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

RefHP® | Copper-Iron Brazing Fittings

Registration number:	EPD-Kiwa-EE-190567-EN
Issue date:	31-01-2025
Valid until:	31-01-2030
Declaration owner:	SANHA GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

RefHP® | Copper-Iron Brazing Fittings

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-190567-EN

1.3 VALIDITY

Issue date: 31-01-2025

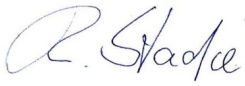
Valid until: 31-01-2030

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 (Germany)

E-mail: info@sanha.com

Website: www.sanha.com

Production location: Production location Ternat, Belgium

Address production location: Industrielaan 7, 1740 Ternat, Belgium

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)

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 'RefHP® | Copper-Iron Brazing Fittings' with the calculation identifier ReTHiNK-90567.

2 Product

2.1 PRODUCT DESCRIPTION

The SANHA® RefHP® high pressure system fittings are made of copper-iron, CuFe2P (material number CW107C). The SANHA® RefHP® 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 brazing the fitting onto the pipe. The extensive range (1/4" – 2 5/8") of the SANHA® RefHP® system consists of high-pressure brazing fittings for copper-iron pipes for use in high-pressure installations such as CO2 refrigeration systems up to 130 bar. The weight of the SANHA® RefHP® high pressure system fittings can be various due to the different dimensions of the product.

Features:

1. RefHP® fittings are compatible with all CuFe pipe types available on the market.
2. The fittings are ideal for the use in high-pressure applications such as refrigeration and air-conditioning systems, especially for CO2 systems, pressures up to 130 bar.
3. Optimal cleaning of the fittings results in a carbon value of <0.5mg C/dm². This is decisive for the quality of the soldered connection as carbon residues can lead to pitting corrosion at higher soldering temperatures.

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

For installations operating at high pressures such as refrigeration, heat pumps and air conditioning. More applications can be requested on demand.

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® RefHP® high pressure 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 one component namely, the copper-iron fitting body. 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® RefHP® high pressure system fittings are made of copper-iron CuFe2P (material number CW107C). The fittings are produced according to the standard EN 14276-1 in combination with copper pipes according to EN 378-2 and EN 14276-2. The SANHA® RefHP® range consists of the following items:

- Range: Couplings, t-pieces, reducers, reducing couplings, slip couplings, bends, end caps, adaptors.
- Dimensions:1/4"– 2 5/8"

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

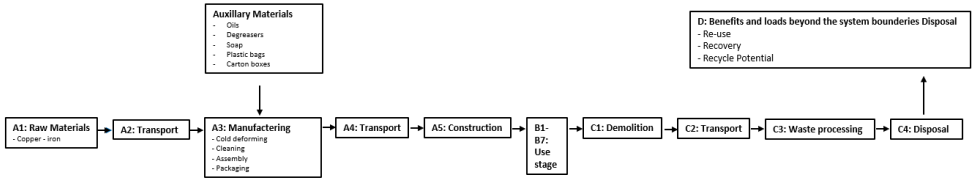
2.6 DESCRIPTION PRODUCTION PROCESS

The SANHA® RefHP® system fittings, which are manufactured in Ternat, Belgium, are produced from copper-iron tubes CuFe2P (material number CW107C) and are cold deformed. 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 you can find an overview of the various cold deformation steps:

- Bending into the correct radius;
- Opening up the pipe ends;
- Calibration;
- Forming of tee pieces through hydroforming process;

After the cold deformation process, the finished product is packed in plastic bags and carton boxes.

The energy used during the production phase is partially generated by solar panels. The other part of the energy consumed is green energy which is bought and 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 RefHP® copper-iron solder fittings.

1 kg of RefHP® copper-iron solder fittings with a reference service life of at least 50 years. Dimensions available from 1/4" up to 2 5/8".

Reference unit: kilogram (kg)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	kg
Conversion factor to 1 kg	0.999992	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 - 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 product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for RefHP® | Copper-Iron Brazing 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, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass or 5% on impact per environmental effect.

