

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Hilti Aktiengesellschaft
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HIL-20230212-IBC3-EN
Issue date	01.09.2023
Valid to	31.08.2028

MT- System (Indoor) HILTI AG

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



1. General Information

HILTI AG

Programme holder

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

Declaration number

EPD-HIL-20230212-IBC3-EN

This declaration is based on the product category rules:

Connection, assembly and installation systems, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

01.09.2023

Valid to

31.08.2028



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



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

MT- System (Indoor)

Owner of the declaration

Hilti Aktiengesellschaft
Feldkircher Strasse 100
9494 Schaan
Liechtenstein

Declared product / declared unit

I.-Channel MT-40D / 1kg

Scope:

This document relates to the I.-Channel MT-40D ("MT-40D") as a representative product for the MT Indoor profile portfolio. The MT Indoor profile portfolio is a set of installation channels with 5 types of wall thickness – 1.2mm, 1.5mm, 1.75mm, 2mm and 2.75mm. Then the products are distinguished into size classes by shape and load performance. Each of these size classes are produced in 3 different lengths to accommodate intended use, which are 2 meters, 3 meters and 6 meters. The declared product for this EPD is MT-40D, with thickness of 2mm, because it is has the highest weight in the MT Indoor profile portfolio and therefore represents the worst case.

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	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Mrs Kim Allbury,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The MT-40 D is designed as a metallic substructure system that is made of thin-walled steel in C shape with surface coating for the indoor environment. The open side of the profile interfaces with other assembly components to form a flexible modular support substructure that is fastened to concrete or steel frame structures. They are horizontal and vertical members at different lengths that interconnect to form either 2D or 3D structures to carry the weight and hold in place mechanical, electrical, and piping services.

For the placing of the product on the market 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 the following European Technical Approval *ETA-21/0414* assessed based on EAD 280016-00-0602 'Products for installation systems for supporting technical building equipment'. For the application and use the respective national provisions apply.

The individual channel items under this product family and represented by MT-40D are as listed below:


Image	Designation
PROFILES - threaded rod trapeze	
	MT-10
	MT-15
	MT-20
	MT-40 T
	MT-40 T S

Image	Designation
PROFILES - strut / open C-channels	
	MT-30 MT-30 S
	MT-40 MT-40 S
	MT-40 V2 MT-40 V2 S
	MT-50 MT-50 S
	MT-60 MT-60 S

Image	Designation
PROFILES - double strut / open C-channels	
	MT-40D MT-40D S
	MT-40D V2 MT-40D V2 S
	MT-30D MT-30D S
	MT-50D MT-50D S
	MT-60D MT-60D S

Image	Designation
PROFILES – Unslotted channels	
	MT-50 U
	MT-50D U

2.2 Application

The MT-40D is developed to be fixed on base materials like concrete and steel frame structures to support the mechanical, electrical, and piping services so that their loads are transferred to the super structure of the building or facility. The product is intended to be used under dry indoor conditions for support:

- Pipes for the transport of fluids and gas
- Technical building equipment in general
- Components of fixed fire-fighting systems
- Electrical cable layouts
- Ventilating system layouts and equipment
- Flooring
- Other instrumentation

The profile flanges are turned at the end which makes it possible to force-fit the channels to specific channel system fixtures. Recesses in the form of oblong holes and round holes allow the use of fasteners and fixtures.

2.3 Technical Data

The following data complies with the dimension drawing provided in the Annexe A3 of *ETA-21/0414*.

Constructional data

Name	Value	Unit
Thickness of material	2	mm
Height of profile	85	mm
Width of profile	42.5	mm
Length of profile	6000.0	mm

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *ETA-21/0414* assessed based on *EAD 280016-00-0602* 'Products for installation systems for supporting technical building equipment'

2.4 Delivery status

The MT-40D is packaged in bundles of long goods, and each length types are bundled together with plastic straps then protected at the edges with wooden blocks. The declared MT-40D is packed in 25 piece-bundle of 6 meter lengths, constituting 150 meters per bundle in a delivery.

