

# EPD

**2020**

ENVIRONMENTAL PRODUCT DECLARATION

SANDWICH PANELS  
WITH STEEL FACINGS  
AND MINERAL WOOL INSULATING CORE

ISOFIRE ROOF  
ISOFIRE WALL  
ISOFIRE WALL PLISSÉ  
ISODECK PVSTEEL MW



Code UN CPC Ver2:1 Code 54  
N° Registration S-P-01550  
N° Ref. ECO EPD: 00000871  
Publication - 23/04/2019  
Revision - 10/03/2021  
Validity - 26/03/2024  
EPD in accordance with EN 15804:2012 + A1:2013





**ISOPAN**

INSULATING DESIGN





# 01. GENERAL INFORMATION

<b>NAME AND ADDRESS OF THE MANUFACTURER</b>	Isopan S.p.A. Via Augusto Righi n. 7 37135 Verona (VR), Italy	 <b>ISOPAN</b> INSULATING DESIGN
<b>PROGRAMME OPERATOR</b>	EPD International AB INTERNATIONAL EPD® SYSTEM www.environdec.com	 <b>EPD</b> ® THE INTERNATIONAL EPD® SYSTEM
<b>EPD® PUBLICATION DATE</b>	23/04/2019	
<b>EPD® REVISION DATE</b>	10/03/2021	
<b>EPD® VALIDITY</b>	26/03/2024	
<b>EPD® PRODUCTS</b>	Sandwich panels with steel facings and mineral wool insulating core	
<b>PRODUCT GROUPS</b>	ISOFIRE WALL, ISOFIRE WALL PLISSÉ: thickness from 50 to 200 mm ISOFIRE ROOF: thickness from 50 to 200 mm ISODECK PVSTEEL MW: thickness from 50 to 150 mm	Representative products identified by specific thicknesses of insulation and steel; the environmental performance results were calculated for additional insulating core and steel thicknesses based on the processing of LCA results.
<b>DECLARED UNIT</b>	1 m <sup>2</sup> of insulation panel with a specific thermal resistance	
<b>SYSTEM BOUNDARIES</b>	From cradle to gate with options	The LCA study was carried out considering the Product stage phases (A1-A2-A3), Distribution (A4), End of life (C2-C3-C4), Potential environmental benefits (D) in accordance with EN 15804:2012
<b>REFERENCE SITES FOR THE CALCULATION OF ENVIRONMENTAL PERFORMANCES</b>	Via Giona, 5 - Trevenzuolo, VR - 37060 - Italy	



## 02. COMPANY PROFILE

### THE GROUP

Isopan S.p.A is a company of Manni Group.

Manni Group promotes innovation in the processing and use of steel in all its applications, developing solutions and services for engineering structures, energy efficiency and sustainability, enabling companies, users and consumers in different markets, from large infrastructures, to Oil & Gas and mechanics.

Manni Group is committed to the creation of innovative, low-impact and carbon-emission buildings, in which healthy and safe materials are used, through constant commitment to research and development of products, services and solutions for dry-construction and redevelopment of the buildings.

### THE COMPANY

Isopan is one of the world leaders in the production of insulating metal panels for roofs and walls intended for commercial, industrial, civil, zootechnical constructions, and for cold logistics.

The Isopan Group is based in Verona and controls six manufacturing companies in the world. It is present in Italy with two production plants in Frosinone and Verona, and in the world with Isopan Ibérica in Tarragona (Spain), Isopan Est in Bucharest (Romania), Isopan Deutschland in Plötz (Halle, Germany), Isopan Rus in Volžskij (Volgograd, Russia) and Isocindu in Silao (Guanajuato, Mexico). Two commercial companies are the reference for France (Mérignac) and the Czech Republic (Prague). Furthermore, the International Business Division develops specific solutions for the needs of the different countries where Isopan is distributed. The widespread presence on the territory and a consolidated network of commercial contacts allows Isopan to preside over the most important markets in the world.

Isopan has always been committed to the innovation of products and services for buildings, with particular attention to improving the performance of buildings in the fields of environment, safety and energy efficiency. Isopan products contribute to obtaining the prerequisites and credits useful for the most widespread sustainability standards of buildings, such as LEED, BREEAM or Living Building Challenge.



## 03. PRODUCT SPECIFICATION

### DESCRIPTION

Insulating sandwich panels are elements for the building's envelope. They consist of two external metal sheet supports, which enclose an insulating core. This EPD takes into consideration sandwich panels with an insulating core of mineral wool. The metal sheets are composed of steel, are profiled and the metal layer is protected against corrosion by galvanization and prepainting. The declared insulation panels can be used for roofs and walls of industrial, commercial, civil buildings, animal husbandry and cold stores. They are light, versatile and easy to assemble, and they assure thermal and acoustic insulation, solidity, air tightness and fire safety. Isopan offers an extremely wide range of metal panels, which includes different thicknesses, colors and surface finishes to create customized solutions with an innovative design.

### WALL PANELS

Wall sandwich panel with double metal facings and mineral wool insulating core which guarantees the incombustibility of the product as well as adequate thermal insulation. It was created to meet the growing performance requirements and legislative constraints on fire behavior for buildings, while maintaining high mechanical and insulation characteristics. Used for infill walls of industrial and civil buildings, it can have an exposed joint (ISOFIRE WALL) or a hidden joint (ISOFIRE WALL PLISSÉ).

### ROOF PANELS

ISOFIRE ROOF is a self-supporting 5 ribs sandwich roofing panel, characterized by a mineral fiber core that guarantees the product's incombustibility as well as excellent thermal insulation. It was created to meet the growing performance requirements and legislative constraints on fire behavior for buildings, while maintaining high mechanical and insulation characteristics.

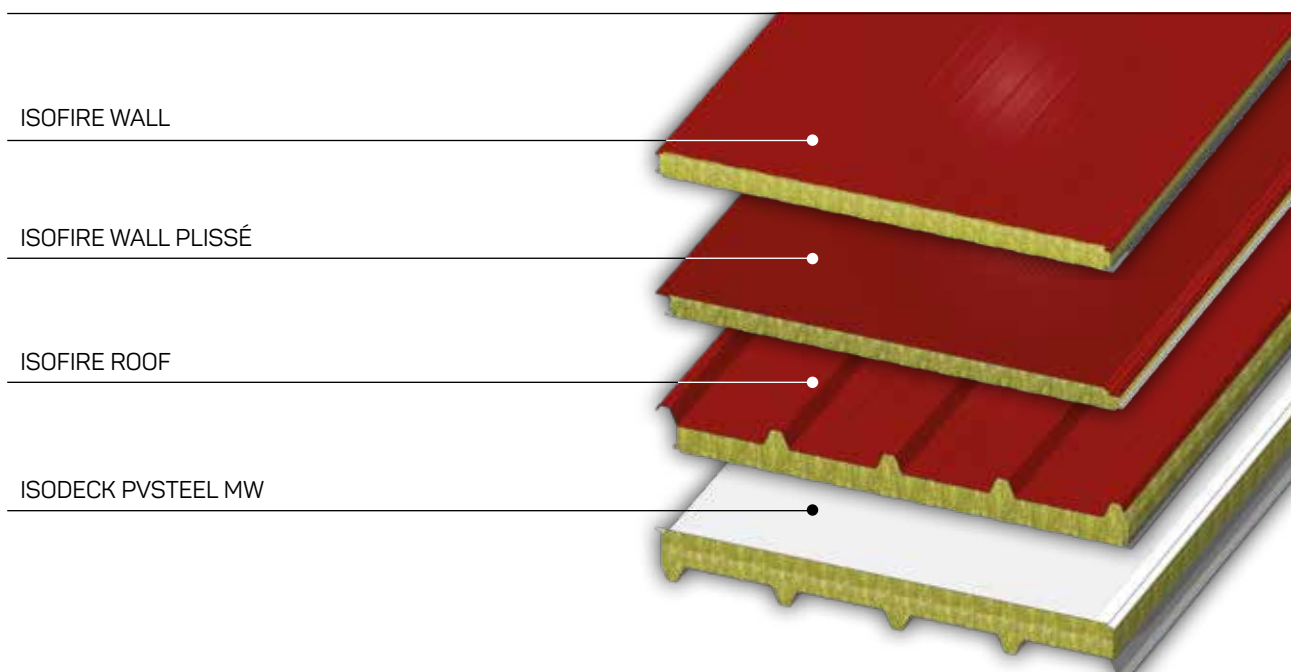
### ISODECK PVSteel MW

Ideal panel for making flat or slightly sloping roofs. The panel consists of an external metal support pre-coupled with a PVC / TPO membrane, an internal corrugated support and an insulating mineral wool core; the solution makes it possible to create a completely waterproof covering of high aesthetic value, also ideal for replacing fiber cement covers.

The ISODECK PVSteel MW panel takes part in the Isopan GREEN ROOF, a solution for green roofs.

ISODECK PVSteel MW panel is an Isopan patented product.

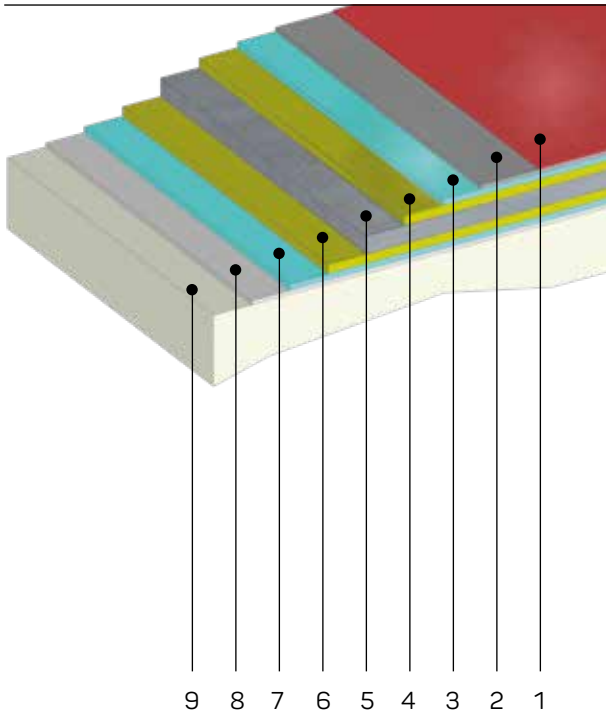
The general characteristics for each product family are summarized in the following section.



