Lindner Heated/Chilled Metal Ceiling System – Plafotherm® E (Cu)

Environmental Product Declaration acc. to ISO 14021

Holder of the declaration

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Content of the declaration

Product information
Certification system DGNB
Certification system LEED
Certification system BREEAM
General information

Lindner | Building New Solutions

Product information

Product description

Plafotherm® E Heated/Chilled Metal Ceiling System
Heated and chilled metal ceiling system in closed version that offers installation space for service and disposal lines with its whole surface. The modular construction allows access to the ceiling void for maintenance works.
The substructure of the non-bearing metal ceiling panels is directly suspended from the raw ceiling or directly installed at it.
Plafotherm® heated/chilled ceilings are water-bearing surface temperature control systems based on the principle of thermal radiation. The temperature on the ceiling surface is reduced below the room temperature when the pipe frets applied on the rear side are streamed by cooled water. A natural radiant heat exchange with surfaces of the room below is created as well as smooth and completely natural convection. Only drinking water that remains in the heating-cooling circuit serves as cooling agent. Due to the low flow temperatures, these systems can be operated with regenerative energy sources, e.g. with a heat pump.

Application area

For the application inside of buildings with high climatic, structural-physical as well as architectural requirements.

Base materials

Base materials per m²/unit = 11.3 kg *)

System components	Material	Weight proportions [%]
Metal ceiling panel	Galvanised steel sheet	~ 45.0 %
Substructure	Galvanised steel sheet	~ 16.0 %
Cu-pipe fret	Copper	~ 16.0 %
Heat conducting profile	Aluminium	~ 22.0 %
Surface – Powder coating of visible substructure and metal ceiling panel	Polyester powder	< 1.0 %
Hotmelt adhesive	Base material: PUR	< 1.0 %
Acoustic tissue	Knitted fabrics area from glass fibre, polyester fibre, cellulose bounded with binder polyvinyl acetate and flame blocking salt free from halogen and grime pigment	< 1.0 %
Gasket strip	Polyolefin foamed material with flame protective agent and clad siliconized polyethylene foil	< 1.0 %

*) Calculation base: room size 10x10 m
panel size: 1250x400 mm, centre distance: 125 mm, hanger distance: 800 mm

Material explanation

Steel
All metal alloys whose main component is iron and whose content of carbon dioxide is between 0.02 % and 2.06 % are named steel.
The recycled content is approx. 25 % (Post-Consumer).

Aluminium
All metal alloys whose main component is pure aluminium with small parts of magnesium (0.35 to 0.6 %) and silicium (0.3 to 0.6 %), material EN AW 6060 T66 (AlMgSi 0.5 F 22) are named aluminium.
The recycled content is approx. 90 % (Post-Consumer).

Copper
All metal alloys whose main component is copper, chemical composition: Cu > 99.9 % and phosphor 0.015 to 0.04, material no. CW024A, are named copper.

Certification system

Lindner Group is member of DGNB
Deutsche Gesellschaft für Nachhaltiges Bauen
German Sustainable Building Council

Not listed characteristics do not apply to this product

Environmental Quality

ENV1.1	Life Cycle Impact Assessment	LCA data can be gathered from verified EPDs for LCA of Lindner products. ** Declaration number: EPD-TAI-20130183-ICG1-DE **Furthermore, project-related LCA data can be created promptly. If applicable, an additional expenditure of time and costs must be considered.
ENV1.2	Local Environment Impact	

Component	Weight proportion	VOC	GISCODE	Other
Metal ceiling panel from galvanised steel sheet	~ 45.0 %	-	-	-
Visible and hidden substructure from galvanised steel sheet	~ 16.0 %	-	-	without plumb, quicksilver, cadmium and chrome (VI)
Surface – Powder coating of visible substructure and metal ceiling panel: polyester powder	< 1.0 %		Giscode BS 10 is not used for powder varnishes	without plumb, quicksilver, cadmium and chrome (VI)
Cu-pipe fret	~ 16.0 %		-	-
Hotmelt adhesive	< 1.0%	0.0 g/l	-	-
Aluminium heat conducting profile	~ 22.0 %	-	-	-
Acoustic tissue	< 1.0 %	-	-	-
Gasket strip	< 1.0 %	-	-	-
Total	**100%**	5 µg/m³		

*Test measures showed a value of 5 µg/m³ = 0.005 mg/m³ after 28 days. The evaluation limit acc. to AgBB/DIBt is 1 mg/m³.

