TENAXPANEL

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

WALL- AND ROOF PANELS WITH AN INSULATION CORE MADE OF POLYURETHANE

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

GENERAL INFORMATION

PROGRAMME INFORMATION

Programme:	EPD® The International EPD® System
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): *PCR 2019:14. Construction Products. Version 1.1.; C-PCR-005 Thermal Insulation products (EN 16783:2017)*

PCR review was conducted by: *The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat info@environdec.com.*

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process certification ☒ EPD verification

Third party verifier: Angela Schindler

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

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COMPANY INFORMATION

Owner of the EPD:

TENAX PANEL, SIA
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Latvija, LV-3701
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Web: www.tenaxpanel.lv

Description of the organisation:

TENAX PANEL, SIA is a sandwich panel producer and a subsidiary of TENAX, SIA as part of a group of companies producing construction and industrial materials based in Dobele, Latvia.

Product-related or management system-related certifications:

TENAX PANEL, SIA is committed to providing reliable and sustainable products and services. The company has an ISO 14001 certified environmental management system, ISO 50001 certified energy management system, ISO 9001 certified quality management system and ISO 45001 certified occupational health and safety management system.

Name and location of production site(s):

The declaration applies to sandwich panels produced at the production site in Lauku iela 23, Dobele, Latvia.

PRODUCT INFORMATION

Product name:

Double skin steel faced sandwich panels with a core made of polyurethane

Product identification:

TENAX W PUR S, TENAX W PUR T, TENAX W PUR H, TENAX TR PUR S.
TENAX W PIR S, TENAX W PIR T, TENAX W PIR H, TENAX TR PIR S.

Product description:

Prefabricated double skin steel faced sandwich panels with a core made of polyurethane used for self-supporting application in wall (facade and partition), roof and ceiling structures. The internal and external facings of the panels are made of flat, lightly profiled or profiled steel sheets protected against corrosion with zinc and organic (polymer) coatings. The thermal insulating core material is made of polyurethane (PUR/PIR) in accordance with European Standard EN 13165. The core is auto-adhered on both sides with the coated steel facings to form the composite resistant to tensile, compressive and shear forces.
The product complies with the Regulation (EU) No 305/2011 considering the harmonized technical specification EN 14509. The product is put on the market with a Declaration of performance and the CE-mark containing the required construction data.
The sandwich panels are manufactured and delivered as a project specific product, with width and length specified for the particular building. This allows to minimize cut-off waste during the installation.

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Product characteristics:

Technical specifications for sandwich panels with a core made of polyurethane are given in:

- EN 14509:2013, Self-supporting double skin metal faced insulating panels
- EN 13165+A2:2016, Thermal insulation products for buildings. Factory made rigid polyurethane foam (PUR) products

Characteristic	Value	Unit
Density of the insulating layer	40	kg/m³
Thickness of panel*	50–200	mm
Modular width of panel	1000–1200	mm
Thickness of internal facing	0.4–0.7	mm
Thickness of external facing	0.5–0.7	mm
Thermal conductivity of the insulating material	0.021	W/(m·K)
Heat transfer coefficient	0.47-0.1	W/(m²·K)

* when the outer layers are even, this is the overall height of the panel (D);
on heavily profiled panels, this is the consistent core thickness without profile (dc)

Manufacturing process of the product:

The production of sandwich panels is on a continuously operating production line. Manufacture begins by unwinding two galvanized steel coils. Self-adhesive film is added to outer facing surfaces of the metal sheets to protect from scratches during production, handling and transportation. The metal surface is then profiled by rolling dice according to product option. Roll forming shapes the joint locks on the sides of the panel. The foaming station pours liquid polyurethane components which expand in a chemical reaction so the insulating core is formed to necessary thickness and width while passing through the rotating steel plate conveyor. The product is then cut to length in panels according to each order specification thus minimizing cutting works and scraps produced on the construction site. Panels then pass through a cooling section into an automatic stacking system. Afterwards panel stacks are packaged for handling and transportation according to option chosen by the client.

Product processing/installation:

The sandwich panel stacks are unloaded at the job site using crane, forklift or front loader. Panels are lifted into place using lifting equipment or manually and attached to the supporting structure. The facing protective film should be removed before installation / finishing. Careful planning limits cuts on the job site to a minimum.
The sandwich panels are fixed into place with fasteners in either pre-drilled holes or with self drilling fasteners. For a weather tight building envelope, sealing foam, polyurethane insulation materials, sealing tapes and steel details are used. Manufacturers of these auxiliary materials and details are to produce the necessary EPDs.