## GENERAL FEATURES

The insulating core of the panel is made of mineral wool, a material that guarantees high performance in terms of thermal insulation, resistance to humidity and incombustibility.

The panels DO NOT contain SVHC Substances of Very High Concern covered by ECHA's Candidate List in concentrations greater than 0.1% by mass.



### METAL PREPAINTED SUPPORTS: COMPOSITION

1. Top coating
2. Primer
3. Pretreatment
4. Galvanizing
5. Steel
6. Galvanizing
7. Pretreatment
8. Back coating
9. Mineral wool



For each product family, the general characteristics are shown, such as the type of insulating material and its density, the material that constitutes the internal and external facings of the panel, fire reaction class and the main applications. Further data regard the weight of the panel in kg/m<sup>2</sup> (depending on the thickness of both the insulation and the internal and external pre-painted steel supports), the composition of the panel (expressed in percentages by weight) and the thermal transmittance coefficient U. Any missing weight or composition data can be estimated by linear interpolation.

## WALL PANELS

**TABLE 3.1** General characteristics of wall panels

Commercial names	ISOFIRE WALL - ISOFIRE WALL PLISSÉ
Panel thickness for LCA analysis	80 – 200 mm
Insulating material	MINERAL WOOL
Density of insulating material	100 kg/m <sup>3</sup>
Inner/outer facing material	Organic coated steel
Reaction to fire	A2-s1,d0
Applications	Wall

**TABLE 3.2** Weight, composition and thermal transmittance of the wall panels

Internal steel thickness (mm)	External steel thickness (mm)		Insulation thickness (mm)							
			50	60	80	100	120	150	170	200
			Weight (%) and composition of wall panels							
0.5	0.5	Weight kg/m <sup>2</sup>	13.5	14.5	16.5	18.5	20.5	23.5	25.5	28.5
		% Steel	63.0	58.7	51.6	46.0	41.5	36.2	33.4	29.9
		% Insulating core	37.0	41.3	48.4	54.0	58.5	63.8	66.6	70.1
0.5	0.6	Weight kg/m <sup>2</sup>	14.4	15.4	17.4	19.4	21.4	24.4	26.4	29.4
		% Steel	65.2	61.0	54.0	48.4	43.9	38.5	35.6	31.9
		% Insulating core	34.8	39.0	46.0	51.6	56.1	61.5	64.4	68.1
0.6	0.6	Weight kg/m <sup>2</sup>	15.2	16.2	18.2	20.2	22.2	25.2	27.2	30.2
		% Steel	67.2	63.0	56.1	50.6	46.0	40.6	37.6	33.8
		% Insulating core	32.8	37.0	43.9	49.4	54.0	59.4	62.4	66.2
0.6	0.8	Weight kg/m <sup>2</sup>	16.9	17.9	19.9	21.9	23.9	26.9	28.9	31.9
		% Steel	70.5	66.6	59.9	54.4	49.9	44.3	41.3	37.4
		% Insulating core	29.5	33.4	40.1	45.6	50.1	55.7	58.7	62.6
0.8	0.8	Weight kg/m <sup>2</sup>	18.6	19.6	21.6	23.6	25.6	28.6	30.6	33.6
		% Steel	73.2	69.5	63.0	57.7	53.2	47.6	44.5	40.6
		% Insulating core	26.8	30.5	37.0	42.3	46.8	52.4	55.5	59.4
<b>Thermal transmittance values U (W/m<sup>2</sup> K)</b>			<b>0.75</b>	<b>0.63</b>	<b>0.49</b>	<b>0.39</b>	<b>0.33</b>	<b>0.27</b>	<b>0.24</b>	<b>0.20</b>

## ROOF PANELS

TABLE 3.3 General characteristics of roof panels

Commercial names	ISOFIRE ROOF
Panel thickness for LCA analysis	80 – 200 mm
Insulating material	MINERAL WOOL
Density of insulating material	100 kg/m <sup>3</sup>
Inner/outer facing material	Organic coated steel
Reaction to fire	A2-s1,d0
Applications	Walls, Roof

TABLE 3.4 Weight, composition and thermal transmittance of the roof panels

Internal steel thickness (mm)	External steel thickness (mm)		Insulation thickness (mm)							
			50	60	80	100	120	150	170	200
			Weight (%) and composition of roof panels							
0.5	0.5	Weight kg/m <sup>2</sup>	14.7	15.7	17.7	19.7	21.7	24.7	26.7	29.7
		% Steel	62.4	58.5	51.9	46.6	42.3	37.2	34.4	30.9
		% Insulating core	37.6	41.5	48.1	53.4	57.7	62.8	65.6	69.1
0.5	0.6	Weight kg/m <sup>2</sup>	15.7	16.7	18.7	20.7	22.7	25.7	27.7	30.7
		% Steel	64.8	60.9	54.4	49.1	44.8	39.6	36.7	33.1
		% Insulating core	35.2	39.1	45.6	50.9	55.2	60.4	63.3	66.9
0.6	0.6	Weight kg/m <sup>2</sup>	16.5	17.5	19.5	21.5	23.5	26.5	28.5	31.5
		% Steel	66.6	62.8	56.4	51.1	46.8	41.5	38.6	34.9
		% Insulating core	33.4	37.2	43.6	48.9	53.2	58.5	61.4	65.1
0.6	0.8	Weight kg/m <sup>2</sup>	18.5	19.5	21.5	23.5	25.5	28.5	30.5	33.5
		% Steel	70.2	66.6	60.4	55.2	50.9	45.5	42.6	38.7
		% Insulating core	29.8	33.4	39.6	44.8	49.1	54.5	57.4	61.3
0.8	0.8	Weight kg/m <sup>2</sup>	20.2	21.2	23.2	25.2	27.2	30.2	32.2	35.2
		% Steel	72.7	69.2	63.3	58.3	54.0	48.6	45.6	41.7
		% Insulating core	27.3	30.8	36.7	41.7	46.0	51.4	54.4	58.3
<b>Thermal transmittance values U (W/m<sup>2</sup> K)</b>			<b>0.78</b>	<b>0.66</b>	<b>0.50</b>	<b>0.40</b>	<b>0.34</b>	<b>0.27</b>	<b>0.24</b>	<b>0.20</b>



## ISODECK PVSTEEL MW

TABLE 3.5 General characteristics of Isodeck PVSteel MW panels

Commercial names	ISODECK PVSTEEL MW TPO - ISODECK PVSTEEL MW PVC
Panel thickness for LCA analysis	80 – 150 mm
Insulating material	MINERAL WOOL
Density of insulating material	100 kg/m <sup>3</sup>
Inner/outer facing material	Organic coated steel + TPO / PVC membrane (external side only)
Reaction to fire	B-s1,d0
Applications	Roof

## ISODECK PVSTEEL MW - TPO

TABLE 3.6 Weight, composition and thermal transmittance of Isodeck PVSteel panels with TPO membrane

Internal steel thickness (mm)	External steel thickness (mm)		Insulation thickness (mm)					
			50	60	80	100	120	150
			Weight (%) and composition of Isodeck PVSteel MW - TPO panels					
0.5	0.8	Weight kg/m <sup>2</sup>	17.8	18.8	20.8	22.8	24.8	27.8
		% Steel	65.8	62.3	56.3	51.4	47.2	42.1
		% Insulating core	30.9	34.6	40.9	46.0	50.4	55.7
		% TPO	3.3	3.1	2.8	2.6	2.4	2.1
0.6	0.8	Weight kg/m <sup>2</sup>	18.8	19.8	21.8	23.8	25.8	28.8
		% Steel	67.5	64.1	58.3	53.4	49.2	44.1
		% Insulating core	29.3	32.9	39.0	44.1	48.5	53.8
		% TPO	3.1	3.0	2.7	2.5	2.3	2.1
0.7	0.8	Weight kg/m <sup>2</sup>	19.8	20.8	22.8	24.8	26.8	29.8
		% Steel	69.1	65.8	60.1	55.2	51.1	46.0
		% Insulating core	27.9	31.3	37.3	42.4	46.7	52.1
		% TPO	3.0	2.8	2.6	2.4	2.2	2.0
0.8	0.8	Weight kg/m <sup>2</sup>	20.8	21.8	23.8	25.8	27.8	30.8
		% Steel	70.6	67.4	61.7	56.9	52.8	47.7
		% Insulating core	26.5	29.9	35.8	40.8	45.0	50.4
		% TPO	2.8	2.7	2.5	2.3	2.1	1.9
<b>Thermal transmittance values U (W/m<sup>2</sup> K)</b>			<b>0.78</b>	<b>0.66</b>	<b>0.50</b>	<b>0.41</b>	<b>0.34</b>	<b>0.28</b>

## ISODECK PVSTEEL MW - PVC

TABLE 3.7 Weight, composition and thermal transmittance of Isodeck PVSteel MW panels with PVC membrane

Internal steel thickness (mm)	External steel thickness (mm)		Insulation thickness (mm)					
			50	60	80	100	120	150
			Weight (%) and composition of Isodeck PVSteel MW - PVC panels					
0.5	0.8	Weight kg/m <sup>2</sup>	18.4	19.4	21.4	23.4	25.4	28.4
		% Steel	63.7	60.4	54.8	50.1	46.1	41.3
		% Insulating core	30.0	33.6	39.8	44.9	49.2	54.6
		% PVC	6.4	6.0	5.5	5.0	4.6	4.1
0.6	0.8	Weight kg/m <sup>2</sup>	19.4	20.4	22.4	24.4	26.4	29.4
		% Steel	65.5	62.3	56.7	52.1	48.1	43.2
		% Insulating core	28.4	31.9	38.0	43.1	47.4	52.8
		% PVC	6.1	5.8	5.2	4.8	4.4	4.0
0.7	0.8	Weight kg/m <sup>2</sup>	20.4	21.4	23.4	25.4	27.4	30.4
		% Steel	67.2	64.0	58.6	53.9	50.0	45.1
		% Insulating core	27.1	30.5	36.4	41.4	45.7	51.1
		% PVC	5.8	5.5	5.0	4.6	4.3	3.9
0.8	0.8	Weight kg/m <sup>2</sup>	21.4	22.4	24.4	26.4	28.4	31.4
		% Steel	68.7	65.6	60.2	55.7	51.7	46.8
		% Insulating core	25.8	29.1	35.0	39.9	44.1	49.5
		% PVC	5.5	5.3	4.8	4.5	4.1	3.7
<b>Thermal transmittance values U (W/m<sup>2</sup> K)</b>			<b>0.78</b>	<b>0.66</b>	<b>0.50</b>	<b>0.41</b>	<b>0.34</b>	<b>0.28</b>

## PANELS TECHNICAL FEATURES

Sandwich panels are designed and manufactured in compliance with the technical specifications defined in following regulations:

- EN 14509
- EN 13165
- EN 10346

The panels declared in this EPD are CE marked. With this mark, the manufacturer states that the products comply with all the legislative requirements concerning health and safety and environmental protection.

