ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Knauf Ceiling Solutions GmbH & Co. KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KNA-20220022-IBD2-EN
Issue date	30.03.2022
Valid to	29.03.2027

Mesh Ceiling Membranes (1.5 mm)

Knauf Ceiling Solutions GmbH & Co. KG

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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1. General Information

Knauf Ceiling Solutions GmbH & Co. KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-KNA-20220022-IBD2-EN

This declaration is based on the product category rules:

Metal ceilings, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

30.03.2022

Valid to

29.03.2027

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

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Mesh Ceiling Membranes (1.5 mm)

Owner of the declaration

Knauf Ceiling Solutions GmbH & Co. KG
Elsenthal 15
94481 Grafenau
Germany

Declared product / declared unit

1 m² average mesh ceiling membrane for indoor application with a thickness of 1.5 mm and a surface weight of 4.28 kg/m²

Scope:

This document refers to average mesh ceiling membranes with a thickness of 1.5 mm and a surface weight of 4.28 kg/m².

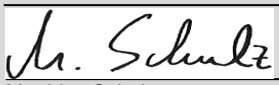
The products are manufactured for Knauf Ceiling Solutions GmbH & Co. KG at Italfim in Pedrengo (Italy).

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+A2. 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



Matthias Schulz,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Knauf Ceiling Solutions mesh ceiling systems are made from punched and formed galvanised steel, as comprehensive construction kits or individual components and industrially manufactured. The construction kit comprises the visible membrane and the substructure. The membranes (tiles, panels, bulkheads) are offered with various edge details and delivered with a range of mesh patterns, fulfilling the functional requirements. The substructure is either exposed or concealed.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011* (CPR) applies. The product needs a declaration of performance taking into consideration *EN 13964:2014*, *suspended ceiling requirements and test methods* and the CE-marking and UKCA-marking (in the UK).
For the application and use the respective national provisions apply.

2.2 Application

The described meshsolutions are typically used internally as design elements, to cover the ceiling void, as well as acoustic solutions for sound absorption and sound attenuation, for fire resistance and against fire spreading, for cleanrooms and high hygiene requirements.

2.3 Technical Data

Mesh membranes are regulated by *EN 13964* and have corresponding labelling and declaration of performance.
The following data provide an overview of results:

Constructional data

Name	Value	Unit
Grammage	4.28	kg/m^2
Release of formaldehyde (EN 13964)	E1	-
Durability class (EN 13964)	C	-

Further characteristics according to the PCR are not relevant for this product.

The performance data of the product, with respect to its essential characteristics, is in accordance with the declaration of performance according to *EN 13964:2014*, *suspended ceiling requirements and test methods*.

2.4 Delivery status

The mesh ceiling systems, construction kits and components are produced in individual module sizes and can be supplied with or without substructures.
Packaging is usually on pallets and/or in cardboard.

2.5 Base materials/Ancillary materials

Name	Value	Unit
Galvanised steel	> 95.5	%
Surface coating	< 4.5	%

1) 'This product contains substances listed in the *candidate list* (08.07.2021) exceeding 0.1 percentage by mass': No.

2) 'This product contains other carcinogenic, mutagenic, reprotoxic (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 it has been 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

The system components for mesh ceilings are manufactured in a continuous manufacturing process. The sheet steel comes in coils, gets expanded, afterwards cut to size, punched, formed and powder-coated after the cleaning process. Punching waste is gathered, collected by local disposal companies, and redirected to the recycling centres. All production steps are carried out in accordance with the requirements and test guidelines outlined in *EN 13964*.

The manufacturing plant is certified according to *ISO 9001*.

2.7 Environment and health during manufacturing

Manufacturing conditions do not demand any particular health protection measures with the exception of those designated by the authorities for special working areas, e.g., high-visibility vests, ear protection, safety shoes.
The threshold limit values are not exceeded at any point in the production process. Waste emissions generated during production are cleaned in accordance with statutory requirements. Emissions are below those outlined in the Technical Guidelines governing Air. Water/ground: No contamination of water or soil occurs. Noise-intensive plant components such as mesh expansion lines are isolated accordingly by structural measures.

2.8 Product processing/Installation

There are no recognised systemic hazards associated with the installation of ceiling membranes. Mesh ceiling membranes are suspended by a substructure.
Installation must be carried out by trained personnel. Workers should wear appropriate personal protective equipment. Equipment such as gloves and goggles are recommended to prevent skin irritation.