3 Calculation rules

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 for A4 and A5 with one exception. In stage A5 only brazing equipment is required to perform the installation. The exact energy required for this equipment is unknown since SANHA® is only the manufacturer of the fitting and not the party that performs the installation. The amount of energy used is however assumed to be very low since a fitting can be brazed in a matter of minutes. It was therefore assumed that the 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.

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 or 5% on impact per environmental effect.

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 EcoInvent 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 (Enterpise Resource Planning) system of the factory where the RefHP 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 Eneco is included in the project dossier.

The net mix has a GWP amount of 0.0299 kg CO2 eqv.

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	804 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	0.056	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]
copper (i.a. sheets, pipes) (NMD ID 41)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
Steel, construction profiles (NMD ID 70)	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 [%]
copper (i.a. sheets, pipes) (NMD ID 41)	NL	0	5	0	95	0
Steel, construction profiles (NMD ID 70)	NL	0	1	0	94	5

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.049	0.000	0.931	0.000
Steel, construction profiles (NMD ID 70)	0.000	0.000	0.000	0.019	0.001
Total	**0.000**	**0.049**	**0.000**	**0.950**	**0.001**

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]
copper (i.a. sheets, pipes) (NMD ID 41)	0.387	0.000
Steel, construction profiles (NMD ID 70)	0.020	0.000
Total	**0.407**	**0.000**

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+ eqv.	1.06E-1	8.94E-4	1.68E-2	1.24E-1	6.65E-4	3.43E-5	0.00E+0	0.00E+0	4.10E-5	2.78E-4	3.84E-6	-2.86E-2
GWP-total	kg CO2 eqv.	2.04E+0	1.68E-1	6.78E-1	2.89E+0	1.15E-1	9.60E-2	0.00E+0	0.00E+0	7.08E-3	2.17E-2	4.61E-4	-6.84E-1
GWP-b	kg CO2 eqv.	-1.19E-3	7.96E-5	-6.73E-2	-6.84E-2	5.29E-5	9.18E-2	0.00E+0	0.00E+0	3.27E-6	-1.31E-3	2.03E-5	-1.38E-3
GWP-f	kg CO2 eqv.	2.04E+0	1.68E-1	7.43E-1	2.95E+0	1.15E-1	4.23E-3	0.00E+0	0.00E+0	7.07E-3	2.30E-2	4.41E-4	-6.82E-1
GWP-luluc	kg CO2 eqv.	2.09E-3	6.13E-5	2.24E-3	4.39E-3	4.20E-5	1.26E-6	0.00E+0	0.00E+0	2.59E-6	2.57E-5	1.24E-7	-6.51E-4
EP-m	kg N eqv.	7.08E-3	3.03E-4	1.55E-3	8.92E-3	2.34E-4	9.85E-6	0.00E+0	0.00E+0	1.45E-5	6.14E-5	1.42E-6	-2.68E-3
EP-fw	kg P eq	1.29E-3	1.64E-6	2.32E-4	1.52E-3	1.16E-6	1.90E-7	0.00E+0	0.00E+0	7.13E-8	1.56E-6	5.70E-9	-2.28E-4
EP-T	mol N eqv.	1.03E-1	3.34E-3	1.75E-2	1.24E-1	2.58E-3	1.13E-4	0.00E+0	0.00E+0	1.59E-4	7.13E-4	1.57E-5	-4.13E-2
ODP	kg CFC 11 eqv.	1.34E-7	3.73E-8	6.11E-8	2.32E-7	2.53E-8	3.99E-10	0.00E+0	0.00E+0	1.56E-9	3.30E-9	1.59E-10	-5.29E-8
POCP	kg NMVOC eqv.	2.55E-2	9.71E-4	3.91E-3	3.04E-2	7.37E-4	3.04E-5	0.00E+0	0.00E+0	4.55E-5	1.95E-4	4.49E-6	-9.19E-3
ADP-f	MJ	2.55E+1	2.53E+0	8.51E+0	3.65E+1	1.73E+0	2.78E-2	0.00E+0	0.00E+0	1.07E-1	3.18E-1	1.18E-2	-8.57E+0
ADP-mm	kg Sb-eqv.	7.70E-4	4.32E-6	7.24E-5	8.47E-4	2.90E-6	1.30E-7	0.00E+0	0.00E+0	1.79E-7	1.28E-6	3.87E-9	-4.73E-4
WDP		1.24E+0	8.76E-3	1.41E-1	1.39E+0	6.18E-3	5.19E-4	0.00E+0	0.00E+0	3.82E-4	3.21E-3	5.68E-5	-5.73E-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)