The sandwich panels with steel skins, according to the conditions of use, have an estimated duration of 40-45 years, as defined on the basis of the methodology for assessing the durability of building components developed by the German Federal Research Institute BBSR (Federal Institute for Building Research, Urban Affairs and Spatial Development) and available on the website:

[www.nachhaltigesbauen.de/baustoff-und-gebaeuedaten/nutzungsdauern-von-bauteilen.html](http://www.nachhaltigesbauen.de/baustoff-und-gebaeuedaten/nutzungsdauern-von-bauteilen.html).

### EFFICIENCY AND ENERGY SAVINGS

Isopan insulating panels have high thermal insulation properties. Performance may vary depending on the thickness of the panel and the type of insulation selected. These parameters can be defined and customized at the product order stage, to comply at best the project design needs.

### ACOUSTIC PROPERTIES

#### SOUND INSULATION

Isopan sandwich panels limit the passage of sound from one environment to another. In particular, various performance certificates have been obtained in the field of Sound insulation, both for wall and roof panels, with certified performances up to  $R_w = 35$  dB.

#### SOUND ABSORPTION

The Isopan insulating panels, thanks to the certified sound absorption performances, are able to cushion the noise reverberation, improving the environmental comfort.

### FIRE PERFORMANCE

Isopan panels offer excellent reaction and fire resistance properties, certified according to EN 13501, parts 1 and 2. Depending on the project specifications, Isopan is able to offer different degrees of fire resistance performance, while as regards to fire reaction the products are classified A2-s1, d0 (ISOFIRE WALL, ISOFIRE WALL PLISSE, ISOFIRE ROOF) or B-s1,d0 (ISODECK PVSTEEL MW).





## 04. SYSTEM BOUNDARIES

In accordance with EN 15804, the following table shows the different phases that make up the life cycle of a construction product and identifies the specific phases (system boundaries) taken into consideration in this declaration.

<b>PRODUCT STAGE</b>	Raw materials	A1	X
	Transport	A2	X
	Manufacturing	A3	X
<b>CONSTRUCTION PROCESS STAGE</b>	Transport	A4	X
	Construction installation	A5	MND
<b>USE STAGE</b>	Use	B1	MND
	Maintenance	B2	MND
	Repair	B3	MND
	Replacement	B4	MND
	Refurbishment	B5	MND
	Operational energy use	B6	MND
	Operational water use	B7	MND
<b>END OF LIFE STAGE</b>	De-construction demolition	C1	MND
	Transport	C2	X
	Waste processing	C3	X
	Disposal	C4	X
<b>RESOURCE RECOVERY STAGE</b>	Reuse - Recovery- Recycling - Potential	D	X

**X** = Module included in the LCA study

**MND** = Module not declared

The declared modules include:

**A1** Raw materials supply

**A2** Raw materials Transport

**A3** Manufacturing of the product

**A4** Product distribution

**C2 - C3 - C4** Waste Transport / Treatment / Disposal

**D** Reuse, Recovery, Recycling potential

## 05. PRODUCTION PROCESS

The production process of Isopan sandwich panels is divided into different phases, ranging from the acquisition of raw materials to the packaging of the finished product. The panels are made with a continuous process, which can be schematized in the following phases: profiling, wool insertion, cutting and packaging.

### PROFILING

Gives the shape to the steel sheets that enclose the insulating material. The production process begins with the unwinding of pre-painted galvanized steel coils, which pass through a series of rollers shaping the geometry of laminates.

### WOOL INSERTION

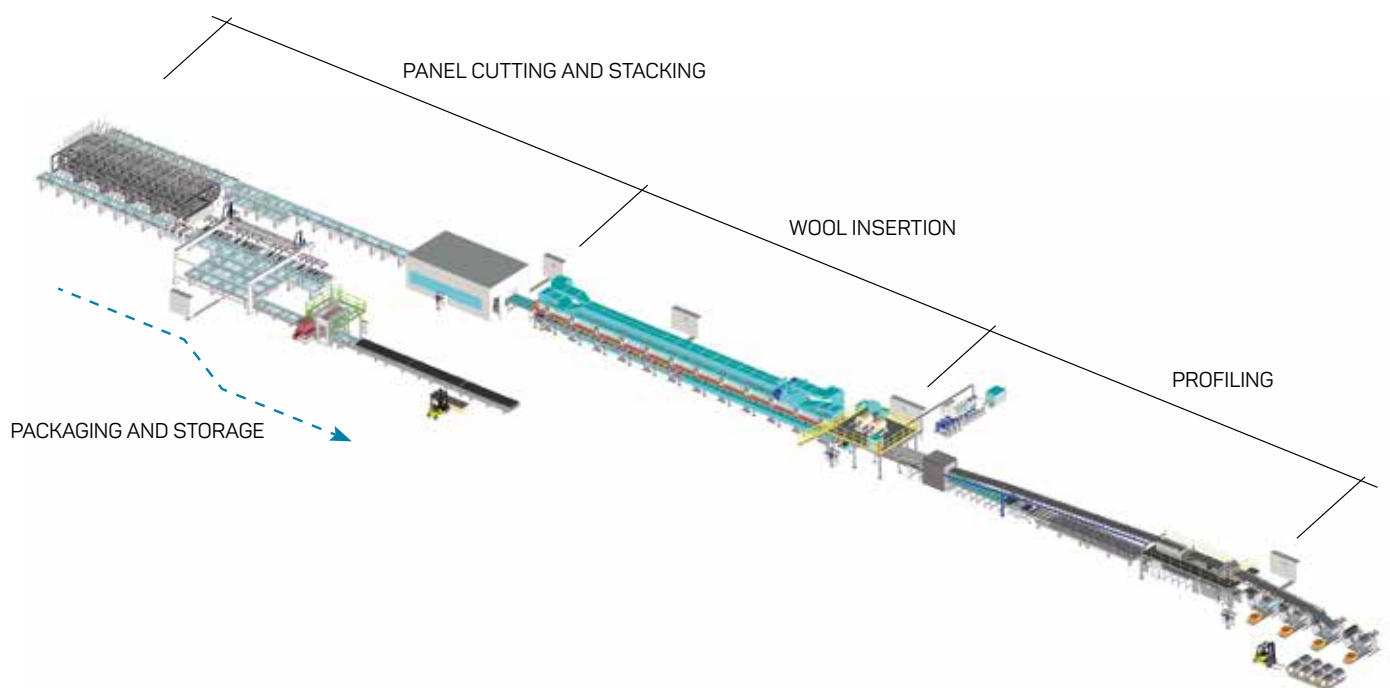
The core of the panel is filled with lamellas of mineral wool, whose adhesion to the sheets is promoted by the application of a glue.

### PANEL CUTTING AND STACKING

The product is cut according to the specifications required by the order and stacked for the formation of packages to be delivered to customers.

### PACKAGING AND STORAGE

Application of various protective systems to help handling parcels on site and reduce the possibility of material damage during transport.



## 06. CALCULATION METHODOLOGY

### FUNCTIONAL UNIT

The functional unit is 1 m<sup>2</sup> of insulating panel with specific R-value (Thermal Resistance expressed as m<sup>2</sup> K/W) depending on the nominal thickness of the panel

### SYSTEM BOUNDARIES

Declaration Type:  
Cradle to Gate With Options.

The Product Stage (A1-A3) includes materials and electricity production processes (A1), material transport (A2) and manufacturing at Isopan production sites (A3).

It is also considered:

- phase A4: finished product distribution, based on the average transport distances of the products from the Isopan production plants to the delivery / use sites, by standard road transport
- phases C2-C3-C4: transport, treatment, disposal of the panel components at the end of life
- module D: potential environmental benefits deriving from the recycling / recovery of panel components at the end of their life

The LCA analysis underlying this EPD was carried out in compliance with the international standards ISO 14040/14044 and the European standard EN 15804 on construction products.

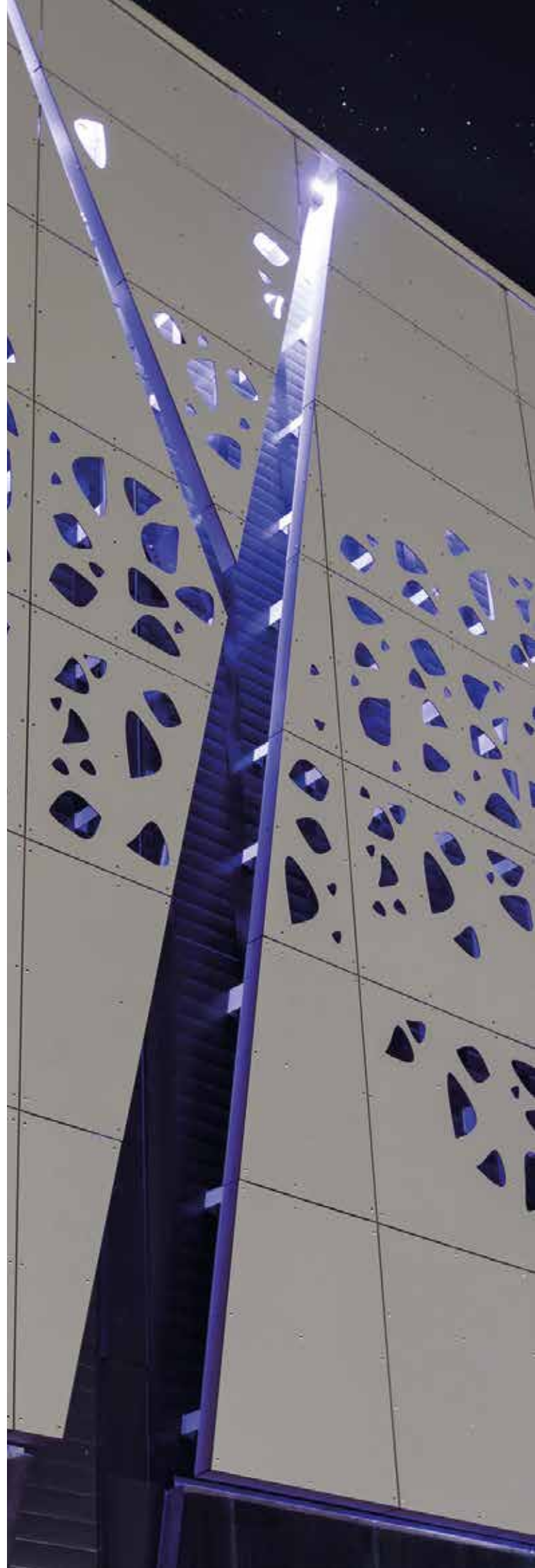
**Geographical scope:** Europe

### DATA COLLECTION

The LCA analysis was performed on the basis of primary data for the year 2019, collected for the Isopan plant in Trevenzolo (VR).