2.9 Packaging

The membranes are packaged in cardboard boxes, panels and bulkheads in wooden crates. These packages lie on chemically untreated wooden pallets and are easily separable. The pallets are wrapped with polyethylene stretch film. Film, paper and wood can be recycled in the usual ways.

2.10 Condition of use

Long service life is based on regular maintenance, care and repair of the product. When handled properly, the mechanical and structural physical properties of the mesh membrane remain intact throughout its entire service life. Generally, the material composition of the product does not alter during the period of use.

2.11 Environment and health during use

There are no known interactions between the product, the environment and health. Volatile organic compounds are below the valuation limit.

2.12 Reference service life

The service life of the mesh membranes is for more than 50 years, depending on the area of use, exposure and state of maintenance. Within the framework of the conditions of use, no ageing effects are to be expected apart from visual discolouration caused by air circulation.

2.13 Extraordinary effects

Fire

The declared products are classified in the fire reaction class

A2-s1, d0 according to *EN 13501-1*. This means that they are "non-combustible" according to the German building authority designation (and also many other European countries) with negligible smoke development and no burning droplets in the event of a fire.

Fire reaction

Name	Value
Building material class	A2
Burning droplets	s1
Smoke gas development	d0

Water
No environmental influences are known in the case of unforeseen water ingress. The resistance of the ceiling system following the impact of water is dependent on the corrosion protection class in which the ceiling system is classified.

Mechanical destruction
In the case of mechanical destruction, all substances remain bound. It can be assumed that in the case of coated ceilings, possible paint splinters arise in such small volumes that no negative effects are incurred by the environment.

2.14 Re-use phase
The mesh ceiling systems can be removed and re-used without damaging the product. Mesh membrane components and substructure components made of steel can be redirected to material recycling.

2.15 Disposal
In accordance with the Waste Index Act (*AVV*) and the *European Waste Catalogue (EWC)*, the waste key for steel as a component of mesh ceiling systems made of steel is: 17-04-05 – Iron and steel.

2.16 Further information
Further information at www.knaufceilingsolutions.com

3. LCA: Calculation rules

3.1 Declared Unit
This EPD refers to a declared unit of 1 m² of average mesh ceiling membrane with a thickness of 1.5 mm (Standard white RAL 9010) and a surface weight of 4.28 kg/m².

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Grammage	4.28	kg/m^2

The substructure is not part of this EPD.

The mesh ceiling membranes are produced under different brand names, for Knauf Ceiling Solutions at Italfim in Pedrengo (IT). The declared product represents an average based on the production volume.

Knauf Ceiling Solutions mesh ceiling membranes can be specifically configurated based on the customer's need resulting in more than 20 standard products. The declared unit, therefore, refers to a representative product sold in large quantities. Products are available in various pattern designs such as RB35 and RB55 and further mesh patterns. The declared average results out of the weighting of the products RB35 and RB55 with a steel gauge of 1.5 mm.

As the mass of steel represents the decisive factor in the product's environmental profile, a linear correlation of product mass and environmental impact is to be expected. Thus, the recalculation for specific products based on the product mass is possible.

3.2 System boundary
The life cycle assessment of average mesh ceiling membranes includes a cradle-to-gate analysis of the products' environmental impacts with modules C1–C4 and module D (A1–A3, + C + D). Subsequent life cycle phases are part of the analysis:

Module A1-A3 | Production stage
The production stage includes the upstream burdens of raw material supply, their transports and the manufacturing plant of Italfim located in Pedrengo (IT). The production of mesh ceiling membranes includes punching and trimming, powder coating and packaging. Main raw material inputs, therefore, refer to steel and paint for powder coating. The production site in Pedrengo is supplied with electricity from the Italian grid as well as the site's own photovoltaic plant.

The packaging of the products is considered in this stage.

Module C1 | Deconstruction and demolition
Disassembly of the product is done either manually or using smaller tools. Referring energy demand is considered to be negligible.

Module C2 | Transport to disposal
The transport to the disposal of the material is estimated declaring a 50 km radius to the disposal. In reality, this scenario may vary depending on the actual location of deconstruction and referring waste treatment.

Module C3 | Waste processing
Regarding the steel fraction, the material flow reaching module D for recycling is declared as material for recycling in Module C3. Environmental impacts resulting from the grinding and sorting of steel scrap are not included. In addition, a loss rate of 5 % of the processed material is assumed. 95 % of the material can potentially be recycled.

Module C4 | Disposal
Module C4 refers to the emissions from the disposal of the losses from waste processing of lost steel. The chosen scenario, therefore, includes the environmental burdens of landfilling of 5 % of the mesh material.

