

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	Verband der Deutschen Holzwerkstoffindustrie e.V. (VHI)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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WPC cladding profiles

Verband der Deutschen

Holzwerkstoffindustrie e.V. (VHI)

Association of the German Wood-based Panel
Industry

www.bau-umwelt.com / <https://epd-online.com>



General Information

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Declaration number

EPD-VHI-20150034-CBE1-EN

This Declaration is based on the Product Category Rules:

Wood polymer composite facade elements, 07.2014
(PCR tested and approved by the SVR)

Issue date

30.07.2015

Valid to

29.07.2020



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WPC cladding profiles

Owner of the Declaration

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Declared product / Declared unit

1 m² cladding profile made of WPC

Scope:

This EPD is an Association EPD. The weighted average from the manufacturer's specifications of three member companies was taken as the data basis for the cladding profile made of wood-polymer composite (WPC). For the list of members, please refer to the Association's websites.

The companies supplying the data represent a share of 100 % of German production.

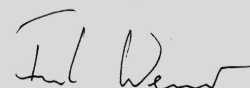
The scope of the EPD covers all cladding profiles made of wood-polymer materials, since the various types of plastic are taken into account in accordance with their shares. This document is translated from the German Environmental Product Declaration into English. It is based on the German original version EPD-VHI-20150034-CBE1-DE. The verifier has no influence on the quality of the translation. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The CEN Norm /EN 15804/ serves as the core PCR

Independent verification of the declaration
according to /ISO 14025/

☐ internally ☒ externally



Dr. Frank Werner
(Independent verifier appointed by SVR)

Product

Product description

The declared product is a wood-polymer cladding profile specially suitable for outdoor use. The plastics matrix can consist either of polyethylene (PE), polypropylene (PP) or polyvinylchloride (PVC).

This EPD does not refer to a specific product of one manufacturer, but declares the average environmental quality for all WPC cladding profiles produced by member companies of the VHI. The information represents 100 % of the German market. Detailed data can be obtained from the product description of the manufacturer in question.

Application

WPC cladding profiles are for cladding façades and can only be used as a non-load-bearing structural element (no construction engineering approval).

The products pose no risk to health and are technically safe.

Technical Data

The technical construction data listed in the following apply to all WPC cladding profiles made by the manufacturers involved.

Technical construction data

Name	Value	Unit
Density in accordance with EN ISO 1183-3/	1150 - 1260	kg/m ³
Grammage	7.5 - 8.76	kg/m ²
Moisture content in accordance with ISO 16979	0 - 1.5	M.-%
length density of the profiles in accordance with DIN EN 15534-1:2014	1520 - 2300	g/m
Dimensions (thickness, length)	2,5/82/1000-	mm

and width of the profiles in accordance with DIN EN 15534-1:2014)	20/242/4000	
Deviation from straightness in accordance with DIN EN 15534-1	1	mm
Curvature in accordance with DIN EN 15534-1	0.5	mm
Flexural properties in accordance with EN 310:1993 - Elasticity modulus	-	MPa
Flexural properties in accordance with EN 310:1993 - Bending strength	-	MPa
Moisture resistance under cyclical conditions in accordance with EN 15534-1:2014	-	-
Impact resistance in accordance with EN 477 - Crack length	No crack	mm
Impact resistance in accordance with EN 477 - Impression depth	<0,5	mm
Linear thermal expansion coefficient in accordance with ISO 11359-2	1.7E-05 - 2.8E-05	K ⁻¹
Swelling in accordance with EN 317 (length, width, thickness)	0,2/0,7/0,4-0,3/0,94/4,16	%
Behavior in weathering tests in accordance with EN ISO 4892-2:2013	-	-

Base materials / Ancillary materials

The average WPC cladding profile consists mainly of the following base materials:

Material	Description	Share in M-%
Wood fibres	Industrial waste wood of spruce and pine	63
Plastics matrix	Polyethylene (PE) Polypropylene (PP) Polyvinylchloride (PVC)	29
Additives	adhesives, internal lubricants, pigments, filling materials, dispersing agent	8

The plastic or plastic compound integrated in the product must consist of 100 % new material, or of pure plastic which has accumulated as waste material once in the course of industrial production. Recycled material that is pure and free of harmful substances may also be used.

In order to obtain the appearance of natural wood, organic pigments and UV stabilisers are also added during production.

