

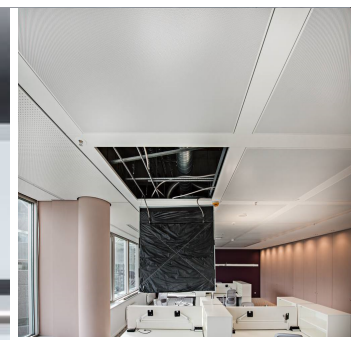
ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	Lindner Group
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-LIN-20210208-IBC1-EN
Issue date	18.11.2021
Valid to	17.11.2026

Heated and chilled ceilings made of steel
Lindner SE

www.ibu-epd.com | <https://epd-online.com>



1. General Information

Lindner SE

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-LIN-20210208-IBC1-EN

This declaration is based on the product category rules:

Metal ceilings, 07.2014
(PCR checked and approved by the SVR)

Issue date

18.11.2021

Valid to

17.11.2026

Heated and chilled ceilings made of steel

Owner of the declaration

Lindner SE
Bahnhofstraße 29
94424 Arnstorf
Germany

Declared product / declared unit

The declared unit is 1 m² heated and chilled ceiling system made of steel.

Scope:

The EPD refers to the heated and chilled ceiling system made of steel and applies to the following product types:

- Plafotherm B (heated and chilled post cap ceilings)
- Plafotherm E (heated and chilled hook-on ceilings and heated and chilled corridor ceilings)
- Plafotherm DS (heated and chilled canopy ceilings)
- Plafotherm L (heated and chilled baffle ceilings)
- Plafotherm St (heated and chilled expanded metal ceilings)

The collected production data are for the year 2020. The heated and chilled ceilings made of steel are manufactured at the Lindner plant in Arnstorf.

The owner of the declaration shall be liable for the underlying information and evidence; any liability of the IBU in relation to manufacturer information, LCA data and evidence is excluded.

The EPD was prepared in accordance with the requirements of *EN 15804+A1*. In the following, the standard is referred to in simplified form as *EN 15804*.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data
according to *ISO 14025:2011*

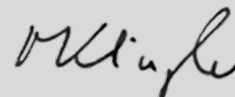
internally externally



Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)



Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)



Matthias Klingler
(Independent verifier)

2. Product

2.1 Product description/Product definition

Lindner heated and chilled ceiling systems are manufactured from edged, rollformed and partially stamped steel as complete kits or as individual

components. The construction set consists of the top layer with integrated heating and cooling technology with stainless steel or copper pipes and the substructure. Both the ceiling panel and the

substructure are made of steel, can have various suspension heights and depend in its design on the shape, functional requirements and the weight of the top layer.

System designations:

- Plafotherm B (heated/chilled post cap ceilings)
- Plafotherm B 100 SD (longitudinally sound-reduced heated/chilled ceilings)
- Plafotherm E (heated and chilled Hook-On ceilings and corridor heated/chilled ceilings)
- Plafotherm DS (heated and chilled canopy ceilings)
- Plafotherm L (heated and chilled baffle ceilings)
- Plafotherm St (heated/chilled expanded metal ceilings)

For putting the product on the market in the EU/EFTA (with the exception of Switzerland), Regulation (EU) No. /305/2011/ (CPR) applies. The product requires a declaration of performance taking into consideration *DIN EN 13964: 2014- 08, Suspended ceilings – Requirements and test methods*. For the use of the product, the respective national provisions apply.

2.2 Application

The heated and chilled ceilings described here are used in interior construction as band grid and suspended systems. Alternatively, they can be designed as ceiling canopies, lamella ceilings or expanded metal ceilings for ceiling cladding. The product is manufactured in accordance with the respective customers requirements.

2.3 Technical Data

Constructional data

Name	Value	Unit
Sound absorption coefficient (EN ISO 354, EN ISO 11654)	<80	%
Grammage	11 - 21	kg/m ²
Heating output (EN ISO 14037)	116 - 350	W/m ²
Cooling output (EN 14240)	104 - 340	W/m ²

The data of the *declaration of performance* apply

2.4 Delivery status

The heated/chilled ceiling systems and their components are produced in individual sizes. Packaging is usually on pallets and/or packed in cardboard. Weight per area (kg/m²) depends on the specific product. A conversion table is helpful for converting the declared unit (kg/m² ratio).

