# ENVIRONMENTAL PRODUCT DECLARATION

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

| | |
|---|---|
| Owner of the Declaration | ELVALHALCOR S.A. |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-ELV-20240354-CBA1-EN |
| Issue date | 29.04.2025 |
| Valid to | 28.04.2030 |

## TALOS® ECUTHERM

## ELVALHALCOR S.A.

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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HALCOR
Evolving Beyond Copper

COPPER & ALLOYS
EXTRUSION DIVISION:
ELVALHALCOR

# General Information

## ELVALHALCOR S.A.

**Programme holder**

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

**Declaration number**

EPD-ELV-20240354-CBA1-EN

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

Metal pipes for domestic installations, 01.08.2021
(PCR checked and approved by the SVR)

**Issue date**

29.04.2025

**Valid to**

28.04.2030

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

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

## TALOS® ECUTHERM

**Owner of the declaration**

ELVALHALCOR S.A.
62km Athens - Lamia National Road 1
GR32011 Oinofyta
Greece

**Declared product / declared unit**

1 kg of TALOS® Ecutherm.

**Scope:**

This core EPD relates to 1 kg of TALOS® Ecutherm. The pipe is manufactured at ELVALHALCOR's facility in Oinofyta, which is located in the Viotia region of Greece, specifically at the 62nd km of Athens-Lamia National Road. The core EPD is representative for the year 2021. The results in this core EPD were calculated using an LCA-tool certified by IBU in 2025.

Owner of the EPD: ELVALHALCOR S.A.
Owner of the EPD Tool: ELVALHALCOR S.A.
Originator of the pilot EPD: LCA practitioner Sphera Solutions

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

**Verification**

| |
|---|
| The standard EN 15804 serves as the core PCR |
| Independent verification of the declaration and data according to ISO 14025:2011 |
| ☐ internally ☒ externally |

Dr.-Ing. Nikolay Minkov,
(Independent verifier)

# Product

### Product description/Product definition

TALOS®ECUTHERM is a type of pre-insulated copper tube that comes in five different variations:

- TALOS® ECUTHERM
- TALOS® ACR ECUTHERM
- TALOS® ACR ECUTHERM 2
- ACR Pre-Insulated Copper Tubes
- TALOS® ECUTHERM SOLAR

These variations are designed for different applications and have varying diameters. However, sincethe functional unit is 1kg and allocations have been made based on mass, these variations are considered to be analogous. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (except for Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration:

| Products according to the CPR based on a hEN | | | |
|---|---|---|---|
| **Product** | **hEN** | **DOP** | **CE*** |
| **TALOS® ECUTHERM** | EN 1057:2006 | CPR | Yes |
| **TALOS® ECUTHERM SOLAR** | EN 1057:2006 | CPR | Yes |

* The CE is for the copper tube

For the application and use the respective national provisions apply.

**TALOS® ECUTHERM** copper tubes are produced in compliance with the requirements of standards that apply in most of the European Union countries, as regards insulation properties, chemical characteristics, and resistance to fire. They exhibit low λ coefficient, determining its heat conductivity properties and high μ coefficient which determines its resistance to penetration of moisture.

**TALOS® ECUTHERM SOLAR** copper tubes are manufactured in pairs (one for supply and one for return), in standardized dimensions which sufficiently cover the usual requirements of solar systems. The two pieces are attached throughout their length, while the tubes also include an incorporated cable for the connection of temperature sensors. For easy connection, separation between the two lines is also possible. TALOS® ECUTHERM SOLAR copper tubes are coated with a 3-layer system. Firstly, a high temperature resistant PES insulation layer is positioned on the outside of the copper tube. Secondly, an industrial insulation of cross-linked polyethylene (PE-X) foam structured in closed micro-cells provides thermal insulation. Thirdly, an external covering creates an integral resistance barrier against the external environment.