Packaging:

Panels are shipped on EPS foam supports with additional EPS sheets and wrapped in stretch wrap film to avoid handling and transportation damage and protect from the weather during short-term storage. The packaging material is to be collected separately and recycled in compliance with local regulations.

End of life:

The steel facing of the sandwich panels can be removed from the insulating core, collected, and reused or recycled after dismantling. The polyurethane core can be incinerated for generating industrial process heat.

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LCA INFORMATION

LCA Practitioner:

Daxner & Merl GmbH, Lindengasse 39/8, 1070 Vienna, Austria

Declared unit:

The EPD refers to a declared unit of 1 m² double skin steel faced sandwich panel with a core made of polyurethane. The results represent a weight of 13.66 kg/m² and a reference thickness of 120 mm. As a result, this EPD declares a specific product with a specific thickness, which also represents the average thickness of the entire production. This product is part of a product family with a large variability depending on the specific panel thickness. If the product analysed shows a high deviation of the declared thickness, please contact the manufacturer.

System boundaries:

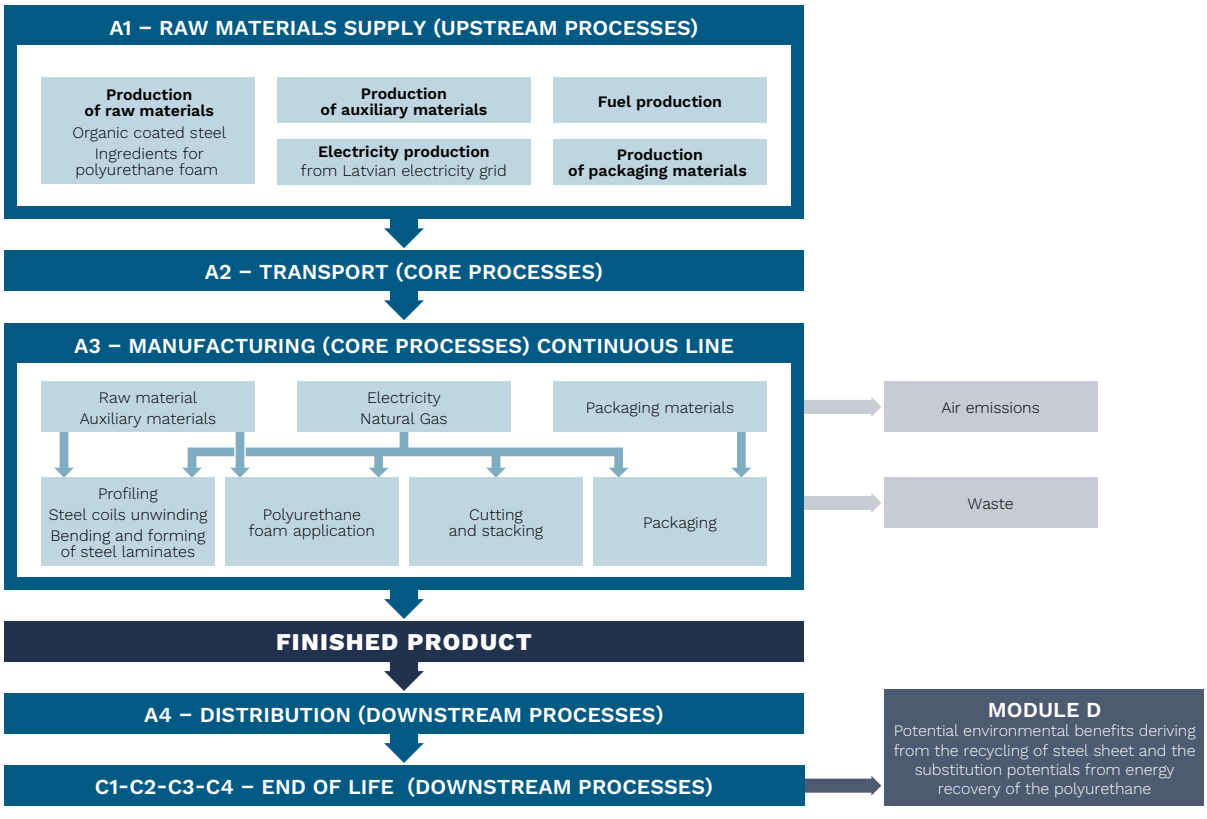
The life cycle assessment of TENAX panels refers to a cradle-to-gate analysis of the product's environmental impacts with options declaring module A4 as well as the end-of-life modules C1–C4 and D (A1–A3 + A4 + C + D).