2.5 Base materials/Ancillary materials

The declared product consists of 11.31 kg/m² of steel, of which 10.2 kg/m² is attributable to the ceiling panel and 1.11 kg/m² to the substructure.

Underneath is a stainless steel register as a cooling unit with a weight of 2.42 kg/m². In addition, a gypsum plasterboard with a weight of 7.5 kg/m² is used for sound insulation. Under the cooling unit there is an acoustic fleece with 0.06 kg/m². The remaining items are a heat conducting profile made of aluminium with 2.08 kg/m², the powder coating with 0.2 kg/m² and the adhesive for acoustic fleece and gypsum plasterboard of 0.07 kg/m².

The product contains substances listed in the candidate list (*REACH 08/01/2019*) exceeding 0.1 percentage by mass: no.

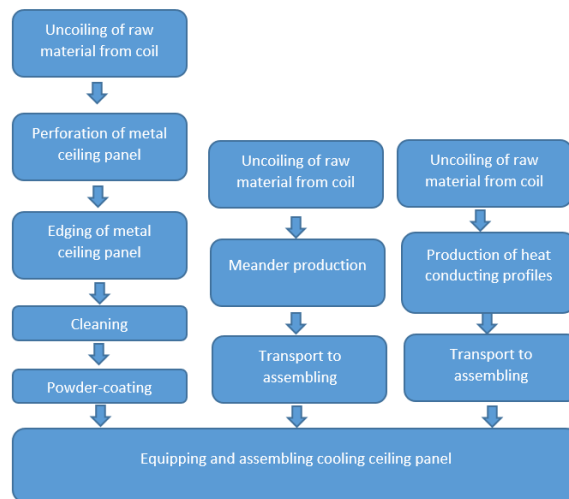
2) The product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no.

3) Biocide products were added to this construction product or treated with biocide products (this then concerns

a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012: no.

2.6 Manufacture

After receipt of the raw material, the steel coils are perforated and cut to length. The steel sheet is then edged to form the ceiling panel. The edged ceiling panel is powder-coated in the flat coating, and then an acoustic fleece insert can be applied on the back in a continuous process. The heated and chilled meander is bent and cut to length and glued to the acoustic fleece with the aluminium heat conducting profiles in the ceiling panel. Optionally, for products such as the B100 SD, a gypsum plasterboard is glued. Stamping and perforation waste is collected, picked up by local waste disposal companies and fed into the recycling loop. Quality is assured in compliance with standard *EN 13964*, "Suspended ceilings - Requirements and test methods" as amended.



2.7 Environment and health during manufacturing

Manufacturing conditions do not require any special health and safety protection measures other than those provided by the authorities for the specific work area, e.g. safety vest, hearing protection or safety shoes. The *MAK values* for the maximum workplace concentration (e.g. Germany) are not exceeded at any point of the manufacturing process. The production-related exhaust air is cleaned in accordance with legal requirements. Emissions are below the technical instructions on clean air, water, soil: No contamination of water or soil occurs. All values determined inside and outside the production facilities are below the requirements for noise protection applicable for

Germany. Noise-intensive installations, such as perforation systems are correspondingly insulated by structural measures. The statutory health and safety regulations for metal and dry construction trades as well as the respective provisions of the construction industry apply. Certificates and other manufacturer-specific documents on environmental and health protection according to *ISO 14001* can be requested.

2.8 Product processing/Installation

The top layer of the metal ceiling system is attached to a substructure. The installation is to be carried out by trained personnel, usually from the area of drywall construction.

2.9 Packaging

For packaging the heated and chilled ceiling systems and components, wooden pallets, cardboard, plastic sheeting and plastic straps are used. The packaging material is easily separable and can be reused if necessary. The remainder can be collected unmixed and taken to the regional recycling centre. Residual materials are to be disposed of according to the relevant national provisions.

