Environmental Product Declaration

In accordance with ISO 14025 and UNE-EN 15804:2012+A1:2014 for:

Metal Ceiling System: Turin Slat, Acoustic Baffle, Siena Panel and Multipanel Slat

from

THU Perfil S.L.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	SP-05670
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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

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General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): *PCR 2012:01 v2.3 Construction Products (EN 15804:A1)*
PCR review was conducted by: *El Comité Técnico del Sistema Internacional EPD®. Presidente: Claudia A. Peña. Contact via 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: Name of verifier: *Ruben Carnerero*
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.

Company information

Owner of the EPD: THU Perfil S.L.

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anunes@thu.es
https://www.thu.es/

Description of the organization: THU is a company based in Valencia with more than 25 years of experience within the national and international market dedicated to the manufacture of metallic ceilings and partition profile solutions. Our philosophy is always based on quality and customer service. At THU our Quality Management system is based on the ISO 9001 standard, which has been in place at our company since 2006, together with a number of other seals of quality (AENOR, NF, etc.). All our products hold certificates issued by accredited laboratories and comply with the strictest UNE standards to obtain CE markings. All this, combined with excellent service and highly competitive prices enable us to guarantee maximum satisfaction for our customers.

At THU we continually work towards reducing our ecological footprint to the maximum. Our products are designed with 100% recyclable materials such as steel and aluminum. In addition, our manufacturing processes employ up to 25% recyclable material, and we recover the waste products generated to reincorporate them into the production cycle. We use 100% renewable energy sources in our manufacturing processes.

We also utilise 100% recycled and recyclable products for packaging, and use the minimum quantity possible to ensure compliance with the three r's: Reduce, Reuse & Recycle. Finally, we would highlight production in Spain, which considerably reduces the transport of the product and fossil fuel requirements.

All our products have been classified under UNE-EN 13501-1 regulations. Our pre- lacquered and lacquered products have a Euroclass A2-s1,d0 fire rating: noncombustible product (without contribution to fire), with a low smoke emission and zero production of inflammable droplets or particles. The nonlacquered products belong to EuroclassA1: no contribution to fire.

Product-related or management system-related certifications: THU performs exhaustive quality control testing on our products in accordance with ISO 9001 standards. Service quality is monitored from the moment we receive an order through to delivery, in order to ensure constantly improved customer service. Our guarantee is endorsed by the following certifications:

- ISO 9001 certification (Quality Management System) administered by Bureau Veritas.
- AENOR Spanish Quality standard certification
- CSTB (the Scientific and Technical Centre for Building) official French certification.
- CE marking in accordance with European Construction Products Standard No. 305/2011 administered by Bureau Veritas.
- Products and systems conform to C.T.E Spanish Construction Code standards.

Thanks to the acoustic insulation of our products, with high acoustic absorption coefficients. As a result, we successfully achieve reverberation times suited to rooms for a wide range of uses.

All THU ceiling systems are governed and manufactured according to the UNE-EN 13964 regulation.

Name and location of production site: C/ Masía de Monte Alcedo, PARC. 4.3. Pol. Ind. Masía Baló, 46394 Ribarroja Del Turia, Valencia, Spain.

Product information

Product name: This EPD® represents the following models of steel and aluminum metal ceiling systems, smooth and perforated:

- Turin Slat.
- Acoustic baffle.
- Sienna Panel.
- Multipanel Slat.

Product identification: The EPD presented covers all the products of the mentioned models, including their references of different dimensions. They are the following, grouped into groups with a total environmental impact variation of less than 10%[1]:

- Group 1 (associated with Environmental Information): Multipanel 80, Multipanel 130 and Multipanel 180.
- Group 2 (associated with Annex 1): Multipanel 30.
- Group 3 (associated with Annex 2): Turin smooth aluminum slat, Turin perforated aluminum slat.
- Group 4 (associated with Annex 3): Siena smooth steel panel, Siena perforated steel panel, Turin smooth steel slat, Turin perforated steel slat, Smooth aluminum acoustic baffle (30x100), Perforated aluminum acoustic baffle (30x100), Smooth aluminum acoustic baffle (40x100), Perforated aluminum acoustic baffle (40x100), Smooth aluminum acoustic baffle (30x150) and Perforated aluminum acoustic baffle (30x150), Smooth aluminum acoustic baffle (40x150) and Perforated aluminum acoustic baffle aluminum (40x150), smooth aluminum acoustic baffle (50x150) and perforated aluminum acoustic baffle (50x150)
- Group 5 (associated with Annex 4): Smooth steel acoustic baffle (30x100), Perforated steel acoustic baffle (30x100), Smooth steel acoustic baffle (40x100), Perforated steel acoustic baffle (40x100), Smooth steel acoustic baffle (50x100), Perforated steel acoustic baffle (50x100), Smooth steel acoustic baffle (30x150), Perforated steel acoustic baffle (30x150), Smooth steel acoustic baffle (40x150), Perforated steel acoustic baffle (40x150); Smooth steel acoustic baffle (50x150), Perforated steel acoustic baffle (50x150), Smooth aluminum acoustic baffle (30x65), Perforated aluminum acoustic baffle (30x65), Smooth aluminum acoustic baffle (40x65), Perforated aluminum acoustic baffle (40x65), Smooth aluminum acoustic baffle (50x65), Perforated aluminum acoustic baffle (50x65)
- Group 6 (associated with Annex 5): Smooth steel acoustic baffle (30x65), Perforated steel acoustic baffle (30x65), Smooth steel acoustic baffle (40x65), Perforated steel acoustic baffle (40x65), Smooth steel acoustic baffle (50x65), Perforated steel acoustic baffle (50x65)