| Product | hEN | Certificate | CE | Comments |
|---|---|---|---|---|
| TALOS® ACR ECUTHERM | EN 12735 | PED | n/a | CE is not applicable because the Quality Management System for materials are certified in accordance with Pressure Equipment Directive 2014/68/EU |
| TALOS® ACR ECUTHERM 2 | EN 12735 | PED | n/a | |
| ACR Pre-Insulated Copper Tubes | EN 12735 | PED | | |

TALOS® copper tubes are manufactured according to (a) the Harmonized *European Standard EN 1057* for use in plumbing installations or (b) the *European Standard EN 12735-1* for use in air conditioning and refrigeration installations. TALOS® ACR ECUTHERM copper tubes meet the requirements imposed by new generations of refrigerants (HFCs, HFOs) which are adopted by major refrigeration and air conditioning unit manufacturers.

**TALOS® ACR ECUTHERM** pre-insulated copper tubes are advanced technological products of high added value and significantly superior in effectiveness compared to conventional insulation methods. The unique advantages offered by the TALOS® ECUTHERM copper tubes, such as copper resistance and durability, coupled with high performance pre-insulation (Engineering Foams), result in significant energy savings. With a competitive market price and low installation cost, TALOS® ACR ECUTHERM copper tubes are the ideal choice for every modern application.
The insulating material used in the manufacturing of TALOSR ACR ECUTHERM copper tubes is an extruded high quality cross-linked polyethylene (PE-X) suitably expanded to form a foam with closed microcells, free of FCFC and fibrous substances. A layer of thin polyethylene coating is adhered to the foamy crosslinked substrate, providing a skin of improved operational features and esthetic appearance.

**TALOS® ACR ECUTHERM 2** pre-insulated copper tubes, manufactured by HALCOR are an innovation that ensures significant advantages for refrigeration and air conditioning installers. TALOS® ACR ECUTHERM 2 copper tubes are manufactured in pairs, firmly connected along their entire length, and in eight standard size combinations which cover sufficiently the usual connectivity requirements of any refrigeration or air conditioning unit. TALOS® ACR ECUTHERM 2 copper tube pairs, form a single unit which is installed easily and fast, ensuring professional results.

**ACR Pre-Insulated Copper Tubes** are advanced technological products of high added value and significantly superior in effectiveness compared to conventional insulation methods. The unique advantages offered by the products, such as copper resistance and durability, coupled with high performance pre-insulation (Engineering Foams), result in significant energy savings. With a competitive market price and low installation cost, ACR Pre-Insulated copper tubes are the ideal choice for every modern application.
The insulating material used in the manufacturing is an extruded high quality cross-linked polyethylene (PE-X) suitably expanded to form a foam with closed microcells, free of FCFC and fibrous substances. A layer of thin polyethylene coating is adhered to the foamy crosslinked substrate, providing a skin of improved operational features and esthetic appearance. The following listed tube dimensions are standardized sizes, other dimensions can also be supplied.

### Quality Marks

- **WATER PIPES**: RAL / DVGW, BSI, AFNOR, AENOR, CSTB (Avis Technique), NSAI, KIWA / GASTEC-QA, SITAC, STF VTT, GOST VIK
- **REFRIGERATION PIPES**: TÜV, GL
- **SOLAR INSTALATION PIPES (PAIRS)**: (RAL/DVGW, AFNOR, AENOR, CSTB, NSAI).

### Application

The products covered in the EPD have the following applications:

- **TALOS® ECUTHERM**: water pipes;

- **TALOS® ACR ECUTHERM**: air conditioning and refrigeration pipes;
- **TALOS® ACR ECUTHERM 2**: air conditioning and refrigeration pipes;
- **ACR Pre-Insulated Copper Tubes**: air conditioning and refrigeration pipes;
- **TALOS® ECUTHERM SOLAR**: solar installation pipes.