2.10 Condition of use

Long years of experience show that there are no relevant changes to be expected with regard to the material composition during the time of use of the heated and chilled ceiling systems.

2.11 Environment and health during use

No health hazards and impairments are to be expected based on current knowledge in the case of normal, appropriate use intended for heated and chilled ceiling systems.

Exposure to air, water and soil cannot arise with proper use of the described products according to the current state of knowledge.

2.12 Reference service life

A reference service life according to *ISO 15686* cannot be calculated for this product. The technical service life is therefore derived from the table

"Service life of components for life-cycle analysis according to the rating system for sustainable construction (Bewertungssystem Nachhaltiges Bauen – BNB) – Code No. 353.211" of the Federal Office for Construction and Regional Planning *BBSR*.

The BNB assumes that ceiling claddings made of metal will last for more than 50 years.

Proper use, preservation and care are prerequisites for the stated service life.

2.13 Extraordinary effects

Fire

Lindner heated and chilled systems are classified according to EN 13501-1.

Fire protection

Name	Value
Building material class	A2
Burning droplets	d0
Smoke gas development	s2

Water

There are no known effects on the environment in the event of unforeseen ingress of water. The resistance of the ceiling system by the ingress of water, depends on the corrosion protection class in which the ceiling system is classified.

Mechanical destruction

In the case of mechanical destruction, all of the substances remain bound. It is to be assumed that in the case of coated ceiling panels, lacquer chippings occur in such a small amount that there are no negative impacts on the environment.

2.14 Re-use phase

Lindner heated and chilled systems can be removed and re-used without damaging the product. In the subsequent use phase, the existing fleece cannot be separated from the metal ceiling. If not re-used, the metal ceiling layers and substructure components made of steel can be recycled. Fleece and lacquer can be detached by melting.

2.15 Disposal

In accordance with the Waste Classification Ordinance (AVV) and the European Waste Catalogue (*EWC*), the waste code for steel as a component of the metal ceiling systems made of steel is:

17 04 05 - Iron and steel

17 06 04 Insulating material other than that mentioned in 17 06 01 and 17 06 03

17 04 02 Aluminium

17 08 02 Gypsum-based building materials

17 09 04 Mixed construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03

2.16 Further information

Lindner Group, www.lindner-group.com

3. LCA: Calculation rules

3.1 Declared Unit

The Declared Unit refers to 1 m² Lindner metal ceiling system consisting of ceiling panel, heated and chilled system - optionally with stainless steel or copper register - and substructure with a maximum weight of 22.47 kg (including packaging and a gypsum plasterboard of 7.5 kg).

Within the product family, the ceiling system varies from 10.35 to 22.26 kg/m². The panels are delivered

perforated, the proportion of holes is 20% of the surface, the total weight was calculated accordingly.

Declared unit

Name	Value	Unit
conversion factor [Mass/Declared Unit]	22.47	-
Declared unit	1	m ²
Grammage	22.47	kg/m ²

3.2 System boundary

Type of EPD: Cradle to grave with options. This life cycle assessment takes into account the life cycle of product manufacture up to the recycling plant. The product stage includes modules A1 (raw material provision), A2 (transport) and A3 (manufacturing) (these are considered together as a module (A1-A3)), transport to building site and installation (A4-A5). No other materials and machinery are considered during installation in the building; module A5 includes the environmental impacts for the disposal of the packaging. During the use phase the product causes no environmental impacts. The product itself requires no maintenance; under normal use, no repair or replacement is expected during building use. The product can be separated manually into correctly sorted material fractions in C1. For the disposal stage, transportation to the recycling facility is considered. (C2) At the end of life, the product is again separated into components and the realistic scenario is selected: For the steel sheet, the stainless steel meanders as well as the heat conducting profile made of aluminium, a waste management company receives compensation for the sorted metals. The metals reach end of waste property status after removal in C1. The potential benefits and loads are given in module D. The calcium sulphate board reaches end of waste property status in module C4 and is disposed of in a landfill for construction waste.