ENV1.3	Responsible Procurement	The product Plafotherm® E contains no timber, timber-based products or timber-based materials.
ENV2.1	Life Cycle Impact Assessment – Primary Energy	LCA data can be gathered from verified EPDs for LCA of Lindner products. ** Declaration number: EPD-TAI-20130183-ICG1-DE **Furthermore, project-related LCA data can be created promptly. If applicable, an additional expenditure of time and costs must be considered.
ENV2.2	Drinking Water Demand and Waste Water Volume	The drinking water used for the heating and cooling mode is always supplied to the circuit.

Economic Quality

ECO1.1	Life Cycle Cost	Lindner metal ceilings are manufactured to the highest international standards. Metal ceilings can be expected to remain durable for up to 50 years (acc. to BBSR table, code no. 353 211, state 11/2011, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development). If used as suspended ceiling lining, no dismantling or costs for demolition incur for this product. Due to the internal return system, it is guaranteed that components are not disposed but flow into the recycling circuit.
ECO2.1	Flexibility and adaptability	Every ceiling panel can be dismantled, moved or replaced individually. The substructure of the non-bearing metal ceiling panels is suspended from the raw ceiling or directly installed at it.

Sociocultural & Functional Quality

SOC1.1	Thermal Comfort	A pleasant room atmosphere is influenced by air and radiation temperature, air humidity and air movement as well as room air quality. Low air movement (draught) as well as heat absorption and heat loss by means of radiation is generally considered comfortable. A heated and chilled ceiling basically works with the radiation principle. It is construed according to the required temperature limits.
SOC1.2	Indoor Air Quality	A TVOC value of 5 µg/m³ was measured in the AgBB measurement. Due to the low value, the Lindner metal ceiling positively contributes to the indoor air quality. It is many times lower than the limit value of 500 µg/m³.
SOC1.3	Acoustic Comfort	Suspended ceilings are ideally suitable for the improvement of room acoustics. Due to perforated metal ceiling panels as well as acoustically effective inlays, sound absorption values up to 0.8 can be achieved, depending on the execution. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654.

SOC1.4	Visual Comfort	A Lindner metal ceiling covers installations in the ceiling void without obstructing the access to it. The ceiling serves as visual highlight according to project-related demands in many different colours, perforations and shapes. Plafotherm® E heated/chilled metal ceilings can be adapted to the building shape and incorporate axes.
SOC1.5	User Control	The surface temperature can be regulated room by room if required.

Technical Quality

TEC1.5	Cleaning and Maintenance	The powder-coated surfaces are easy to clean. The simple dismantling of metal ceiling panels enables an uncomplicated access to the ceiling void for maintenance works.
TEC1.6	Deconstruction and Disassembly	Lindner metal ceiling systems are produced in such a way that they can be installed on site with as little waste as possible. Waste that cannot be avoided on site is put into recycling processes by means of waste management facilities. Every ceiling panel can be dismantled and replaced individually and non-destructively. The substructure can as well be dismantled non-destructively.

Process Quality

PRO1.5	Documentation for Facility Management	Utilisation, maintenance and care instructions are created to the usual extent and can be provided.

PRO2.1	Environmental Impact of Construction	The compliance with project-related requirements regarding low-waste, low-noise and low-dust site as well as measures for soil and ground water protection are ensured by specialised in-house departments. An appropriate verification can be created and implemented on request by specialised personnel. Due to the delivery of finished ceiling elements that do not have to be processed on site, the product contributes to a noise-free and dust-free site. The packaging is selected project-related to produce as little waste as possible.
PRO2.2	Construction Quality Assurance	All documents relevant for project documentation can be provided.

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Certification system LEED

Not listed credits do not apply for this product

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Sustainable Sites

Construction Activity Pollution Prevention	The compliance with project-related requirements of an ESC plan is ensured by specialised in-house departments. A complete ESC plan can be created and implemented on request by specialised personnel.

Materials and Resources

Construction and Demolition Waste Management Planning	Waste that cannot be avoided on site is preferentially put into recycling processes by means of waste management facilities. A complete CWM plan can be created and implemented on request by specialised personnel.
Building Life Cycle Impact Reduction	We can provide product-specific data for the assessment of the building. Due to the long-life cycle of ceiling systems, Lindner guarantees a reuse of products over the whole useful life.
Building Product Disclosure and Optimization – Environmental Product Declaration	LCA data can be gathered from verified EPDs for LCA of Lindner products. ** Declaration number: EPD-TAI-20130183-ICG1-DE **Furthermore, project-related LCA data can be created promptly. If applicable, an additional expenditure of time and costs must be considered.