**Technical Data**

The performance data of the product according to the harmonized norms, based on the harmonization provisions above apply.
The relevant technical specifications according to the PCR Part B are given in the table below.

| Product Name | Temper | EN 1057 / EN 12735 Designation | Min. Tensile Strength Rm (MPa) | Min. Elongation A% |
|---|---|---|---|---|
| ECUTHERM ACR | Soft | R-220 | 220 | 40 |
| ECUTHERM ACR 2 | Soft | R-220 | 220 | 40 |
| ECUTHERM SOLAR | Soft | R-220 | 220 | 40 |

**TALOS® ECUTHERM Standard Dimensions according to EN 1057**

| Copper tube external diameter (mm) | Copper tube wall thickness (mm) | Overall external diameter with 9mm thick insulation (mm) |
|---|---|---|
| 6 | 0,8 | 24 |
| 8 | 0,8 | 26 |
| 10 | 0,8 | 28 |
| 12 | 1 | 30 |
| 15 | 1 | 33 |
| 16 | 1 | 34 |
| 18 | 1 | 36 |
| 22 | 1 | 40 |

**TALOS® ACR ECUTHERM Standard Dimensions according to EN 12735-1**

| Copper tube external diameter (mm) | Copper tube external diameter (inch) | Copper tube wall thickness (mm) | Overall external diameter with 9mm thick insulation (mm) |
|---|---|---|---|
| 4,76 | mar-16 | 0,8 | 22,76 |
| 6,35 | 01-apr | 0,8 | 24,35 |
| 7,94 | 05-giu | 0,8 | 25,94 |
| 9,52 | 03-ago | 0,8 | 27,52 |
| 12,7 | 01-feb | 0,8 | 30,7 |
| 15,87 | 05-ago | 1 | 33,87 |
| 19,05 | 03-apr | 1 | 37,05 |
| 22,22 | 07-ago | 1 | 40,23 |

**TALOS® ACR ECUTHERM 2 - Standard Pair Dimensions (Coils 15m, 25m, 30m Long)**

| Copper tube external diameter (mm) | Copper tube external diameter (inch) | Copper tube wall thickness (mm) | Overall external diameter with 9mm thick insulation (mm) |
|---|---|---|---|
| 6,35-9,52 | 1/4-3/8 | 0,80-0,80 | 24,4-27,5 |
| 6,35-12,70 | 1/4-1/2 | 0,80-0,80 | 24,4-30,7 |
| 6,35-15,87 | 1/4-5/8 | 0,80-1,00 | 24,4-33,9 |
| 6,35-19,05 | 1/4-3/4 | 0,80-1,00 | 24,4-37,10 |
| 9,52-12,70 | 3/8-1/2 | 0,80-0,80 | 27,5-30,7 |
| 9,52-15,87 | 3/8-5/8 | 0,80-1,00 | 27,5-33,9 |
| 9,52-19,05 | 3/8-3/4 | 0,80-1,00 | 27,5-37,1 |
| 12,70-19,05 | 1/2-3/4 | 0,80-1,00 | 30,7-37,1 |

*Other sizes and special packaging in pallets or cardboard boxes are available upon request.*

**TALOS® ECUTHERM SOLAR – Standardized dimensions (Roll Lengths 10, 15, 20, 25 meters)**

| Outside diameter of copper tube (mm) | Wall Thickness (mm) | Total diameter with 13mm thick insulation (mm) | Bend Radius |
|---|---|---|---|
| 10 | 0,5 | 36 | 4xOD |
| 11 | 0,6 | 37 | |
| 12 | 0,6 | 38 | |
| 15 | 0,7 | 41 | |
| 18 | 0,75 | 44 | |
| 22 | 0,9 | 48 | |

*The quality marks of Solar Installation Pipes (Pairs) do not apply to the dimensions in the table above.*