**Primary data** relating to both plants were acquired with regard to energy consumption, waste production, atmospheric emissions, consumption of raw materials and auxiliaries, distances and types of transport relating to the production plants concerned.

**Secondary data** have been used for the modeling of the production processes of raw materials and auxiliary materials, production of packaging materials, transport of materials, treatment of waste and end-of-life materials. The environmental databases used are: World Steel Association for organic coated steel production processes, Ecoinvent 3.5 for production processes of other materials, transport and end-of-life treatment. The modeling of the LCA system was carried out with SIMAPRO 9.0.0.





## END OF LIFE

The management of the panel at the end of its life cannot be controlled by Isopan. The end of life scenarios has been defined on the basis of literature data related to the construction sector or national statistics on waste disposal.

Average data from studies conducted in Europe lead to consider that about 90% of the end-of-life panels are collected at the sites of disposal/demolition of buildings and its components are sent for recycling/recovery. Isopan panels are easily disassembled to facilitate the recycling of its components (steel and insulating materials). The steel is collected for recycling, constituting a source of secondary material for the production of new steel. The collected mineral wool can be used for recycling or disposal in landfills. The residual percentage of panels, not intended for the collection, separation, recovery and recycling, is destined to landfill.

The treatment processes at the end of life of packaging materials has been modeled on the basis of national statistical surveys on recovery and recycling rates of plastic materials.

## MODULE D

In accordance with the PCRs of the construction products sector, Module D can be used to declare the potential environmental benefits deriving from the recycling and recovery of the product or parts thereof, outside the boundaries of the system under study. At the end of life, the Isopan panel generates two flows of materials whose treatment can give rise to environmental credits accounted for in Module D of this EPD:

- **steel destined to recycling:** the steel is one of the most recycled materials in the world; to quantify the environmental credit related to the use of scrap steel instead of virgin raw materials in the steel industry, data sets provided by the World Steel Association (WSA) were used for organic coated steel produced respectively in Europe and Asia. Details on context and WSA methodology is available at [www.worldsteel.org](http://www.worldsteel.org)
- **mineral wool for recycling:** mineral wool can be recycled; the recycled material obtained is used as a secondary material for the production of new mineral wool (closed loop recycling), reducing the consumption of virgin raw materials.
- **for PVSteel products only:** protective membrane in TPO or PVC plastic with material recovery (recycling) and energy produced by incineration, deriving from the membrane at the end of life.

## LCA RESULTS

The LCA analysis was carried out considering material and energy flows in and out of the system, normalized with respect to 1 m<sup>2</sup> of panel having a specific thickness and specific Thermal Resistance (R-value) performance. The main function of Isopan panels is to provide thermal insulation for buildings; for this reason the LCA results normalized with respect to a Thermal Resistance unit (1 m<sup>2</sup> K/W) were also provided, obtaining the environmental load of different panels compared to the same value of Thermal Resistance R. Those values can be calculated with the protocol described in the following section.



## 07. ENVIRONMENTAL PERFORMANCES

The environmental performance indicators are summarized in the following tables, grouped by product family. Data are reported for the insulation and steel thicknesses used for the LCA study. At the end of each section a table defines the results as a function of insulation and steel thicknesses, using formulas. These expressions can be used to calculate the values of environmental performance indicators in cases not explicitly mentioned.

For example, for wall panels, tables 7.1 and 7.2 show the indicators relating to the insulation thickness of 80 and 200 mm respectively. In both cases, the thickness of the steel supports considered is 0.5 / 0.5 mm (external/internal). Indicators for other combinations of insulation thickness and steel supports (for example 100 mm insulation and 0.6 / 0.6 mm external / internal steel) can be calculated with the formulas shown in Table 7.3.

For each environmental performance indicator, the formulas are:

$$A * i + B * m + C = y$$

where  $i$  is the insulation thickness expressed in mm,  $m$  is the total (sum) thickness of the steel (internal + external) expressed in mm. A, B and C are constants that vary according to the indicator, the module and the type of panel,  $y$  is the value of any of the environmental indicators considered.

As an example, we report the calculation of the Acidification (AP) indicator, on Module A4, for a wall panel of 80 mm thickness with steel supports of 0.5 and 0.6 mm (internal and external side, respectively). From the Table 7.3, the corresponding formula is

$$y \text{ (Acidification [AP], A4)} = 2,00E-5 * i + 1,66E-3 * m + 1,71E-4$$

Where  $i = 80$  and  $m = 0,5 + 0,6 = 1,1$

The calculation is

$$\begin{aligned} y \text{ (Acidification [AP], A4)} &= 2,00E-5 * 80 + 1,66E-3 * 1,1 + 1,71E-4 \\ &= 0,0016 + 0,001826 + 0,000171 \\ &= 0,003597 \end{aligned}$$

The reference thicknesses for the insulation and the steel supports can be consulted in the PRODUCT SPECIFICATION.

The environmental performance indicators are expressed per 1 m<sup>2</sup> of panel. To obtain the values per unit of thermal resistance, simply multiply the indicator by the thermal transmittance value U, listed in the tables in the PRODUCT SPECIFICATION.



## ENVIRONMENTAL INDICATORS LEGEND

### Potential environmental impacts

<b>GWP</b>	Climate change
<b>ODP</b>	Ozone depletion
<b>AP</b>	Acidification of land and water
<b>EP</b>	Eutrophication
<b>POCP</b>	Photochemical ozone creation
<b>ADP - MM</b>	Depletion of abiotic resources (elements)
<b>ADP - F</b>	Depletion of abiotic resources (fossil)

### Resource use

<b>PERE</b>	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
<b>PERM</b>	Use of renewable primary energy resources used as raw materials
<b>PERT</b>	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)
<b>PENRE</b>	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
<b>PENRM</b>	Use of non-renewable primary energy resources used as raw materials
<b>PENRT</b>	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)
<b>SM</b>	Use of secondary material
<b>RSF</b>	Use of renewable secondary fuels
<b>NRSF</b>	Use of non-renewable secondary fuels
<b>FW</b>	Use of net fresh water

### Waste production

<b>HW</b>	Hazardous waste disposed
<b>NHW</b>	Non-hazardous waste disposed
<b>RW</b>	Radioactive waste disposed

### Output flows

<b>REUSE</b>	Components for re-use
<b>RECYCLE</b>	Materials for recycling
<b>EN-REC</b>	Materials for energy recovery
<b>EE-E</b>	Exported energy-electricity
<b>EE-T</b>	Exported energy-thermal energy



## WALL PANELS

### ISOFIRE WALL, ISOFIRE WALL PLISSÉ

**TABLE 7.1** Environmental performance indicators for 1 m<sup>2</sup>  
Wall panels – Thickness 80 mm – Steel thickness 0,5/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	3,72E+01	8,80E-01	3,35E-01	-1,76E+01
ODP	kg CFC-11 eq	8,99E-07	1,64E-07	4,85E-08	-5,19E-07
AP	kg SO <sub>2</sub> eq	1,66E-01	3,43E-03	8,95E-04	-8,22E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	2,66E-02	8,11E-04	3,18E-04	-1,55E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	1,48E-02	1,45E-04	4,88E-05	-7,71E-03
ADP - MM	kg Sb eq	1,64E-04	2,66E-06	1,44E-06	-2,01E-05
ADP - F	MJ	4,29E+02	1,34E+01	4,10E+00	-1,54E+02
PERE	MJ	2,94E+01	1,44E-01	5,59E-02	-5,33E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,94E+01	1,44E-01	5,59E-02	-5,33E+00
PENRE	MJ	4,63E+02	1,45E+01	4,43E+00	-1,66E+02
PENRM	MJ	4,59E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,67E+02	1,45E+01	4,43E+00	-1,66E+02
SM	kg	7,31E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	4,08E+00	2,22E-03	9,37E-04	-1,16E-03
HW	kg	1,47E-04	8,61E-06	3,55E-06	-1,12E-04
NHW	kg	1,59E+00	6,41E-01	1,84E+00	-4,98E-01
RW	kg	3,76E-04	9,22E-05	2,72E-05	-1,57E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	8,04E+00	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	2,32E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	6,96E-01	0,00E+00

**TABLE 7.2** Environmental performance indicators for 1 m<sup>2</sup>  
Wall panels – Thickness 200 mm – Steel thickness 0,5/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	5,28E+01	1,49E+00	5,65E-01	-3,03E+01
ODP	kg CFC-11 eq	2,12E-06	2,78E-07	8,32E-08	-1,29E-06
AP	kg SO <sub>2</sub> eq	2,90E-01	5,83E-03	1,54E-03	-1,78E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	5,37E-02	1,38E-03	5,32E-04	-3,68E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	2,19E-02	2,46E-04	8,38E-05	-1,33E-02
ADP - MM	kg Sb eq	2,00E-04	4,52E-06	2,47E-06	-4,59E-05
ADP - F	MJ	6,12E+02	2,28E+01	7,04E+00	-2,99E+02
PERE	MJ	4,90E+01	2,45E-01	9,59E-02	-1,31E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,90E+01	2,45E-01	9,59E-02	-1,31E+01
PENRE	MJ	6,74E+02	2,46E+01	7,61E+00	-3,29E+02
PENRM	MJ	7,05E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	6,81E+02	2,46E+01	7,61E+00	-3,29E+02
SM	kg	1,10E+01	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	4,17E+00	3,76E-03	1,61E-03	-2,71E-02
HW	kg	3,46E-04	1,46E-05	6,07E-06	-2,78E-04
NHW	kg	3,30E+00	1,09E+00	3,16E+00	-1,24E+00
RW	kg	8,10E-04	1,57E-04	4,68E-05	-3,89E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	8,06E+00	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	3,61E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	1,08E+00	0,00E+00