Module D | Benefits and loads beyond the system boundary
Module D declares the recycling of the recovered steel (95 % of the product). It includes the potential for substituting primary steel.

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

3.4 Cut-off criteria
The LCA model covers all available input and output flows, which can be represented based on robust data. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented

accordingly. Only data with a contribution lower than 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cut-off material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows.

3.5 Background data

This study uses generic background data for the evaluation of upstream environmental impacts from *GaBi* databases (*GaBi* 10; 2021.2).

3.6 Data quality

Data collection is based on product-specific questionnaires. It follows an iterative process clarifying questions via e-mail, telephone calls or in personal/web meetings. Intensive discussions between Knauf Ceiling Solutions and Daxner & Merl results in an accurate mapping of product-related material and energy flows. This leads to a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044*.

The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *GaBi* background datasets refer to the latest versions available (not more than ten years old) and are carefully chosen.

3.7 Period under review

Foreground data were collected for the production year 2020. The data are based on the volumes produced on an annual basis.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Italy

3.9 Allocation

For foreground data, the calculation of specific input quantities is based on the annual production quantity (square meter), e.g. for energy input, packaging, etc.. The steel input on product level was calculated based on the mass of steel in the output.

Background data for the supply chain of the steel are published by worldsteel (*GaBi*-databases). Representing an average of the global steel industry, worldsteel background datasets ensure a good geographical and technological representation of steel production. All worldsteel datasets are modelled according to the worldsteel LCA methodology, applying the system expansion approach for the allocation of co-products from steel production. As a result, these datasets are not fully compliant with the requirements of the *EN 15804*, which emphasises the so-called partitioning approach applying a subdivision of environmental impacts according to their physical relationships. Due to a lack of global data calculated based on the partitioning approach, the worldsteel datasets refer to the closest representation of steel production in this context. Additionally, the deviation of the results of the two allocation approaches is to be expected under 5 % according to *Sphera*. Scrap input is regarded as burden-free.

3.10 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 background database was used to calculate the LCA (GaBi 10; 2021.2).

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.1	kg C

The declared product does not contain biogenic carbon.

End of life (C1-C4)

Name	Value	Unit
Collected separately (steel)	4.28	kg
Recycling 95 %	4.07	kg
Landfilling 5 %	0.21	kg

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

Name	Value	Unit
Net flow of steel scrap	3.85	kg/m²

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 m² average mesh ceiling membrane with a thickness of 1.5 mm and a surface weight of 4.28 kg/m².

Disclaimer:
EP-freshwater: This indicator has been calculated as 'kg P eq' as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR 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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² mesh ceiling membrane (1.5 mm; 4.28 kg/m²)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	1.39E+01	0	1.29E-02	0	1.04E-02	-6.54E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	1.47E+01	0	1.29E-02	0	1.05E-02	-6.54E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	-7.94E-01	0	-1.52E-05	0	-1.07E-04	-3.72E-03
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	5.6E-03	0	1.05E-04	0	1.05E-05	-1.43E-04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	3.64E-12	0	2.53E-18	0	2.47E-17	-1.56E-14
Acidification potential of land and water (AP)	mol H^+ eq	3.81E-02	0	4.24E-05	0	3.33E-05	-1.16E-02
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.41E-05	0	3.8E-08	0	7.95E-09	-1.42E-06
Eutrophication potential aquatic marine (EP-marine)	kg N eq	9.32E-03	0	1.95E-05	0	8.26E-06	-2.24E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	9.94E-02	0	2.18E-04	0	9.07E-05	-2.27E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	3.03E-02	0	3.83E-05	0	2.6E-05	-1E-02
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	5.93E-05	0	1.13E-09	0	7.21E-10	-1.62E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	1.75E+02	0	1.7E-01	0	1.52E-01	-6.4E+01
Water use (WDP)	m^3 world eq deprived	2.08E+01	0	1.19E-04	0	-1.24E-04	-1.78E+01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² mesh ceiling membrane (1.5 mm; 4.28 kg/m²)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.33E+01	0	9.81E-03	0	1.1E-02	4.02E+00
Renewable primary energy resources as material utilization (PERM)	MJ	8.02E+00	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	2.13E+01	0	9.81E-03	0	1.1E-02	4.02E+00
Non renewable primary energy as energy carrier (PENRE)	MJ	1.72E+02	0	1.71E-01	0	1.52E-01	-6.4E+01
Non renewable primary energy as material utilization (PENRM)	MJ	3.17E+00	0	0	-3.01E+00	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	1.75E+02	0	1.71E-01	-3.01E+00	1.52E-01	-6.4E+01
Use of secondary material (SM)	kg	4.76E-01	0	0	0	0	3.85E+00
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	4.97E-01	0	1.12E-05	0	1.57E-06	-4.16E-01