**INSULATION MATERIALS**

Insulation Technical Properties of TALOS® ECUTHERM, TALOS® ACR ECUTHERM

| | |
|---|---|
| Material | PE foam<br>PE-X foam |
| Density According to DIN 53420 ASTM D 1667 | 30-33 kg/m$^3$ |
| Thermal Conductivity Coefficient (λ) According to EN ISO 8497 | 0,0357 W/Mk (0°C)<br>0,0389 W/Mk (40°C) |
| Vapour-Water Diffusion Resistance co-efficient (μ) according to EN13469 | 12,5 |
| Working Temperature | -80 °C to +110 °C |
| Reaction to fire | EN 13501-1 Class B or Class E,<br>DIN 4102, B2, BS 476,<br>NF P 92 501-M1 |
| Resistance to chemical agents acc. To ASTM 543-56 T. | Very Good |
| Dimensional Stability According to ISO 2796 for temperatures up to 100 °C | <5% |

*Values are listed, as obtained under standard laboratory conditions and may be amended, without prior notice.*

**Insulation Technical Properties of TALOS® ECUTHERM SOLAR**

| | |
|---|---|
| Material | PES/ PE-X |
| Density According to DIN 53420 ASTM D 1667 | 30-33 kg/m$^3$ |
| Thermal Conductivity Coefficient (λ) According to EN ISO 8497 | 0,0357 W/Mk (0°C)<br>0,0389 W/Mk (40°C) |
| Vapour-Water Diffusion Resistance co-efficient (μ) according to EN13469 | 12,5 |
| Working Temperature | -80 °C to +150 °C |
| Reaction to fire | EN 13501 Class E |
| Resistance to chemical agents acc. To ASTM 543-56 T. | Very Good |
| Dimensional Stability According to ISO 2796 for temperatures up to 100 °C | <5% |

For 1 kg of TALOS®ECUTHERM, the amount of insulation material does not exceed 5% of the mass.

Data about performance are not required since this is a core EPD.

**Base materials/Ancillary materials**

The main constituents of the product are: copper and insulation materials (PE foam, PE-X foam, PES, PE-X).

**Reference service life**

The documentation of the RSL is not required for the EPDs calculated using the LCA tool because the EPDs scope does not cover the use phase. The following are the declared modules: A1-A3, C1-C4 and D.

## LCA: Calculation rules

**Declared Unit**

For the product family TALOS®ECUTHERM, the declared unit is 1 kg of copper pipe.
Declaration type with respect to the manufacturer:

1c) declaration of an average product from one plant of one manufacturer.

Declaration type with respect to life cycle stages covered according to *clause 5.2 EN 15804+A2 (EN 15804)* is cradle to gate with modules C1–C4 and module D.

**Declared unit and mass reference**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |
| Gross density | 8.96 | $kg/m^3$ |

The Talos®ECUTHERM family includes various product categories, which necessitated an estimation of the robustness of the LCA values through a variability analysis. Key production processes were evaluated for variability, with electrical energy consumption identified as the primary influencing factor. A ±10% variation in energy was applied to the relevant key processes. This resulted in a maximum change of 4.1% in Ozone Depletion Potential (ODP) and a variation of ±2.3% in Global Warming Potential (GWP-total), while other environmental impacts showed minimal variability and remained lower than ODP.

**System boundary**

The system boundaries of the present LCA and related model follow the modular structure defined by *EN 15804+A2 (EN 15804)*.
The modules taken into account are the following:

- A1: production of preliminary products;
- A2: transport to the plant;
- A3: production incl. provision of energy, production of packaging as well as auxiliaries and consumables, and waste treatment;
- C1: deconstruction and demolition;
- C2: transport to the waste treatment plant;
- C3: waste processing;
- C4: disposal;
- D: recycling potential.

One scenario is considered: 100% recycling (C3). For this reason, the impact of the C4 module will be zero.

According to *EN 15804*, any declared benefits and loads from net flows leaving the product system that have not been allocated as co-products (which is the case for flows from A1-A3) and that have passed the end-of-waste state (processing up to the end-of-waste state or disposal of final residues during the product stage) shall be included in module D.