Building Product Disclosure and Optimization – Sourcing of Raw Materials

Component	Weight proportion	Recycled content		
		Pre-Consumer	Post-Consumer	Production site
Metal ceiling panel from galvanised steel sheet	~ 45.0 %	0%	25%	Arnstorf
Visible and hidden substructure from galvanised steel sheet	~ 16.0 %	0%	25%	Arnstorf
Cu-pipe fret	~ 16.0 %	0%	75%	Arnstorf
Aluminium heat conducting profile	~ 22.0 %	0 %	90%	Arnstorf
Surface – Powder coating of visible substructure and metal ceiling panel: polyester powder	< 1.0 %	0%	0%	Arnstorf
Hotmelt adhesive – Base material PUR	< 1.0 %	0%	0%	
Acoustic tissue	< 1.0 %	0%	0%	
Gasket strip	< 1.0 %	0%	0%	
Total	**100%**	**47.1 %**		

The product Plafotherm® E contains no timber-based materials. Thus, a FSC proof is not necessary.

Building Product Disclosure and Optimization – Material Ingredients

The aim of the **REACH** regulation (**R**egistration, **E**valuation and **A**uthorization of **CH**emicals) is to capture materials produced and used in the EU and to determine and record their impact on health and environment.

As manufacturer of products, Lindner fulfils the obligations towards the EU chemical directive “REACH” and created its own REACH declaration.

Construction and Demolition Waste Management

The compliance with project-related requirements regarding low-waste, low-noise and low-dust site as well as measures for soil and ground water protection are ensured by specialised in-house departments. An appropriate verification can be created and implemented on request by specialised personnel. Due to the delivery of finished ceiling elements that do not have to be processed on site, the product contributes to a noise-free and dust-free site. The packaging is selected project-related to produce as little waste as possible.

Indoor Environmental Quality

Low Emitting Materials

A TVOC value of 5 µg/m³ was measured in the AgBB measurement. The use of coating materials on site is omitted as the ceiling panels are coated in factory.

Construction Indoor Air Quality Management Plan	The compliance with project-related requirements of an IAQ plan is ensured by specialised in-house departments. A complete IAQ plan can be created and implemented on request by specialised personnel.
Indoor Air Quality Assessment	A TVOC value of 5 µg/m³ was measured in the AgBB measurement Due to the low value, the Lindner metal ceiling positively contributes to the indoor air quality.
Thermal Comfort	A pleasant room atmosphere is influenced by air and radiation temperature, air humidity and air movement as well as room air quality. Low air movement (draught) as well as heat absorption and heat loss by means of radiation is generally considered comfortable. A heated and chilled ceiling basically works with the radiation principle. It is construed according to the required temperature limits.
Acoustic Performance	Suspended ceilings are ideally suitable for the improvement of room acoustics. Due to perforated metal ceiling panels as well as acoustically effective inlays, sound absorption values up to 0.8 can be achieved, depending on the execution. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654.

Certification system

BREEAM®

Not listed characteristics do not apply to this product

bre Management

Man 01	Sustainable procurement	The product Plafotherm® E heated/chilled metal ceiling contains no timber-based materials.
Man 02	Responsible construction practices	Generally, all companies of the Lindner Group largely fulfil the requirements of an environmental management system. For companies of the Lindner Group certified according to ISO 14001, ISO 50001, SCC**- and OHSAS, further specific environmental and safety targets are defined in conjunction with the annual management review. The implementation of environmental protection and relevant legal regulations are defined in the Lindner intern guideline “Environmental protection”.
Man 03	Construction site impacts	The compliance with project-related requirements regarding low-waste, low-noise and low-dust site as well as measures for soil and ground water protection are ensured by specialised in-house departments. An appropriate verification can be created and implemented on request by specialised personnel.
Man 05	Life cycle cost and service life planning	Lindner products have a long life expectancy *(due to the raw materials, production processes and high production quality).* Moreover, certain products can systematically be dismantled and reused after small processing (C2C). Metal ceilings can be expected to remain durable for up to 50 years (acc. to BBSR table, code no. 353 211, state 11/2011, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development). If used as suspended ceiling lining, no dismantling or costs for demolition incur for this product.

bre Health and Wellbeing

Hea 01	Visual comfort	Due to the high light reflection of approx. 82% of a white (9010 acc. to Lindner) powder-coated metal ceiling, the incident daylight is transferred to the room.

