

Environmental Product Declaration (EPD)  
According to ISO 14025 and EN 15804

# SANHA-Therm® | Carbon Steel Fittings

|                      |                        |
|----------------------|------------------------|
| Registration number: | EPD-Kiwa-EE-184624-EN  |
| Issue date:          | 15-11-2024             |
| Valid until:         | 15-11-2029             |
| Declaration owner:   | SANHA GmbH & Co. KG    |
| Publisher:           | Kiwa-Ecobility Experts |
| Programme operator:  | Kiwa-Ecobility Experts |
| Status:              | verified               |



## 1 General information

### 1.1 PRODUCT

SANHA-Therm® | Carbon Steel Fittings

### 1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-184624-EN

### 1.3 VALIDITY

**Issue date:** 15-11-2024

**Valid until:** 15-11-2029

### 1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts  
Wattstraße 11-13  
13355 Berlin  
DE



Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

### 1.5 OWNER OF THE DECLARATION

**Manufacturer:** SANHA GmbH & Co. KG

**Address:** Im Teelbruch 80, 45219 Essen

**E-mail:** info@sanha.com

**Website:** www.sanha.com

**Production location:** Production location Schmiedefeld

**Address production location:** Hauptstraße 76, 01909 Großharthau-Schmiedefeld

### 1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☒ External



Lucas Pedro Berman, Senda

### 1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

### 1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

EN15804+A2:2019

Core PCR used: EN 15804:2012+A2:2019/AC:2021

PCR guidance texts for building-related products and services:  
Part B: Requirements for the EPD for metal pipes for domestic installations" (01.08.2024)  
by Institute Construction and Environment e.V. (IBU).

## 1 General information

### 1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

### 1.10 CALCULATION BASIS

**LCA method R<THINK:** Ecobility Experts | EN15804+A2

**LCA software\*:** Simapro 9.1

**Characterization method:** EN 15804 +A2 Method v1.0

**LCA database profiles:** EcoInvent version 3.6

**Version database:** v3.17 (2024-05-22)

*\* Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.*

### 1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'SANHA-Therm® | Carbon Steel Fittings' with the calculation identifier ReTHiNK-84624.

## 2 Product

### 2.1 PRODUCT DESCRIPTION

The SANHA®-Therm system fittings are made of Carbon Steel (material number E195 / E235). The SANHA®-Therm system meets the highest quality standards, can be easily installed and provides a solution for a large number of applications. The system ensures a permanent leak-proof connection by compressing the fitting perpendicular onto the pipe. The pressing procedure deforms the pipe and fitting which creates a permanent leak-proof connection. The range consists of carbon steel press fittings starting from 12 mm up to 108 mm. The weight of the SANHA®-Therm system fittings can be various due to the different dimensions of the product.

Features:

1. **Unique tool compatibility** = The SANHA®-Therm system fittings can be pressed with press jaws and slings with the original SA, V and M-profiles up to and including 54 mm and up to 108 mm with SA and M-profile.
2. **Leak path feature** = The SANHA®-Therm system fittings benefit from a leak before press function.
3. **Push & stay** = The SANHA®-Therm system fittings are designed in a way that safe and reliable installation in every position is guaranteed.

### 2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

For closed heating installations, compressed air, cooling water (depending on the temperature and pressure), fire extinguishing systems, glycol. More applications can be requested on demand.

Different seals are inserted into the fittings depending on the system:

- **SANHA®-Therm (Series 24000) | Carbon Steel:** Sealing ring made of Ethylene Propylene Diene Monomer (EPDM).
- **SANHA®-Therm Industry (Series 28000) | Carbon Steel:** Sealing ring made of fluoro rubber (FKM).

### 2.3 REFERENCE SERVICE LIFE

#### RSL PRODUCT

A reference service life of at least 50 years has been declared by the manufacturer for the SANHA®-Therm system fittings manufactured by SANHA GmbH & Co. KG.

The reference service life depends on the conditions of use, which are described in the EPD, and the specific characteristics of the product. There are no known (climatic) influences that could have a negative influence on the reference service life.

The reference service life only applies to this specific EPD. The reference service life does not provide any information on actual lifetime of the product, nor any guarantee referring to performance characteristics or warranties.