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
	m3 world eqv.												

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	1.33E+3	2.22E+0	1.76E+2	1.50E+3	1.54E+0	2.19E-1	0.00E+0	0.00E+0	9.51E-2	1.37E+0	5.68E-2	-5.08E+2
PM	disease incidence	2.95E-7	1.44E-8	6.06E-8	3.70E-7	1.03E-8	2.65E-10	0.00E+0	0.00E+0	6.36E-10	3.50E-9	7.91E-11	-1.04E-7
HTP-c	CTUh	1.93E-8	7.06E-11	2.17E-9	2.16E-8	5.00E-11	1.58E-11	0.00E+0	0.00E+0	3.09E-12	3.33E-11	5.44E-13	-1.11E-8
HTP-nc	CTUh	1.54E-6	2.42E-9	2.04E-7	1.75E-6	1.69E-9	2.53E-10	0.00E+0	0.00E+0	1.04E-10	1.58E-9	4.45E-11	-8.00E-7
IR	kBq U235 eqv.	1.12E-1	1.07E-2	3.88E-2	1.61E-1	7.24E-3	1.14E-4	0.00E+0	0.00E+0	4.47E-4	1.59E-3	5.89E-5	-3.96E-2
SQP	Pt	2.70E+1	2.13E+0	2.18E+1	5.09E+1	1.50E+0	2.24E-2	0.00E+0	0.00E+0	9.25E-2	6.41E-1	2.89E-2	-1.26E+1

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

Disclaimer 1 – 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.

Disclaimer 2 – 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.

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	6.07E+0	3.25E-2	5.19E+0	1.13E+1	2.16E-2	1.97E-3	0.00E+0	0.00E+0	1.34E-3	5.00E-2	6.64E-4	-3.48E+0
PERM	MJ	0.00E+0	0.00E+0	7.41E-1	7.41E-1	0.00E+0	7.41E-5	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	6.07E+0	3.25E-2	5.93E+0	1.20E+1	2.16E-2	2.05E-3	0.00E+0	0.00E+0	1.34E-3	5.00E-2	6.64E-4	-3.48E+0
PENRE	MJ	2.70E+1	2.69E+0	8.64E+0	3.83E+1	1.83E+0	2.96E-2	0.00E+0	0.00E+0	1.13E-1	3.37E-1	1.25E-2	-9.12E+0
PENRM	MJ	0.00E+0	0.00E+0	3.87E-1	3.87E-1	0.00E+0	3.87E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.42E-3
PENRT	MJ	2.70E+1	2.69E+0	9.03E+0	3.87E+1	1.83E+0	2.96E-2	0.00E+0	0.00E+0	1.13E-1	3.37E-1	1.25E-2	-9.12E+0
SM	Kg	5.44E-1	0.00E+0	1.05E-1	6.49E-1	0.00E+0	6.49E-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	3.66E-2	3.03E-4	1.02E-2	4.71E-2	2.11E-4	3.28E-5	0.00E+0	0.00E+0	1.30E-5	1.51E-4	1.47E-5	-1.44E-2