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² mesh ceiling membrane (1.5 mm; 4.28 kg/m²)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.62E-07	0	9.01E-12	0	2.7E-11	1.4E-08
Non hazardous waste disposed (NHWD)	kg	4.26E-01	0	2.68E-05	0	2.14E-01	8.16E-01
Radioactive waste disposed (RWD)	kg	1.83E-03	0	3.1E-07	0	1.73E-06	6.94E-06
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	4.07E+00	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² mesh ceiling membrane (1.5 mm; 4.28 kg/m²)

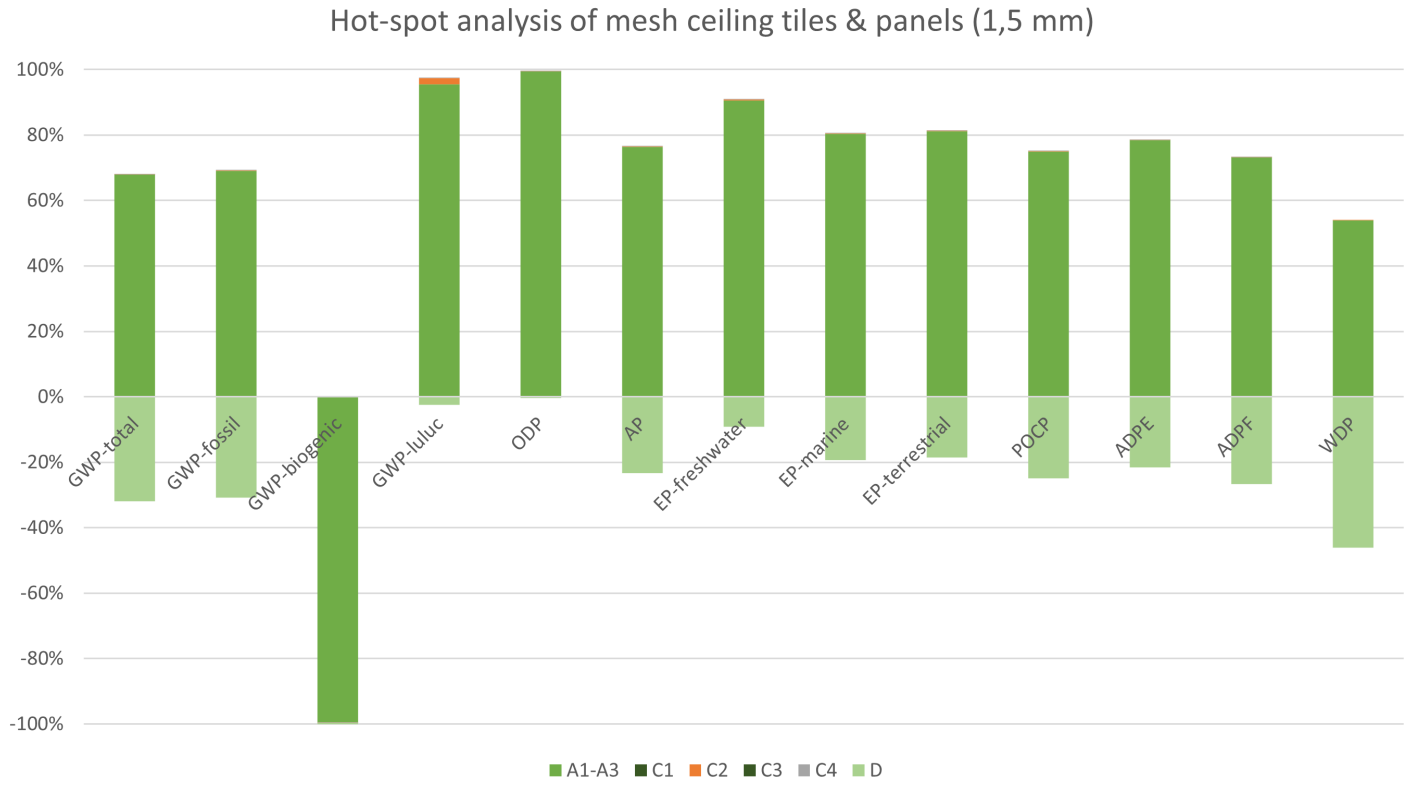
Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	5.32E-07	0	2.41E-10	0	3.61E-10	-2.21E-07
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	4.28E-01	0	4.54E-05	0	2.49E-04	1.21E-01
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	3.1E+01	0	1.26E-01	0	4.48E-02	-4.13E+00
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	6.32E-09	0	2.56E-12	0	5.2E-12	-3.55E-09
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	1.91E-07	0	1.5E-10	0	5.22E-10	-7.89E-08
Soil quality index (SQP)	SQP	1.55E+02	0	5.86E-02	0	1.12E-02	9.59E-01