The product consists of two main components, the carbon steel fitting body and the elastomer sealing ring. The product is manufactured according to the European Construction Product Regulation (CPR) and is declared as a permanent connection. Extensive tests on both components have been carried out to demonstrate the design life of at least 50 years.

#### USED RSL (YR) IN THIS LCA CALCULATION:

50

### 2.4 TECHNICAL DATA

The SANHA®-Therm system fittings are made of Carbon Steel, (material number E195 / E235). The fittings can be used in combination with carbon steel pipes according to the standard EN 10305. The SANHA®-Therm range consists of the following items:

- Range: Couplings, t-pieces, reducers, reducing couplings, bends, end caps, crossovers, flanges.
- Dimensions: 12 mm – 108 mm

*For more detailed technical data, please visit the SANHA® website via the following link: <https://www.sanha.com/>.*

### 2.5 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain any substances listed in the "Candidate List of Substances" of Very High Concern (SVHC) for authorisation" exceeding 0.1% of the weight of the product.

## 2 Product

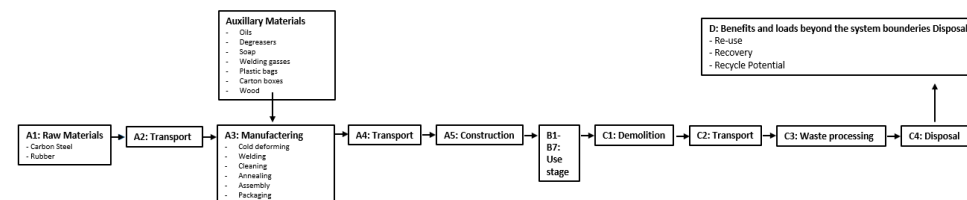
### 2.6 DESCRIPTION PRODUCTION PROCESS

The SANHA®-Therm system fittings, which are manufactured in Schmiedefeld, Germany, are produced from carbon steel (material number E195 / E235) through cold deformation (+partially welded). The cold deformation process consists of multiple production steps depending on the type of fitting being produced. The raw material is always cut in the proper length. Here is an overview of the various cold deformation steps:

- Bending into the correct radius;
- Opening up the pipe ends;
- Forming the sealing ring groove;
- Calibration;
- Welding (t-pieces).

After the cold deformation process, the fittings are annealed and a zinc coating is added. Finally, the semi-finished product is mounted with a specific sealing ring and afterwards packed in plastic bags and carton boxes.

The energy used during the production phase is bought from Scholt Energy as stated in the guarantee of origin.



### 2.7 CONSTRUCTION DESCRIPTION

During installation, no relevant environmental impacts are considered. Thanks to the user-friendly and efficient installation process of SANHA® products, no energy or additional auxiliary materials are required. Only packaging materials are considered for the waste treatment.

## 3 Calculation rules

### 3.1 FUNCTIONAL UNIT

#### 1 kg of SANHA-Therm® carbon steel fittings

1 kg of SANHA-Therm® carbon steel fittings with a reference service life of at least 50 years. Dimensions available from 12 up to 108 mm.

Reference unit: kilogram (kg)

### 3.2 CONVERSION FACTORS

| Description               | Value    | Unit |
|---------------------------|----------|------|
| Reference unit            | 1        | kg   |
| Conversion factor to 1 kg | 0.991650 | kg   |

### 3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to grave EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X |

The modules of the EN15804 contain the following:

|                                                    |                                                                       |
|----------------------------------------------------|-----------------------------------------------------------------------|
| Module A1 = Raw material supply                    | Module B5 = Refurbishment                                             |
| Module A2 = Transport                              | Module B6 = Operational energy use                                    |
| Module A3 = Manufacturing                          | Module B7 = Operational water use                                     |
| Module A4 = Transport                              | Module C1 = De-construction / Demolition                              |
| Module A5 = Construction -<br>Installation process | Module C2 = Transport                                                 |
| Module B1 = Use                                    | Module C3 = Waste Processing                                          |
| Module B2 = Maintenance                            | Module C4 = Disposal                                                  |
| Module B3 = Repair                                 | Module D = Benefits and loads beyond the<br>product system boundaries |
| Module B4 = Replacement                            |                                                                       |

### 3.4 REPRESENTATIVENESS

This EPD is representative for SANHA-Therm® | Carbon Steel Fittings, a product of SANHA GmbH & Co. KG. The results of this EPD are representative for European Union.

