

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

|                          |                                      |
|--------------------------|--------------------------------------|
| Owner of the Declaration | Leviat GmbH                          |
| Publisher                | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder         | Institut Bauen und Umwelt e.V. (IBU) |
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| Issue date               | 11.08.2023                           |
| Valid to                 | 10.08.2028                           |

## HALFEN mounting and cast-in anchor channel systems Leviat GmbH

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## 1. General Information

### Leviat GmbH

#### Programme holder

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

#### Declaration number

EPD-HAL-20230141-IBC1-EN

#### This declaration is based on the product category rules:

Thin walled profiles and profiled panels of metal, 01.08.2021  
(PCR checked and approved by the SVR)

#### Issue date

11.08.2023

#### Valid to

10.08.2028



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### HALFEN mounting and cast-in anchor channel systems

#### Owner of the declaration

Leviat GmbH  
Liebigstrasse 14  
40764 Langenfeld  
Germany

#### Declared product / declared unit

The declared unit is one running metre of anchor channel with a weight of 2.69 kg per meter.

#### Scope:

The results declared in this document and its annexe are based on the product HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2,69 kg/m. The data in the annexe can be used to calculate all other variants of HALFEN cast-in anchor channel systems HTA-CE (HTA), HZA, and HZA-PS as well as HALFEN mounting channels HM, HZM with corresponding HS and HZS channel bolts (hook-head channel bolts and hammer-head channel bolts). HALFEN channels are produced from carbon or stainless steel. HALFEN cast-in anchor channels type HTA-CE, HZA, and HZA-PS as well as HALFEN mounting channels HM, HZM are produced at Leviat manufacturing plant Langenfeld/Germany and HALFEN cast-in anchor channels type HTA and HZA are produced at Leviat manufacturing plant Converse/USA. More than 97 % of the production happens in Germany.

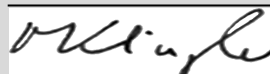
Specific data from the Leviat production facility in Langenfeld/Germany was recorded for the LCA. The results of this EPD can be used as approximation for the products mentioned above produced in the production facility of Converse/USA.

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 |



Matthias Klingler,  
(Independent verifier)

## 2. Product

### 2.1 Product description/Product definition

The product portfolio of HALFEN channels comprises cast-in anchor channels type HTA-CE/HTA, HZA, and HZA-PS as well as HALFEN mounting channels HM and HZM (welded or fixed to a substructure) with corresponding hook-head channel bolts and hammerhead channel bolts named as HS (for HTA-CE/HTA and HM) and HZS (for HZA and HZM).

HALFEN mounting and anchor channels comprise a C-shaped steel profile made of carbon or stainless steel with corresponding channel bolts; HALFEN mounting channels are also available in mill finish.

HALFEN cast-in anchor channels additionally consist of at least two mounted anchors on the channel back.

These anchors are formed as round bolt anchors or as I-anchors. The anchors are mounted on the channel back by riveting or welding process. Hot-dipped galvanized quality and stainless steel were considered for this EPD.

The inner section of the anchor channel is filled with PE foam which prevents an entry of concrete slurry during casting.

The various HALFEN channels differ in terms of mass in relation to running meters (1.08 kg/m- 12.19 kg/m). The declared reference product is the cast-in anchor channel system HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2.69 kg/m.

The LCA results can be applied to the following HALFEN channel types (mounting and cast-in anchor channels) by approximately scaling the mass to the specific product weight by using the data in the EPD and the annexe:

- HTA-CE / HTA / HM 28/15
- HTA-CE / HTA / HM 38/17
- HTA-CE / HTA / HM 40/25
- HTA-CE / HTA / HM 40/22
- HTA-CE / HTA 40/22P
- HTA-CE / HTA / HM 49/30
- HTA-CE / HTA / HM 50/30
- HTA-CE / HTA 50/30P
- HTA-CE / HTA / HM 54/33
- HTA-CE / HTA / HM 52/34
- HTA-CE / HTA / HM 55/42
- HTA-CE / HTA / HM 72/48
- HZA / HZM 41/22
- HZA / HZM 29/20
- HZA / HZM 38/23
- HZA / HZM 41/27
- HZA / HZM 53/34
- HZA / HZM 64/44
- HZA-PS 29/20
- HZA-PS 38/23
- HZA-PS 41/27
- HZA-PS 53/34
- HZA-PS 64/44

For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the *Regulation (EU) No. 305/2011* (CPR) applies. Products with an ETA need a declaration of performance and the CE-marking. For the application and use the respective national provisions apply.

