# ENVIRONMENTAL PRODUCT DECLARATION

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

| | |
|---|---|
| Owner of the Declaration | SOUDAL N.V. |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-SDL-20240122-CAA1-EN |
| Issue date | 03.04.2024 |
| Valid to | 16.01.2028 |

## SOUDAFIX VE400-SF

## SOUDAL N.V.

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## General Information

### SOUDAL N.V.

**Programme holder**

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

**Declaration number**

EPD-SDL-20240122-CAA1-EN

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

Reaction resin products, 01.08.2021
(PCR checked and approved by the SVR)

**Issue date**

03.04.2024

**Valid to**

16.01.2028

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

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

### SOUDAFIX VE400-SF

**Owner of the declaration**

SOUDAL N.V.
Everdongenlaan 18-20
2300 Turnhout
Belgium

**Declared product / declared unit**

The declared product is the two-component reaction resin mortar "SOUDAFIX VE400-SF", manufacturated by SOUDAL N.V.. The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use. The packaging is also included in the calculation, since the product is sold by SOUDAL N.V. with its packaging. The declared unit is indicated in [kg].

**Scope:**

This document covers the two-component reaction resin mortar "SOUDAFIX VE400-SF". To prepare the life cycle assessment [*LCA*], specific data were collected from the SOUDAL N.V. manufacturing facility in Germany. The assessment is based on data from 2020 which correspond to the yearly average. The procedure by which the data are allocated to the declared unit is described in the "Allocation" section.

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 | |

Angela Schindler,
(Independent verifier)

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## Product

**Product description/Product definition**

The declared product SOUDAFIX VE400-SF is a two-component reaction resin mortar based on vinyl ester resin that is delivered in a two-component plastic cartridge. The high-performance product is applied through a static mixer using a manual, battery-operated or pneumatic gun. It was specially developed for use in securing threaded rods, rebar or internally threaded sleeves in solid brick, concrete, autoclaved aerated concrete and lightweight concrete. Due to its excellent mechanical strength, it can also be used in perforated brick by using a special perforated sleeve. SOUDAFIX VE400-SF mortar has a wide range of possible applications at installation tempeartures as low as -10 °C and operating temperatures of up to 120 °C, and offers high chemical resistance in extreme environments like swimming pools (chlorine) or near the sea (salt). With its broad range of national and international approvals and certifications, it can be used in almost any application.

Marketing of the product in the EU/EFTA (except for Switzerland) is governed by *Regulation (EU) No. 305/2011 (CPR)*. The product requires a Declaration of Performance subject to *ETA-10/0167, ETA-21/0170, ETA-12/0558* and CE marking.

**Application**

The declared product SOUDAFIX VE400-SF is used to reliably secure threaded rods, internally threaded sleeves and post-installed rebar connections in dry and moist concrete or masonry. The SOUDAFIX VE400-SF product can also be used for water-filled boreholes. The declared product SOUDAFIX VE400-SF has very good mechanical and thermal properties as well as very high chemical resistance. It can be used in aggressive environments. The declared product SOUDAFIX VE400-SF emits only a slight odour.

Sample applications

Suitable for securing façades, canopies, wooden structures, metal structures, metal profiles, supports, beams, panels, railings, gratings, plumbing fixtures, pipes, cable trays, post-installed rebar connections (for renovations or reinforcement), etc.

**Technical Data**

The following construction data are relevant for the declared product SOUDAFIX VE400-SF as delivered:

**Construction data**

| Name | Value | Unit |
|---|---|---|
| Density acc. to DIN 51757 for mixing the two components | 1.6 | g/ml |
| Compressive strength acc. to DIN EN 196 Part 1 | 100.6 | N/mm² |
| Flexural strength acc. to DIN EN 196 Part 1 | 14.7 | N/mm² |

**Storage:**

Store in a cool, dry and dark place; storage temperature: +5°C to +25°C

**Shelf life:**

18 months in standard cartridge systems
18 months in foil tube cartridge systems

**Gel and working time:**

-10°C 90 min.
-5°C 90 min.
0°C 45 min.
+5°C 25 min.
+10°C 15 min.
+20°C 6 min.
+30°C 4 min.
+35°C 2 min.
+40°C 1.5 min.