### 3.5 CUT-OFF CRITERIA

#### Product stage (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, ancillaries, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected

### 3 Calculation rules

input flows do therefore not exceed the limit of 5% of energy use and mass or 5% on impact per environmental effect.

#### Construction process stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use) of energy use for assembly, etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

#### Use stage (B1-B3)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

#### Use stage (B4-B5)

It is assumed that no replacement will be necessary during the 50-year reference service life and the 50-year building service life. The environmental impacts of replacement are due to the product, construction and disposal stages. Conversion of the environmental impacts for annual values was based on the RSL.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from SANHA GmbH & Co KG.

According to the manufacturer, the elements are not included in the refurbishment activities for buildings. For updated information refer to the respective instructions for assembly/installation, operation and maintenance from SANHA GmbH & Co KG.

#### Use stage (B6-B7)

There is no energy used during normal use. Ancillaries, consumables, water use, material losses, waste materials, transport distances and other scenarios are negligible.

There is no water consumption when used as intended. This is irrelevant for this product group.

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

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

#### Benefits and loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

\*Please note that the following topics are not considered:

- The manufacture of equipment used in production, buildings or any other capital goods;
- The transport of personnel to the plant;
- The transportation of personnel within the plant;
- Research and development activities;
- Long-term emissions.

### 3.6 ALLOCATION

Allocation has not been applied in this LCA.

### 3.7 DATA COLLECTION & REFERENCE PERIOD

Data collection of the used raw materials, suppliers information, energy consumption, production waste and emissions are all based on the reference year 2023.

### 3.8 ESTIMATES AND ASSUMPTIONS

We assume that demolition of the plant consumes very little energy and therefore falls under the cut of rules (<1%).

### 3.9 DATA QUALITY

Background data is based on EPDs and EcolInvent 3.6. Foreground data is <2 years and background data is < 10 years. The data quality is considered to be good.

### 3 Calculation rules

The data used to compile this EPD is extracted from the internal ERP (Enterprise Resource Planning) system of the factory where the SANHA®-Therm system fittings are produced. Consequently, the data is exact, highly specific and reliable.

#### 3.10 POWER MIX

SANHA purchases Electricity with a Guaranty of Origin. The Guaranty of Origin as provided by Supplier Scholt Energy is included in the project dossier. The energy contract shows us that green, grey and other types of energy are used according to the Scholt Energy mix. The total percentage of the green energy is 62,16%.

## 4 Scenarios and additional technical information

### 4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

|                                                | Value and unit                                                |
|------------------------------------------------|---------------------------------------------------------------|
| Vehicle type used for transport                | Lorry (Truck), unspecified (default)   market group for (GLO) |
| Fuel type and consumption of vehicle           | not available                                                 |
| Distance                                       | 524 km                                                        |
| Capacity utilisation (including empty returns) | 50 % (loaded up and return empty)                             |
| Bulk density of transported products           | inapplicable                                                  |
| Volume capacity utilisation factor             | 1                                                             |

### 4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

#### FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

#### FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

| Description                                                                                                     | Value | Unit |
|-----------------------------------------------------------------------------------------------------------------|-------|------|
| Output materials as result of loss during construction                                                          | 0.01  | %    |
| Output materials as result of waste processing of materials used for installation/assembly at the building site | 0.000 | kg   |
| Output materials as result of waste processing of used packaging                                                | 0.107 | kg   |

### 4.3 USE STAGE (B1-B7)

No significant environment impact in the use stage modules, because there is no (significant) emission to air, soil or water.