### 2.2 Application

HALFEN mounting and anchor channels ensure the transfer of high loads to steel structures or in reinforced and unreinforced concrete components.

Mounting channels can be screwed or welded directly to the component or substructure.

Cast-in anchor channels are cast in concrete. Prior to the casting process, they are positioned in the component and fastened in their position to the formwork, to the reinforcement or by appropriate auxiliary construction. HALFEN channels serve towards subsequent fastening of fixtures.

Typical areas of application include curtain wall façades, fastening elevator installations in shafts, fastening of overhead wires, utility service pipes and cables in tunnels, fastening of handrails, platforms or seats, connection of precast concrete elements, supporting structures for pipes as well as applications in the area of installation technology.

### 2.3 Technical Data

All geometrical dimensions, product-specific parameters and the static load capacities of the different mounting and cast-in anchor channel systems HTA-CE/HTA/HM, HZA/HZM and HZA-PS are given in the following technical specifications:

#### HTA-CE/HTA/HM system:

ETA 09/0339

ETA 19/0438

ICC-ESR 1008 by ICC-ES

#### HZA and HZA-PS system:

ETA-20/1081

ETA-17/0728

ICC-ESR 4016 by ICC-ES

Some types of cast-in anchor channels HTA-CE/HTA, HZA and HZA-PS are also approved for fatigue cyclic tension loads, seismic loading and exposure to fire. Please refer to the mentioned approval documents for a detailed design of the anchor channel and other data related to the specific application condition.

#### Technical constructional data HTA-CE (HTA) 40/22

| Name                              | Value | Unit |
|-----------------------------------|-------|------|
| Minimum anchoring depth min h(ef) | 79    | mm   |
| Minimum edge distance c(min)      | 50    | mm   |
| Anchor channel width b(ch)        | 39.5  | mm   |
| Anchor channel height h(ch)       | 23    | mm   |
| Profile thickness t[nom]          | 2.6   | mm   |

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to the respective ETA.



## 2.4 Delivery status

HALFEN mounting and cast-in anchor channels and HALFEN channel bolts are packed separately and can also be ordered separately (further information available in section 2.9).

## 2.5 Base materials/Ancillary materials

| Name                               | Value | Unit |
|------------------------------------|-------|------|
| Channel profile: galvanized steel  | 82    | %    |
| Channel anchor: galvanized steel   | 6     | %    |
| Channel bolt set: galvanized steel | 11    | %    |
| Channel Filler: PE Foam            | 1     | %    |

The product weight with respect to the declared unit HTA-CE (HTA) 40/22 in hot-dipped galvanized quality is ca. 2.69 kg per metre (average value).

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

This product/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 materials needed for the final assembly of the HALFEN mounting and cast-in anchor channel systems HTA-CE/HTA/HM and HZA/HZA-PS/HZM are manufactured in-house or purchased from qualified vendors.

The HALFEN mounting and cast-in anchor channels are made of cold-formed or hot-rolled channel profiles. The cold-formed channel profiles are produced at LEVIAT plant Langenfeld/Germany. The anchors are mounted on the channel back by a riveting or welding process. HALFEN cast-in anchor channels with riveted bolt anchors are produced at LEVIAT plant Langenfeld/Germany. HALFEN cast-in anchor channels with welded I-anchors are produced at LEVIAT plant Langenfeld/Germany and LEVIAT plant Converse/USA. The anchor channels made of carbon steel are hot-dipped galvanised after the mounting process of the anchors. The filler is assembled after the galvanising process at LEVIAT plant Langenfeld/Germany or LEVIAT plant Converse/USA.

## 2.7 Environment and health during manufacturing

The criteria for environmental and energy management and the requirements for Health and Safety at work follow all statutory requirements and LEVIAT standards.

LEVIAT is certified according to *DIN EN ISO 50001* for all its 18 locations inside Europe, the United States of America and China by the SWEDAC Certification Institute International GmbH.

Since 1994 all former HALFEN locations are certified according to *ISO 9001 (ISO 9001:2015)*.