2.5 Base materials/Ancillary materials

Name	Value	Unit
Galvanized steel	100	%

The raw material used to produce the declared product MT-40D is galvanized steel according to the standard *EN 10346:2015*, weighing 2.039 kg per meter.

100% of the total material used is galvanized steel, produced via Blast Furnace - Basic Oxygen Furnace route. This usually contains approximately 25% of recycled material. Based on the most comprehensive market information and internal evaluations, the recycled content is around 98% pre-consumer and 2% post-consumer material. This may vary from steel supplier to steel supplier.

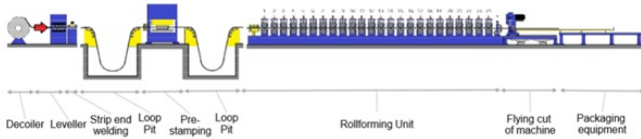
This product/article/at least one partial article contains substances listed in the *REACH SVHC candidate list* (date: 17.01.2023) exceeding 0.1 percentage by mass: NO.

This product/article/at least one partial article 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.

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 raw material for MT-40D is sourced from Linz, Austria and transported to Gresten, Austria via train. The profile is manufactured through cold-roll forming process of steel sheets which also includes cutting to designated lengths at the end of the line.



2.7 Environment and health during manufacturing

Hilti ensures that the suppliers implement a quality management system that meets the requirements of the *ISO 9001* or *ISO/TS 16949* standards or higher. Quality must be planned, ensured and documented using appropriate quality tools, e.g. Statistical process control (SPC) or failure mode and effects analysis (FMEA). The production and quality control according to the product specifications and approval specifications of the MT profile and its system components are ensured by an in-house quality control by Hilti. We expect the environmental management implemented by our suppliers to meet at least the *ISO14001* standard international regulations on forbidden substances.

The supplier for the MT-40D holds the following certifications:

- *ISO 9001*
- *ISO 45001*
- *ISO 14001*

2.8 Product processing/Installation

The MT-40D is supplied as a ready to install modular support system element provided with an Instruction for Use explaining the basic steps for installation. The MT-40D is either connected to a pre-positioned baseplate element that connects it to the building structure or is positioned directly to the building structure when delivered as a pre-assembled module. For fastening the connection point to the baseplate or other connection elements, a Hilti automated impact wrench tool

called SIW 6AT-A22 may be used to ensure anchoring or bolting at precise fastening torques. No special environmental protection measures need to be taken while installing the MT profiles.

2.9 Packaging

The MT-40D is delivered packed and strapped in bundles as long goods. The product type can be 2 meters, 3 meters or 6 meters in lengths. Same length types are bundled together in plastic straps (PE) and delivered on wooden blocks that protect the ends of the bundles. Depending on the usage case and user request, the channel can be cut into various lengths as requested and bundled or preassembled in customized conditions.

Both materials cannot be re-used, but they can be recycled. The PE plastic straps can be collected per recycle waste collection process and can be recycled through thermal recycling method.

2.10 Condition of use

All supplied materials are protected in the installed condition against external influences and designed for the service life of the respective construction. No risks can arise to water, air and soil if the products are used as designated in an indoor dry environment.

2.11 Environment and health during use

When used as designated, there is no impact on the environment or health.

2.12 Reference service life

The MT-40D has an assumed service life of 50 years in accordance with the *BBSR* table 'Service lives of Components for life cycle assessment according to BNB'. The practical service life can however be considerably longer and will depend on the specific installation situation and the product exposure scenario. The main factors influencing the period of use involve weathering as well as mechanical loads.

2.13 Extraordinary effects

Fire

The MT-40D is assessed in accordance with the European Assessment Document *EAD 280016-00-0502* for the following performance in safety in case of fire (*BWR2*).

Fire protection

Name	Value
Reaction to fire	Class A1
Pull-through resistance of channel back holes under fire exposure	ETA 23/0105
Bending characteristics under fire exposure	ETA 23/0105

Water

The MT-40D is comprised of galvanized steel. There are no environmental risks attributable to the effects of water except the product's own corrosion impact.