A summary of all the references included in this EPD can be found in the table below:

Model	Steel	Aluminum
Turin Slat **(4 references)**	Smooth and perforated	Smooth and perforated
Acoustic baffle **(36 references)**	Smooth and perforated of: • 30x65mm • 40x65mm • 50x65mm • 30x100mm • 40x100 mm	Smooth and perforated of: • 30x65 mm • 40x65 mm • 50x65 mm • 30x100 mm • 40x100 mm

[1] According to Chapter 2.5 of PCR 2012:01 v2.3, Similar products with differences between the mandatory impact indicators lower than ± 10% (concerning A1-A3) could be presented using the impacts of a representative product. A variation range description shall be presented in the declaration.

	• 50x100 mm • 30x150 mm • 40x150 mm • 50x150 mm	• 50x100 mm • 30x150 mm • 40x150 mm • 50x150 mm
***Siena Panel* (4 referencias)**	Smooth and perforated	Smooth and perforated
***Multipanel Slat* (4 referencias)**	Not applicable	Thickness: • 30 mm • 80 mm • 130 mm • 180 mm

Product description: Among the extensive range of products that THU manufactures, this EPD includes all the aforementioned ceilings, made up of the main panel/slat, a system of fixation profiles, accessories and acoustic veil in some cases.

The plates are made of highly resistant and durable pre-lacquered galvanized steel or pre-lacquered aluminum, high-quality and resistant materials that also allow easy cleaning. They are structures with easy registration and access to lighting, wiring or air conditioning systems, avoiding complex repairs and maintenance.

The specific description of each mentioned product model is detailed below:

1. **Turin Slat**

Figure 1. Lama Turin in operation

Turin is a metal ceiling system with 90º straight edges installed with a 100 mm visible U-shaped profile.

The plate supports and crimps on the profile, leaving the entire system flush at the same level. The perpendicular rails that form the profiles with respect to the slats give the ceiling an elegant and functional aesthetic.

Ideal for installation in work areas and transit areas due to its ease of installation and disassembly, allowing easy access for maintenance and repair operations of plenums.

With a width of 300 mm and variable length according to needs (maximum length of 2.5 meters) and registerable at any point. This ceiling is assembled with THU exposed profiles and finished off on the perimeter in multiple ways: by means of angles, perimeter strips and even with the same profile from the wall.

Figure 2. Turin slat

These are slats formed by cold profiling, manufactured with 0.50 mm thick pre-lacquered steel sheet. All slats are supplied with a protective adhesive film that guarantees their quality during the manufacturing process.

Finishing characteristics: Prelacquered slats in polyester with a layer thickness of 25 microns in White and Silver. This type of finish is characterized by resistance to corrosion and durability (gloss and color retention). There is the possibility of providing the slats in any other color under special supply conditions.

Accessories (options):

i. Thermo-adhesive acoustic veil (THU Profile):

The perforated slats have a 0.2 mm thick acoustic veil, fixed to the inside by means of a thermally activated adhesive. This system prevents the deposition of dust and dirt caused by air currents from the plenum as well as providing acoustic absorption and therefore increasing the acoustic comfort of the room.

ii. 10 mm thick textile fiber blanket (via supplier):

The perforated slats can have a textile fiber blanket depending on the acoustic absorption needs, which is placed on the inside face of the metal plates to achieve greater acoustic comfort.

iii. Stone wool plates (via supplier):

The perforated slats can have rock wool plates of various thicknesses and densities on their upper part, depending on the acoustic conditioning needs. The thicknesses are usually 40 mm, while the densities range between 30 and 50 kg/m3.

2. Acoustic Baffle

Figure 3. Acoustic baffle in operation

The Acoustic Baffle provides modern aesthetics and improves the acoustic comfort of the surfaces where it is installed. It is a metal false ceiling made up of baffles of variable widths and heights according to the project specifications.

THU baffles are a special solution with a simple, decorative and functional installation. These are suspended from a hidden support structure and with safety tabs, making each baffle individually removable.

THU baffles are manufactured smooth and perforated with different finishes with all the elements and accessories. They are suspended from a hidden support structure and with safety tabs, making each piece individually removable.

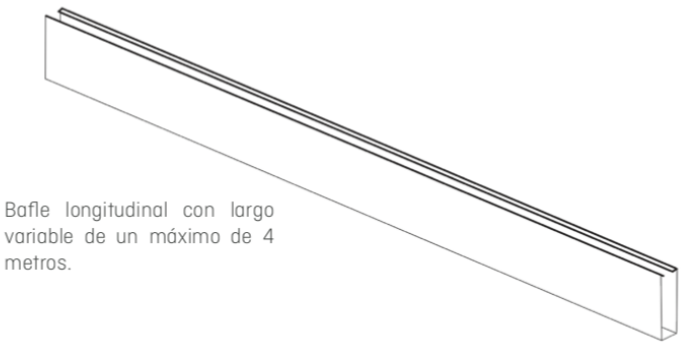


Figure 4. Unit format of Acoustic baffle

The baffles are manufactured in three heights 65 mm, 100 mm and 150 mm (Fig. 1) and three widths 30 mm, 40 mm and 50 mm. In its installation and use, for 1 m 2 of *acoustic baffle ceiling system*, regardless of height, for the width of 30 mm 10 baffles are used, for the width of 40 mm 9 baffles and for the width of 50 mm 8 pieces baffles are used. That is, the greater the width, the greater the spacing between baffle pieces. In the context of environmental impact power, both the production process and the material and energy consumption associated with 30x65mm, 40x65mm, 50x65mm baffles are the same; the same applies to the 30x100 mm, 40x100 mm, 50x100 mm and similarly, the 30x150 mm, 40x150 mm, 50x150 mm.