The continuous production and product quality according to the product specifications and approval specifications of HALFEN mounting and cast-in anchor channel systems are ensured by an in-process quality control by LEVIAT and by regularly third-party quality inspections by *MPA NRW* and *IAS* certified bodies. All types of waste such as steel, PE foam, wood (wood pallets) and packaging materials (cardboard) that are incurred in the production of the product or remain as excess material will be separated according to type and recycled.

## 2.8 Product processing/Installation

The HALFEN mounting channel systems HM/HZM and cast-in anchor channel systems HTA-CE/HTA/HZA/HZA-PS are supplied as a ready-to-install channel element. The HALFEN cast-in anchor channel is positioned in the building shell or in the precast concrete

plant during or alternatively after the reinforcement installation without the use of lifting equipment. The HALFEN cast-in anchor channel is positioned in the component and fastened in position to the formwork, to the reinforcement or by appropriate auxiliary construction and secured against slippage during subsequent concreting. After installation and casting, the foam is usually removed and disposed of.

HALFEN mounting channels are directly welded or screwed to the substructure.

No special environmental protection measures need to be taken while processing HALFEN mounting or cast-in channels.

## 2.9 Packaging

The HALFEN mounting and cast-in channels are delivered packed and strapped in bundles as long goods.

Up to a length of 1.05 metres, mounting and cast-in channels are delivered on Euro pallets or cardboard. Depending on the size and length, HALFEN channel bolts are packed in packing units of several sizes in cardboard boxes.

The individual packaging materials should be separated according to their type and recycled.

## 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.

## 2.11 Environment and health during use

When used as designated, there is no impact on the environment or health. No risks can arise to water, air and soil if the products are used as designated.

## 2.12 Reference service life

A service life of at least 50 years confirmed by approval procedures is applicable for HALFEN mounting and cast-in channel systems HM/HZM and HTA-CE/HTA/HZA/HZA-PS, which are in line with the safety concepts outlined in the *Eurocode* or *ACI*. The practical service life can however be considerably longer. A further condition for the service life is that the HALFEN mounting and cast-in channel system is used in accordance with the designed application. This service life refers to a static design approach and not to reference service life according to *ISO 15686*.

Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

## 2.13 Extraordinary effects

### Fire

HALFEN mounting channel systems HM/HZM and cast-in channel systems HTA-CE/HTA/HZA/HZA-PS correspond to building material class A1 according to *EN 13501*. In addition, HALFEN cast-in channel systems are approved for fire exposure (see section 2.3).

### Fire protection

| Name                    | Value |
|-------------------------|-------|
| Building material class | A1    |
| Burning droplets        |       |
| Smoke gas development   |       |

## Water

The declared HALFEN mounting and cast-in anchor channel systems comprise hot-dipped galvanised and stainless steel. There are no environmental risks attributable to the effects of water.

## Mechanical destruction

In the event of unintentional mechanical destruction, there is no risk for users or the environment if the product has been installed correctly.

### 2.14 Re-use phase

HALFEN mounting and cast-in anchor channels cannot be re-used but material recycling is possible.

All components of the described product can be returned and

recycled into the material cycle.

In view of an efficient recycling process it should be ensured that a separation of materials during decommissioning is possible.

### 2.15 Disposal

The disposal of non-recycled parts of HALFEN mounting and cast-in anchor channels can be disposed of at any waste disposal site with the appropriate waste number *EWC 191001* (for steel components) or *EWC 170904* (other components) according to the European Waste Code of the European Waste Catalogue.

### 2.16 Further information

[www.leviat.com](http://www.leviat.com)

## 3. LCA: Calculation rules

### 3.1 Declared Unit

The declared unit is 1 m length of cast-in anchor channel.

#### Declared unit

| Name          | Value | Unit |
|---------------|-------|------|
| Declared unit | 1     | m    |
| Grammage      | 2.69  | kg/m |

More than 97 % of the production happens in Germany. Specific data from the Leviat production facility in Langenfeld/Germany was recorded for the LCA.

The results of this EPD can be used as an approximation for the products mentioned above produced in the production facility of Converse/USA.

### 3.2 System boundary

Type of the EPD: cradle-to-gate - with options, modules C1-C4 and module D (A1-A3 + C + D and additional modules: A4, A5).

**Production Stage (A1-A3):** The Product stage includes:

- A1 Raw material supply and processing (mainly steel),
- A2 Transport of raw materials to the manufacturer,
- A3 Production of HTA-CE (HTA) 40/22 with HS 40/22 channel bolts in the factory, (incl. energy provision for welding and riveting, treatment of production waste, production of packaging materials).