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 m² of average mesh ceiling membrane with a thickness of 1.5 mm and a surface weight of 4.28 kg/m² produced for Knauf Ceilings Solutions at Italfim in Pedrengo (IT).



The comparison of the products' life cycle phases shows a clear dominance of the production phase (modules A1-A3).

Module C4 declares impacts from landfilling of steel losses (assumption: 5 % of steel in the product) making up a minor fraction of the total environmental impact of the products.

As a result of material recyclability, the steel fraction removed at the end of life can substitute primary steel. Module D shows the recycling potential of 95 % of the steel in the product at the end of its life. This results in credits from the substitution of primary steel.

When it comes to the environmental impacts in the production phase of the mesh membranes, the upstream supply chain of the steel coils represents the major hot spot in all of the impact categories considered, except for potential ozone depletion.

Furthermore, the coating has an observable influence on total global warming potential (GWP-total) as well as abiotic depletion potential for fossil resources (ADPF).

Knauf Ceiling Solutions mesh ceiling membranes can be specifically configurated based on the customer's need resulting in more than 20 standard products. The conversion of the LCA results to other material thicknesses than the declared reference thickness is principally proportional to the surface weight. As a result, the variability of the environmental impacts

of single products shows a direct correlation to the steel content of the product.

7. Requisite evidence

The relevant paragraph of the suspended ceiling product standard (*EN 13964*) requires formaldehyde emissions declaration only for products for which a formaldehyde-containing compound is used during the manufacturing process. Mesh ceilings covered by this EPD do not contain any formaldehyde-containing compounds.

8. References

Standards

EN 13501-1
EN 13501-1:2019, Classification of construction products and building elements according to their reaction to fire, Part 1: Classification with the results of tests on the reaction to fire of construction products.

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

EN 15804
EN 15804:2012+A2:2019, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 9001
EN ISO 9001:2015-11, Quality management systems - Requirements.

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

ISO 14044
EN ISO 14044:2006-10, Environmental management – Life cycle assessment – Requirements and guidelines.

Further References

AVV
AVV, German List of Wastes Ordinance. Regulation on the European Waste List.

Candidate list
List of substances of very high concern (SVHC) for authorisation (ECHA Candidate List), 25.06.2020, published under Article 59(10) of REACH. Helsinki:
European Chemicals Agency.

European Waste Catalogue
Guidance on classification of waste according to EWC-Stat categories. Supplement to the Manual for the Implementation of the Regulation (EC) No 2150/2002 on Waste Statistics. Commission of the European Communities, EUROSTAT.

GaBi
GaBi 10, Software-System and Database for Life Cycle Engineering. DB 2021.2. Stuttgart, Echterdingen: Sphera, 1992-2021. Available at:
http://documentation.gabi-software.com

IBU 2021
Institut Bauen und Umwelt e.V.: Allgemeine Anleitung für das EPD--Programm des Institut Bauen und Umwelt e.V. (IBU). Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.
www.ibu--epd.com

Ordinance on Biocide Products
Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

PCR part A
Product category rules for building--related products and services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019. Version 1.1.
Berlin: Institut Bauen und Umwelt e.V., 2021.

PCR: Metal ceilings
Product category rules for building-related products and services. Part B: EPD requirements for metal ceilings. Version 1.7. Berlin: Institut Bauen und Umwelt e.V., 08.01.2019.

Publisher

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Daxner & Merl GmbH
Lindengasse 39/8
1070 Wien
Austria

+43 676 849477826
office@daxner-merl.com
www.daxner-merl.com

Owner of the Declaration

Knauf Ceiling Solutions GmbH & Co. KG
Elsenthal 15
94481 Grafenau
Germany

0049 8552 422 0
ceiling.solutions@knauf.com
www.knaufceilingsolutions.com