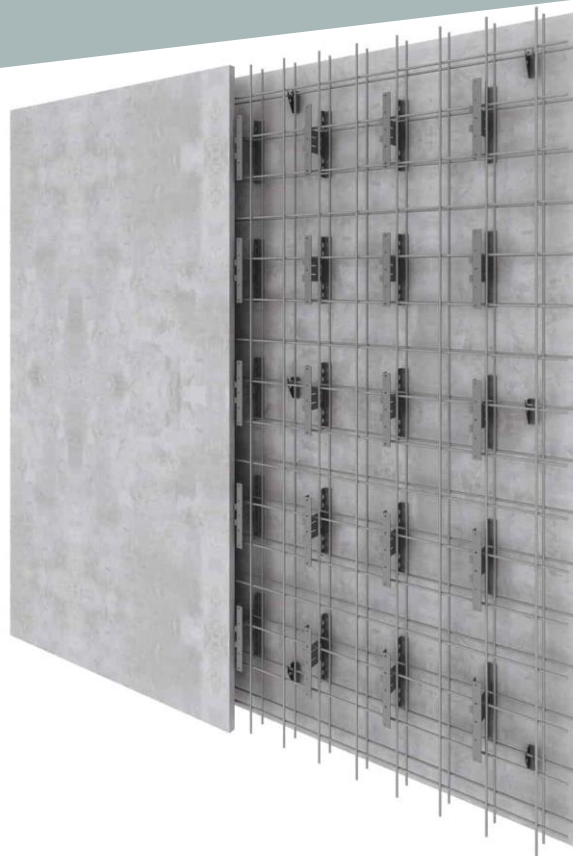


Owner: VST BUILDING TECHNOLOGIES AG
No.: MD-20028-EN
ECO EPD: 00001341
Issued: 21-09-2020
Valid to: 21-09-2025

3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



Owner of declaration

VST BUILDING TECHNOLOGIES AG
 Feuerwehrstrasse 17, Schloss
 Leopoldsdorf,
 2333 Leopoldsdorf bei Wien, Austria
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Programme

EPD Danmark
 www.epddanmark.dk



- Industry EPD
- Product EPD

Declared products

The VST wall is a permanent formwork element consisting of two 24 mm thick cement-bonded particle boards (CBPB) connected by steel spacers.

Production site

VST Production s.r.o.
 Novozámocká 179,
 949 01 Nitra, Slovakia

Products use

The formwork elements are used for internal and external walls situated above and below ground, load-bearing or non-load-bearing walls, as well as walls subject to fire regulations.

Declared unit

1 m² of VST permanent formwork, walls (incl. minor pipe slots/breakthroughs for fitting, but without the actual fittings and openings for windows/doors)

Year of data

2018

Issued:
21-09-2020

Valid to:
21-09-2025

Basis of calculation

This EPD is developed in accordance with the European standard EN 15804+A1.

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type

- Cradle-to-gate
- Cradle-to-gate with options
- Cradle-to-grave

CEN standard EN 15804 serves as the core PCR
Independent verification of the declaration and data, according to EN ISO 14025
<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier:
 _____ Kim Christiansen

Henrik F. Larsen
 EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Product information

Product description

The main product components are shown in the table below. They represent 100 weight % of the declared product.

Material	Weight-% of declared product
Cement-bonded Particleboard	92%
Glue	<1%
Screws	<1%
Spacer/hat profiles	8%
Reinforcement bars	-
SUM	100%

Hazardous substances

The permanent formwork does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorisation"

(<http://echa.europa.eu/candidate-list-table>)

Essential characteristics (CE)

The VST permanent formwork system is assessed and covered by a European Technical Assessment; ETA-07/0039, which is used to identify the product.

Technical key data can be found on the website of VST:

- for walls

(<https://vstbuildingtechnologies.com/wp-content/uploads/2019/12/VST-WALL.pdf>)

Product illustration



Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of VST permanent formwork, walls, on the production site located in Nitra, Slovakia. Product specific data are based on average values collected in the year 2018. Background data are based on GaBi v 8.7, databases updated in 2020 and are less than 10 years old. In one case, GaBi data were supplemented with data from ecoinvent 3.5.

Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

Data are based on information from 2018, however some suppliers have been changed incurring natural uncertainties of the raw material documentation. The main component, CBPB, has been changed from a Czech supplier to CSP BZS. As product-specific data/information available on the new CBPB was limited, a conservative approach in regard to representativity and modelling has been applied.

Reference Service Life (RSL)

No RSL is declared. This EPD is based on a cradle-to-gate assessment.