3.3 Estimates and assumptions

Specific or material average data inventories are not available for all materials. Approximation data sets are used for the plastic film and certain chemical additives in the coating analysis. It is assumed that no expenses are incurred for the dismantling of the systems. The acoustic fleece is sent to recycling with the metal scrap and incinerated, where it enters as an impurity in the production of secondary metal. The emissions from the disposal of the fleece are not included in the balance sheet. The acoustic fleece with a weight of 0.06 kg/m² is cut off in Module D. The substance carries no potential for significant emissions to soil, water or air in relation to the environmental indicators of the *EN 15804* standard.

3.4 Cut-off criteria

All specified data collected from operational data, i.e. all source materials used in accordance with production guidelines, as well as the thermal and electrical energy used were calculated. The machinery and equipment required in production were not considered. Thus, material flows with a share of less than 1 mass % are also taken into account. Energy flows with a share of less than 1 mass % are also taken into account. With the exception of the acoustic fleece in Module D, no known material flows were neglected that would significantly contribute to the declared environmental impacts.

3.5 Background data

The software system for holistic balancing *GaBi 10* developed by thinkstep AG was used for modelling the life cycle of the product concerned (Service Pack 40). The data required for the prior chain, for which no

specific details are available, are taken from the *GaBi 10 2021 D* database.

3.6 Data quality

Small uncertainties arise from the background data resulting from provision of the *GaBi 10 2021 D* databases and these have to be considered in interpreting the results. The background data are not more than 5 years old. The quality of the data can be rated as good.

3.7 Period under review

The base data for the life cycle assessment was collected in 2020.

3.8 Allocation

The total production of Lindner SE includes further products in addition to the concerned product. The data collection values for thermal and electrical energy and raw materials accordingly relate to the product being declared.

It is difficult to break down the production processes of the steel ceiling system into different subprocesses. The declared product and further products produced in the production line follow the same production steps.

In addition to heated and chilled ceilings, Lindner SE also produces steel ceiling systems, where the top layer is the same as for heated and chilled ceilings, minus the heat conducting profile and meander.

The profile production takes place in a separate production centre, and profiles can also form the substructure of other metal ceilings: aluminium ceilings, stainless steel ceilings, fireproof ceilings and steel ceilings.

In the production of profiles, besides the substructure for the ceilings under consideration, profiles are also produced for drywall or wall production. Allocation by weight of the required profiles for the ceilings was carried out. Allocation of steel was modelled by dimensions.

A small part leaves the product system as scrap, without carrying loads. A conversion based on the existing input materials and the weight of the ceiling system was considered. The benefits and loads from the thermal recovery of packaging materials and production waste as well as the benefits and loads from the recycling of the dismantled product are declared in module D.

3.9 Comparability

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

The *GaBi 10* database was used.

4. LCA: Scenarios and additional technical information

There follows a more detailed description of the scenarios upon which the life cycle assessment was based.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.203	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	75	%

Installation into the building (A5)

At the construction site, the ceiling system is mechanically installed by professionals, the packaging is to be removed before installation and the panel with substructure is then installed. There are no environmental impacts connected with such installation. Module A5 only includes the environmental impacts for disposal of the packaging. The packaging materials are transported to a disposal facility and incinerated. The disposed materials are thermally recycled. It is assumed that the R-value of the incineration plant is >0.6. The resulting credits are accounted for in Module D.

Name	Value	Unit
Auxiliary	-	kg
Water consumption	-	m ³
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Output substances following waste treatment on site	0.376	kg

A reference service life cannot be calculated for this product. A technical service life of around 50 years is assumed according to the *BNB*.

End of life (C1-C4)

The product is to be recycled at the end of life in the same composition as described in the declared unit. It is assumed that the ceiling system is driven 100 km by lorry from the construction site to the nearest recycling plant. The gypsum plasterboard is separated and deposited in a landfill for commercial waste.

Name	Value	Unit
Recycling	10.34	kg
Landfilling	7.5	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

the substructure are completely recycled. The averted environmental impacts of the resulting secondary steel are duly reflected according to the input composition in module D. The acoustic fleece is not separated and goes into the steel recycling plant. Corresponding credits are not accounted for. The gypsum plasterboard is landfilled and the corresponding loads are reflected in module C4.