**Construction stage (A4-A5):** The construction process stage includes:

- A4 transport to the construction site 100km by truck,
- A5 Disposal of the packaging after installation of the HTA-CE (HTA) 40/22 with HS 40/22 channel bolts

**End-of-life stage (C1-C4):** The end-of-life stage includes:

- C1 machine-assisted de-construction (demolition excavator - diesel-powered)
- C2 transport to waste processing; 50 km by truck. Transport distance can be adjusted at building level if necessary (e.g., for 100 km actual transport distance: multiply LCA values by factor 2)
- C3 waste processing for incineration of plastic components, recycling of metals
- C4 no components of the product are landfilled.

### Benefits and loads beyond the System Boundary

**(D):** Module D includes:

Material recovery potentials from metal recycling and energy recovery potentials from the thermal recovery of the mixed plastic waste.

### 3.3 Estimates and assumptions

No estimates and assumptions were made.

### 3.4 Cut-off criteria

In this assessment, all data for the production process is considered. This includes input flows with a contribution of less than 1 % of mass or energy. The transport expenditure for all raw materials is considered. Impacts relating to the production of machines and facilities required during production are outside the scope of this assessment.

The impacts arising from the dismantling of the products from the building structure (separating concrete, metal and other building materials) are not considered. The impacts are estimated to contribute less than 1 % to the overall result.

Production of capital equipment, facilities and infrastructure required for manufacture are outside the scope of this assessment.

Transport processes for the packaging materials are neglected.

The impacts are estimated to contribute less than 1 % to the overall result.

### 3.5 Background data

For modelling the life cycle of the declared product, the Life Cycle Assessment software GaBi developed by Sphera GmbH is used.

The underlying database is *GaBi 2022*, version 2022.2

### 3.6 Data quality

The data quality can be described as good. The primary data collection was done thoroughly, all flows were considered. Technological, geographical and temporal representativeness is given. Primary data to the year 2021. The background data have been taken from the *GaBi* databases. The last update of the databases has taken place in 2022.

### 3.7 Period under review

The period under review is the year 2021.

### 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: Europe

## 3.9 Allocation

Information about allocation procedure of single datasets is documented in <https://gabi.sphera.com/databases/gabi-data-search/>

Allocation in the foreground data: The production process does not deliver any co-products. The applied software model does not contain any allocation.

## 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 used database is *GaBi 2022*, version 2022.2.

## 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 product                | -     | kg C |
| Biogenic carbon content in accompanying packaging | 0.016 | kg C |

#### Transport to the building site (A4)

| Name               | Value | Unit |
|--------------------|-------|------|
| Transport distance | 100   | km   |

#### Assembly (A5)

Module A5 includes the treatment and disposal of packaging material.

Credits for potential avoided burdens due to energy substitution of electricity and thermal energy generation are declared in module D and affects only the rate of primary material (no secondary materials).

| Name                                                                      | Value | Unit |
|---------------------------------------------------------------------------|-------|------|
| Output substances following waste treatment on site (pallets and cartons) | 0.04  | kg   |

#### End of life (C1-C4)

The product dismantling from the building is done with a machine.

| Name            | Value | Unit |
|-----------------|-------|------|
| Recycling       | 2.67  | kg   |
| Energy recovery | 0.019 | kg   |

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

Collection rate is 100 %

## 5. LCA: Results

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             | X                                   | X        | MND       | MND         | MNR    | MNR         | MNR           | MND                    | MND                   | X                          | X         | X                | MND      | X                                               |