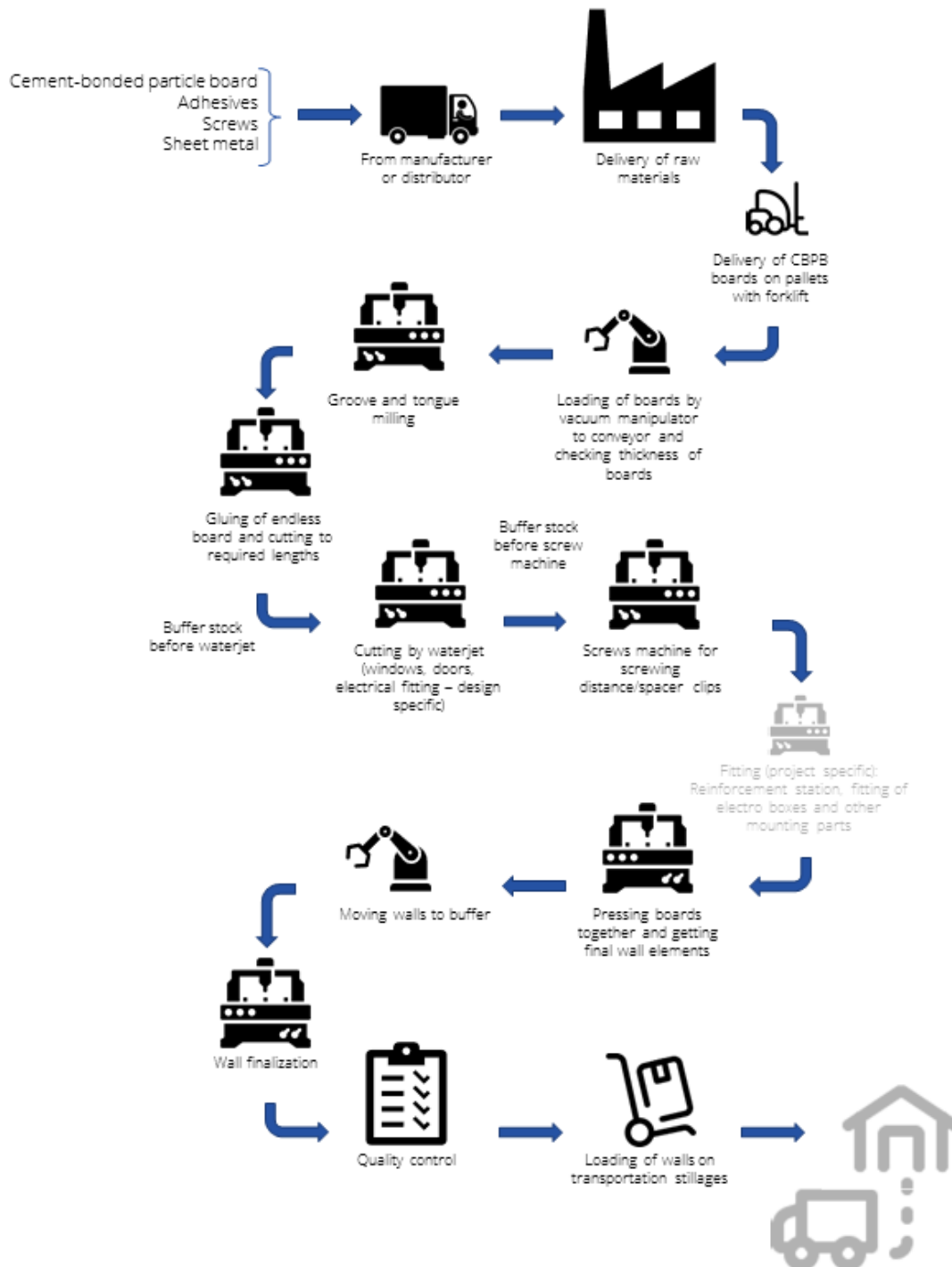
LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1 m² of VST permanent wall formwork.

	VST wall	Unit
Declared unit	1	m ²
Conversion factor to 1 kg	0,014	-
Weight	74	kg/m ²

Flowdiagram



System boundary

This EPD is based on a cradle-to-gate LCA, in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

Components of the system, which are not included in this study:

The steel reinforcement specified by a structural engineer is already installed offsite at the factory. All kinds of openings and cuttings as well as the installation of built-in parts (e.g. empty electrical piping) are performed at the factory. The VST elements are transported to the customer's construction site where they are installed according to the assembly plan and then cast with concrete. The concrete core connects with the formwork element; stripping of formwork is not necessary. Once the concrete core has set, the formwork element itself does not assume any load-bearing function.

Attention should be given, that the formwork product requires additional material use to obtain a function as described:

- The steel reinforcement specified by a structural engineer for VST walls are project specific, and thus not included in the system boundary of this study.
- The declared unit does not include/take into account window- or door openings, or the actual fittings (e.g. empty electrical piping). These are installed/performed at the factory, but are project specific as well, for which reason this is not included in the declared unit.
- Concrete poured in the permanent formwork is not included in the system boundary and should thus be added to the values of this study when performing a building LCA.