Hea 02	Indoor air quality	Lindner metal ceiling systems are made from materials that show almost no emissions of e.g. VOC and formaldehyde. Test chamber measurements according to the AgBB test method are available as proof. TVOC (AgBB/DIBT) C_6-C_{16}: after 3 days 6.7 µg/m³
Hea 03	Thermal comfort	A pleasant room atmosphere is influenced by air and radiation temperature, air humidity and air movement as well as room air quality. Low air movement (draught) as well as heat absorption and heat loss by means of radiation is generally considered comfortable. A heated and chilled ceiling basically works with the radiation principle. It is construed according to the required temperature limits.
Hea 05	Acoustic performance	Suspended ceilings are ideally suitable for the improvement of room acoustics. Due to perforated metal ceiling panels as well as acoustically effective inlays, sound absorption values up to 0.8 can be achieved, depending on the execution. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654.

Energy

Ene 01	Energy efficiency	LCA data can be gathered from verified EPDs for LCA of Lindner products. ** Declaration number: EPD-TAI-20130183-ICG1-DE **Furthermore, project-related LCA data can be created promptly. If applicable, an additional expenditure of time and costs must be considered.

Materials

Mat 01	Life cycle impacts	We can provide product-specific data for the assessment of the building. Due to the long-life cycle of ceiling systems, Lindner guarantees a reuse of products over the whole useful life.
Mat 03	Responsible sourcing of materials	Lindner metal ceiling systems are made from materials with a high recycling content. The recycling content of scrap metal of the main component steel is approx. 25% (Post-Consumer), depending on the required quality of used material components. Local suppliers are preferred. The company Lindner is certified according to the environmental management system according to DIN EN ISO 14001.

Waste		
Wst 01	Construction waste management	Lindner metal ceiling systems are produced in such a way that they can be installed on site with as little waste as possible. Waste that cannot be avoided on site is put into recycling processes by means of waste management facilities.
Pollution		
Pol 01	Impact of refrigerants	Only drinking water that remains in the heating-cooling circuit serves as cooling agent.

General information

CO_2 & Waste

In order to reduce waste from demolition and building measures, waste streams are dedicated to recycling processes. The verification can be done by the company Lindner.

The used transport packaging (timber, cardboard, foils) can be recycled. Where possible, they are collected separately and supplied to a proper recycling (packaging regulation).

Lindner system products are delivered to the construction site in ready-for-assembly condition. This means that no work or possibly minor work has to be done on the product. In this way, only little waste or no waste is generated on site. The used transport packaging can in large part be recycled. Only certified waste management companies are entrusted with the disposal conforming to the law for waste that cannot be avoided.

Vision 2020: Co_2 neutral and waste-free location

Less is more. Much less is our aim!

The vision: It is our aim to further develop Lindner production sites in CO_2 neutral and waste-free locations. We derived concrete aims from the vision to make an entrepreneurial contribution to the reduction of CO_2 emissions as well as all commercial waste.
The analysis of major pollutants is of course given top priority.

Environmental Management – Acting sustainably, saving resources

For Lindner, responsibility towards humans and environment is as important as the quality of the products. For this reason, an environmental management system acc. to DIN EN ISO 14001 is established company-wide and largely certified.

Our central environment programme comprises the responsible and sustainable use of resources, the reduction of CO_2 emissions and a continuous improvement process to achieve our environmental objectives. An integrated management system evaluates the production of Lindner products regularly according to ecological aspects and adapts the processes to current standards.

Our principles comprise an active waste management in all business units – from waste prevention concept to waste balance. We also keep an eye on preceding stages of the value added chain. Environmental aspects also play a major role in the selection of our suppliers.

Energy Management

Towards an environmentally friendly future.

The national and international supply situation asks for a targeted and effective use of resources and environmentally friendly forms of energy. At Lindner, an energy management system based on DIN EN ISO 50001 controls the procurement of energy sources centrally for all locations as well as their transformation, delivery and distribution to affiliated companies.
Energy saving and the change of fossil and nuclear energy to ecological sources of energy are the core of all measurements to implement energetic business objectives. Thus, every single employee is aware of its role in sustainable, operative project management. Due to many small improvements, for example the improvement of compressed air loss, the utilisation of waste heat and targeted light control, we could achieve massive energy savings in the last years. Especially at future-oriented investments, for example the installation of new production plants, we pay attention to the implementation of resource-saving solutions.