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2.6 kg/m

| Parameter      | Unit                             | A1-A3    | A1       | A2       | A3       | A4       | A5       | C1       | C2       | C3       | D         |
|----------------|----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| GWP-total      | kg CO <sub>2</sub> eq            | 3.62E+00 | 1.81E-02 | 6.26E-02 | 3.62E+00 | 1.81E-02 | 6.26E-02 | 1.76E-03 | 9.18E-03 | 5.92E-02 | -1.04E+00 |
| GWP-fossil     | kg CO <sub>2</sub> eq            | 3.66E+00 | 1.79E-02 | 1.04E-03 | 3.66E+00 | 1.79E-02 | 1.04E-03 | 1.75E-03 | 8.97E-03 | 5.92E-02 | -1.04E+00 |
| GWP-biogenic   | kg CO <sub>2</sub> eq            | -5E-02   | 5.84E-05 | 6.15E-02 | -5E-02   | 5.84E-05 | 6.15E-02 | 0        | 1.46E-04 | 1.9E-06  | -1.71E-04 |
| GWP-luluc      | kg CO <sub>2</sub> eq            | 8.06E-04 | 1.21E-04 | 1.37E-07 | 8.06E-04 | 1.21E-04 | 1.37E-07 | 1.13E-05 | 6.06E-05 | 6.24E-08 | -1.52E-04 |
| ODP            | kg CFC11 eq                      | 1.38E-11 | 1.77E-15 | 5.43E-15 | 1.38E-11 | 1.77E-15 | 5.43E-15 | 1.65E-16 | 8.83E-16 | 2.54E-15 | -1.28E-12 |
| AP             | mol H <sup>+</sup> eq            | 8.59E-03 | 2.02E-05 | 1.02E-05 | 8.59E-03 | 2.02E-05 | 1.02E-05 | 8.47E-06 | 1.01E-05 | 5.88E-06 | -3.18E-03 |
| EP-freshwater  | kg P eq                          | 5.02E-06 | 6.42E-08 | 1.3E-09  | 5.02E-06 | 6.42E-08 | 1.3E-09  | 6.01E-09 | 3.21E-08 | 5.91E-10 | -9.23E-07 |
| EP-marine      | kg N eq                          | 2E-03    | 6.51E-06 | 3.35E-06 | 2E-03    | 6.51E-06 | 3.35E-06 | 3.96E-06 | 3.26E-06 | 1.23E-06 | -4.93E-04 |
| EP-terrestrial | mol N eq                         | 2.15E-02 | 7.8E-05  | 4.87E-05 | 2.15E-02 | 7.8E-05  | 4.87E-05 | 4.39E-05 | 3.9E-05  | 2.75E-05 | -4.81E-03 |
| POCP           | kg NMVOC eq                      | 6.82E-03 | 1.74E-05 | 9.09E-06 | 6.82E-03 | 1.74E-05 | 9.09E-06 | 1.11E-05 | 8.69E-06 | 3.65E-06 | -1.86E-03 |
| ADPE           | kg Sb eq                         | 1.23E-04 | 1.81E-09 | 1.32E-10 | 1.23E-04 | 1.81E-09 | 1.32E-10 | 1.7E-10  | 9.06E-10 | 6.14E-11 | -1.11E-04 |
| ADPF           | MJ                               | 4.57E+01 | 2.36E-01 | 1.5E-02  | 4.57E+01 | 2.36E-01 | 1.5E-02  | 2.21E-02 | 1.18E-01 | 6.9E-03  | -1.11E+01 |
| WDP            | m <sup>3</sup> world eq deprived | 2.51E-01 | 2.01E-04 | 7.5E-03  | 2.51E-01 | 2.01E-04 | 7.5E-03  | 1.88E-05 | 1.01E-04 | 5.46E-03 | -2.11E-01 |

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; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2.6 kg/m

| Parameter | Unit           | A1-A3    | A1       | A2        | A3       | A4       | A5        | C1       | C2       | C3        | D         |
|-----------|----------------|----------|----------|-----------|----------|----------|-----------|----------|----------|-----------|-----------|
| PERE      | MJ             | 8.42E+00 | 1.64E-02 | 6.09E-01  | 8.42E+00 | 1.64E-02 | 6.09E-01  | 1.53E-03 | 8.18E-03 | 1.63E-03  | -6E-01    |
| PERM      | MJ             | 6.06E-01 | 0        | -6.06E-01 | 6.06E-01 | 0        | -6.06E-01 | 0        | 0        | 0         | 0         |
| PERT      | MJ             | 9.03E+00 | 1.64E-02 | 3.47E-03  | 9.03E+00 | 1.64E-02 | 3E-03     | 1.53E-03 | 8.18E-03 | 1.63E-03  | -6E-01    |
| PENRE     | MJ             | 4.49E+01 | 2.37E-01 | 1.5E-02   | 4.49E+01 | 2.37E-01 | 1.5E-02   | 2.22E-02 | 1.19E-01 | 8.76E-01  | -1.11E+01 |
| PENRM     | MJ             | 8.69E-01 | 0        | 0         | 8.69E-01 | 0        | 0         | 0        | 0        | -8.69E-01 | 0         |
| PENRT     | MJ             | 4.58E+01 | 2.37E-01 | 1.5E-02   | 4.58E+01 | 2.37E-01 | 1.5E-02   | 2.22E-02 | 1.19E-01 | 6.9E-03   | -1.11E+01 |
| SM        | kg             | 2.21E+00 | 0        | 0         | 2.21E+00 | 0        | 0         | 0        | 0        | 0         | 4.77E-01  |
| RSF       | MJ             | 0        | 0        | 0         | 0        | 0        | 0         | 0        | 0        | 0         | 0         |
| NRSF      | MJ             | 0        | 0        | 0         | 0        | 0        | 0         | 0        | 0        | 0         | 0         |
| FW        | m <sup>3</sup> | 1.15E-02 | 1.89E-05 | 1.76E-04  | 1.15E-02 | 1.89E-05 | 1.76E-04  | 1.77E-06 | 9.45E-06 | 1.28E-04  | -5.35E-03 |