The share of wood in the product must be at least 50 per cent by weight (dry), and must come from verifiably sustainable forestry (FSC or PEFC certificate). Natural waste wood (waste wood category AI in accordance with the Waste Wood Ordinance) may be used, but waste wood of the categories AII to AIV may not be used. Other natural fibres may be components of the product.

In order to save raw materials and to prevent emissions, ground material which comes from elements of the company's own system and which was taken back from the market may be added again.

Reference service life

No reference service life is declared; according to manufacturers' specifications, a service life (SL) of 40 years can be expected for average use.

The technical service life of individual components is not exceeded here either, and so replacement does not need to be taken into account during the service life.

LCA: Calculation rules

Declared Unit

The declared unit is defined as follows:

1 m² of installed WPC cladding profiles, with the dimensions 1,000 - 4,000 mm/80 - 240 mm/18 - 25 mm and a surface weight of 7.79 kg/m², over a service life of 40 years.

The composition of the WPC cladding profiles results from the weighted average, depending on the production volume of the manufacturers involved.

Details on declared unit

Name	Value	Unit
Conversion factor to 1 kg	0.1284	-
Declared unit	1	m ²
Density	1211	kg/m ³
Profile type	54 % solid profile and 46 % hollow-chamber profile	-

System boundary

Type of EPD: cradle-to-gate, with options

In accordance with EN 15804 the following modules are used:

Module A1-3

The aggregated representation in the form of A1-3 is used for production. This includes the supply of raw materials, the production of the WPC façade elements, all transportation to the manufacturer, the required energy consumption and resources, as well as all production waste that may accrue.

Module A4

Transportation of the product from the manufacturer to the construction site

Module B2

Maintenance of the WPC façade elements during the utilisation phase: cleaning of the WPC façade elements

Module C2

Transportation of the scrapped product to the recycling yard or to the manufacturer

Module C3

Waste treatment, such as thermal or material utilisation:

On account of the selected system boundaries (definition of the *end-of-waste* status), no disposal (Module C4) of the WPC façade elements takes place. This means that only the export of the properties inherent in the material is included in the balance.

Module D

Credits and debits outside the system under review, through thermal and material utilisation

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

The following technical information forms the basis for the declared modules or can be used for developing specific scenarios within the context of a building appraisal if modules are not declared (MND).

Transport to construction site (A4)

Name	Value	Unit
Litres of fuel	142	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	1211	kg/m ³

Construction installation process (A5)

Composition of the packaging waste to be disposed of:

Name	Value	Unit
Squared timber	15	%
Polyethylene foil	55	%
Polyester strapping	2	%
Grey board	20	%
Hardboard	8	%

Maintenance (B2)

Name	Value	Unit
Information on maintenance		
Cleaning frequency in m ² /a	0.0298	-
Water consumption	0.083	m ³
Auxiliary material cleaning agent	0.01	kg
Maintenance cycle in m ² /SL	1,192	Number/SL

End of life (C1-C4)

According to information from manufacturers, it can be assumed that 70 % of WPC products are subject to material recycling and 30 % thermal recycling. Material and thermal recycling is declared in 100 % scenarios.

The average transportation distance between the consumer and the waste disposal facility is 250 km.

Re-Use, recovery and recycling potential (D), relevant scenario information

The energy (electrical and thermal) or the created recycling material resulting from the thermal and material recycling of the waste is credited here. The efficiency of the waste recycling facilities is 66 % for German facilities and 69 % for European facilities. The data records used are based on German and European recycling facilities. The data records for electricity and heat are "DE:power mix" (production mix) and "DE: process steam" from natural gas 85 %, from GaBi 6.4.

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	X	MND	MND	MND	MND	MND	MND	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² WPC cladding profile

Parameter	Unit	A1-A3	A4	B2	C2	C3/1	C3/2	D/1	D/2
GWP	[kg CO ₂ -Eq.]	-5.58E-1	2.35E-1	2.27E-1	1.10E-2	8.78E+0	8.78E+0	-2.75E+0	-2.95E+0
ODP	[kg CFC11-Eq.]	3.72E-9	2.83E-13	4.76E-12	1.38E-13	0.00E+0	0.00E+0	2.63E-8	9.24E-10
AP	[kg SO ₂ -Eq.]	1.76E-2	1.00E-3	5.26E-4	4.88E-4	0.00E+0	0.00E+0	-8.66E-3	-8.59E-3
EP	[kg (PO ₄) ³⁻ -Eq.]	2.05E-3	2.74E-4	5.63E-5	1.33E-4	0.00E+0	0.00E+0	-1.16E-3	-9.69E-4
POCP	[kg ethene-Eq.]	2.71E-3	-3.44E-4	7.80E-5	-1.68E-4	0.00E+0	0.00E+0	-1.13E-3	-2.36E-3
ADPE	[kg Sb-Eq.]	2.26E-6	1.19E-8	1.14E-6	5.78E-9	0.00E+0	0.00E+0	-1.07E-6	-5.21E-5
ADPF	[MJ]	2.21E+2	3.13E+0	6.63E+0	1.52E+0	0.00E+0	0.00E+0	-1.53E+2	-1.41E+2