**TABLE 7.3** Environmental performance indicators for 1 m<sup>2</sup>

Wall panels – Formulas for the calculation according to the insulation thickness (i) and total thickness of metal supports (m)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	$1,30E-1 \cdot i + 2,39E+1 \cdot m + 2,96E+0$	$5,12E-3 \cdot i + 4,26E-1 \cdot m + 4,39E-2$	$1,92E-3 \cdot i + 1,34E-1 \cdot m + 4,77E-2$	$-1,06E-1 \cdot i - 8,66E+0 \cdot m - 3,97E-1$
ODP	kg CFC-11 eq	$1,02E-8 \cdot i + 4,62E-8 \cdot m + 4,10E-8$	$9,52E-10 \cdot i + 7,92E-8 \cdot m + 8,16E-9$	$2,89E-10 \cdot i + 2,41E-8 \cdot m + 1,23E-9$	$-6,44E-9 \cdot i - 3,43E-9$
AP	kg SO <sub>2</sub> eq	$1,03E-3 \cdot i + 7,36E-2 \cdot m + 1,00E-2$	$2,00E-5 \cdot i + 1,66E-3 \cdot m + 1,71E-4$	$5,34E-6 \cdot i + 4,42E-4 \cdot m + 2,58E-5$	$-8,00E-4 \cdot i - 1,71E-2 \cdot m - 1,11E-3$
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	$2,26E-4 \cdot i + 6,43E-3 \cdot m + 2,11E-3$	$4,72E-6 \cdot i + 3,93E-4 \cdot m + 4,05E-5$	$1,78E-6 \cdot i + 1,10E-4 \cdot m + 6,54E-5$	$-1,77E-4 \cdot i - 1,24E-3 \cdot m - 1,34E-4$
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	$5,95E-5 \cdot i + 7,34E-3 \cdot m + 2,67E-3$	$8,42E-7 \cdot i + 7,01E-5 \cdot m + 7,22E-6$	$2,91E-7 \cdot i + 2,41E-5 \cdot m + 1,47E-6$	$-4,68E-5 \cdot i - 3,79E-3 \cdot m - 1,74E-4$
ADP - MM	kg Sb eq	$3,01E-7 \cdot i + 1,33E-4 \cdot m + 6,30E-6$	$1,55E-8 \cdot i + 1,29E-6 \cdot m + 1,33E-7$	$8,59E-9 \cdot i + 7,14E-7 \cdot m + 3,56E-8$	$-2,15E-7 \cdot i - 2,76E-6 \cdot m - 1,51E-7$
ADP - F	MJ	$1,53E+0 \cdot i + 2,57E+2 \cdot m + 4,94E+1$	$7,81E-2 \cdot i + 6,50E+0 \cdot m + 6,70E-1$	$2,45E-2 \cdot i + 2,03E+0 \cdot m + 1,05E-1$	$-1,20E+0 \cdot i - 5,40E+1 \cdot m - 4,28E+0$
PERE	MJ	$1,63E-1 \cdot i + 1,26E+1 \cdot m + 3,74E+0$	$8,38E-4 \cdot i + 6,98E-2 \cdot m + 7,19E-3$	$3,34E-4 \cdot i + 2,77E-2 \cdot m + 1,47E-3$	$-6,46E-2 \cdot i - 1,62E-1$
PERM	MJ	0	0	0	0
PERT	MJ	$1,63E-1 \cdot i + 1,26E+1 \cdot m + 3,74E+0$	$8,38E-4 \cdot i + 6,98E-2 \cdot m + 7,19E-3$	$3,34E-4 \cdot i + 2,77E-2 \cdot m + 1,47E-3$	$-6,46E-2 \cdot i - 1,62E-1$
PENRE	MJ	$1,76E+0 \cdot i + 2,64E+2 \cdot m + 5,76E+1$	$8,43E-2 \cdot i + 7,01E+0 \cdot m + 7,22E-1$	$2,65E-2 \cdot i + 2,20E+0 \cdot m + 1,14E-1$	$-1,36E+0 \cdot i - 5,32E+1 \cdot m - 4,74E+0$
PENRM	MJ	$2,06E-2 \cdot i + 2,98E+0$	0	0	0
PENRT	MJ	$1,78E+0 \cdot i + 2,64E+2 \cdot m + 6,06E+1$	$8,43E-2 \cdot i + 7,01E+0 \cdot m + 7,22E-1$	$2,65E-2 \cdot i + 2,20E+0 \cdot m + 1,14E-1$	$-1,36E+0 \cdot i - 5,32E+1 \cdot m - 4,74E+0$
SM	kg	$3,06E-2 \cdot i + 4,66E+0 \cdot m + 2,03E-1$	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m <sup>3</sup>	$7,55E-4 \cdot i + 3,80E+0 \cdot m + 2,14E-1$	$1,29E-5 \cdot i + 1,07E-3 \cdot m + 1,11E-4$	$5,59E-6 \cdot i + 4,62E-4 \cdot m + 2,79E-5$	$-2,17E-4 \cdot i + 1,68E-2 \cdot m - 6,49E-4$
HW	kg	$1,66E-6 \cdot i + 6,17E-6 \cdot m + 7,65E-6$	$5,01E-8 \cdot i + 4,17E-6 \cdot m + 4,29E-7$	$2,11E-8 \cdot i + 1,74E-6 \cdot m + 1,24E-7$	$-1,39E-6 \cdot i - 9,80E-7$
NHW	kg	$1,42E-2 \cdot i + 3,12E-1 \cdot m + 1,38E-1$	$3,73E-3 \cdot i + 3,11E-1 \cdot m + 3,20E-2$	$1,10E-2 \cdot i + 9,11E-1 \cdot m + 4,93E-2$	$-6,18E-3 \cdot i - 3,73E-3$
RW	kg	$3,62E-6 \cdot i + 6,47E-5 \cdot m + 2,15E-5$	$5,37E-7 \cdot i + 4,47E-5 \cdot m + 4,60E-6$	$1,63E-7 \cdot i + 1,35E-5 \cdot m + 6,83E-7$	$-1,94E-6 \cdot i - 2,38E-6$
REUSE	kg	0	0	0	0
RECYCLE	kg	4,80E-1	0	$2,05E-4 \cdot i + 7,68E+0 \cdot m + 3,46E-1$	0
EN-REC	kg	0	0	0	0
EE-E	MJ	0	0	$1,08E-3 \cdot i - 1,48E-1$	0
EE-T	MJ	0	0	$3,23E-3 \cdot i + 4,43E-1$	0



## ROOF PANELS

### ISOFIRE ROOF

**TABLE 7.4** Environmental performance indicators for 1 m<sup>2</sup>  
Roof panels – Thickness 80 mm – Steel thickness 0,5/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	4,00E+01	8,26E-01	3,61E-01	-1,90E+01
ODP	kg CFC-11 eq	9,80E-07	1,53E-07	5,24E-08	-5,66E-07
AP	kg SO <sub>2</sub> eq	1,79E-01	3,22E-03	9,68E-04	-8,94E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	2,88E-02	7,61E-04	3,42E-04	-1,69E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	1,58E-02	1,36E-04	5,28E-05	-8,34E-03
ADP - MM	kg Sb eq	1,76E-04	2,50E-06	1,55E-06	-2,19E-05
ADP - F	MJ	4,60E+02	1,26E+01	4,43E+00	-1,67E+02
PERE	MJ	3,20E+01	1,35E-01	6,04E-02	-5,81E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,20E+01	1,35E-01	6,04E-02	-5,81E+00
PENRE	MJ	4,96E+02	1,36E+01	4,80E+00	-1,80E+02
PENRM	MJ	4,85E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	5,01E+02	1,36E+01	4,80E+00	-1,80E+02
SM	kg	7,87E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	4,37E+00	2,08E-03	1,01E-03	-1,51E-03
HW	kg	1,61E-04	8,08E-06	3,84E-06	-1,22E-04
NHW	kg	1,72E+00	6,02E-01	1,99E+00	-5,43E-01
RW	kg	4,08E-04	8,66E-05	2,95E-05	-1,71E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	8,63E+00	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	2,46E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	7,37E-01	0,00E+00

**TABLE 7.5** Environmental performance indicators for 1 m<sup>2</sup>  
 Roof panels – Thickness 200 mm – Steel thickness 0,5/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	5,69E+01	1,41E+00	6,01E-01	-3,29E+01
ODP	kg CFC-11 eq	2,29E-06	2,62E-07	9,03E-08	-1,41E-06
AP	kg SO <sub>2</sub> eq	3,14E-01	5,50E-03	1,67E-03	-1,94E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	5,83E-02	1,30E-03	5,59E-04	-4,01E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	2,35E-02	2,32E-04	9,08E-05	-1,45E-02
ADP - MM	kg Sb eq	2,15E-04	4,25E-06	2,68E-06	-5,00E-05
ADP - F	MJ	6,58E+02	2,15E+01	7,63E+00	-3,24E+02
PERE	MJ	5,11E+01	2,31E-01	1,04E-01	-1,42E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	5,11E+01	2,31E-01	1,04E-01	-1,42E+01
PENRE	MJ	7,24E+02	2,32E+01	8,26E+00	-3,57E+02
PENRM	MJ	6,80E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,31E+02	2,32E+01	8,26E+00	-3,57E+02
SM	kg	1,19E+01	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	4,46E+00	3,55E-03	1,74E-03	-2,95E-02
HW	kg	3,68E-04	1,38E-05	6,58E-06	-3,04E-04
NHW	kg	3,57E+00	1,03E+00	3,42E+00	-1,35E+00
RW	kg	8,81E-04	1,48E-04	5,07E-05	-4,24E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	8,65E+00	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	3,48E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	1,04E+00	0,00E+00