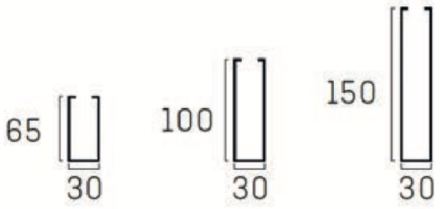


Figure 5. Cross section of Acoustic baffle unit

3. Sienna Panel

Figure 6. Siena panel in operation

THU panel with beveled edges prepared for installation on removable primary profiles, whether they are T24, T15, T35 or wide DP profiles in their various sizes. Manufactured in galvanized steel or aluminium, once installed, the plates are crowded against each other on their 1200 mm long longitudinal sides, and lean against the profile on their 8 mm short sides, which gives it a quick and easy registration at any point.

These are panels shaped by drawing, made of pre-lacquered galvanized steel sheet 0.50 mm thick. There is the option of manufacturing the panels in 0.60 mm thick aluminium. All panels are supplied with a protective adhesive film that guarantees quality during the manufacturing process.

Accessories (Options)

i. Thermo-adhesive acoustic veil (THU Profile)

The perforated panels have a 0.2 mm thick acoustic veil, fixed to the inside by thermally activated adhesive. This system prevents the deposition of dust and dirt caused by air currents in addition to providing certain acoustic comfort.

ii. Mineral fiber blanket (through Supplier)

Perforated panels can have a mineral wool blanket (includes acoustic veil) depending on the acoustic absorption needs, which is placed on the inside face of the metal plates to achieve greater acoustic comfort.

4. Multipanel Slat

It is a linear false ceiling made up of slats made of aluminum that can be randomly combined on the same fastening support with available widths of 30, 80, 130 and 180 mm.

The slats are inserted by pressure into a batten that remains semi-hidden and that allows the combination of the previous slat widths freely, being able to give the false ceiling an irregular appearance at all times, which results in the creation of unique and singular spaces. The range of finishes is expanded with the addition of various color finishes and even wood finishes.

Accessories (Options)

i. Step Track 50

Profile used for fixing the slats, 3 m long and made of 0.65 mm thick galvanized steel and pre-lacquered in Black. The support or hanging element consists of an M6 threaded rod that is inserted into the holes in the upper part of the battens. The separation between slats is 20 mm.

ii. Curved Flexible Profile

Flat profile made of galvanized steel pre-lacquered in black that allows the installation of ceilings making both concave and convex curved shapes. It is a flexible flat profile suitable for laying Italian slats (30x37 mm.) in their different slat spacing steps, and the different widths of our multipanel range (30/80/130 and 180 x 14 mm.) in its 50 mm pitch. (Fixed separation of 20 mm.).

iii. Batten splice

Piece used for joining the battens, with a length between 10 and 20 cm (Depending on the pitch of the installed batten) and made of 0.6 mm thick steel and pre-lacquered in Black. The union of the joint to

the battens is carried out by means of an M6 screw and a nut that is inserted into the upper holes that the piece has and that coincide with those of the batten.

TECHNICAL CHARACTERISTICS of THU metal ceiling systems:

i. Reaction to Fire Tests in AIDIMA (UNE-EN 13501-1:2007)

Pre-lacquered plate (Smooth or Perforated with veil, in steel or aluminium): Euroclass A2-s1,d0. Non-combustible product (no contribution to fire), with low quantity and speed of smoke emission and does not produce inflamed droplets or particles.

ii. Acoustic Absorption Tests in APPLUS LGAI (UNE-EN ISO 354:2003)

Absorption class: B and C (depending on the supplements used)

iii. Airborne Noise and Impact Acoustic Insulation Tests in APPLUS LGAI

A) Horizontal Transmission Test (UNE-EN ISO 10848-2:2006) replaces UNE-EN 20140-9:1995

Samples Tested: Various samples of 600x600 mm THU plate ceilings were made with different combinations of finishes (V6, V8 and flush) and perforated (Ø1.5, Ø2.5, Ø5x5 and Smooth option). All the samples were covered with Rock Wool 40 mm thick and with a density of 40 kg/m3. In addition, in two of the samples, a sound barrier made of Rock Wool 80 mm thick and with a density of 70 kg/m3 was added. The following table shows the isolation level values:

Tipos de Bandejas		Barrera Fónica	Diferencia de N.G.N.* Dn,f,w	Niveles por Bandas de Octava (dB)						Número Informe APPLUS LGAI
Acabado	Perforado (%)			125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	
Enrasada	Ø2.5 (12.5%)	No	30 dB	10.8	15.9	27.2	33.3	43.7	50.9	10/101565-1819
V8	□5x5 (23%)	No	31 dB	12.5	18.1	29.3	34.5	42.8	47.3	10/101565-1189
V6	Ø1.5 (10%)	No	31 dB	9.9	18.5	29.3	34.1	41.0	44.6	10/101565-1192
V8	Ø1.5 (10%)	No	32 dB	11.8	18.6	30.3	36.7	43.7	47.2	10/101565-1193
V8	Ø1.5 (10%)	Si	37 dB	13.8	25.0	37.6	43.4	51.9	52.2	10/101565-1818
Enrasada	Lisa (0%)	No	37 dB	12.5	25.4	38.8	42.3	40.8	45.0	10/101565-1190
Enrasada	Lisa (0%)	Si	42 dB	16.1	31.3	42.5	48.9	47.0	49.1	10/101565-1191

*N.G.N. : Niveles Global Normalizado

B) Vertical Noise Reduction (UNE-EN-ISO 140-3:1995)

Sample Tested: 30 cm concrete slab. False Smooth Ceiling formed by Smooth Flush Plates. Perforated False Ceiling formed by Flush Plates with Ø2.5 mm perforation. Both ceilings covered with Rock Wool 40 mm thick and density 40 kg/m3.