### 4.4 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

## 4 Scenarios and additional technical information

### 4.5 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

| Waste Scenario                                                                         | Transport conveyance                                          | Not removed (stays in work) [km] | Landfill [km] | Incineration [km] | Recycling [km] | Re-use [km] |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------|---------------|-------------------|----------------|-------------|
| Metals, others (i.a. fasteners, fittings) (NMD ID 50)                                  | Lorry (Truck), unspecified (default)   market group for (GLO) | 0                                | 100           | 150               | 50             | 0           |
| Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75) | Lorry (Truck), unspecified (default)   market group for (GLO) | 0                                | 100           | 150               | 50             | 0           |
| elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)                              | Lorry (Truck), unspecified (default)   market group for (GLO) | 0                                | 100           | 150               | 50             | 0           |

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

|                                                | Value and unit                                                |
|------------------------------------------------|---------------------------------------------------------------|
| Vehicle type used for transport                | Lorry (Truck), unspecified (default)   market group for (GLO) |
| Fuel type and consumption of vehicle           | not available                                                 |
| Capacity utilisation (including empty returns) | 50 % (loaded up and return empty)                             |
| Bulk density of transported products           | inapplicable                                                  |
| Volume capacity utilisation factor             | 1                                                             |

### 4.6 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

| Waste Scenario                                        | Region | Not removed (stays in work) [%] | Landfill [%] | Incineration [%] | Recycling [%] | Re-use [%] |
|-------------------------------------------------------|--------|---------------------------------|--------------|------------------|---------------|------------|
| Metals, others (i.a. fasteners, fittings) (NMD ID 50) | NL     | 0                               | 5            | 5                | 90            | 0          |
|                                                       | NL     | 0                               | 5            | 0                | 95            | 0          |

## 4 Scenarios and additional technical information

| Waste Scenario                                                                         | Region | Not removed (stays in work) [%] | Landfill [%] | Incineration [%] | Recycling [%] | Re-use [%] |
|----------------------------------------------------------------------------------------|--------|---------------------------------|--------------|------------------|---------------|------------|
| Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75) |        |                                 |              |                  |               |            |
| elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)                              | NL     | 0                               | 10           | 85               | 5             | 0          |

| Waste Scenario                                                                         | Not removed (stays in work) [kg] | Landfill [kg] | Incineration [kg] | Recycling [kg] | Re-use [kg]  |
|----------------------------------------------------------------------------------------|----------------------------------|---------------|-------------------|----------------|--------------|
| Metals, others (i.a. fasteners, fittings) (NMD ID 50)                                  | 0.000                            | 0.049         | 0.049             | 0.887          | 0.000        |
| Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75) | 0.000                            | 0.000         | 0.000             | 0.008          | 0.000        |
| elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)                              | 0.000                            | 0.001         | 0.012             | 0.001          | 0.000        |
| <b>Total</b>                                                                           | <b>0.000</b>                     | <b>0.051</b>  | <b>0.061</b>      | <b>0.896</b>   | <b>0.000</b> |

### 4.7 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

| Waste Scenario                                                                         | Net output flow [kg] | Energy recovery [MJ] |
|----------------------------------------------------------------------------------------|----------------------|----------------------|
| Metals, others (i.a. fasteners, fittings) (NMD ID 50)                                  | 0.710                | 0.000                |
| Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75) | 0.008                | 0.000                |
| elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)                              | 0.001                | 0.330                |
| <b>Total</b>                                                                           | <b>0.719</b>         | <b>0.330</b>         |