**Curing time in dry substrate:**

-10°C 1440 min.
-5°C 840 min.
0°C 420 min.
+5°C 120 min.
+10°C 80 min.
+20°C 45 min.
+30°C 25 min.
+35°C 20 min.
+40°C 15 min.

For more information, please refer to the relevant technical data sheet.

Product performance values in accordance with the Declaration of Performance with regard to its principal charateristics according to *ETA-10/0167, ETA-21/0170* and *ETA-12/0558*.

**Base materials/Ancillary materials**

The declared product SOUDAFIX VE400-SF is delivered as a two-component plastic cartridge and consists of a resin component and a curing agent component in a 10:1 volume ratio. The mixing ratio between the resin component and the curing agent component is set automatically as the product is pushed out of the cartridge. Curing begins immediately after the components are mixed.

1) "This product/article/at least one partial article contains substances in the ECHA candidate list of substances of very high concern (SVHC) (10 June 2022) above a concentration of 0.1% by mass: no."

2) "This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no"

3)"Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Regulation on Biocidal Products No. 528/2012): no"

The product considered in this EPD contains individual components in the following ranges:

Resin component:

Vinyl ester resin: 30 to 40% by weight

Mineral fillers: 50 to 70% by weight

Other components: < 5% by weight

Curing agent component:
Dibenzoyl peroxide: 10 to 15% by weight

Mineral fillers: 40 to 60% by weight

Other components: 10 to 35% by weight

**Reference service life**
The declared product SOUDAFIX VE400-SF may be exposed to a wide range of environmental conditions during the use phase. Its expected reference service life depends on the specific installation situation and on the product's resulting exposure. The main factors influencing service life are weather conditions and mechanical and chemical stresses.

## LCA: Calculation rules

**Declared Unit**
The product declared is a two-component reaction resin mortar manufactured by SOUDAL N.V. with the product name SOUDAFIX VE400-SF. The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use.

The mixing ratio between the resin component and the curing agent component is 9:1 [m/m] (volume ratio 10:1). The packaging is also included in the calculation at 0.3013 kg per 1 kg of reaction resin product. The declared unit data are presented in the table below.

**Declared unit data**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |

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

Production stage (A1- A3):
• A1, Raw material extraction,
• A2, Transport to the manufacturer,
• A3, Manufacturing.

End of life (C1- C4):
C1, Deconstruction/demolition,
C2, Transport,
C3, Waste processing,
C4, Disposal.

Reuse, recovery and recycling potential (D)

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

The precursor products are sourced from Germany, England and France, Transport is mainly done by truck. Only the transport from England is done by rail. The following process diagrams illustrate the underlying production process.

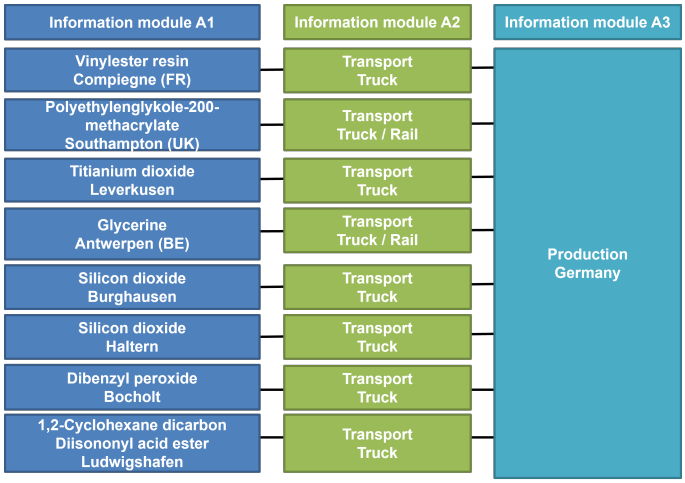


**Figure 1 Information modules A 1 to A3 of the product**

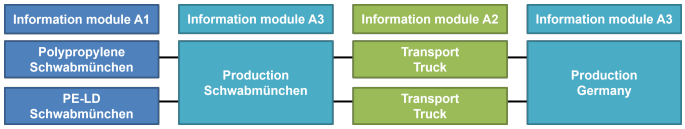


**Figure 2 Information modules A 1 to A3 of the packaging**

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

**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.

## LCA: Scenarios and additional technical information

**Characteristic product properties of biogenic carbon**
No renewable raw materials are used in the product or the packaging. The biogenic carbon value is therefore reported as zero.