	Ra	Rw	Lnw	ΔRa	ΔLnw	N° de Informe APPLUS LGAI
Forjado 30 cm	56,5 dBA	57 dB	86 dB	-	-	-
Forjado + Falso Techo Liso	62,5 dBA	65 dB	57 dB	6,0 dBA	29 dB	07/32302207 07/32302208
Forjado + Falso Techo Perforado	61,9 dBA	64 dB	67 dB	5,4 dBA	19 dB	07/32302209 07/32302210

Ra = Índice de Aislamiento a Ruido Rosa
Rw (dB) = Índice de Aislamiento
Lnw (dB) = Nivel de Presión del Ruido de Impacto Normalizado y Ponderado
ΔRa = Mejora del Índice Global de Reducción Acústica, ponderado A
ΔLnw = Reducción del Nivel Global de Presión de Ruido de Impactos.

UN CPC Code: 4219 Other structures (except prefabricated buildings) and parts of structures of iron, steel or aluminum.

Description of the principal components and/or material of the product

THU metal ceilings have a variable composition depending on the model and the reference. For information regarding environmental performance, the exact composition of each reference has been analysed using primary data from the factory. It is not necessary to model an average product.

The following table shows the general composition range of the products under study:

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Panel or slat	70,41 - 95,82%	Steel: 18% Aluminum: 85%	0
Profiles	11,3 - 11,9%	Steel: 18% Aluminum: 85%	0
Accessories	4,2 - 30%	In case of application of Rastrel and Profile C: Steel: 18%	0
TOTAL	100%	0	0

During its life cycle, the product does not include any hazardous substance included in the "Very High Impact Candidate Substances for Authorization (SVHC) List" in a percentage greater than 0.1% of the weight of the product.

LCA information

DECLARED PRODUCT	The declared unit is that quantification of a function offered by the object of study according to which all the inputs (resources and necessary energy) and outputs (emissions and waste) of the studied system will be referred. In this case, the manufacturing of one square meter (1 m2) of THU metal ceiling system has been selected as the Declared Unit.
SYSTEM BOUNDARIES	The presented EPD® is structured by the life cycle stages established according to the PCR 2012:01 v2.3 reference standards for construction products, basing on UNE 15804 standard. This EPD® is from cradle to gate (A1-A3).
REFERENCE SERVICE LIFE (RSL)	Although according to UNE-EN 15804:A1, for a cradle-to-gate EPD, the RSL must be declared as "Not Specified", THU metal ceiling products comply with UNE-EN 13964: 2016 stantard - type B durability.
REGLAS DE CORTE	More than 95% of data regarding inputs and central system has been included
ALLOCATION	Data regaring energy and waste has been allocated basing on the unit of surface (m²). The consumptions of specific processes have been measured with specialized devices.
DATA QUALITY	Primary data on the amounts of materials and energy used during the life cycle of the product has been used. These data have been supplied by THU, referring to the year 2020, and come directly from the factory plant. The treatment and processing of the data has been carried out according to the international standards ISO 14025, ISOs 14040 and 14044 for the preparation of life cycle analysis and inventories, selecting the characterization factors established in the UNE-EN 15804:2012+A1:2014.
SUPPORTING DATA	Secondary data was obtained from the Ecoinvent 3.6 database of recognized international prestige and processed with software SimaPro 9.2.
GEOGRAPHICAL COVERAGE	Global.
PERIOD	2020.