Name	Value	Unit
Aluminium	2.08	kg
Steel	7.75	kg
Stainless steel	0.509	kg

5. LCA: Results

Important Notice:

Freshwater EP: This indicator has been calculated in accordance with the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://epca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>) as

"kg P-eq."

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m² heated and chilled ceilings

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	[kg CO ₂ -Eq.]	5.91E+1	7.20E-1	3.53E-1	0.00E+0	1.42E-1	0.00E+0	5.49E-1	-3.20E+1
ODP	[kg CFC11-Eq.]	6.63E-9	3.29E-16	3.30E-17	0.00E+0	6.47E-17	0.00E+0	5.68E-16	1.41E-15
AP	[kg SO ₂ -Eq.]	2.00E-1	1.60E-3	1.75E-5	0.00E+0	3.14E-4	0.00E+0	6.50E-4	-9.79E-2
EP	[kg (PO ₄) ³ -Eq.]	1.87E-2	3.78E-4	3.78E-6	0.00E+0	7.44E-5	0.00E+0	7.31E-5	-7.20E-3
POCP	[kg ethene-Eq.]	1.60E-2	-5.71E-4	1.47E-6	0.00E+0	-1.12E-4	0.00E+0	4.93E-5	-7.93E-3
ADPE	[kg Sb-Eq.]	3.43E-4	6.28E-8	4.01E-10	0.00E+0	1.24E-8	0.00E+0	1.04E-8	-9.34E-5
ADPF	[MJ]	6.13E+2	9.61E+0	3.52E-2	0.00E+0	1.89E+0	0.00E+0	1.45E+0	-3.12E+2

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m² heated and chilled ceilings

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	3.08E+2	5.76E-1	7.86E-3	0.00E+0	1.33E-1	0.00E+0	1.96E-1	-7.19E+1
PERM	[MJ]	4.53E+0	0.00E+0	-4.53E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	3.12E+2	5.76E-1	-4.52E+0	0.00E+0	1.33E-1	0.00E+0	1.96E-1	-7.19E+1
PENRE	[MJ]	6.77E+2	9.64E+0	4.11E-2	0.00E+0	1.90E+0	0.00E+0	1.49E+0	-3.57E+2
PENRM	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	6.77E+2	9.64E+0	4.11E-2	0.00E+0	1.90E+0	0.00E+0	1.49E+0	-3.57E+2
SM	[kg]	3.93E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.50E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m ³]	3.79E-1	5.10E-4	4.47E-4	0.00E+0	1.00E-4	0.00E+0	3.76E-4	-2.11E-1

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m² heated and chilled ceilings

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	8.56E-7	8.56E-7	3.75E-11	0.00E+0	2.28E-8	0.00E+0	2.28E-8	3.21E-4
NHWD	[kg]	7.08E+0	7.08E+0	1.73E-3	0.00E+0	7.51E+0	0.00E+0	7.51E+0	-4.00E+0
RWD	[kg]	2.40E-2	2.47E-2	1.28E-5	0.00E+0	1.67E-5	0.00E+0	1.67E-5	-1.65E-2
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	1.44E+0	0.00E+0	9.93E-2	1.03E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	2.67E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	4.86E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

6. LCA: Interpretation

Due to the declaration of the "worst case", a variance of about 20% downwards can be expected for the different impact categories

Total GWP

The total GWP is almost exclusively caused in the manufacturing phase. In module D, credits are given for steel recycling. All other phases play a minor role - as is the case for most categories.

Ozone depletion potential (ODP)

The largest share of the ozone depletion potential is caused by packaging and, in turn, to a large extent by corrugated board. In addition, the very low values in the impact category ODP are due to emissions from steel, stainless steel and aluminium production (A1 - A3).

Acidification, land and water (AP)

A relatively high share of the acidification potential of soil and freshwater is contributed by the extraction of biogas for thermal energy in the production stage. The second largest contribution comes from the generation of electric power, according to the German energy mix. A reduction in energy use would thus significantly minimize the acidification potential of freshwater. The largest polluter in raw materials is the production of aluminium, followed by the production of steel and

stainless steel, which require high energy inputs in the production process.