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

RESULTS OF THE LCA - RESOURCE USE: 1 m² WPC cladding profile

Parameter	Unit	A1-A3	A4	B2	C2	C3/1	C3/2	D/1	D/2
PERE	[MJ]	1.23E+0	2.39E-1	2.58E-1	1.17E-1	0.00E+0	0.00E+0	-1.77E+1	-1.04E+0
PERM	[MJ]	8.41E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-9.11E+1
PERT	[MJ]	8.53E+1	2.39E-1	2.58E-1	1.17E-1	0.00E+0	0.00E+0	-1.77E+1	-9.21E+1
PENRE	[MJ]	9.40E+1	3.14E+0	4.48E+0	1.53E+0	0.00E+0	0.00E+0	-1.66E+2	-8.57E+0
PENRM	[MJ]	1.41E+2	0.00E+0	2.38E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.31E+2
PENRT	[MJ]	2.35E+2	3.14E+0	6.86E+0	1.53E+0	0.00E+0	0.00E+0	-1.66E+2	-1.39E+2
SM	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.40E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.19E+1	4.10E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.29E+2	6.45E+0
FW	[m ³]	3.39E+1	1.38E-1	9.09E-1	6.73E-2	0.00E+0	0.00E+0	1.14E+1	-1.45E+1

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

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m² WPC cladding profile

Parameter	Unit	A1-A3	A4	B2	C2	C3/1	C3/2	D/1	D/2
HWD	[kg]	8.19E-5	2.53E-6	1.42E-6	1.23E-6	0.00E+0	0.00E+0	-7.25E-5	-2.41E-5
NHWD	[kg]	1.39E-1	7.84E-4	1.65E-3	3.82E-4	0.00E+0	0.00E+0	-4.56E-2	-1.01E-1
RWD	[kg]	5.59E-3	4.17E-6	9.27E-5	2.03E-6	0.00E+0	0.00E+0	-5.55E-3	-5.07E-4
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.40E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.79E+0	3.90E-1	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+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

GWP: Share of biogenic CO₂ A1-3: -8,78 kg CO₂-equiv., C3: 8,78 kg CO₂-equiv.

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General principles

for the EPD range of Institut Bauen und Umwelt e.V.
(IBU), 2013/04
www.bau-umwelt.de

ISO 14025
DIN EN ISO 14025:2011-10: Environmental labels and

declarations — Type III environmental declarations — Principles and procedures

EN 15804

EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

PCR cladding profiles

Product Category Rules for Construction Products, Part B: Requirements to be met by the EPD for cladding profiles made of wood-based materials (WPC), 2014

Waste Wood Ordinance

Ordinance governing the requirements on utilisation and disposal of waste wood (AltholzV), 2012

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DIN EN 13501-5

Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests; German version EN 13501-5:2005+A1:2009

DIN EN 15534-1

Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 1: Test methods for characterisation of compounds and products; German version EN 15534-1:2014

DIN EN 15534-5

Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) – Part 5: Specifications for cladding profiles and tiles, German version EN 15534-5:2014

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EN 310:1993

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EN 477

Unplasticised polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors - Determination of the resistance to impact of main profiles by falling mass; German version EN 477:1995

ISO 11359-2

Plastics - Thermomechanical analysis (TMA) - Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature, ISO 11359-2:1999-10

EN 317

Particleboards and fibreboards; determination of swelling in thickness after immersion in water; German version EN 317:1993

EN ISO 4892-2:2013

Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps

European Waste Classification

Ordinance governing the European Waste Classification (Waste Classification Ordinance, AVV), 2001

GaBi 6.4

Software-System and Databases for Life Cycle Engineering, PE International AG, Leinfelden-Echterdingen, 1992-2015, with special acknowledgement to LBP, University of Stuttgart

ÖKOBau.DAT

Ökobau.dat 2014, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

FSC

Forest Stewardship Council, Germany

PEFC

Programme for the Endorsement of Forest Certification Schemes, Germany

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