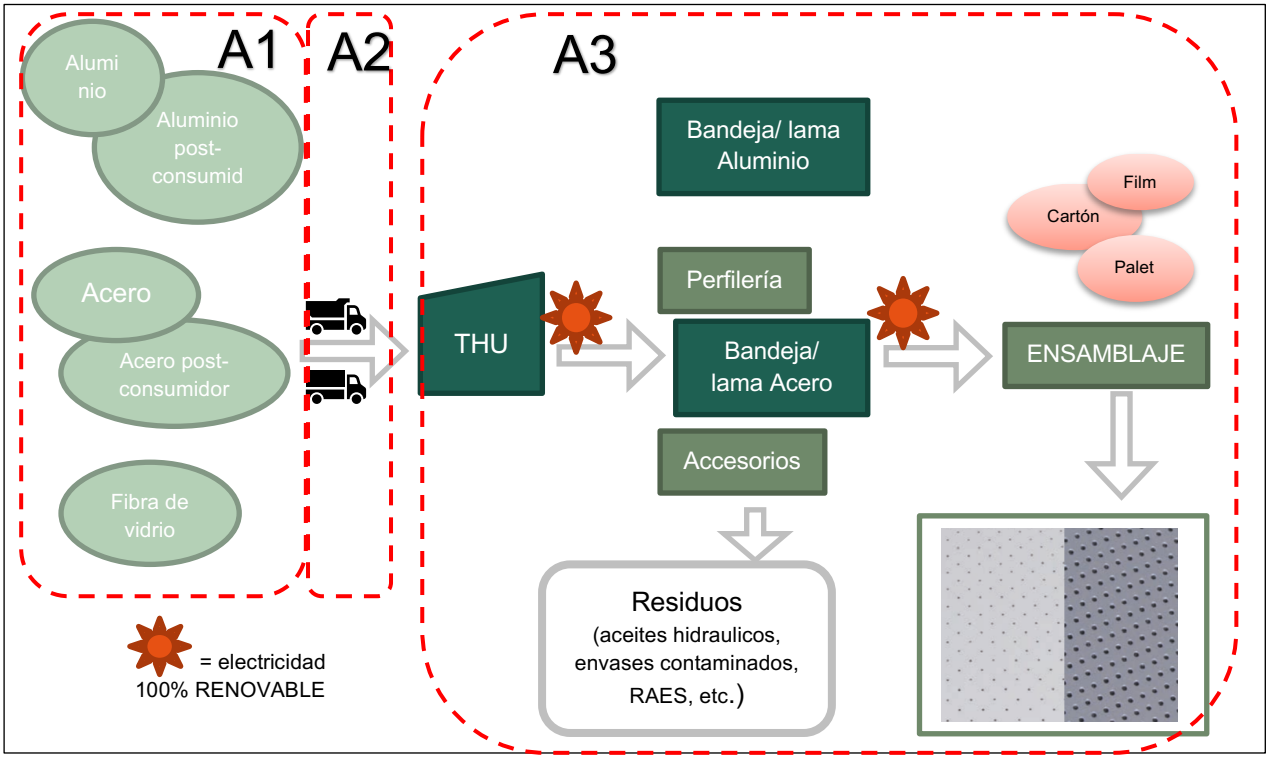
Life cycle stages

The life cycle stages analyzed are described below:

A1. Supply of raw materials
This module takes into account the extraction and processing of the raw materials that make up the product. The generation of the energy consumed in module A3 during the manufacture of the product is also assigned to this module. The electrical energy consumed in the production plant is of 100% renewable origin. THU metal ceiling system is made up of several components for its correct installation. For stage A1, the entry of all products necessary for the installation of the metal roof has been considered, regardless of whether or not they are manufactured by THU. The elements that have been contemplated are the panels or slats, fixation profiles and accessories. For steel roofs, it is considered that 18% of the raw material is recycled steel. For those made of aluminium, it is considered that 85% of the raw material is recycled aluminium.
A2. Transport of raw materials
This module includes the transport of the different raw materials and auxiliary materials from the supplier to the factory where the final product is made (Ribarroja Del Turia, Valencia). The distance and specific truck type have been taken into account for each raw material. Only the outward trip is considered, while the return trip is assigned to another system.
A3. Manufacturing
This module includes the consumption of electrical energy and both auxiliary and packaging materials used during the manufacturing process of THU metal ceiling products. At the same time, transport and management of waste originated from the plant (as well as production losses, managed externally to the production center) are analyzed. The manufacture of these products does not require any use of fuel. Primary data has been obtained from the production plant itself and is representative of the production of THU metal ceiling products for the year 2020. During the product stage A1-A3, a 0.3-3% loss is estimated. These only affect the consumption of raw materials and not the consumption of energy, since the latter is the factory's average, therefore, it already includes the reintroduction of energy losses to the production system.

System diagram:

This EPD is cradle to gate (A1-A3). The following figure shows the boundaries of the system under study, the inputs and outputs of matter and energy, as well as the processes that make up the system.



More information at: https://thu.es/

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

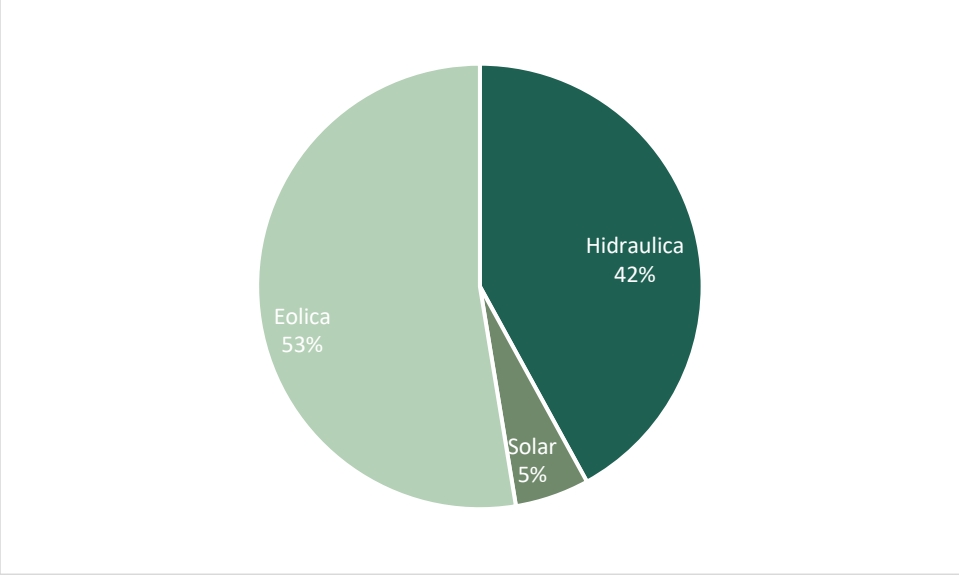
Description of the system boundaries (X=included in the LCA, NR= not relevant, MNE=module not evaluated).