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage		Construction process stage			Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	LV	LV-SWE	–	–	–	–	–	–	–	–	EU	EU	EU	EU	EU
Specific data used	100% primary data used for manufacturing					–	–	–	–	–	–	–	–	–	–	–	–
Variation – products	<5%					–	–	–	–	–	–	–	–	–	–	–	–
Variation – sites	Not relevant					–	–	–	–	–	–	–	–	–	–	–	–

ND = module not declared

A system diagram depicting the TENAX PANEL process in detail



The following life cycle phases are part of the analysis:

Module A1-A3 | Production stage
The panels are produced using the following materials:

- galvanized and painted steel sheet coils
- backing film/filament tape made of HDPE attached to the steel sheet
- insulation foam formed from MDI, polyol, catalysts and pentane
- siliconized paper and HDPE tape for containing foam during core forming
- self adhesive PU foam tape
- EPDM joint gaskets and glue
- standard packaging made up from EPS, stretch wrap and optional cargo straps and spacer boards.

The production stage accounts for all upstream burdens of raw materials supply until panel manufacturing including the transports to the production site in Dobele. The main inputs include the organic coated steel sheets and the insulation material. Thermal energy is provided by natural gas. Electrical energy is obtained directly from the Latvian electricity grid.

Module A4 | Transport
The transport from the plant in Dobele, Latvia to the customer is considered as a weighted average based on a representative scenario. This includes truck transport over 360 km and ship transport over 410 km transport distance.

Module C1 | Deconstruction, demolition
Disassembly of sandwich panels is done by means of cranes. The calculation for lifting by crane results in an estimated energy demand of 0.2 MJ/m² of panel. Due to the comparable small impact of the energy demand as well as a very large associated uncertainty in reality, the referring energy demand is considered negligible and cut-off.

Module C2 | Transport
Module C2 includes the transport to waste treatment. In this case transport by truck (Truck-trailer, Euro 5, 27 t payload) over a transport distance of 50 km is assumed.

Module C3 | Waste processing
The steel sheet reaches Module D for recycling and leaves the product system in C3. Environmental impacts from grinding and sorting of steel scrap are not included. The materials can be separated, with the help of suitable tools at the construction site. The separability was confirmed by an expert.

Module C4 | Disposal
Module C4 declares the emissions from the energy recovery of the polyurethane insulation material after removal and separation of the elements.
In addition, the environmental impacts declared in module C4 reflect the recycling losses of the steel top layer.

Module D | Credits and loads beyond the system boundary
Module D describes the recycling of the steel sheet as well as the substitution potentials from the energy recovery of the polyurethane insulation material in the form of a European average scenario.

Time representativeness of data collection:

Foreground data were collected for the production year 2019. All data are based on annual volumes.

Database and LCA-software used:

This study uses generic background data for the evaluation of upstream environmental impacts from GaBi databases (GaBi 10; data base version 2020.2).

Data quality:

Data collection is based on product specific questionnaires. It follows an iterative process clarifying questions via e-mail, telephone calls or in web meetings. Intensive discussion between TENAX and Daxner & Merl results in an accurate mapping of product related material and energy flows. This leads to a high quality of foreground data collected. Data collection relies on a consistent process considering the requirements of ISO 14044. The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead.

Estimates and assumptions:

Assumptions and approximations are applied in case of a lack of representative data. All assumptions and approximations are documented precisely and represent a best-guess representation of reality. In case of uncertainty, a conservative approach is chosen.

Cut-off criteria:

The LCA model covers all available input and output flows, which can be represented based on robust data. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented accordingly. Only data with a contribution lower 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cut-off material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows.

Allocation:

Upstream processes in the supply chain are mainly based on GaBi background data sets.

Background data for the supply chain of the organic coated steel are published by worldsteel (latest publication). Representing an average of the global steel industry, worldsteel background datasets ensure a good geographical and technological representation of steel production. All worldsteel datasets are modelled according to the worldsteel LCA methodology, applying the system expansion approach for the allocation of co-products from steel production.

All information for the allocation of given material and energy flows is based on the ERP-systems of the entire production site. The calculation of thickness-specific amounts is based on suitable allocation factors.
Steel scrap as well as waste insulation material is sent to recycling. Due to its minor contribution to the overall revenue of the company, no co-product allocation is applied. A certain share of the polyurethane waste is deposited and considered in the modelling accordingly.