## 5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

### 5.1 ENVIRONMENTAL IMPACT INDICATORS PER KILOGRAM

#### CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

| Abbr.     | Unit              | A1       | A2      | A3       | A1-A3    | A4      | A5       | B1-B7   | C1      | C2      | C3       | C4       | D        |
|-----------|-------------------|----------|---------|----------|----------|---------|----------|---------|---------|---------|----------|----------|----------|
| AP        | mol H+<br>eqv.    | 1.33E-2  | 5.01E-4 | 7.63E-3  | 2.14E-2  | 4.57E-4 | 4.34E-5  | 0.00E+0 | 0.00E+0 | 4.63E-5 | 9.59E-6  | 4.02E-6  | -4.32E-3 |
| GWP-total | kg CO2 eqv.       | 2.13E+0  | 8.64E-2 | 2.76E+0  | 4.97E+0  | 7.89E-2 | 1.82E-1  | 0.00E+0 | 0.00E+0 | 7.99E-3 | 3.92E-2  | 6.79E-4  | -1.05E+0 |
| GWP-b     | kg CO2 eqv.       | -4.30E-3 | 3.99E-5 | -3.30E-2 | -3.73E-2 | 3.64E-5 | 1.77E-1  | 0.00E+0 | 0.00E+0 | 3.68E-6 | 7.09E-6  | 2.08E-5  | 9.50E-3  |
| GWP-f     | kg CO2 eqv.       | 2.13E+0  | 8.63E-2 | 2.79E+0  | 5.01E+0  | 7.88E-2 | 5.86E-3  | 0.00E+0 | 0.00E+0 | 7.98E-3 | 3.92E-2  | 6.58E-4  | -1.06E+0 |
| GWP-luluc | kg CO2 eqv.       | 8.05E-4  | 3.16E-5 | 2.79E-3  | 3.63E-3  | 2.89E-5 | 1.70E-6  | 0.00E+0 | 0.00E+0 | 2.92E-6 | 5.13E-7  | 1.33E-7  | 6.04E-4  |
| EP-m      | kg N eqv.         | 1.92E-3  | 1.76E-4 | 1.30E-3  | 3.40E-3  | 1.61E-4 | 1.79E-5  | 0.00E+0 | 0.00E+0 | 1.63E-5 | 3.32E-6  | 1.52E-6  | -8.27E-4 |
| EP-fw     | kg P eq           | 9.96E-5  | 8.71E-7 | 2.72E-4  | 3.73E-4  | 7.95E-7 | 9.16E-8  | 0.00E+0 | 0.00E+0 | 8.05E-8 | 2.31E-8  | 6.04E-9  | -3.91E-5 |
| EP-T      | mol N eqv.        | 3.80E-2  | 1.95E-3 | 1.79E-2  | 5.78E-2  | 1.78E-3 | 2.03E-4  | 0.00E+0 | 0.00E+0 | 1.80E-4 | 3.69E-5  | 1.64E-5  | -9.85E-3 |
| ODP       | kg CFC 11<br>eqv. | 1.24E-7  | 1.91E-8 | 1.48E-7  | 2.92E-7  | 1.74E-8 | 6.89E-10 | 0.00E+0 | 0.00E+0 | 1.76E-9 | 2.16E-10 | 1.65E-10 | -3.01E-8 |
| POCP      | kg NMVOC<br>eqv.  | 1.05E-2  | 5.55E-4 | 4.93E-3  | 1.59E-2  | 5.07E-4 | 5.48E-5  | 0.00E+0 | 0.00E+0 | 5.13E-5 | 1.01E-5  | 4.73E-6  | -6.05E-3 |
| ADP-f     | MJ                | 2.32E+1  | 1.30E+0 | 3.34E+1  | 5.79E+1  | 1.19E+0 | 5.02E-2  | 0.00E+0 | 0.00E+0 | 1.20E-1 | 1.72E-2  | 1.23E-2  | -7.78E+0 |
| ADP-mm    | kg Sb-eqv.        | 6.77E-4  | 2.19E-6 | 2.11E-5  | 7.00E-4  | 2.00E-6 | 1.33E-7  | 0.00E+0 | 0.00E+0 | 2.02E-7 | 1.93E-8  | 4.08E-9  | -6.19E-4 |

**AP**=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

## 5 Results

| Abbr. | Unit          | A1      | A2      | A3      | A1-A3   | A4      | A5      | B1-B7   | C1      | C2      | C3       | C4      | D        |
|-------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|----------|
| WDP   | m3 world eqv. | 7.12E-1 | 4.66E-3 | 6.37E-1 | 1.35E+0 | 4.25E-3 | 7.67E-4 | 0.00E+0 | 0.00E+0 | 4.31E-4 | -1.25E-4 | 7.17E-5 | -2.21E-1 |