	Product Stage			Construction stage		Use stage							End-of-life stage				Benefits
	Raw materials	Transport	Manufacturing	Transport	Installation/construction	Use	Maintenance	Reparation	Replacement	Rehabilitation	Energy use	Water use	Deconstruction-demolition	Transport	Waste treatment	Waste elimination	Reutilization, recuperation and recycle potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Declared module	X	X	X	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE
Geography	ES	ES	ES	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Additional information

- Technical support for the implementation of the EPD: ISOLANA Ahorro Energético SL.
- Allocation processes: Wherever possible, allocation has been avoided, but for energy consumption, waste production and distribution an allocation had to be made based on physical mass considerations.
- Cut-off rules and considerations:
  - The following processes have been excluded:
    - Manufacture of equipment used in production, in buildings or any other capital good
    - Transportation of personnel to the plant
    - Transportation of personnel within the plant
    - Research and development activities
    - Long-term emissions
  - 95% of all the mass and energy inputs and outputs of the central system have been included, identified in the life cycle inventory included in this report and at least 99% for the total life cycle.
  - The principle of modularity has been followed, as well as the polluter-payer principle.
- Calculation methodologies: to obtain the results in accordance with the provisions of UNE-EN 15804+A1, “EF method”, “CML”, “EDIP” and “CED” methodologies have been used for environmental impacts, waste generation and energy consumption, respectively.
- The scenarios included are currently in use and are representative of one of the most likely alternatives for the product under review.

- The electricity mix used in the manufacturing plant is 100% certified renewable. It has been specifically modeled in SimaPro adapting to the National Electric Mix of Spain in 2020.



LCA results

In the following tables, results are presented in absolute values:

Results

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Multipanel 80, Multipanel 130 and Multipanel 180

Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	7,59E-05	7,43E-05	8,61E-09	1,54E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1,04E+02	8,36E+01	2,06E+00	1,86E+01
Soil and water acidification	kg SO2 eq	1,96E-03	1,80E-03	9,00E-06	1,49E-04
Depletion of the ozone layer	kg CFC-11 eq	4,46E-07	3,43E-07	3,38E-08	6,88E-08
Global warming	GWP kg CO2 eq	1,00E+01	8,81E+00	1,45E-01	1,06E+00
Eutrophication	EP kg (PO4)3- eq	4,69E-03	4,11E-03	2,84E-05	5,56E-04
Photochemical ozone formation	kg ethylene eq	1,41E-02	1,25E-02	7,86E-05	1,54E-03

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	4,70E+01	1,23E+01	2,89E-03	3,48E+01
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	4,70E+01	1,23E+01	2,89E-03	3,48E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	1,18E+02	9,25E+01	2,19E+00	2,32E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1,18E+02	9,25E+01	2,19E+00	2,32E+01
Use of secondary materials	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	4,07E+00	1,21E+00	-4,55E-04	2,86E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	7,61E-05	6,29E-05	5,47E-06	7,72E-06
Non-hazardous waste disposed	kg	3,67E+00	3,63E+00	8,59E-05	4,68E-02
Radioactive waste disposed	kg	2,04E-04	1,37E-04	1,50E-05	5,17E-05

Results intepretation

In this section, the results of the reference Smooth Multipanel Tray 80 with the least impact have been taken as representative. As can be seen in Figure 7, within the cradle-to-gate boundary, the A1 stage of material supply is the stage of the life cycle that has the greatest impact on all the impact categories analyzed, representing between 80 % (abiotic depletion of fossil resources) and 98% (abiotic depletion of non-fossil resources) of the total impact of the product stage.

A2 represents a minor impact for all impact categories analyzed, between 0.01% and 2% compared to the total for the entire product stage.

On the other hand, stage A3 has a slightly greater impact potential since it assumes all energy consumption and the treatment of wastes generated in the production plnat, including hazardous and WEEE waste.