**TABLE 7.6** Environmental performance indicators for 1 m<sup>2</sup>

Roof panels – Formulas for the calculation according to the insulation thickness (i) and total thickness of metal supports (m)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	$1,41E-1 \cdot i + 2,57E+1 \cdot m + 3,10E+0$	$4,85E-3 \cdot i + 3,99E-1 \cdot m + 3,92E-2$	$2,01E-3 \cdot i + 1,44E-1 \cdot m + 5,91E-2$	$-1,16E-1 \cdot i - 9,32E+0 \cdot m - 4,13E-1$
ODP	kg CFC-11 eq	$1,09E-8 \cdot i + 4,97E-8 \cdot m + 5,49E-8$	$9,02E-10 \cdot i + 7,41E-8 \cdot m + 7,28E-9$	$3,15E-10 \cdot i + 2,59E-8 \cdot m + 1,31E-9$	$-7,02E-9 \cdot i - 4,33E-9$
AP	kg SO <sub>2</sub> eq	$1,12E-3 \cdot i + 7,92E-2 \cdot m + 1,04E-2$	$1,89E-5 \cdot i + 1,56E-3 \cdot m + 1,53E-4$	$5,81E-6 \cdot i + 4,75E-4 \cdot m + 2,81E-5$	$-8,72E-4 \cdot i - 1,84E-2 \cdot m - 1,23E-3$
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	$2,46E-4 \cdot i + 6,92E-3 \cdot m + 2,20E-3$	$4,47E-6 \cdot i + 3,67E-4 \cdot m + 3,61E-5$	$1,82E-6 \cdot i + 1,19E-4 \cdot m + 8,19E-5$	$-1,93E-4 \cdot i - 1,33E-3 \cdot m - 1,57E-4$
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	$6,48E-5 \cdot i + 7,90E-3 \cdot m + 2,69E-3$	$7,98E-7 \cdot i + 6,56E-5 \cdot m + 6,44E-6$	$3,17E-7 \cdot i + 2,59E-5 \cdot m + 1,61E-6$	$-5,10E-5 \cdot i - 4,08E-3 \cdot m - 1,81E-4$
ADP - MM	kg Sb eq	$3,25E-7 \cdot i + 1,44E-4 \cdot m + 6,78E-6$	$1,47E-8 \cdot i + 1,20E-6 \cdot m + 1,18E-7$	$9,36E-9 \cdot i + 7,68E-7 \cdot m + 3,77E-8$	$-2,34E-7 \cdot i - 2,97E-6 \cdot m - 1,63E-7$
ADP - F	MJ	$1,65E+0 \cdot i + 2,77E+2 \cdot m + 5,19E+1$	$7,40E-2 \cdot i + 6,08E+0 \cdot m + 5,97E-1$	$2,67E-2 \cdot i + 2,19E+0 \cdot m + 1,12E-1$	$-1,31E+0 \cdot i - 5,81E+1 \cdot m - 4,86E+0$
PERE	MJ	$1,59E-1 \cdot i + 1,36E+1 \cdot m + 5,61E+0$	$7,94E-4 \cdot i + 6,53E-2 \cdot m + 6,41E-3$	$3,63E-4 \cdot i + 2,98E-2 \cdot m + 1,57E-3$	$-7,02E-2 \cdot i - 2,05E-1$
PERM	MJ	0	0	0	0
PERT	MJ	$1,59E-1 \cdot i + 1,36E+1 \cdot m + 5,61E+0$	$7,94E-4 \cdot i + 6,53E-2 \cdot m + 6,41E-3$	$3,63E-4 \cdot i + 2,98E-2 \cdot m + 1,57E-3$	$-7,02E-2 \cdot i - 2,05E-1$
PENRE	MJ	$1,90E+0 \cdot i + 2,84E+2 \cdot m + 6,06E+1$	$7,98E-2 \cdot i + 6,56E+0 \cdot m + 6,45E-1$	$2,89E-2 \cdot i + 2,37E+0 \cdot m + 1,22E-1$	$-1,48E+0 \cdot i - 5,72E+1 \cdot m - 5,44E+0$
PENRM	MJ	$1,70E-2 \cdot i + 3,71E+0$	0	0	0
PENRT	MJ	$1,91E+0 \cdot i + 2,84E+2 \cdot m + 6,43E+1$	$7,98E-2 \cdot i + 6,56E+0 \cdot m + 6,45E-1$	$2,89E-2 \cdot i + 2,37E+0 \cdot m + 1,22E-1$	$-1,48E+0 \cdot i - 5,72E+1 \cdot m - 5,44E+0$
SM	kg	$3,34E-2 \cdot i + 5,02E+0 \cdot m + 1,77E-1$	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m <sup>3</sup>	$7,14E-4 \cdot i + 4,09E+0 \cdot m + 2,27E-1$	$1,22E-5 \cdot i + 1,00E-3 \cdot m + 9,87E-5$	$6,08E-6 \cdot i + 4,97E-4 \cdot m + 3,05E-5$	$-2,34E-4 \cdot i + 1,81E-2 \cdot m - 8,40E-4$
HW	kg	$1,73E-6 \cdot i + 6,64E-6 \cdot m + 1,62E-5$	$4,75E-8 \cdot i + 3,90E-6 \cdot m + 3,83E-7$	$2,29E-8 \cdot i + 1,87E-6 \cdot m + 1,37E-7$	$-1,51E-6 \cdot i - 1,24E-6$
NHW	kg	$1,55E-2 \cdot i + 3,35E-1 \cdot m + 1,47E-1$	$3,54E-3 \cdot i + 2,91E-1 \cdot m + 2,86E-2$	$1,20E-2 \cdot i + 9,80E-1 \cdot m + 5,30E-2$	$-6,73E-3 \cdot i - 4,70E-3$
RW	kg	$3,94E-6 \cdot i + 6,96E-5 \cdot m + 2,32E-5$	$5,09E-7 \cdot i + 4,18E-5 \cdot m + 4,11E-6$	$1,77E-7 \cdot i + 1,46E-5 \cdot m + 7,24E-7$	$-2,11E-6 \cdot i - 3,01E-6$
REUSE	kg	0	0	0	0
RECYCLE	kg	4,80E-1	0	$1,69E-4 \cdot i + 8,26E+0 \cdot m + 3,59E-1$	0
EN-REC	kg	0	0	0	0
EE-E	MJ	0	0	$8,88E-4 \cdot i + 1,86E-1$	0
EE-T	MJ	0	0	$2,66E-3 \cdot i + 5,59E-1$	0

## ISODECK PVSTEEL MW - TPO

**TABLE 7.7** Environmental performance indicators for 1 m<sup>2</sup>  
 Isodeck PVSteel MW TPO – Thickness 80 mm – Steel thickness 0,8/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	4,90E+01	9,64E-01	4,63E-01	-2,26E+01
ODP	kg CFC-11 eq	1,07E-06	1,79E-07	6,26E-08	-5,66E-07
AP	kg SO <sub>2</sub> eq	2,06E-01	3,76E-03	1,16E-03	-9,75E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	3,16E-02	8,88E-04	2,52E-03	-1,76E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	1,83E-02	1,59E-04	7,10E-05	-9,69E-03
ADP - MM	kg Sb eq	2,17E-04	2,91E-06	1,82E-06	-2,27E-05
ADP - F	MJ	5,84E+02	1,47E+01	5,30E+00	-2,15E+02
PERE	MJ	3,64E+01	1,58E-01	7,27E-02	-6,04E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,64E+01	1,58E-01	7,27E-02	-6,04E+00
PENRE	MJ	6,29E+02	1,59E+01	5,74E+00	-2,32E+02
PENRM	MJ	4,85E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	6,34E+02	1,59E+01	5,74E+00	-2,32E+02
SM	kg	9,33E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	5,53E+00	2,43E-03	1,31E-03	-3,90E-03
HW	kg	1,82E-04	9,43E-06	4,57E-06	-1,22E-04
NHW	kg	1,96E+00	7,03E-01	2,75E+00	-5,53E-01
RW	kg	4,45E-04	1,01E-04	3,52E-05	-1,72E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	1,15E+01	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	2,46E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	7,37E-01	0,00E+00



**TABLE 7.8** Environmental performance indicators for 1 m<sup>2</sup>  
Isodeck PVSteel MW TPO – Thickness 150 mm – Steel thickness 0,8/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	5,89E+01	1,30E+00	6,15E-01	-3,07E+01
ODP	kg CFC-11 eq	1,84E-06	2,42E-07	8,47E-08	-1,06E-06
AP	kg SO <sub>2</sub> eq	2,84E-01	5,09E-03	1,57E-03	-1,59E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	4,88E-02	1,20E-03	2,67E-03	-3,12E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	2,28E-02	2,15E-04	9,33E-05	-1,33E-02
ADP - MM	kg Sb eq	2,40E-04	3,94E-06	2,48E-06	-3,91E-05
ADP - F	MJ	7,01E+02	1,99E+01	7,18E+00	-3,07E+02
PERE	MJ	4,76E+01	2,14E-01	9,83E-02	-1,10E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,76E+01	2,14E-01	9,83E-02	-1,10E+01
PENRE	MJ	7,64E+02	2,15E+01	7,77E+00	-3,36E+02
PENRM	MJ	6,80E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,70E+02	2,15E+01	7,77E+00	-3,36E+02
SM	kg	1,17E+01	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	5,58E+00	3,29E-03	1,73E-03	-2,06E-02
HW	kg	3,03E-04	1,28E-05	6,19E-06	-2,28E-04
NHW	kg	3,04E+00	9,51E-01	3,59E+00	-1,03E+00
RW	kg	7,22E-04	1,37E-04	4,76E-05	-3,20E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	1,15E+01	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	3,48E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	1,04E+00	0,00E+00