**AP**=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

### ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

| Abbr.  | Unit              | A1      | A2       | A3      | A1-A3   | A4       | A5       | B1-B7   | C1      | C2       | C3       | C4       | D         |
|--------|-------------------|---------|----------|---------|---------|----------|----------|---------|---------|----------|----------|----------|-----------|
| ETP-fw | CTUe              | 6.60E+1 | 1.16E+0  | 2.83E+1 | 9.54E+1 | 1.06E+0  | 9.22E-2  | 0.00E+0 | 0.00E+0 | 1.07E-1  | 9.09E-2  | 5.80E-2  | -4.10E+1  |
| PM     | disease incidence | 2.00E-7 | 7.77E-9  | 5.54E-8 | 2.63E-7 | 7.09E-9  | 4.60E-10 | 0.00E+0 | 0.00E+0 | 7.18E-10 | 1.67E-10 | 8.25E-11 | -6.19E-8  |
| HTP-c  | CTUh              | 1.04E-8 | 3.77E-11 | 2.87E-9 | 1.33E-8 | 3.44E-11 | 2.82E-11 | 0.00E+0 | 0.00E+0 | 3.48E-12 | 2.25E-12 | 5.62E-13 | -2.87E-10 |
| HTP-nc | CTUh              | 7.40E-8 | 1.27E-9  | 6.13E-8 | 1.37E-7 | 1.16E-9  | 1.35E-10 | 0.00E+0 | 0.00E+0 | 1.17E-10 | 4.73E-11 | 4.54E-11 | 1.94E-7   |
| IR     | kBq U235 eqv.     | 4.94E-2 | 5.45E-3  | 1.28E-1 | 1.83E-1 | 4.98E-3  | 1.96E-4  | 0.00E+0 | 0.00E+0 | 5.04E-4  | 5.58E-5  | 6.10E-5  | 1.43E-2   |
| SQP    | Pt                | 5.83E+0 | 1.13E+0  | 2.77E+1 | 3.47E+1 | 1.03E+0  | 3.82E-2  | 0.00E+0 | 0.00E+0 | 1.04E-1  | 1.68E-2  | 3.01E-2  | -8.60E+0  |

**ETP-fw**=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

### CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

| ILCD classification | Indicator                                                  | Disclaimer |
|---------------------|------------------------------------------------------------|------------|
| ILCD type / level 1 | Global warming potential (GWP)                             | None       |
|                     | Depletion potential of the stratospheric ozone layer (ODP) | None       |
|                     | Potential incidence of disease due to PM emissions (PM)    | None       |
| ILCD type / level 2 | Acidification potential, Accumulated Exceedance (AP)       | None       |
|                     |                                                            | None       |

## 5 Results

| ILCD classification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Indicator                                                                                           | Disclaimer |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------|
| ILCD type / level 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)         | None       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Eutrophication potential, Accumulated Exceedance (EP-terrestrial)                                   | None       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Formation potential of tropospheric ozone (POCP)                                                    | None       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Potential Human exposure efficiency relative to U235 (IRP)                                          | 1          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)                          | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Abiotic depletion potential for fossil resources (ADP-fossil)                                       | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Water (user) deprivation potential, deprivation-weighted water consumption (WDP)                    | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Potential Comparative Toxic Unit for ecosystems (ETP-fw)                                            | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Potential Comparative Toxic Unit for humans (HTP-c)                                                 | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Potential Comparative Toxic Unit for humans (HTP-nc)                                                | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Potential Soil quality index (SQP)                                                                  | 2          |
| <p><b>Disclaimer 1</b> – 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.</p> <p><b>Disclaimer 2</b> – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |                                                                                                     |            |

### 5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

#### PARAMETERS DESCRIBING RESOURCE USE

| Abbr. | Unit | A1      | A2      | A3      | A1-A3   | A4      | A5      | B1-B7   | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| PERE  | MJ   | 1.07E+0 | 1.63E-2 | 6.94E+0 | 8.03E+0 | 1.49E-2 | 2.05E-3 | 0.00E+0 | 0.00E+0 | 1.51E-3 | 5.77E-4 | 6.80E-4 | -1.23E+0 |
| PERM  | MJ   | 0.00E+0 | 0.00E+0 | 1.41E+0 | 1.41E+0 | 0.00E+0 | 1.41E-4 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0  |