Product stage (A1-A3) includes:

- A1 – Extraction and processing of raw materials
- A2 – Transport to the production site
- A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste

processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

VST walls production

As shown in the production processes/flow diagram on the previous page, the production for VST walls is an automated system. The cement-bonded Particle Boards (CBPB) (delivered on pallets) are lifted onto the machinery with diesel driven forklifts.

"The cement-bonded particles boards with a standard size of 3.35 x 1.25 are picked up by the handling robot and placed on the conveyor system. The boards are fed automatically through an edge processing machine, where the groove and tongue are milled on both long edges of the board as it passes through, after which glue is applied. The individual boards are pulled together and pressed to form an "infinite" board.

After the standard board elements have been pressed, the "infinite" board is immediately cut to the required length of the wall element. The boards are individually cut to size with a water jet saw.

Two screwing robots with grabbing and placing devices especially suited for the spacers simultaneously screw the spacer profiles onto the boards. The screwing robots are automatically supplied with the spacer profiles and the screws.

The boards with the spacer profiles screwed in place are positioned vertically and fitted with all components (reinforcement, empty pipework, sanitary and heating pipework, etc.). The two halves of the wall are then pressed together.

The finished walls are guided by a ceiling crane into the finishing station, where the final inspection and any necessary rework is carried out. The automated production line is controlled by specially developed software. The plans for the elements to be produced are first created with a BIM- based planning program. Next, they are sent to the manufacturing plant's controlling computer, which automatically manufactures the elements on the auto-mated line according to the plan specifications."

<https://vstbuildingtechnologies.com/manufacturing-plants/machinery/?lang=en>

VST metal fabrication

"All spacers, steel components required for production and transport are manufactured or machined in the VST metal fabrication. The VST plant requires only the necessary raw material for production, such as rolled steel and reinforcing steel. The punching machine produces the spacer profiles from slotted strip material, whereby

different punching heads enable the production of different sizes of spacer. This allows the thickness of the VST walls to vary as required to suit the static requirements. The bending machine processes the rolled steel that is needed for the corner reinforcements and the shear heads."

<https://vstbuildingtechnologies.com/manufacturing-plants/machinery/?lang=en>

LCA results

Table 1. Environmental impacts per 1m² of VST wall formwork

ENVIRONMENTAL IMPACTS		
Parameter	Unit	A1-A3
GWP	[kg CO ₂ -eq.]	1,06E+02
ODP	[kg CFC11-eq.]	2,10E-08
AP	[kg SO ₂ -eq.]	1,78E-01
EP	[kg PO ₄ ³⁻ -eq.]	2,58E-02
POCP	[kg ethene-eq.]	9,59E-03
ADPE	[kg Sb-eq.]	1,65E-03
ADPF	[MJ]	1,11E+03
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources	

Table 2. Resource use per 1m² of VST wall formwork

RESOURCE USE		
Parameter	Unit	A1-A3
PERE	[MJ]	6,74E+01
PERM*	[MJ]	1,17E+02
PERT	[MJ]	1,84E+02
PENRE	[MJ]	1,19E+03
PENRM**	[MJ]	3,47E+00
PENRT	[MJ]	1,20E+03
SM	[kg]	0,00E+00
RSF	[MJ]	1,39E+01
NRSF	[MJ]	1,46E+02
FW	[m ³]	1,65E-01
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	

* Equals contribution from packaging material of raw material and raw material components (VST wall: product contribution=1,03E+02 MJ and packaging contribution=1,39E+01 MJ, VST slab: product contribution=5,13E+01 MJ and packaging contribution=6,25E+00 MJ).

** Contribution from packaging material of raw material and raw material components (VST wall: product contribution=2,82E-1 MJ and packaging contribution=3,19E+00 MJ, VST slab: product contribution=1,35E-1 MJ and packaging contribution=1,55E+00 MJ).

Table 3. Output flows and waste categories per 1m² of VST wall formwork

OUTPUT FLOWS AND WASTE CATEGORIES		
Parameter	Unit	A1-A3
HWD	[kg]	7,06E-03
NHWD	[kg]	1,57E+00
RWD	[kg]	3,72E-02
CRU	[kg]	5,84E+00
MFR	[kg]	8,08E-01
MER	[kg]	INA
EEE	[MJ]	INA
EET	[MJ]	INA
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; EET = Exported thermal energy	

Additional information

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

References

Publisher	 www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA software /background data	<i>Thinkstep GaBi 8.7, 2020</i> <i>ecoinvent 3.5 2018</i>
3rd party verifier	Kim Christiansen www.kimconsult.dk

General programme instructions

Version 2.0

www.epddanmark.dk

EN 15804

DS/EN 15804 + A1:2013 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025

DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040

DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

ISO 14044

DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"