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+A2: HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2.6 kg/m

| Parameter | Unit | A1-A3    | A1       | A2       | A3       | A4       | A5       | C1       | C2       | C3       | D         |
|-----------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| HWD       | kg   | 5.25E-09 | 1.25E-12 | 1.45E-12 | 5.25E-09 | 1.25E-12 | 1.45E-12 | 1.17E-13 | 6.27E-13 | 6.49E-13 | -3.82E-10 |
| NHWD      | kg   | 3.8E-02  | 3.86E-05 | 5.2E-04  | 3.8E-02  | 3.86E-05 | 5.2E-04  | 3.61E-06 | 1.93E-05 | 2.35E-04 | 9.64E-02  |
| RWD       | kg   | 2.47E-03 | 4.4E-07  | 8.87E-07 | 2.47E-03 | 4.4E-07  | 8.87E-07 | 4.12E-08 | 2.2E-07  | 4.17E-07 | -2.61E-04 |
| CRU       | kg   | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0         |

|     |    |          |   |          |          |   |          |   |   |          |   |
|-----|----|----------|---|----------|----------|---|----------|---|---|----------|---|
| MFR | kg | 1.16E-02 | 0 | 0        | 1.16E-02 | 0 | 0        | 0 | 0 | 2.68E+00 | 0 |
| MER | kg | 0        | 0 | 0        | 0        | 0 | 0        | 0 | 0 | 0        | 0 |
| EEE | MJ | 2.53E-03 | 0 | 1.05E-01 | 2.53E-03 | 0 | 1.05E-01 | 0 | 0 | 1.26E-01 | 0 |
| EET | MJ | 4.49E-03 | 0 | 1.88E-01 | 4.49E-03 | 0 | 1.88E-01 | 0 | 0 | 2.25E-01 | 0 |

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; EET = Exported thermal energy

## RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: HTA-CE (HTA) 40/22 with HS 40/22 channel bolts with a weight of 2.6 kg/m

| Parameter | Unit              | A1-A3    | A1       | A2       | A3       | A4       | A5       | C1       | C2       | C3       | D         |
|-----------|-------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| PM        | Disease incidence | 1.16E-07 | 1.38E-10 | 5.03E-11 | 1.16E-07 | 1.38E-10 | 5.03E-11 | 9.61E-11 | 6.92E-11 | 3.43E-11 | -4.37E-08 |
| IR        | kBq U235 eq       | 3.22E-01 | 6.64E-05 | 1.45E-04 | 3.22E-01 | 6.64E-05 | 1.45E-04 | 6.22E-06 | 3.32E-05 | 6.85E-05 | -1.75E-02 |
| ETP-fw    | CTUe              | 1.21E+01 | 1.67E-01 | 6.62E-03 | 1.21E+01 | 1.67E-01 | 6.62E-03 | 1.57E-02 | 8.37E-02 | 3.19E-03 | -2.62E+00 |
| HTP-c     | CTUh              | 1.79E-09 | 3.45E-12 | 4.51E-13 | 1.79E-09 | 3.45E-12 | 4.51E-13 | 3.23E-13 | 1.72E-12 | 3.77E-13 | 6.14E-10  |
| HTP-nc    | CTUh              | 1E-07    | 1.87E-10 | 1.57E-11 | 1E-07    | 1.87E-10 | 1.57E-11 | 2.02E-11 | 9.33E-11 | 1.17E-11 | 1.1E-07   |
| SQP       | SQP               | 1.61E+01 | 9.99E-02 | 4.44E-03 | 1.61E+01 | 9.99E-02 | 4.44E-03 | 9.35E-03 | 5E-02    | 2.09E-03 | -2.54E-01 |