**TABLE 7.9** Environmental performance indicators for 1 m<sup>2</sup>

Isodeck PVSteel MW TPO - Formulas for the calculation according to the insulation thickness (i) and total thickness of metal supports (m)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	1,41E-1* i + 2,75E+1* m + 2,00E+0	4,85E-3* i + 4,27E-1* m + 2,11E-2	2,01E-3* i + 1,54E-1* m + 1,04E-1	-1,16E-1* i - 9,97E+0* m - 3,34E-1
ODP	kg CFC-11 eq	1,09E-8* i + 5,29E-8* m + 1,25E-7	9,02E-10* i + 7,93E-8* m + 3,92E-9	3,15E-10* i + 2,77E-8* m + 1,33E-9	-7,02E-9* i - 4,74E-9
AP	kg SO <sub>2</sub> eq	1,12E-3* i + 8,35E-2* m + 7,29E-3	1,89E-5* i + 1,67E-3* m + 8,23E-5	5,81E-6* i + 5,09E-4* m + 3,80E-5	-8,72E-4* i - 1,97E-2* m - 2,12E-3
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	2,46E-4* i + 7,29E-3* m + 2,45E-3	4,47E-6* i + 3,93E-4* m + 1,94E-5	1,82E-6* i + 1,27E-4* m + 2,22E-3	-1,93E-4* i - 1,42E-3* m - 3,33E-4
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	6,48E-5* i + 8,42E-3* m + 2,17E-3	7,98E-7* i + 7,02E-5* m + 3,47E-6	3,17E-7* i + 2,77E-5* m + 9,64E-6	-5,10E-5* i - 4,37E-3* m + 7,66E-5
ADP - MM	kg Sb eq	3,25E-7* i + 1,54E-4* m + -8,58E-6	1,47E-8* i + 1,29E-6* m + 6,37E-8	9,36E-9* i + 8,23E-7* m + 6,70E-9	-2,34E-7* i - 3,18E-6* m + 1,45E-7
ADP - F	MJ	1,65E+0* i + 2,96E+2* m + 6,79E+1	7,40E-2* i + 6,51E+0* m + 3,22E-1	2,67E-2* i + 2,34E+0* m + 1,24E-1	-1,31E+0* i - 6,22E+1* m - 2,97E+1
PERE	MJ	1,59E-1* i + 1,45E+1* m + 4,79E+0	7,94E-4* i + 6,99E-2* m + 3,45E-3	3,63E-4* i + 3,19E-2* m + 2,20E-3	-7,02E-2* i - 4,36E-1
PERM	MJ	0	0	0	0
PERT	MJ	1,59E-1* i + 1,45E+1* m + 4,79E+0	7,94E-4* i + 6,99E-2* m + 3,45E-3	3,63E-4* i + 3,19E-2* m + 2,20E-3	-7,02E-2* i - 4,36E-1
PENRE	MJ	1,90E+0* i + 3,04E+2* m + 8,23E+1	7,98E-2* i + 7,02E+0* m + 3,47E-1	2,89E-2* i + 2,54E+0* m + 1,36E-1	-1,48E+0* i - 6,13E+1* m - 3,48E+1
PENRM	MJ	1,70E-2* i + 3,71E+0	0	0	0
PENRT	MJ	1,91E+0* i + 3,04E+2* m + 8,60E+1	7,98E-2* i + 7,02E+0* m + 3,47E-1	2,89E-2* i + 2,54E+0* m + 1,36E-1	-1,48E+0* i - 6,13E+1* m - 3,48E+1
SM	kg	3,34E-2* i + 5,15E+0* m - 3,82E-2	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m <sup>3</sup>	7,14E-4* i + 4,38E+0* m - 2,24E-1	1,22E-5* i + 1,08E-3* m + 5,31E-5	6,08E-6* i + 5,32E-4* m + 1,28E-4	-2,34E-4* i + 1,93E-2* m - 1,05E-2
HW	kg	1,73E-6* i + 7,02E-6* m + 3,50E-5	4,75E-8* i + 4,18E-6* m + 2,06E-7	2,29E-8* i + 2,00E-6* m + 1,42E-7	-1,51E-6* i - 1,29E-6
NHW	kg	1,55E-2* i + 4,01E-1* m + 1,98E-1	3,54E-3* i + 3,11E-1* m + 1,54E-2	1,20E-2* i + 1,05E+0* m + 4,31E-1	-6,73E-3* i - 1,42E-2
RW	kg	3,94E-6* i + 7,40E-5* m + 3,40E-5	5,09E-7* i + 4,47E-5* m + 2,21E-6	1,77E-7* i + 1,56E-5* m + 7,46E-7	-2,11E-6* i - 3,11E-6
REUSE	kg	0	0	0	0
RECYCLE	kg	4,80E-1	0	1,69E-4* i + 8,84E+0* m - 4,33E-2	0
EN-REC	kg	0	0	0	0
EE-E	MJ	0	0	8,88E-4* i + 1,86E-1	0
EE-T	MJ	0	0	2,66E-3* i + 5,59E-1	0

## ISODECK PVSTEEL MW - PVC

**TABLE 7.10** Environmental performance indicators for 1 m<sup>2</sup>  
Isodeck PVSteel MW PVC – Thickness 80 mm – Steel thickness 0,8/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	5,45E+01	9,90E-01	4,77E-01	-2,40E+01
ODP	kg CFC-11 eq	2,31E-06	1,84E-07	6,50E-08	-5,67E-07
AP	kg SO <sub>2</sub> eq	2,22E-01	3,86E-03	1,22E-03	-1,01E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	3,57E-02	9,12E-04	2,67E-03	-1,85E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	2,01E-02	1,63E-04	7,40E-05	-9,80E-03
ADP - MM	kg Sb eq	2,53E-04	2,99E-06	1,88E-06	-2,28E-05
ADP - F	MJ	6,74E+02	1,51E+01	5,52E+00	-2,32E+02
PERE	MJ	4,06E+01	1,62E-01	7,59E-02	-6,81E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,06E+01	1,62E-01	7,59E-02	-6,81E+00
PENRE	MJ	7,29E+02	1,63E+01	5,97E+00	-2,61E+02
PENRM	MJ	3,42E+01	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,64E+02	1,63E+01	5,97E+00	-2,61E+02
SM	kg	9,33E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	5,54E+00	2,49E-03	1,41E-03	-2,17E-01
HW	kg	3,76E-04	9,68E-06	4,75E-06	-1,22E-04
NHW	kg	2,03E+00	7,21E-01	3,07E+00	-6,30E-01
RW	kg	6,21E-04	1,04E-04	3,66E-05	-1,72E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	1,20E+01	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	2,46E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	7,37E-01	0,00E+00

**TABLE 7.11** Environmental performance indicators for 1 m<sup>2</sup>  
 Isodeck PVSteel MW PVC - Thickness 150 mm – Steel thickness 0,8/0,5 mm (external/internal)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	6,44E+01	1,33E+00	6,30E-01	-3,21E+01
ODP	kg CFC-11 eq	3,08E-06	2,47E-07	8,72E-08	-1,06E-06
AP	kg SO <sub>2</sub> eq	3,01E-01	5,19E-03	1,62E-03	-1,62E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	5,30E-02	1,23E-03	2,81E-03	-3,20E-02
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	2,47E-02	2,19E-04	9,63E-05	-1,34E-02
ADP - MM	kg Sb eq	2,75E-04	4,02E-06	2,53E-06	-3,92E-05
ADP - F	MJ	7,91E+02	2,03E+01	7,39E+00	-3,24E+02
PERE	MJ	5,18E+01	2,18E-01	1,01E-01	-1,18E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	5,18E+01	2,18E-01	1,01E-01	-1,18E+01
PENRE	MJ	8,64E+02	2,19E+01	8,00E+00	-3,64E+02
PENRM	MJ	3,62E+01	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	9,00E+02	2,19E+01	8,00E+00	-3,64E+02
SM	kg	1,17E+01	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	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
FW	m <sup>3</sup>	5,59E+00	3,35E-03	1,84E-03	-2,33E-01
HW	kg	4,97E-04	1,30E-05	6,36E-06	-2,28E-04
NHW	kg	3,11E+00	9,69E-01	3,91E+00	-1,10E+00
RW	kg	8,98E-04	1,39E-04	4,90E-05	-3,20E-04
REUSE	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	4,80E-01	0,00E+00	1,20E+01	0,00E+00
EN-REC	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE-E	MJ	0,00E+00	0,00E+00	3,48E-01	0,00E+00
EE-T	MJ	0,00E+00	0,00E+00	1,04E+00	0,00E+00



**TABLE 7.12** Environmental performance indicators for 1 m<sup>2</sup>

Isodeck PVSteel MW PVC – Formulas for the calculation according to the insulation thickness (i) and total thickness of metal supports (m)