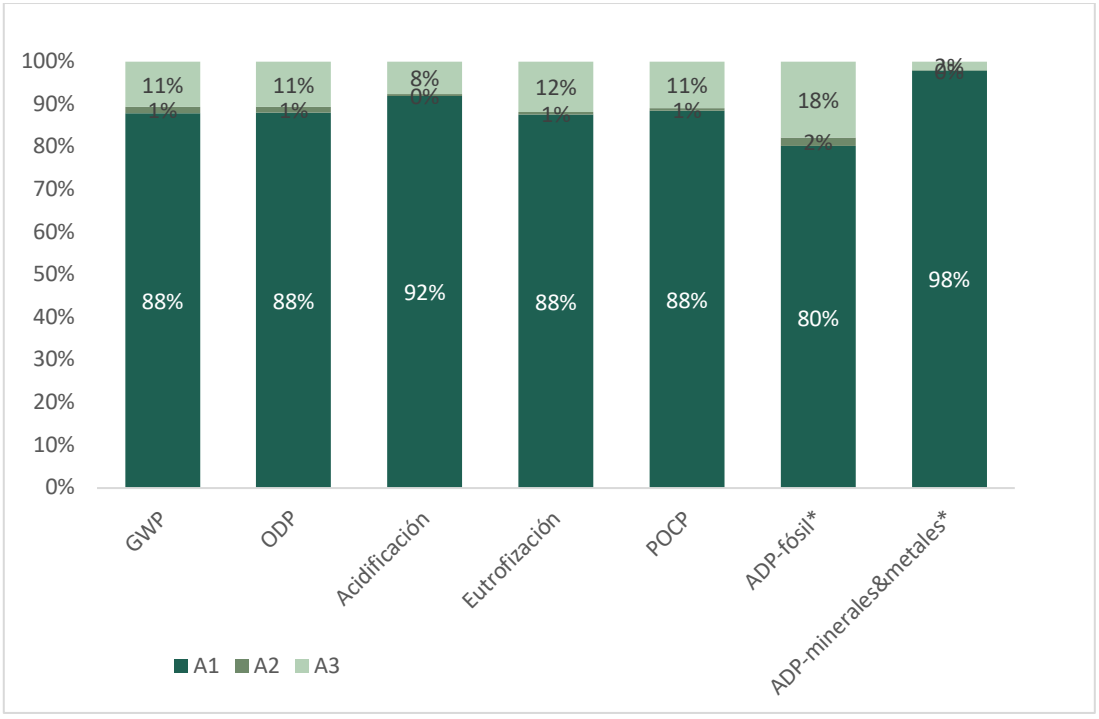


Figure 7. Contribution of life cycle stages to environment impact

*For the rest of the metal ceilings systems, the impact results maintain the same trend.

Information related to the EPD Sector

This EPD® is individual.

References

- General Program Instructions of the International EPD® Version 4.0.
- ISO 14020:2000 Environmental labels and declarations: General principles.
- ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
- ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework.
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- PCR 2012:01 v2.3 Construction products (UNE-EN 15804:A1).
- UNE-EN 15804:2012+A1:2014 Sustainability of construction works - Declarations of environmental products - Basic rules for the product category of construction products.
- Memory of the Life Cycle Analysis of THU Metal Ceiling Systems v4, February 2022.

Annex 1

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Multipanel 30 Slat
Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	7,76E-05	7,52E-05	9,39E-09	2,44E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1,27E+02	9,03E+01	2,25E+00	3,40E+01
Soil and water acidification	kg SO2 eq	2,20E-03	1,95E-03	9,81E-06	2,38E-04
Depletion of the ozone layer	kg CFC-11 eq	5,07E-07	3,69E-07	3,69E-08	1,02E-07
Global warming	GWP kg CO2 eq	1,14E+01	9,53E+00	1,58E-01	1,69E+00
Eutrophication	EP kg (PO4)3- eq	5,37E-03	4,44E-03	3,09E-05	8,98E-04
Photochemical ozone formation	kg ethylene eq	1,62E-02	1,34E-02	8,57E-05	2,66E-03

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	5,42E+01	1,30E+01	3,15E-03	4,13E+01
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	5,42E+01	1,30E+01	3,15E-03	4,13E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	1,43E+02	9,99E+01	2,39E+00	4,11E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1,43E+02	9,99E+01	2,39E+00	4,11E+01
Use of secondary materials	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	4,61E+00	1,30E+00	-4,96E-04	3,31E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	8,27E-05	6,48E-05	5,96E-06	1,20E-05
Non-hazardous waste disposed	kg	3,82E+00	3,75E+00	9,36E-05	6,71E-02
Radioactive waste disposed	kg	2,36E-04	1,47E-04	1,63E-05	7,30E-05

Annex 2

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Turin smooth aluminum slat, Turin perforated aluminum slat

Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	7,64E-05	7,50E-05	1,26E-08	1,38E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1,34E+02	1,17E+02	3,02E+00	1,33E+01
Soil and water acidification	kg SO2 eq	2,72E-03	2,56E-03	1,32E-05	1,43E-04
Depletion of the ozone layer	kg CFC-11 eq	6,00E-07	4,70E-07	4,96E-08	8,02E-08
Global warming	GWP kg CO2 eq	1,36E+01	1,25E+01	2,12E-01	9,35E-01
Eutrophication	EP kg (PO4)3- eq	6,39E-03	5,76E-03	4,16E-05	5,89E-04
Photochemical ozone formation	kg ethylene eq	1,11E-01	1,00E-01	6,66E-04	9,81E-03

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	7,20E+01	1,56E+01	4,24E-03	5,64E+01
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	7,20E+01	1,56E+01	4,24E-03	5,64E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	1,50E+02	1,29E+02	3,22E+00	1,70E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1,50E+02	1,29E+02	3,22E+00	1,70E+01
Use of secondary materials	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	4,31E+00	1,66E+00	-6,67E-04	2,65E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	8,93E-05	7,02E-05	8,02E-06	1,11E-05
Non-hazardous waste disposed	kg	4,20E+00	4,16E+00	1,26E-04	4,47E-02
Radioactive waste disposed	kg	2,59E-04	1,84E-04	2,20E-05	5,35E-05

Annex 3

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Siena smooth steel panel, Siena perforated steel panel, Turin smooth steel slat, Turin perforated steel slat, Aluminum smooth acoustic baffle (30x100), Aluminum perforated acoustic baffle (30x100), Aluminum smooth acoustic baffle (40x100), Aluminum perforated acoustic baffle (40x100), Aluminum smooth acoustic baffle (30x150) and Aluminum perforated acoustic baffle (30x150), Aluminum smooth acoustic baffle (40x150) and Aluminum perforated acoustic baffle (40x150), Aluminum smooth acoustic baffle (50x150) and Aluminum perforated acoustic baffle (50x150)

Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	7,76E-05	7,52E-05	9,39E-09	2,44E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1,27E+02	9,03E+01	2,25E+00	3,40E+01
Soil and water acidification	kg SO2 eq	2,20E-03	1,95E-03	9,81E-06	2,38E-04
Depletion of the ozone layer	kg CFC-11 eq	5,07E-07	3,69E-07	3,69E-08	1,02E-07
Global warming	GWP kg CO2 eq	1,14E+01	9,53E+00	1,58E-01	1,69E+00
Eutrophication	EP kg (PO4)3- eq	5,37E-03	4,44E-03	3,09E-05	8,98E-04
Photochemical ozone formation	kg ethylene eq	1,62E-02	1,34E-02	8,57E-05	2,66E-03