Mechanical destruction

In the event of mechanical destruction of the MT-40D, the profile assembly has to be replaced with a new set for the intended functional performance.

2.14 Re-use phase

The MT-40D cannot be re-used as a component for a modular support system, but the material can be recycled. All components of the described product can be returned and recycled into the material cycle.

2.15 Disposal

The MT-40D is disassembled from a building in which it has been installed by a series of unfastening processes. The interfaces with assembly components and with concrete or steel structures which have been originally fastened with a bolt and nut mechanism are untightened and separated back into individual product parts without change or deformation of the product material. These are fed into the recycling process in

accordance with the applicable disposal guidelines. The waste code for the profiles in accordance with the *European Waste Index is 17 04 05 (iron and steel)*.

2.16 Further information

Further information is available on the Hilti website: www.hilti.group

3. LCA: Calculation rules

3.1 Declared Unit

The declared product here is a mounting system from HILTI AG with the designation I. Channel MT-40D is a representative product of the MT Indoor portfolio. The declared unit refers to 1 kg of mounting system. The packaging, related to 1 kg of mounting rail, is additionally included in the calculation at 0.007 kg. The following table shows the data of the declared unit.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	kg
Declared unit	7850	kg/m ³
Mass reference	4,46	kg/m
conversion factor	4,46	

3.2 System boundary

Type of EPD: Cradle to factory gate with options. The following information modules are defined as system boundaries in this study:

Production stage (A1- A3):

- A1, raw material extraction,
- A2, transport to the manufacturer,
- A3, production.

End of life (C1- C4):

- C1, deconstruction/demolition,
- C2, transport,
- C3, waste treatment ,
- C4, disposal.

Reuse, recovery and recycling potential (D).

In order to accurately capture the indicators and environmental impacts of the declared unit, a total of 8 information modules are considered. The information modules A1 to A3 describe the material provision, the transport to the production site, as well as the production processes of the product itself.

The primary products are sourced from the European Union. The transport is carried out by lorry and train. The following flow charts illustrate the underlying production process.

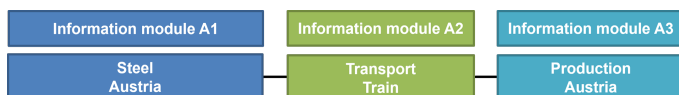


Illustration 1: Information module A1 to A3 of product

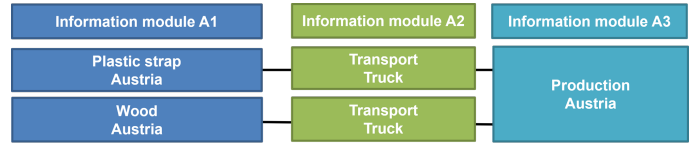


Illustration 2: Information module A1 to A3 of packaging

In the information modules C1 to C4, the deconstruction or demolition from the building, the transport to waste disposal, the waste treatment and disposal of the product are recorded. Furthermore, reuse, recovery and recycling potentials are reported in information module D.

3.3 Estimates and assumptions

A steel coil with zinc content was used for the MT-40D. The transport of the lubricant was not taken into account, as the mass fraction is small and the effect is estimated to be low.

3.4 Cut-off criteria

The transport for the lubricant was not taken into account as the mass fraction is small. The lubricant itself was taken into account in the production for transparency of production. The cut-off criterion according to EN 15804+A2 is otherwise not applied. All energy and mass inputs were taken into account.

3.5 Background data

The background data referred to in this study comes from *Sphera's LCA for Experts database*.

3.6 Data quality

For the preparation of the LCA, specific data from the Gersten plant in Austria of HILTI AG from the year 2022 were collected. The background data from the *LCA for Experts database* is from 2023 and therefore highly relevant. The data quality is rated as adequate.

3.7 Period under review

The input and output flows used in this calculation come from the annual average consumption from the year 2022.