Photochemical ozone creation potential - human health (POCP)

Raw material accounts for the largest share here (0.108 kg ethene eq.). Steel (0.0438 kg ethene eq.) and aluminium (0.0374 kg ethene eq.) stand out.

Resource consumption, minerals and metals (ADPE)

The biggest polluter is the raw material. In terms of quantity, it is almost solely determined by stainless steel (0.000334 kg SB eq.). The largest item on the positive side for the end-of-life consideration is a credit for recycling stainless steel scrap (- 0.000019 kg SB eq.), which accounts for almost the entire share of this consideration.

Resource consumption, fossil energy sources (ADPF)

Raw materials account for the largest share (602.29 MJ), of which aluminium (236.03 MJ), sheet steel (203.21 MJ) and stainless steel (100.17 MJ) account for the largest shares. Gypsum (22.96 MJ) is behind energy (70.95 MJ). The steel credit (-501.97 MJ), consisting, among others, of the credit for steel and aluminium, accounts for the largest share on the positive side.

7. Requisite evidence

eurofins Product Testing ilac MRA DANAK

5.2 Résultats après 28 jours

No. CAS	Temps de rétention (min)	Cat. ID	Conc. [µg/m³]	Éq. total [µg/m³]	ER spécifique [µg/(m³·h)]	R ₀	R _h
VOC avec NIK/LCI							
Non détecté							
VOC sans NIK/LCI							
Non détecté							
Somme VOC sans NIK/LCI			<5	<5	<7		
VVOC Composants							
Non détectés							
TVVOC			<5	<5	<7		
SVOC Composants							
Non détectés							
TSVOC			<5	<5	<7		
Cancérogènes							
Total cancérogènes			<1	<1	<2		
Composants CMR							
Benzol	71-43-2	1	<1		<2		
Trichloroéthylène	79-01-6	1	<1		<2		
Dibutylphthalate (DBP)*	84-74-2	1	<1		<2		
Diéthylhexyphthalate (DEHP)*	117-81-7	1	<1		<2		
Aldéhydes							
Formaldéhyde	50-00-0	1	9,5		12	0,095	0,095
Acétaldéhyde	75-07-0	1	<3		<4		
Propionaldéhyde	123-38-6	1	<3		<4		
Butyraldéhyde	123-72-8	1	<3		<4		
2-buténal	123-73-9	1	<5		<7		
Glutaraldéhyde	111-30-8	1	<5		<7		
Valeur R						0,095	0,095
TVOC			<5	<5	<7		
TVOC (classe française de VOC)					<2		
Toluène	108-88-3		<2	<2	<3		
Tétrachloroéthylène	127-18-4		<2	<2	<3		

Les résultats des essais ne sont valables que pour le ou les échantillons examinés.
Le rapport ne peut être reproduit que dans son intégralité, des extraits ne peuvent être reproduits qu'avec l'accord écrit du laboratoire d'essai.

392-2019-00327601_A_DE_rev1 Page 6 de 19

Test report no. 392-2019-00327601_A_DE_rev1 (test report Lindner SE) is available for the heated and

chilled ceiling system. The test institute was Eurofins Product Testing A/S, Smedeskovvej 38, DK- 8464 Galten, Denmark.

Result: The investigated product Plafotherm heated and chilled ceiling is suitable for indoor use according to the "admission principles for health-related evaluation of construction products in indoor spaces" (DIBt notifications 10/2008 in connection with the LCI values according to AgBB in the version of March 2008).

8. References

DIN 4102

-2:1977-09: Fire behaviour of building materials and building components – part 2: Building components; definitions, requirements and tests.

EN 13501-1

DIN EN 13501-1:2012-01,
Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 13964

DIN EN 13964:2014-08: Suspended ceilings - Requirements and test methods.

EN 14037

DIN EN 14037-1:2016-12,
Free hanging heating and cooling surfaces for water with a temperature below 120 °C - Part 1: Pre-fabricated ceiling mounted radiant panels for space heating - Technical specifications and requirements.