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	7,82E+01	2,57E+01	7,91E-03	5,25E+01
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	7,82E+01	2,57E+01	7,91E-03	5,25E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	2,69E+02	2,33E+02	6,00E+00	2,97E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	2,69E+02	2,33E+02	6,00E+00	2,97E+01
Use of secondary materials	kg	0	0	0	0

Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	5,92E+00	2,93E+00	-1,24E-03	2,99E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	1,29E-04	9,92E-05	1,50E-05	1,48E-05
Non-hazardous waste disposed	kg	6,15E+00	6,09E+00	2,35E-04	6,15E-02
Radioactive waste disposed	kg	4,30E-04	3,19E-04	4,10E-05	7,03E-05

Annex 4

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Smooth steel acoustic baffle (30x100), Perforated steel acoustic baffle (30x100), Smooth steel acoustic baffle (40x100), Perforated steel acoustic baffle (40x100), Smooth steel acoustic baffle (50x100), Perforated steel acoustic baffle (50x100), Smooth steel acoustic baffle (30x150), Perforated steel acoustic baffle (30x150), Smooth steel acoustic baffle (40x150), Acoustic baffle perforated steel (40x150); Smooth steel acoustic baffle (50x150), Perforated steel acoustic baffle (50x150), Smooth aluminum acoustic baffle (30x65), Perforated aluminum acoustic baffle (30x65), Smooth aluminum acoustic baffle (40x65), Perforated aluminum acoustic baffle (40x65), Smooth aluminum acoustic baffle (50x65), Perforated aluminum acoustic baffle (50x65)

Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	1,07E-03	1,07E-03	1,95E-08	5,63E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	3,77E+02	3,33E+02	4,68E+00	3,91E+01
Soil and water acidification	kg SO2 eq	6,84E-03	6,39E-03	2,04E-05	4,27E-04
Depletion of the ozone layer	kg CFC-11 eq	2,02E-06	1,65E-06	7,68E-08	2,83E-07
Global warming	GWP kg CO2 eq	3,58E+01	3,28E+01	3,28E-01	2,68E+00
Eutrophication	EP kg (PO4)3- eq	3,58E+01	3,28E+01	3,28E-01	2,68E+00
Photochemical ozone formation	kg ethylene eq	3,40E-01	3,11E-01	1,03E-03	2,78E-02

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	1,94E+02	9,04E+01	6,56E-03	1,04E+02
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1,94E+02	9,04E+01	6,56E-03	1,04E+02
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	4,39E+02	3,86E+02	4,98E+00	4,83E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	4,39E+02	3,86E+02	4,98E+00	4,83E+01

Use of secondary materials	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	9,35E+00	5,97E+00	-1,03E-03	3,38E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	7,69E-04	7,16E-04	1,24E-05	4,01E-05
Non-hazardous waste disposed	kg	3,83E+01	3,82E+01	1,95E-04	1,13E-01
Radioactive waste disposed	kg	9,45E-04	7,77E-04	3,40E-05	1,34E-04

Annex 5

These results are valid for the declared Unit of 1 m2 of metal ceiling system: Steel smooth acoustic baffle (30x65), Steel perforated acoustic baffle (30x65), Steel smooth acoustic baffle (40x65), Steel perforated acoustic baffle (40x65), Steel smooth acoustic baffle (50x65), Steel perforated acoustic baffle (50x65)

Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

Potencial environmental impact

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Abiotic resources depletion - elements	kg Sb eq	1,59E-03	1,59E-03	2,86E-08	3,06E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	5,47E+02	5,02E+02	6,84E+00	3,84E+01
Soil and water acidification	kg SO2 eq	9,92E-03	9,60E-03	2,98E-05	2,89E-04
Depletion of the ozone layer	kg CFC-11 eq	2,74E-06	2,49E-06	1,12E-07	1,37E-07
Global warming	GWP kg CO2 eq	5,18E+01	4,94E+01	4,80E-01	1,98E+00
Eutrophication	EP kg (PO4)3- eq	2,63E-02	2,50E-02	9,41E-05	1,19E-03
Photochemical ozone formation	kg ethylene eq	4,88E-01	4,67E-01	1,51E-03	1,94E-02

Use of resources

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Use of renewable primary energy excluding primary renewable energy resources used as feedstock	MJ, net calorific value	1,95E+02	1,37E+02	9,59E-03	5,75E+01
Use of renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1,95E+02	1,37E+02	9,59E-03	5,75E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	6,34E+02	5,81E+02	7,28E+00	4,63E+01
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0	0	0	0
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	6,34E+02	5,81E+02	7,28E+00	4,63E+01
Use of secondary materials	kg	0	0	0	0

Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Net use of freshwater resources	m3	1,24E+01	8,97E+00	-1,51E-03	3,41E+00

Waste production

Results per Declared Unit					
Indicator	**Unit**	**Total A1-A3**	**A1**	**A2**	**A3**
Hazardous waste disposed	kg	1,12E-03	1,08E-03	1,81E-05	1,77E-05
Non-hazardous waste disposed	kg	5,82E+01	5,82E+01	2,85E-04	7,86E-02
Radioactive waste disposed	kg	1,31E-03	1,17E-03	4,97E-05	8,79E-05

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