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: Global

3.9 Allocation

The I.Channel MT-40D assembly system as a representative product of the MT Indoor portfolio is produced in Gresten, Austria. The data for input and output flows are taken from the year 2022, which corresponds to the annual average. The input and output flows used in this calculation were measured directly by the manufacturer for this production process and are shown in the following table. In order to calculate the net flows, the mass that is produced as production waste and used as external steel scrap is subtracted from the total mass of secondary material.

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 database referred to in this study is *LCA for Experts by Sphera*.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The declared product does not contain any biogenic Carbon.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.0018	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

End of life (C1-C4)

In information module C1, the demolition of the mounting system from the building is calculated. The demolition is carried

out with an electric screwdriver. The electrical energy consumption for the tool is assumed to be 0.003 MJ for the specified unit. The electricity consumption is calculated with a German electricity mix.

In information module C3, the waste treatment (sorting and pressing) of the steel is calculated.

Name	Value	Unit
Collected separately waste type waste type	1	kg
Recycling	1	kg

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

In Module D, a recycling rate of 85% is assumed (*world steel association*).

Name	Value	Unit
Recycling	0,85	kg

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = 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 kg I.Channel MT-40D

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO ₂ eq	2.83E+00	7.28E-04	4.41E-03	1.69E-02	0	-1.89E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO ₂ eq	2.83E+00	7.28E-04	4.39E-03	1.69E-02	0	-1.89E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO ₂ eq	1.64E-03	1.58E-07	0	4.11E-06	0	-1.02E-03
Global Warming Potential luluc (GWP-luluc)	kg CO ₂ eq	1.22E-03	1.06E-07	1.61E-05	2.12E-06	0	-6.72E-04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	2.15E-12	4.29E-17	7.63E-16	1.58E-10	0	-1.42E-12
Acidification potential of land and water (AP)	mol H ⁺ eq	6.53E-03	8.57E-07	1.69E-05	9.99E-05	0	-4.14E-03
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	2.83E-06	7.24E-11	1.02E-08	3.05E-07	0	-1.44E-06
Eutrophication potential aquatic marine (EP-marine)	kg N eq	1.65E-03	2.85E-07	8.07E-06	4.53E-05	0	-1.06E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	1.79E-02	3.1E-06	9.02E-05	4.92E-04	0	-1.14E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	5.47E-03	7.87E-07	1.53E-05	1.45E-04	0	-3.5E-03
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.13E-07	3.01E-12	3.09E-10	3.49E-09	0	-7.25E-08
Abiotic depletion potential for fossil resources (ADPF)	MJ	3.77E+01	1.07E-02	5.92E-02	2.29E-01	0	-1.68E+01
Water use (WDP)	m ³ world eq deprived	3.43E-02	4.08E-06	2.27E-05	4.76E-04	0	-2.2E-02

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg I.Channel MT-40D

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.56E+00	4.08E-05	3.83E-03	1.12E-03	0	-9.97E-01
Renewable primary energy resources as material utilization (PERM)	MJ	8E-02	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.64E+00	4.08E-05	3.83E-03	1.12E-03	0	-9.97E-01
Non renewable primary energy as energy carrier (PENRE)	MJ	3.77E+01	1.07E-02	5.92E-02	2.29E-01	0	-1.69E+01
Non renewable primary energy as material utilization (PENRM)	MJ	1.2E-01	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	3.79E+01	1.07E-02	5.92E-02	2.29E-01	0	-1.69E+01
Use of secondary material (SM)	kg	1.98E-01	0	0	0	0	0
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	1.67E-03	1.61E-06	3.48E-06	2.52E-05	0	-9.95E-04

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg I.Channel MT-40D

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	4.4E-10	5.45E-13	1.59E-13	5.05E-12	0	4.42E-11
Non hazardous waste disposed (NHWD)	kg	3.08E-02	2.81E-06	8.63E-06	2.6E-05	0	-2.3E-02
Radioactive waste disposed (RWD)	kg	1.88E-04	9.32E-07	6.19E-08	8.63E-06	0	-9.96E-05
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	6.3E-03	0	0	8.5E-01	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 kg I.Channel MT-40D

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND

Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND
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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 the soil, from 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 dominance analysis shows that the main causes of environmental impacts and indicators are to be found in information module A1. This shows the total global warming potential for material supply with approx. 55% and approx. 10% for production, related to all information modules.