EN 14240

DIN EN 14240:2004-04:
Ventilation for buildings - Chilled ceilings - Testing and rating.

EN 15804

DIN EN 15804:2014-07
Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 354

DIN EN ISO 354:2003-12, Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (ISO 11654:1997)

ISO 9001

ISO 9001:201509, Quality Management Systems – Requirements.

ISO 14001

ISO 14001:2015-09, Energy management systems - Requirements with guidance for use.

ISO 14025

DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006).

ISO 15686

ISO 15686-1:2011-05, Buildings and constructed assets - Service life planning - Part 1: General principles and framework.

ISO 50001

ISO 50001:201106, Energy management systems - Requirements with guidance for use.

AVV

Directive on the European Waste Catalogue (Abfallverzeichnis-Verordnung - AVV).
Issue date: 10/12/2001. Last amended by Article 1 V dated 4/3/2016 I 382.

AgBB

Committee for Health-related Evaluation of Construction Products, (AgBB), updated LCI values list 2008, procedure for the health-related evaluation of emissions of volatile organic compounds from construction products.

MAK values (Maximum Workplace Concentration)

2016 list of MAK and BAT values
Maximum Workplace Concentrations (MAK) and Biological Working Material Tolerance (BAT) values, permanent senate commission for the examination of harmful working materials, notification 52, German Research Foundation.

Regulation (EU) No. 305/2011

Regulation of the European Parliament and of the Council of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, in: Official Journal of the European Union L 88/5, April 2011.

Regulation (EC) No. 1907/2006 (REACH Regulation)

Registration, Evaluation, Authorisation and Restriction of Chemicals

BBSR

Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): 353.211 - metal claddings: aluminium, steel, copper, zinc
Service lives of construction components, service lives of construction components for life cycle assessments according to the assessment system for sustainable construction (BNB), in: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (ed.), 2017.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, First General Administrative Regulation on the Federal Immission Control Act, Technical Instructions on Air Quality Control (TA Luft), July 24, 2002.

GaBi 10

thinkstep AG; GaBi 10: Software system and database for holistic balancing. Copyright, TM. Stuttgart, Echterdingen, 1992-2013

Gabi 10 2021 D

GaBi 10: Documentation of GaBi 10 records of the database for holistic balancing. Copyright, TM. Stuttgart, Echterdingen, 1992-2021. <http://www.gabi-software.com/support/gabi-database-2021-lci-documentation/>

IBU Programme Instructions

for the EPD programme of the Institut Bauen und Umwelt e.V. (general instructions for the IBU-EPD programme). The Preparation of Environmental Product Declarations - EPDs, version 2.0, (2021)

Declaration of Performance

Declaration of performance for Plafotherm steel according to Regulation (EU) No. 305/2011 Regulation on Construction Products

PCR Part A

Product category rules for building-related products and services. Part A: Calculation rules for life cycle assessment and requirements for the project report according to EN 15804+A2:2019, Institut Bauen und Umwelt e.V. (ed.), 2021, www.ibu-epd.com.

PCR: Metal ceilings

Product category rules for building-related products and services. Part B: Requirements For the environmental product declaration for metal ceilings,

version 1.6 Institut Bauen und Umwelt e.V. (ed.), 2021, www.ibu-epd.com.

Test report Lindner SE,

PM ceiling, testing of product emissions according to the AgBB/DIBt method for LMD metal ceiling panels, report no. 392-2019-00327601.

**Publisher**

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Programme holder**

Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 - 3087748 - 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Author of the Life Cycle
Assessment**

Lindner Group
Bahnhofstraße 5
94424 Arnstorf
Germany

Tel +49 872320 3809
Fax +49 872320 2323
Mail green.building@lindner-group.com
Web www.lindner-group.com

**Owner of the Declaration**

Lindner Group
Bahnhofstraße 29
94424 Arnstorf
Germany

Tel +49 (0) 8723 20 3679
Fax +49 (0) 8723 20 2323
Mail ceilingsystems@lindner-group.com
Web www.Lindner-Group.com