Emissions from the raw material recycling process at the end of product life were considered in Module D.

**Geographic Representativeness**

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

**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 Managed LCA Content (GaBi database 2023.2) has been used.

## LCA: Scenarios and additional technical information

**Characteristic product properties of biogenic carbon**

In the case of a product with raw materials containing biogenic carbon, emissions of equivalent biogenic $CO_2$ have been calculated and considered. The biogenic carbon content of the packaging is related to the amount of pallets, papers, and cardboard consumed, which is given as a yearly amount and then scaled to 1 kg of product.

The products that will be verified with this LCA tool do not contain biogenic carbon.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of $CO_2$

**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 | 0.055 | kg C |

Modules declared: A1, A2, A3, C1, C2, C3, C4, and D.

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

The end-of-life stage includes:

- C1 – deconstruction and demolition
- C2 – transport to end of life
- C3 – waste processing for recycling
- C4 - disposal

A 100% recycling scenario is considered, thus 1kg of product is fully sent to recycling.

| Name | Value | Unit |
|---|---|---|
| Recycling | 1 | kg |

# LCA: Results

## DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

| Product stage | | | Construction process stage | | Use stage | | | | | | | End of life stage | | | | Benefits and loads beyond the system boundaries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | MND | MND | MND | MND | MNR | MNR | MNR | MND | MND | X | X | X | X | X |

## RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg TALOS®ECUTHERM

| Parameter | Unit | A1 | A2 | A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg $CO_2$ eq | 2.24E+00 | 1.35E-01 | 7.54E-01 | 4.79E-04 | 1.25E-02 | 2.26E-01 | 0 | -7.53E-01 |
| GWP-fossil | kg $CO_2$ eq | 2.23E+00 | 1.34E-01 | 7.14E-01 | 4.78E-04 | 1.25E-02 | 2.25E-01 | 0 | -7.53E-01 |
| GWP-biogenic | kg $CO_2$ eq | 4.82E-03 | 1.35E-04 | 3.93E-02 | 5.02E-07 | 1.33E-05 | 1.23E-03 | 0 | 1.88E-03 |
| GWP-luluc | kg $CO_2$ eq | 3.19E-03 | 5.53E-06 | 2.96E-04 | 2.87E-08 | 7.58E-07 | 3.1E-05 | 0 | -1.99E-03 |
| ODP | kg CFC11 eq | 1.95E-11 | 1.26E-14 | 1.42E-12 | 5.4E-17 | 1.42E-15 | 2.56E-12 | 0 | -3.34E-12 |
| AP | mol $H^+$ eq | 1.85E-02 | 1.87E-03 | 2.25E-03 | 2.3E-06 | 7.93E-05 | 5.6E-04 | 0 | -1.03E-02 |
| EP-freshwater | kg P eq | 3.11E-06 | 3.1E-08 | 2.9E-06 | 1.11E-10 | 2.92E-09 | 7.07E-07 | 0 | -1.48E-06 |
| EP-marine | kg N eq | 1.56E-03 | 7.33E-04 | 9.81E-04 | 1.09E-06 | 3.92E-05 | 1.11E-04 | 0 | -6.57E-04 |
| EP-terrestrial | mol N eq | 1.63E-02 | 8.04E-03 | 1.07E-02 | 1.19E-05 | 4.32E-04 | 1.18E-03 | 0 | -6.75E-03 |
| POCP | kg NMVOC eq | 5.24E-03 | 1.84E-03 | 2.48E-03 | 3.08E-06 | 7.66E-05 | 3.43E-04 | 0 | -2.33E-03 |
| ADPE | kg Sb eq | 7.02E-04 | 1.44E-09 | 1.46E-07 | 5.66E-12 | 1.49E-10 | 2.22E-08 | 0 | -4.45E-04 |
| ADPF | MJ | 3.96E+01 | 1.77E+00 | 9.98E+00 | 6.56E-03 | 1.73E-01 | 4.09E+00 | 0 | -1.27E+01 |
| WDP | $m^3$ world eq deprived | 1.06E+00 | 2.73E-04 | 1.56E-01 | 1.1E-06 | 2.9E-05 | 1.5E-01 | 0 | -4.08E-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: 1 kg TALOS®ECUTHERM