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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 most important life cycle phase for cast-in anchor channel system HTA-CE 40/22P-FV is the manufacturing phase. With regard to the manufacturing phase, the upstream processes of primary and secondary steel along with steel screw and galvanisation dominate all the indicators. Zinc has relevant

influence on resource use, minerals and metals impact category.

The biogenic global warming potential shows the absorption of atmospheric carbon dioxide during plant growth in connection with packaging (wooden pallets and wooden packaging).

## 7. Requisite evidence

No evidence required.

## 8. References

### Standards

#### AC 232

Acceptance Criteria for Anchor Channels in Concrete Elements  
International Code Council – Evaluation Service (ICC-ES) 2021

#### ACI 318

Building Code Requirements for Structural Concrete ACI  
American Concrete Institute 2019

#### Biocide Products Regulation (BPR)

Regulation (EU) No. 528/2012, European Parliament and Council Dated: 22.05.2012

#### Candidate List

Candidate List of substances of very high concern for Authorisation, European Chemicals Agency (ECHA)

#### Construction Products Regulation (CPR)

Regulation (EU) No. 305/2011, European Parliament and Council Dated: 09.03.2011

#### DIN EN 15804

EN 15804:2012+A2:2019: Sustainability of construction works -

Environmental Product Declarations - Core rules for the product category of construction products

#### DIN EN ISO 50001

Energy management systems - Requirements with guidance for use ISO 50001:2011

#### EN 1992-4

Eurocode 2: Design of concrete structures Part 4: Design of fastenings for use in concrete 2018

#### EN 13501

Fire classification of construction products and building elements, 2018

#### EOTA TR 047

Technical Report TR 047 Calculation Method for the performance of Anchor Channels European Organisation for Technical Assessment March 2018

#### ETA 09/0339

European Technical Approval ETA-09/0339 Halfen anchor channel HTA German Institute for Building Technology - DIBt Dated: 07.12.2021



**ETA 19/0438**

European Technical Assessment ETA-19/0438 Halfen hot-rolled mounting channel HM, special screws German Institute for Building Technology - DIBt Dated: 12.01.2022

**ETA 20/1081**

European Technical Assessment ETA-20/1081 Halfen serrated anchor channel HZA German Institute for Building Technology - DIBt Dated: 15.07.2022

**ETA 17/0728**

European Technical Assessment ETA-17/0728 Halfen anchor channel HZA-PS German Institute for Building Technology - DIBt Dated: 09.12.2022

**EWC**

European Waste Code according to European Waste Catalogue Directive 2008/98/EC European Parliament and of the Council 2014

**IAS**

International Accreditation Service Subsidiary of the International Code Council Brea / California / USA

**ICC ESR 1008**

ICC Evaluation Report 1008 Halfen HTA anchor channels and HS channel bolts International Code Council - Evaluation Service 2022

**ICC ESR 4016**

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**ISO 9001**

Quality management systems 2015

**ISO 15686**

Building and constructed assets - service life planning 2017

**MPA NRW**

Materialprüfungsamt Nordrhein-Westfalen Dortmund / Germany

**Literature****GaBi software**

Sphera Solutions GmbH GaBi Software System and Database for Life Cycle Engineering CUP Version: 2022.2 University of Stuttgart Leinfelden Echterdingen

**GaBi documentation**

GaBi life cycle inventory data documentation (<http://www.gabi-software.com/international/databases/gabi-data-search/>)

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Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., version 2.0., Berlin: Institut Bauen und Umwelt e.V., 2021, <http://www.ibu-epd.com>

**PCR Part A**

Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, Berlin: Institut Bauen und Umwelt e.V., [www.ibu-epd.com](http://www.ibu-epd.com), Version 2.1, 2021

**PCR Part B**

Requirements on the EPD for Thin-walled profiles and profiled panels, version 1.7, Institut Bauen und Umwelt e.V., [www.bau-umwelt.com](http://www.bau-umwelt.com), 2019



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