PERE=renewable primary energy ex. raw materials | PERM=renewable primary energy used as raw materials | PERT=renewable primary energy total | PENRE=non-renewable primary energy ex. raw materials | PENRM=non-renewable primary energy used as raw materials | PENRT=non-renewable primary energy total | SM=use of secondary material | RSF=use of renewable secondary fuels | NRSF=use of non-renewable secondary fuels | FW=use of net fresh water

## 5 Results

| Abbr. | Unit | A1      | A2      | A3      | A1-A3   | A4      | A5      | B1-B7   | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| PERT  | MJ   | 1.07E+0 | 1.63E-2 | 8.35E+0 | 9.44E+0 | 1.49E-2 | 2.19E-3 | 0.00E+0 | 0.00E+0 | 1.51E-3 | 5.77E-4 | 6.80E-4 | -1.23E+0 |
| PENRE | MJ   | 2.42E+1 | 1.38E+0 | 3.46E+1 | 6.02E+1 | 1.26E+0 | 5.33E-2 | 0.00E+0 | 0.00E+0 | 1.28E-1 | 1.84E-2 | 1.31E-2 | -8.08E+0 |
| PENRM | MJ   | 3.89E-1 | 0.00E+0 | 1.08E+0 | 1.47E+0 | 0.00E+0 | 1.47E-4 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -2.18E-2 |
| PENRT | MJ   | 2.46E+1 | 1.38E+0 | 3.57E+1 | 6.17E+1 | 1.26E+0 | 5.35E-2 | 0.00E+0 | 0.00E+0 | 1.28E-1 | 1.84E-2 | 1.31E-2 | -8.10E+0 |
| SM    | Kg   | 1.77E-1 | 0.00E+0 | 2.48E-2 | 2.02E-1 | 0.00E+0 | 2.02E-5 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0  |
| RSF   | MJ   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0  |
| NRSF  | MJ   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0  |
| FW    | M3   | 1.94E-2 | 1.59E-4 | 2.60E-2 | 4.56E-2 | 1.45E-4 | 5.73E-5 | 0.00E+0 | 0.00E+0 | 1.47E-5 | 3.65E-5 | 1.53E-5 | -4.46E-3 |

**PERE**=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

### OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

| Abbr. | Unit | A1      | A2      | A3      | A1-A3   | A4      | A5      | B1-B7   | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| HWD   | Kg   | 2.53E-4 | 3.30E-6 | 4.42E-5 | 3.00E-4 | 3.01E-6 | 1.40E-7 | 0.00E+0 | 0.00E+0 | 3.05E-7 | 5.66E-8 | 1.52E-8 | -2.02E-4 |
| NHWD  | Kg   | 3.67E-1 | 8.26E-2 | 2.50E-1 | 6.99E-1 | 7.54E-2 | 1.12E-2 | 0.00E+0 | 0.00E+0 | 7.63E-3 | 1.50E-3 | 5.12E-2 | -1.05E-1 |
| RWD   | Kg   | 5.15E-5 | 8.55E-6 | 1.45E-4 | 2.05E-4 | 7.81E-6 | 2.77E-7 | 0.00E+0 | 0.00E+0 | 7.90E-7 | 7.88E-8 | 8.12E-8 | 3.54E-6  |

**HWD**=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

### ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

| Abbr. | Unit | A1      | A2      | A3      | A1-A3   | A4      | A5      | B1-B7   | C1      | C2      | C3      | C4      | D       |
|-------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| CRU   | Kg   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.68E-3 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |

**CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

## 5 Results

| Abbr. | Unit | A1      | A2      | A3       | A1-<br>A3 | A4      | A5      | B1-B7   | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|----------|-----------|---------|---------|---------|---------|---------|---------|---------|----------|
| MFR   | Kg   | 0.00E+0 | 0.00E+0 | 1.24E-1  | 1.24E-1   | 0.00E+0 | 9.91E-3 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 8.96E-1 | 0.00E+0 | 0.00E+0  |
| MER   | Kg   | 0.00E+0 | 0.00E+0 | 0.00E+0  | 0.00E+0   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0  |
| EET   | MJ   | 0.00E+0 | 0.00E+0 | -3.23E-1 | -3.23E-1  | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -4.67E-1 |
| EEE   | MJ   | 0.00E+0 | 0.00E+0 | -1.87E-1 | -1.87E-1  | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -2.71E-1 |

**CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

## 5 Results

### 5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

#### BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per kilogram:

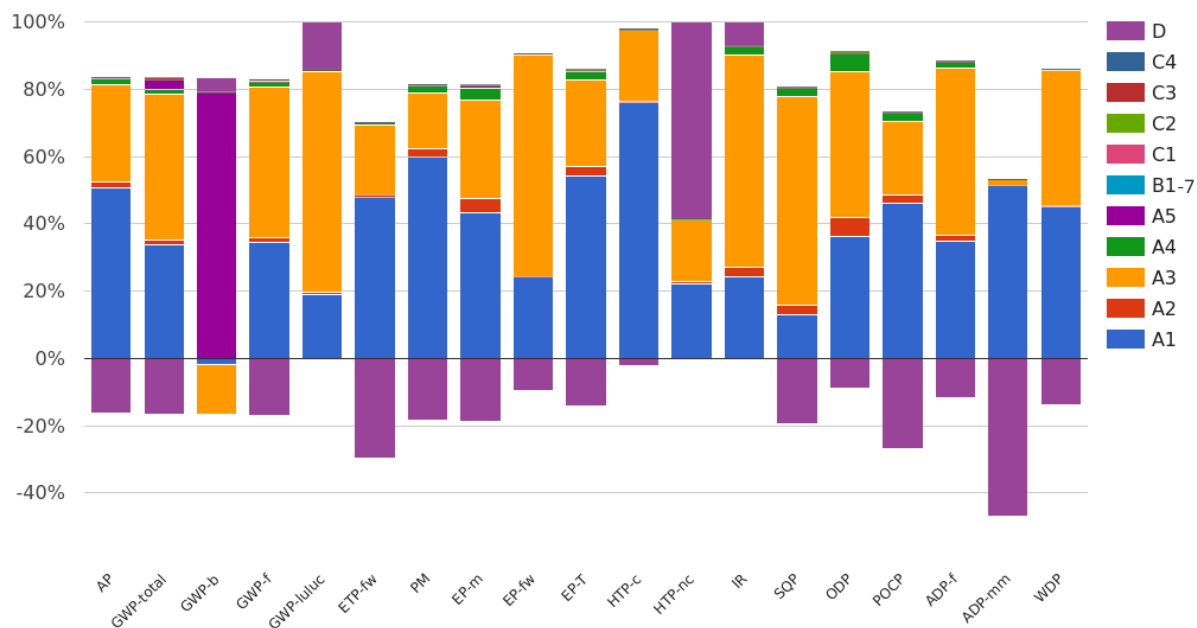
| Biogenic carbon content                           | Amount  | Unit |
|---------------------------------------------------|---------|------|
| Biogenic carbon content in the product            | 0       | kg C |
| Biogenic carbon content in accompanying packaging | 0.04597 | kg C |

#### UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

| Uptake Biogenic Carbon dioxide | Amount | Unit              |
|--------------------------------|--------|-------------------|
| Packaging                      | 0.1686 | kg CO2 (biogenic) |

## 6 Interpretation of results



The largest impacts for most of the environmental impact categories are in phases A1, A3 and Module D. This is well explainable because subject of this LCA study is a carbon steel press fitting. Carbon steel is a material which holds a considerable amount of environmental burden which explains the high impacts in phase A1. To turn carbon steel tubes into carbon steel press fittings SANHA® uses various production steps that require the use of electricity and ancillary materials which explain the impacts in phase A3. Finally, carbon steel is a material which at end-of-life is very well recyclable which explains de considerable negative values for Module D.

## 7 References

### ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

### ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

### ISO 14025

ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

### EN 15804+A2

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

### General PCR Ecobility Experts

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

### EN 10305

The fittings can be used in combination with carbon steel pipes according to the standard EN 10305.

### C-PCR

Part B: Requirements for the EPD for metal pipes for domestic installations" (01.08.2024) by Institute Construction and Environment e.V. (IBU).

## 8 Contact information

| Publisher                                                                                                                                                                                                                                                 | Operator                                                                                                                                                                                                                                                  | Owner of declaration                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                                                                                                          |                                                                                                                                                                          |  |
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