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CONTENT INFORMATION

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Steel	8.9	6%	0%
Insulation core	4.8	0%	0%
TOTAL	13.7		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Wooden spacer boards	0.078	0.6%	
PE-film	0.102	0.7%	
EPS	0.097	0.7%	
PP-film	0.002	0.01%	
TOTAL	0.279	2.04%	

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
None			

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The following tables contain the LCA results for a declared unit of 1 m² double skin steel faced sandwich panel with a core made of polyurethane (weight of 13.66 kg/m²; representative thickness of 120 mm).

Potential environmental impact – mandatory indicators according to EN 15804

Results for 1 m² of TENAX panel (120 mm)								
Indicator	**Unit**	**Tot. A1–A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	4.07E+01	2.84E-01	0.00E+00	3.29E-02	0.00E+00	1.06E+01	-1.62E+01
GWP-fossil	kg CO_2 eq.	4.15E+01	2.82E-01	0.00E+00	3.27E-02	0.00E+00	1.06E+01	-1.62E+01
GWP-biogenic	kg CO_2 eq.	-8.52E-01	-3.32E-04	0.00E+00	-5.47E-05	0.00E+00	-2.27E-04	-1.78E-02
GWP-luluc	kg CO_2 eq.	1.56E-02	1.90E-03	0.00E+00	2.64E-04	0.00E+00	1.21E-04	-1.30E-03
ODP	kg CFC 11 eq.	2.65E-05	4.75E-17	0.00E+00	5.98E-18	0.00E+00	1.30E-15	-6.50E-14
AP	mol H^+ eq.	1.13E-01	2.46E-03	0.00E+00	1.01E-04	0.00E+00	6.35E-03	-2.74E-02
EP-freshwater	kg PO_4 eq.	2.98E-04	2.22E-06	0.00E+00	3.04E-07	0.00E+00	7.00E-07	-2.46E-05
EP-freshwater	kg P eq.	9.70E-05	7.25E-07	0.00E+00	9.92E-08	0.00E+00	2.28E-07	-8.01E-06
EP-marine	kg N eq.	2.84E-02	7.79E-04	0.00E+00	4.47E-05	0.00E+00	3.05E-03	-4.75E-03
EP-terrestrial	mol N eq.	3.11E-01	8.61E-03	0.00E+00	5.01E-04	0.00E+00	3.50E-02	-4.78E-02
POCP	kg NMVOC eq.	9.74E-02	1.92E-03	0.00E+00	8.90E-05	0.00E+00	7.84E-03	-2.08E-02
ADP-minerals & metals*	kg Sb eq.	1.87E-04	2.02E-08	0.00E+00	2.63E-09	0.00E+00	2.38E-08	-2.66E-05
ADP-fossil*	MJ	6.25E+02	3.70E+00	0.00E+00	4.34E-01	0.00E+00	3.13E+00	-1.77E+02
WDP	m^3	1.13E+01	2.37E-03	0.00E+00	3.17E-04	0.00E+00	1.04E+00	-2.79E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; 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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary indicators

Results for 1 m² of TENAX panel (200 mm)								
Indicator	**Unit**	**Tot. A1–A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO_2 eq.	4.15E+01	2.84E-01	0.00E+00	3.29E-02	0.00E+00	1.06E+01	-1.62E+01
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND
IRP**	kBq U235-equiv.	ND	ND	ND	ND	ND	ND	ND
ETP-fw***	CTUe	ND	ND	ND	ND	ND	ND	ND
HTP-c***	CTUh	ND	ND	ND	ND	ND	ND	ND
HTP-nc***	CTUh	ND	ND	ND	ND	ND	ND	ND
SQP***	—	ND	ND	ND	ND	ND	ND	ND
Acronyms	PM = Potential incidence of disease due to PM emissions; IRP = Potential human exposure efficiency relative to U235; ETP-fw = Potential comparative toxic unit for ecosystems; HTP-c = Potential comparative toxic unit for humans, cancer effects; HTP-nc = Potential comparative toxic unit for humans, non-cancer effects; SQP = Potential soil quality index							

* The indicator includes all greenhouse gases included in GWP-total. This indicator follows a comparable rationale to the GWP indicator originally defined in EN 15804:2012+A1:2013.

** Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

*** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Use of resources

Results for 1 m² of TENAX panel (120 mm)								
Indicator	Unit	Tot. A1–A3	A4	C1	C2	C3	C4	D
PERE	MJ	3.45E+01	1.83E-01	0.00E+00	2.51E-02	0.00E+00	4.17E-01	-6.49E+00
PERM	MJ	1.36E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.58E+01	1.83E-01	0.00E+00	2.51E-02	0.00E+00	4.17E-01	-6.49E+00
PENRE	MJ	4.79E+02	3.71E+00	0.00E+00	4.36E-01	0.00E+00	1.34E+02	-1.77E+02
PENRM	MJ	1.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.31E+02	0.00E+00
PENRT	MJ	6.25E+02	3.71E+00	0.00E+00	4.36E-01	0.00E+00	3.13E+00	-1.77E+02
SM	kg	5.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.84E-01	2.14E-04	0.00E+00	2.93E-05	0.00E+00	2.45E-02	-7.11E-02
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Waste production and output flows

Waste production

Results for 1 m² of TENAX panel (120 mm)								
Indicator	Unit	Tot. A1–A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3.64E-05	1.45E-07	0.00E+00	2.02E-08	0.00E+00	3.02E-09	-1.96E-10
Non-hazardous waste disposed	kg	9.30E-01	5.56E-04	0.00E+00	6.91E-05	0.00E+00	4.97E-01	1.21E+00
Radioactive waste disposed	kg	7.33E-03	6.42E-06	0.00E+00	8.04E-07	0.00E+00	1.18E-04	-5.47E-03

Output flows

Results for 1 m² of TENAX panel (120 mm)								
Indicator	Unit	Tot. A1–A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+01	0.00E+00

Interpretation:

The comparison of the panels' life cycle phases shows a clear dominance of the production phase (modules A1-A3). The environmental impacts in the production phase mainly result from the supply chain of the purchased components.

Module A4 includes the transport of the product to a Scandinavian client representing a minor share in the declared environmental indicators.

Environmental impacts in module C4 mainly refer to emissions from the energetic treatment of the polyurethane foam in a waste incineration plant. Module C4 declares impacts from landfilling of steel losses making up a minor fraction of the total environmental impact of the panels.

As a result of material recyclability, the steel fraction removed at the end of life can substitute primary steel. Module D shows the recycling potential of steel at the end of its product life. Except for depletion potential of stratospheric ozone (ODP), this results in credits from the substitution of primary steel.
In addition, the incineration of polyurethane results in substitution potential from energy recovery. Hence, the utilisation of energy stored in polyurethane potentially substitutes emissions of (mainly) fossil energy sources.

Information on biogenic carbon content

The analysed product does not contain biogenic carbon. The carbon content of the wooden pallet used as packaging material is calculated as carbon neutral in module A1-A3.

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ADDITIONAL INFORMATION

Optimal application of panels:

TENAX PANEL provides consultations and materials on the advantages and limitations of panel variations for specific use cases in order to ensure the optimal performance, lifespan and value for the specific project.

Correct handling and installation of panels:

TENAX PANEL provides customers and users of the products with detailed documentation on storage, handling and installation of the sandwich panels. Furthermore, the Product Technical Details contain technical information useful in the design and installation phases.
Each content can be consulted and downloaded from TENAX PANEL website: www.tenaxpanel.com

Maintenance:

TENAX sandwich panels have an estimated life of 40–45 years depending on the conditions of use, according to BBSR. The product does not require special maintenance but lifespan can be prolonged by carrying out maintenance as outlined in Product Use and Maintenace Manual. The products are easily washable and their cleaning does not require chemicals harmful to the environment. Content can be consulted and downloaded from TENAX PANEL website: www.tenaxpanel.com

Rating systems for sustainability of buildings:

The use of TENAX panels helps to obtain the prerequisites and credits for the most important building sustainability assessment systems, including LEED, BREEAM, Miljobyggnad, DGNB. The technical characteristics and certificates of TENAX PANEL products provide credits for these certifications, and make them comply with the environmental criteria required by many nations for construction products used on their territory.

Certifications:

TENAX PANEL has an integrated management system certified acccording to ISO 9001:2015, ISO 14001:2015, ISO 50001:2018, ISO 45001:2018 and ISO 27001:2013.

Owner of the declaration:

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Nutzungsdauern von Bauteilen für Lebenszyklusanalysen nach Bewertungssystem Nachhaltiges Bauen, BBSR, 24-02-2017.

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Core value for companies of TENAX GROUP from an early start –
to be reliable and stable partner to employees, customers, and suppliers
continuously ensuring compliance to highest quality standards and
regional requirements in all activity fields of the group.

INCREASE ENERGY EFFICIENCY

CONTINUOUS DEVELOPMENT

ENVIRONMENTAL QUALITY ENHANCEMENT

HIGH QUALITY STANDARDS

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