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	5.85E-5	6.46E-6	2.76E-5	9.26E-5	4.38E-6	7.06E-8	0.00E+0	0.00E+0	2.70E-7	9.59E-7	1.45E-8	-1.39E-5
NHWD	Kg	7.05E-1	1.55E-1	3.51E-1	1.21E+0	1.10E-1	4.09E-3	0.00E+0	0.00E+0	6.77E-3	9.31E-3	4.93E-2	-5.08E-1
RWD	Kg	1.03E-4	1.67E-5	3.94E-5	1.59E-4	1.13E-5	1.54E-7	0.00E+0	0.00E+0	7.00E-7	1.89E-6	7.81E-8	-3.68E-5

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	9.50E-3	9.50E-3	0.00E+0	2.55E-3	0.00E+0	0.00E+0	0.00E+0	1.00E-3	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-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
MFR	Kg	0.00E+0	0.00E+0	3.59E-1	3.59E-1	0.00E+0	8.28E-3	0.00E+0	0.00E+0	0.00E+0	9.50E-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	-1.07E-1	-1.07E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.84E-1
EEE	MJ	0.00E+0	0.00E+0	-6.20E-2	-6.20E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.07E-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:

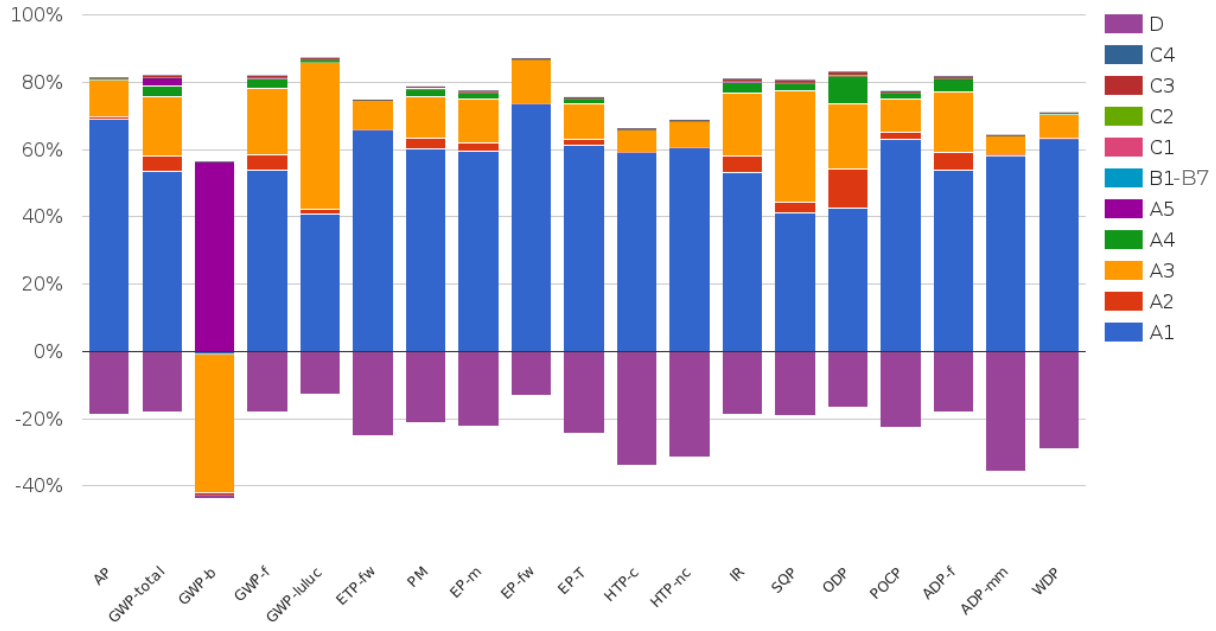
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.02399	kg C

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	0.08797	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 copper-iron solder fitting. Copper-iron is a material which holds a considerable amount of environmental burden which explains the high impacts in phase A1. To turn copper-iron tubes into copper-iron solder fittings, SANHA® uses various production steps that require the use of electricity and ancillary materials which explain the impacts in phase A3. Finally, copper-iron 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 14276-1 ; EN 378-2 ; EN 14276-2

The fittings are produced according to the standard EN 14276-1 in combination with copper pipes according to EN 378-2 and EN 14276-2

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)

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