73E-02	1.44E-02	3.29E-03	3.06E+02
Construction process stage	Transport	A4	5.04E-01	9.27E-08	1.68E-03	4.44E-04	2.94E-04	1.33E-06	7.61E+00
	Construction	A5	4.04E+01	2.58E-06	1.90E-01	1.19E-01	4.21E-02	6.74E-04	5.47E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.28E+01	1.71E-01	1.30E+01	2.95E+02	0.00E+00	2.95E+02
	Transport	A2	1.24E-01	4.57E-07	1.24E-01	9.21E+00	0.00E+00	9.21E+00
	Manufacturing	A3	1.01E+01	5.25E-05	1.01E+01	4.18E+01	2.53E-01	4.20E+01
	Total (of product stage)	A1-3	2.30E+01	1.71E-01	2.32E+01	3.46E+02	2.53E-01	3.47E+02
Construction process stage	Transport	A4	1.01E-01	3.76E-07	1.01E-01	7.56E+00	0.00E+00	7.56E+00
	Construction	A5	4.38E+01	1.44E-02	4.38E+01	5.70E+02	1.87E+01	5.89E+02

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	0.00E+00	0.00E+00	0.00E+00	7.96E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	2.01E-03
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	2.15E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	8.19E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	1.65E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.20E+00

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

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	3.55E-01	1.06E+00	2.44E-04
	Transport	A2	3.89E-03	4.30E-01	6.40E-05
	Manufacturing	A3	1.42E-02	1.14E-01	1.68E-04
	Total (of product stage)	A1-3	3.73E-01	1.60E+00	4.75E-04
Construction process stage	Transport	A4	3.19E-03	3.55E-01	5.25E-05
	Construction	A5	1.04E+01	4.25E+00	1.37E-03

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

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	3.30E-01	2.62E-05	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	3.30E-01	2.62E-05	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	7.05E-02	2.82E-01	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results - 30.8 mm Thickness

The results per declared unit (16.386 kg/m²) of the KömaCel Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	4.09E+01	1.44E-06	1.86E-01	9.86E-02	4.31E-02	1.08E-02	8.40E+02
	Transport	A2	2.00E+00	3.69E-07	6.92E-03	1.79E-03	1.18E-03	5.25E-06	3.03E+01
	Manufacturing	A3	4.13E+00	4.64E-07	1.29E-02	2.09E-02	2.18E-03	1.82E-05	1.02E+02
	Total (of product stage)	A1-3	4.70E+01	2.27E-06	2.06E-01	1.21E-01	4.65E-02	1.08E-02	9.73E+02
Construction process stage	Transport	A4	1.64E+00	3.03E-07	5.50E-03	1.45E-03	9.59E-04	4.33E-06	2.48E+01
	Construction	A5	4.21E+01	2.66E-06	1.98E-01	1.23E-01	4.37E-02	1.05E-03	5.82E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	4.17E+01	5.59E-01	4.23E+01	9.64E+02	0.00E+00	9.64E+02
	Transport	A2	4.04E-01	1.49E-06	4.04E-01	3.01E+01	0.00E+00	3.01E+01
	Manufacturing	A3	3.28E+01	1.71E-04	3.28E+01	1.11E+02	8.25E-01	1.12E+02
	Total (of product stage)	A1-3	7.49E+01	5.59E-01	7.55E+01	1.10E+03	8.25E-01	1.11E+03
Construction process stage	Transport	A4	3.30E-01	1.23E-06	3.30E-01	2.47E+01	0.00E+00	2.47E+01
	Construction	A5	4.64E+01	3.38E-02	4.64E+01	6.09E+02	1.87E+01	6.28E+02

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	0.00E+00	0.00E+00	0.00E+00	2.60E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	6.56E-03
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	6.70E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	2.67E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	5.38E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.29E+00

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

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.16E+00	3.46E+00	7.96E-04
	Transport	A2	1.27E-02	1.40E+00	2.09E-04
	Manufacturing	A3	4.34E-02	3.64E-01	3.57E-04
	Total (of product stage)	A1-3	1.21E+00	5.23E+00	1.36E-03
Construction process stage	Transport	A4	1.04E-02	1.16E+00	1.71E-04
	Construction	A5	1.04E+01	4.47E+00	1.42E-03

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

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	1.08E+00	8.38E-05	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	1.08E+00	8.38E-05	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	1.08E-01	8.50E-01	0.00E+00	0.00E+00

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	Transported from Germany to mainly plastic distributors and industrial customers, also building industries across Europe		
	Fuel type / Vehicle type	Vehicle type	Lorry, 16 - 32 metric ton
	Distance	km	600
	Capacity utilisation (incl. empty returns)	%	26
	Bulk density of transported products	kg/m^3	217
A5 – Installation in the building	The panels will be adjusted to the final dimensions, then they are installed using screw or adhesive connections		
	Installation waste percentage to recycling	5	%

Additional information

Interpretation of results:

The bulk of the environmental impacts and primary energy demand are attributed to the upstream manufacturing process of the Interior wall cladding panel, covered by information modules A1-A3 of EN15804:2012+A1:2013.

Individual product calculations

The LCA results listed in the tables above are for KömaCel panels, which are for the processing of 1 kg/m^2. The end-user of this EPD can therefore use these results to calculate impact profiles for each KömaCel panels with different thicknesses by using the weight per m^2. In the below calculation table, the GWP impacts have been calculated for the standard product thicknesses for 1 kg/m2 as an example to enable calculations for other thicknesses.

KömaCel thickness (mm)		**8**	**13**	**19**	**30**
Kg/m²	1	4.09	6.34	9.08	15.21
A1	2.50E+00	1.02E+01	1.59E+01	2.27E+01	3.80E+01
A2	1.22E-01	4.99E-01	7.73E-01	1.11E+00	4.64E+00
A3	2.61E-01	1.07E+00	1.65E+00	2.37E+00	1.21E+00
A1-A3	2.88E+00	1.18E+01	1.83E+01	2.62E+01	4.39E+01

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.

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.

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