| Parameter | Unit | A1 | A2 | A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 9.32E+00 | 9.85E-03 | 1.95E+00 | 4.24E-05 | 1.12E-03 | 1.74E+00 | 0 | -2.45E+00 |
| PERM | MJ | 0 | 0 | 2.38E+00 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 9.32E+00 | 9.85E-03 | 4.33E+00 | 4.24E-05 | 1.12E-03 | 1.74E+00 | 0 | -2.45E+00 |
| PENRE | MJ | 3.29E+01 | 1.77E+00 | 9.07E+00 | 6.59E-03 | 1.74E-01 | 8.72E+00 | 0 | -1.27E+01 |
| PENRM | MJ | 6.71E+00 | 0 | 9.31E-01 | 0 | 0 | -4.63E+00 | 0 | 0 |
| PENRT | MJ | 3.96E+01 | 1.77E+00 | 1E+01 | 6.59E-03 | 1.74E-01 | 4.09E+00 | 0 | -1.27E+01 |
| SM | kg | 7.58E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 2.26E-01 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | $m^3$ | 1.99E-02 | 1.2E-05 | 3.62E-03 | 4.93E-08 | 1.3E-06 | 4.2E-03 | 0 | -7.57E-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: 1 kg TALOS®ECUTHERM

| Parameter | Unit | A1 | A2 | A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | 2.67E-09 | 4.24E-12 | 1.39E-08 | 1.21E-14 | 3.2E-13 | -6.98E-11 | 0 | -3.66E-10 |
| NHWD | kg | 4.62E-01 | 1.7E-04 | 6.09E-02 | 6.56E-07 | 1.73E-05 | 1.08E-01 | 0 | -2.36E-01 |
| RWD | kg | 8.39E-04 | 2.59E-06 | 2.16E-04 | 1.1E-08 | 2.9E-07 | 4.58E-04 | 0 | -1.76E-04 |
| CRU | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 0 | 0 | 3.94E-02 | 0 | 0 | 1E+00 | 0 | 0 |
| MER | kg | 0 | 0 | 2.83E-02 | 0 | 0 | 0 | 0 | 0 |
| EEE | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EET | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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: 1 kg TALOS®ECUTHERM**

| Parameter | Unit | A1 | A2 | A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 1.52E-07 | 3.43E-08 | 3.03E-08 | 2.61E-11 | 2.76E-10 | 4.92E-09 | 0 | -8.37E-08 |
| IR | kBq U235 eq | 1.19E-01 | 3.78E-04 | 3.45E-02 | 1.62E-06 | 4.28E-05 | 7.6E-02 | 0 | -2.77E-02 |
| ETP-fw | CTUe | 1.7E+01 | 1.26E+00 | 6.35E+00 | 4.73E-03 | 1.25E-01 | 1.12E+00 | 0 | -8.19E+00 |
| HTP-c | CTUh | 1.01E-09 | 2.31E-11 | 1.28E-09 | 8.68E-14 | 2.3E-12 | 7.12E-11 | 0 | -5.05E-10 |
| HTP-nc | CTUh | 6.97E-08 | 7.42E-10 | 3.78E-08 | 2.81E-12 | 7.4E-11 | 2.5E-09 | 0 | -3.95E-08 |
| SQP | SQP | 1.36E+01 | 8.84E-03 | 3.23E+01 | 4.1E-05 | 1.08E-03 | 1.15E+00 | 0 | -7.16E+00 |

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.

This EPD was created using a software tool.

## References

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**Further references**

**CEN/TR 15941**
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