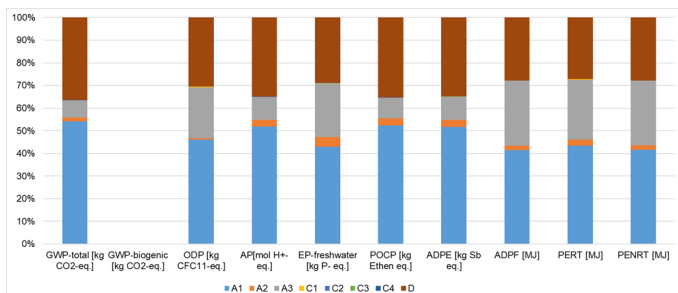


Illustration: Dominance analysis A1- A3

Looking at the material supply of the assembly system and the packaging in the de-tail, it becomes clear which raw materials contribute decisively to the respective environmental impacts and indicators.

The assembly system itself accounts for 98% of the total global warming potential in information module A1. Approx. 2% is accounted for by the plastic strap

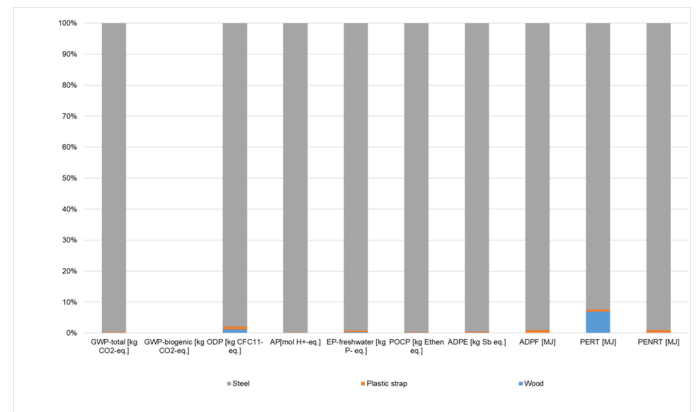


Illustration: Dominance analysis A1

7. Requisite evidence

The MT-40D may be used to constitute a supporting system to carry the load of cable trays and ladders but is not within scope of the *DIN EN 61537* which is specific to cable tray systems

and cable ladder systems. Therefore, requisite evidence pertaining to this standard shall not be given for this product.

8. References

Standards

EN 10346:2015

Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions

EN 15804

EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 61537

DIN EN 61537 VDE 0639:2007-09, Cable management
Cable tray systems and cable ladder systems
(IEC 61537:2006); German version EN 61537:2007

ISO 9001:2015

Quality management system

ISO 14001:2015

Environmental Management System

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 15686

Buildings and constructed assets

ISO 45001:2018

Occupational health and safety system

Further references

Candidate List of substances of very high concern for

**Authorisation**

European Chemicals Agency (ECHA), in accordance with Article 50(10) of the REACH regulation

European Technical Approval ETA-21/0414 Hilti Installation channels of MT system

assessed based on EAD 280016-00-0602 'Products for installation systems for supporting technical building equipment'

European Technical Approval ETA-23/0105**European Waste code**

in accordance with the European Waste Catalogue (EWC) (EWC 2014/955/EU) Commission Decision amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

IBU 2021

General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.de

PCR Part A

Institut Bauen und Umwelt e.V, Berlin (pub.): Product Category Rules for Construction Products from the range of

Environmental Product Declarations for Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, 202108

PCR Part B

Connection, assembly and installation systems, .10.2022

Regulation (EU) No. 305/2011 (CPR)

Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC Text with EEA relevance

Sphera

LCA for Experts: Ganzheitliche Bilanzierung
Leinfelden-Echterdingen; Sphera Solution GmbH (Hrsg.)
<http://www.gabi-software.com/deutsch/index/>

World steel association

<https://www.worldsteel.org/steel-topics/raw-materials/>



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