**Packaging per declared unit**

| Name | Value | Unit |
|---|---|---|
| Packaging PP | 0.0318 | kg |
| Packaging PA6 | 0.2696 | kg |

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

The product is demolished by using an electric chisel. The electrical energy consumption for this tool is estimated at 0.05 MJ for the declared unit. The power consumption is calculated using a European energy mix. Construcion waste is transported 200 km by truck to a waste treatment facility. At the waste treatment facility, the construction waste is shredded and the disposed of in a landfill.

| Name | Value | Unit |
|---|---|---|
| Collected as mixed construction waste | 1 | kg |
| Shredding | 1 | kg |
| Disposal in landfill | 1 | kg |

**Reuse, recovery and recycling potential (D), relevant scenario specifications**

The product has no reuse, recovery or recycling potential. Information module D is therefore declared and reported as zero.

| Name | Value | Unit |
|---|---|---|
| Reuse, recovery and recycling potential | 0 | kg |

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## 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 SOUDAFIX VE400-SF**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Global Warming Potential total (GWP-total) | kg $CO_2$ eq | 4.68E+00 | 5.12E-03 | 1.51E-02 | 2.6E-03 | 1.45E-02 | 0 |
| Global Warming Potential fossil fuels (GWP-fossil) | kg $CO_2$ eq | 4.68E+00 | 5.12E-03 | 1.5E-02 | 2.59E-03 | 1.45E-02 | 0 |
| Global Warming Potential biogenic (GWP-biogenic) | kg $CO_2$ eq | 0 | 0 | 0 | 0 | 0 | 0 |
| Global Warming Potential luluc (GWP-luluc) | kg $CO_2$ eq | 8E-04 | 1.08E-06 | 8.28E-05 | 1.2E-05 | 2.67E-05 | 0 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC11 eq | 6.24E-09 | 7.5E-14 | 8.9E-16 | 3.85E-15 | 3.4E-14 | 0 |
| Acidification potential of land and water (AP) | mol $H^+$ eq | 7.09E-03 | 1.12E-05 | 4.67E-05 | 1.34E-05 | 1.03E-04 | 0 |
| Eutrophication potential aquatic freshwater (EP-freshwater) | kg P eq | 2.57E-05 | 1.49E-08 | 4.43E-08 | 7.43E-09 | 2.45E-08 | 0 |
| Eutrophication potential aquatic marine (EP-marine) | kg N eq | 2.29E-03 | 2.52E-06 | 2.15E-05 | 6.11E-06 | 2.62E-05 | 0 |
| Eutrophication potential terrestrial (EP-terrestrial) | mol N eq | 2.1E-02 | 2.65E-05 | 2.4E-04 | 6.74E-05 | 2.88E-04 | 0 |
| Formation potential of tropospheric ozone photochemical oxidants (POCP) | kg NMVOC eq | 6.57E-03 | 6.82E-06 | 4.22E-05 | 1.66E-05 | 7.97E-05 | 0 |
| Abiotic depletion potential for non fossil resources (ADPE) | kg Sb eq | 1.14E-06 | 1.4E-09 | 1.24E-09 | 2.87E-09 | 1.48E-09 | 0 |
| Abiotic depletion potential for fossil resources (ADPF) | MJ | 9.01E+01 | 9.29E-02 | 1.98E-01 | 5.06E-02 | 1.9E-01 | 0 |
| Water use (WDP) | $m^3$ world eq deprived | 1.49E-01 | 1.17E-03 | 1.33E-04 | 4.99E-04 | 1.59E-03 | 0 |

**RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg SOUDAFIX VE400-SF**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Renewable primary energy as energy carrier (PERE) | MJ | 1.17E+01 | 5.16E-02 | 1.13E-02 | 4.06E-03 | 2.85E-02 | 0 |
| Renewable primary energy resources as material utilization (PERM) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of renewable primary energy resources (PERT) | MJ | 1.17E+01 | 5.16E-02 | 1.13E-02 | 4.06E-03 | 2.85E-02 | 0 |
| Non renewable primary energy as energy carrier (PENRE) | MJ | 6.07E+01 | 9.3E-02 | 1.99E-01 | 5.07E-02 | 1.9E-01 | 0 |
| Non renewable primary energy as material utilization (PENRM) | MJ | 2.95E+01 | 0 | 0 | 0 | 0 | 0 |
| Total use of non renewable primary energy resources (PENRT) | MJ | 9.02E+01 | 9.3E-02 | 1.99E-01 | 5.07E-02 | 1.9E-01 | 0 |
| Use of secondary material (SM) | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of renewable secondary fuels (RSF) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of non renewable secondary fuels (NRSF) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of net fresh water (FW) | $m^3$ | 1.33E-02 | 4.92E-05 | 1.28E-05 | 1.42E-05 | 4.82E-05 | 0 |

**RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg SOUDAFIX VE400-SF**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Hazardous waste disposed (HWD) | kg | 9.76E-09 | 8.04E-12 | 9.53E-13 | 6.34E-13 | 9.75E-12 | 0 |
| Non hazardous waste disposed (NHWD) | kg | 8.53E-02 | 7E-05 | 2.85E-05 | 1.34E-05 | 9.71E-01 | 0 |
| Radioactive waste disposed (RWD) | kg | 1.33E-03 | 1.49E-05 | 2.45E-07 | 6.68E-07 | 2.11E-06 | 0 |
| Components for re-use (CRU) | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for recycling (MFR) | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for energy recovery (MER) | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported electrical energy (EEE) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported thermal energy (EET) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg SOUDAFIX VE400-SF**

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Soil quality index (SQP) | SQP | ND | ND | ND | ND | ND | ND |

The dataset "DE: Epoxy Resin, Source: Sphera, Reference year: 2021" was updated with reference to the previous EPD. As this dataset has a strong influence on the overall calculation, the results are higher in comparison to the previous EPD from 2015.

## References


**Standards**

**DIN 51757**
DIN 51757:2011-01
Testing of mineral oils and related materials - Determination of density

**EN 196**
DIN EN 196-1:2016-11
Test methods for cement - Part 1: Determination of strength
German version EN 196-1:2016

**EN 15804**
EN 15804:2019-04+A2, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

**ISO 14025**
DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

**ISO 14044**
DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines.

**Further references**

**ecoinvent 3.7.1**
Background database: ecoinvent 3.7.1
Zürich: ecoinvent (Ed.) .
http://www.ecoinvent.org
(25/03/2022)

**ETA-10/0167**
European Technical Assessment.

**ETA-21/0170**
European Technical Assessment.

**ETA-12/0558**
European Technical Assessment.

**IBU 2021**
Institut Bauen und Umwelt e.V.: General guidance for the EPD programme of the Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.
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**PCR PART A**
Product Category Rules for Building-Related Products and Services - Calculation Rules for the Life Cycle Assessment and requirements on the Project Report V2.1, Institut Bauen und Umwelt e.V., 11.2021.

**PCR: Reaction resin products**
Guidance-Texts for Building-Related Products and Services. Part B: Requirements on the EPD for Reaction resin products, Version 1.3. Berlin: Institut Bauen und Umwelt e.V. (Hrsg.),07.2014.

**Sphera**
GaBi 10 Software: Life Cycle Assessment
Leinfelden-Echterdingen; Sphera Solution GmbH (Hrsg.).
http://www.gabi-software.com/deutsch/index/
(25/03/2022)

**Regulation (EU) No. 305/2011** (CPR)
**Regulation (EU) No. 528/2012** (Biocidal Product Regulation)

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