IMPACT CATEGORY	UNIT	A1-A3	A4	C2-C3-C4	D
GWP	kg CO <sub>2</sub> eq	$1,41E-1^* i + 2,75E+1^* m + 7,49E+0$	$4,85E-3^* i + 4,27E-1^* m + 4,65E-2$	$2,01E-3^* i + 1,54E-1^* m + 1,19E-1$	$-1,16E-1^* i - 9,97E+0^* m - 1,77E+0$
ODP	kg CFC-11 eq	$1,09E-8^* i + 5,29E-8^* m + 1,37E-6$	$9,02E-10^* i + 7,93E-8^* m + 8,65E-9$	$3,15E-10^* i + 2,77E-8^* m + 3,76E-9$	$-7,02E-9^* i - 5,98E-9$
AP	kg SO <sub>2</sub> eq	$1,12E-3^* i + 8,35E-2^* m + 2,39E-2$	$1,89E-5^* i + 1,67E-3^* m + 1,82E-4$	$5,81E-6^* i + 5,09E-4^* m + 8,95E-5$	$-8,72E-4^* i - 1,97E-2^* m - 5,49E-3$
EP	kg PO <sub>4</sub> <sup>3-</sup> eq	$2,46E-4^* i + 7,29E-3^* m + 6,59E-3$	$4,47E-6^* i + 3,93E-4^* m + 4,29E-5$	$1,82E-6^* i + 1,27E-4^* m + 2,36E-3$	$-1,93E-4^* i - 1,42E-3^* m - 1,19E-3$
POCP	kg C <sub>2</sub> H <sub>4</sub> eq	$6,48E-5^* i + 8,42E-3^* m + 3,99E-3$	$7,98E-7^* i + 7,02E-5^* m + 7,65E-6$	$3,17E-7^* i + 2,77E-5^* m + 1,26E-5$	$-5,10E-5^* i - 4,37E-3^* m - 3,61E-5$
ADP - MM	kg Sb eq	$3,25E-7^* i + 1,54E-4^* m + 2,66E-5$	$1,47E-8^* i + 1,29E-6^* m + 1,41E-7$	$9,36E-9^* i + 8,23E-7^* m + 5,95E-8$	$-2,34E-7^* i - 3,18E-6^* m + 1,05E-7$
ADP - F	MJ	$1,65E+0^* i + 2,96E+2^* m + 1,58E+2$	$7,40E-2^* i + 6,51E+0^* m + 7,10E-1$	$2,67E-2^* i + 2,34E+0^* m + 3,37E-1$	$-1,31E+0^* i - 6,22E+1^* m - 4,64E+1$
PERE	MJ	$1,59E-1^* i + 1,45E+1^* m + 8,96E+0$	$7,94E-4^* i + 6,99E-2^* m + 7,62E-3$	$3,63E-4^* i + 3,19E-2^* m + 5,36E-3$	$-7,02E-2^* i - 1,21E+0$
PERM	MJ	0	0	0	0
PERT	MJ	$1,59E-1^* i + 1,45E+1^* m + 8,96E+0$	$7,94E-4^* i + 6,99E-2^* m + 7,62E-3$	$3,63E-4^* i + 3,19E-2^* m + 5,36E-3$	$-7,02E-2^* i - 1,21E+0$
PENRE	MJ	$1,90E+0^* i + 3,04E+2^* m + 1,82E+2$	$7,98E-2^* i + 7,02E+0^* m + 7,65E-1$	$2,89E-2^* i + 2,54E+0^* m + 3,67E-1$	$-1,48E+0^* i - 6,13E+1^* m - 6,31E+1$
PENRM	MJ	$1,70E-2^* i + 3,31E+1$	0	0	0
PENRT	MJ	$1,91E+0^* i + 3,04E+2^* m + 2,15E+2$	$7,98E-2^* i + 7,02E+0^* m + 7,65E-1$	$2,89E-2^* i + 2,54E+0^* m + 3,67E-1$	$-1,48E+0^* i - 6,13E+1^* m - 6,31E+1$
SM	kg	$3,34E-2^* i + 5,15E+0^* m - 3,82E-2$	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m <sup>3</sup>	$7,14E-4^* i + 4,38E+0^* m - 2,11E-1$	$1,22E-5^* i + 1,08E-3^* m + 1,17E-4$	$6,08E-6^* i + 5,32E-4^* m + 2,35E-4$	$-2,34E-4^* i + 1,93E-2^* m - 2,23E-1$
HW	kg	$1,73E-6^* i + 7,02E-6^* m + 2,29E-4$	$4,75E-8^* i + 4,18E-6^* m + 4,55E-7$	$2,29E-8^* i + 2,00E-6^* m + 3,20E-7$	$-1,51E-6^* i - 1,43E-6$
NHW	kg	$1,55E-2^* i + 4,01E-1^* m + 2,69E-1$	$3,54E-3^* i + 3,11E-1^* m + 3,39E-2$	$1,20E-2^* i + 1,05E+0^* m + 7,50E-1$	$-6,73E-3^* i - 9,20E-2$
RW	kg	$3,94E-6^* i + 7,40E-5^* m + 2,10E-4$	$5,09E-7^* i + 4,47E-5^* m + 4,88E-6$	$1,77E-7^* i + 1,56E-5^* m + 2,12E-6$	$-2,11E-6^* i - 3,60E-6$
REUSE	kg	0	0	0	0
RECYCLE	kg	4,80E-1	0	$1,69E-4^* i + 8,84E+0^* m + 4,81E-1$	0
EN-REC	kg	0	0	0	0
EE-E	MJ	0	0	$8,88E-4^* i + 1,86E-1$	0
EE-T	MJ	0	0	$2,66E-3^* i + 5,59E-1$	0

## 08. ADDITIONAL INFORMATION

### DIFFERENCES VERSUS PREVIOUS VERSION

With this version of the EPD, the environmental performance results of all the products declared in the previous version (Isofire Wall, Isofire Plissè, Isofire Roof) have been updated through the acquisition of new primary data for LCA inventory updated to 2019 and using the most up-to-date versions of environmental databases as regards secondary data.

The environmental performances obtained in this version show impact values related to Climate Change without substantial differences compared to those of the previous version, while improvements in performance related to the Resource Depletion (both fossil and mineral resources) are recorded. In addition to the product families indicated above, this version includes the environmental performance of the Isopan PVSteel product family.

The calculation specifications (equations) are also provided to obtain the environmental performance values of all the above products, with respect to any thickness combination of insulation / steel facings, in order to provide a complete overview of the environmental impacts of the Isopan product range.

### SUSTAINABILITY POLICY

Manni Group has a document that addresses the sustainability strategies of the Group companies, including Isopan. This document, updated in 2020, identifies the priorities on which to base the development, namely:

- Governance
- Internationalization
- Supply chain responsibility
- Innovation
- Responsible production
- Sustainable construction
- Health and safety
- Training
- Renewable sources
- Fight against climate change
- Energy efficiency

### INNOVATION

Isopan has a Research and Development division dedicated to product and process innovation, which has allowed the introduction of new more sustainable technologies, more performing products and new international certificates.

### CERTIFICATIONS

Isopan has a UNI EN ISO 9001: 2015 certified global management system for all group companies.



## SUPPLY CHAIN RESPONSABILITY

Manni Group and Isopan suppliers are evaluated and selected considering product quality, ethical, environmental, social parameters, reduction of the impacts generated, company strategies. The procurement policies are contained in the Manni Group Sourcing Policy, published in 2018. Isopan thus intends to consolidate its market leadership by contributing, through products with high socio-environmental performance, to an evolution in the demand for more sustainable products and services.

## PRODUCT END OF LIFE

Different types of Isopan panels are designed and built to be disassembled and reused. The individual parts can be separated and destined for recycling, recovery or disposal depending on the type of material.

## INFORMATION ON CORRECT INSTALLATION AND USE OF THE PANEL

Isopan provides customers and users of the products with extensive documentation on storage, handling and use of the sandwich panels. Furthermore, the Product Technical Manuals contain technical information useful in the design and installation phases. Tutorial installation videos are also available for most of the Isopan product range. Each content can be consulted and downloaded from Isopan website: [www.isopan.com](http://www.isopan.com)

## MAINTENANCE

I pannelli sandwich Isopan presentano una vita utile stimata di 40 - 45 anni a seconda delle condizioni d'uso, secondo la tabella BBSR. Il prodotto non richiede particolari attività di manutenzione. I prodotti sono facilmente lavabili e la pulizia non richiede l'utilizzo di prodotti chimici dannosi per l'ambiente.

## BUILDING SUSTAINABILITY RATING AND GREEN PUBLIC PROCUREMENT

The use of Isopan insulating panels contributes to the prerequisites and credits for the most important building sustainability assessment systems, including LEED, BREEAM and Living Building Challenge.

Isopan was also the first Italian company to endow some products with the Declare environmental label.

The technical characteristics and the certificates obtained provide credits for these certifications and make them meet the environmental criteria required by many states in the world on construction products used in their territory.

Specifically, it is specified that:

- During the production process no flame retardants are used which are subject to restrictions or prohibitions provided for by applicable national or community regulations;
- During the production process, no blowing agents are used with an ozone reduction potential greater than zero;
- No lead catalysts are used during the production process;
- The mineral wools used comply with the note Q referred to in Regulation (EC) no. 1272/2008 (CLP) and subsequent amendments (29), as they meet the established biosolubility criteria; therefore the classification "suspected of causing cancer" does not apply.

The 2019 production also recorded the following average circularity characteristics:

- recycled content > 37% for MW mineral wool sandwich panels.

These percentage values vary depending on the type of panel, the thickness of the insulation and the sheets and finally the raw materials used. The mineral wool used has a recycled content higher than 30%.

## OTHER ENVIRONMENTAL INFORMATION

At the Isopan factories there are no water discharges deriving from the panel production process. Isopan has obtained certifications on VOC emissions in accordance with UNI EN ISO 16000-9.

[www.isopan.com](http://www.isopan.com)

## 09. CONTACTS

The following contacts are available for more information on ISOPAN Group activities or on this product declaration:

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Technical support for the preparation of the LCA study was provided by:  
Bureau Veritas Nexta Srl - [www.nexta.bureauveritas.it](http://www.nexta.bureauveritas.it).

## 10. VERIFICATION AND REGISTRATION

### CEN STANDARD EN 15804 SERVED AS THE CORE PCR

#### PCR:

PCR 2012:01 ver 2.3, 2018-11-15  
"Construction products and construction services"  
Sub-PCR-I Thermal insulation products (EN 16783)

#### PCR review was conducted by:

The Technical Committee of the International EPD® System.  
Chair: Filippo Sessa  
Contact via [info@environdec.com](mailto:info@environdec.com)

#### Independent verification of the declaration and data, according to ISO 14025:

EPD process certification (Internal)  
EPD verification (External)

#### Third party verifier:

Ugo Pretato - Recognized Individual Verifier

#### Accredited or approved by:

Technical Committee of "The International EPD® System"

### STATEMENTS

EPD for construction products may not be comparable if they do not comply with EN 15804.

EPD of the same product category but coming from different programs may not be comparable







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## 11. REFERENCES

GENERAL PROGRAMME INSTRUCTIONS FOR THE INTERNATIONAL EPD® SYSTEM, VER 3.0.

**PCR 2012:01 ver 2.3, 2018-11-15**

"Construction products and construction services"

**EN 15804:2012 + A1:2013**

Sustainability of construction works  
Environmental product declarations  
Core rules for the product category of construction products.

**UNI EN ISO 14025:2010**

Environmental labels and declarations  
Type III environmental declarations  
Principles and procedures

**UNI EN ISO 14040:2006**

Life cycle assessment - Principles and framework

**UNI EN ISO 14044:2006**

Life cycle assessment - Requirements and guidelines

**UNI EN 16783**

Thermal insulation  
Thermal insulation products  
Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations

**Sub-PCR-I Thermal insulation products (EN 16783)**

**Life Cycle Assessment Technical Report  
Rev2, March 2019**

Bureau Veritas Nexta Srl

**Life Cycle Assessment Technical Report  
Rev2, December 2020**

Bureau Veritas Nexta Srl

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