# ENVIRONMENTAL PRODUCT DECLARATION

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

| | |
|---|---|
| Owner of the Declaration | Adolf Würth GmbH & Co. KG |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-AWU-20260364-IBC2-EN |
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| Valid to | 17.06.2031 |

## 4-in-1 natural stone sealant

# Adolf Würth GmbH & Co. KG

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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# 1. General Information

## Adolf Würth GmbH & Co. KG

**Programme holder**

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

**Declaration number**

EPD-AWU-20260364-IBC2-EN

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

Building sealants, 01.08.2021
(PCR checked and approved by the SVR)

**Issue date**

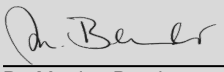
18.06.2026

**Valid to**

17.06.2031



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



Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

## 4-in-1 natural stone sealant

**Owner of the declaration**

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-17
74653 Künzelsau
Germany

**Declared product / declared unit**

1 kg of 4-in-1 natural stone sealant

**Scope:**

This declaration is a representative EPD that applies to the 4-in-1 natural stone sealant manufactured by Adolf Würth GmbH & Co. KG. The product is available in multiple colour variants and packaging configurations; the variant with the highest environmental impacts was selected as the basis for this declaration, ensuring a conservative worst-case approach. It is based on production data for the reference year 2024 from a manufacturing facility located in Germany. For reasons of confidentiality, no further details about the specific production site or manufacturer are provided.
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 evidence.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard is abbreviated 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 |
| ☐ internal ☒ external |



Mr Stephen Forson ,
(Independent verifier)

## 2. Product

### 2.1 Product description/Product definition

The 4-in-1 Natural Stone Sealant is an permanently elastic silicone sealant compatible with natural stone substrates such as granite, marble and sandstone. The product is suitable for sealing expansion joints in facade, glazing, sanitary and floor applications, as well as for laminated safety glass and insulating glass edge seal compatibility, for use in interior and exterior environments. It is available in multiple colour variants as well as in a transparent version and is supplied in HDPE cartridges or foil bags. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration:

*EN 15651-1*: Sealants for non-structural use in joints in buildings and pedestrian walkways — Facade elements
*EN 15651-2*: Sealants for glazing
*EN 15651-3*: Sealants for sanitary joints
*EN 15651-4*: Sealants for pedestrian walkways

and the CE-marking. For the application and use the respective national provisions apply.

### 2.2 Application

The 4-in-1 Natural Stone Sealant is used for sealing expansion joints in interior and exterior applications. Designated areas of application include:

- Sealing and jointing of natural stones such as granite, marble and sandstone
- Sealing expansion joints in facade, glazing, sanitary and floor areas
- Sealing of laminated safety glass and insulating glass edge bonds
- Applications in facade construction, glass and window construction
- Applications in the sanitary sector
- Applications in food-adjacent environments

The product is to be applied in accordance with the manufacturer's technical data sheet and the applicable general notes on application for sealants.

### 2.3 Technical data

**Constructional data**

| Name | Value | Unit |
|---|---|---|
| Resilience (EN ISO 7389) | ≥ 70 % | % |
| Volume depletion (EN ISO 10563) | ≤ 5 % | % |
| Vertical stability | ≤ 3 mm | mm |
| Tensile properties (EN ISO 8339) | Passed | - |
| Tensile properties / Secant modulus at 23 °C (EN ISO 8339) | < 0.4 | MPa |
| Tensile behaviour: For non-load-bearing joint sealants with low modulus, used in joints in areas with cold climate conditions −30 °C (EN ISO 9046) | < 0.9 | MPa |
| Tensile properties under prestress in cold climate conditions −30 °C (EN ISO 9046) | Passed | |
| Tear resistance EN 15651-4 | Passed | |
| Adhesion/cohesion properties at maintained extension after 28-day immersion in water EN 15651-4 | No Performance Declared | |
| Adhesion/cohesion properties at maintained extension after 28-day immersion in saltwater EN 15651-4 | No Performance Declared | |
| Microbiological growth EN ISO 846 | 0 | |

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

- *EN 15651-1:2012+A1:2017* — Sealants for non-structural use in joints in buildings and pedestrian walkways — Facade elements
- *EN 15651-2:2012+A1:2017* — Sealants for glazing
- *EN 15651-3:2012+A1:2017* — Sealants for sanitary joints
- *EN 15651-4:2012+A1:2017* — Sealants for pedestrian walkways

### 2.4 Delivery status

The 4-in-1 natural stone sealant is supplied ready for use and requires no mixing or further preparation prior to application. It is available in HDPE cartridges with a nominal volume of 310 ml and in foil bags with a nominal volume of 600 ml. Both packaging configurations are available in a transparent version as well as in multiple colour variants. For the purposes of the LCA, the packaging was modelled as a combination of HDPE cartridge, a cardboard box, and a wooden pallet.

### 2.5 Base materials/auxiliary materials

| Name | Value | Unit |
|---|---|---|
| Siloxanes | 45-90 | % |
| Silanes | 1-10 | % |
| Fumed Silica | 5-15 | % |
| Silicone plasticizers | 1-5 | % |
| Pigment | 0-3 | % |
| Calcium Carbonate | 0-30 | % |
| Catalyst | 0-2 | % |
| Biocidal additive | 0-1 | % |

1) This product contains substances listed in the candidate list (*ECHA Candidate List of Substances of Very High Concern*, current version 04.02.2026) exceeding 0.1 percentage by mass: No.

2) This product contains other carcinogenic, mutagenic, reprotoxic (*CMR*) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass:

No.

3) Biocide products were added to this construction product (treated product as defined by Regulation (EU) *No. 528/2012* on biocidal products): Yes.

- Active Substance: 2-Octyl-2H-isothiazol-3-one
- CAS No. 26530-20-1

The product is classified as water hazard class WGK 1 (slightly hazardous to water) in accordance with AwSV. The volatile organic compound (VOC) content is 3.22 % (2.57 g/l) in accordance with Directive *2010/75/EU*.

### 2.6 Manufacture

The product is manufactured at a single production site in Germany. The manufacturing process consists of the following steps:

1. Mixing of Raw Materials
The silicone base, fillers, additives, and curing agents are combined in a mixing unit and blended until a homogeneous silicone compound is formed.

2. Colouring (if required)
Approved pigments are added to the mixture to achieve the desired colour. Transparent variants are produced without the addition of pigments.

3. Filling and Packaging
The finished silicone compound is filled either into HDPE cartridges for direct application or into foil bags for use with refill systems.

### 2.7 Environment and health during manufacturing

The manufacturing of the product is subject to the statutory requirements applicable in Germany. No measures relating to health protection or environmental protection extending beyond the applicable national legal requirements are implemented at the production site.

### 2.8 Product processing/Installation

The product is typically dispensed into joints using a cartridge gun. No special machinery or equipment is required for installation.

During application, volatile organic compound (*VOC*) emissions may occur. Health and safety measures, including the use of protective gloves and goggles as well as adequate ventilation of the working area, are to be observed in accordance with the information provided in the safety data sheet and the applicable conditions on site.

### 2.9 Packaging

The product is delivered in HDPE cartridges or foil bags, packed in cardboard boxes and stacked on wooden pallets. A detailed description of the packaging configuration is provided in Section 2.4.

Wooden pallets are assumed to be reused multiple times before disposal. Cardboard packaging is suitable for material recycling. For the purposes of the LCA, a conservative approach was applied, assuming energy recovery via incineration for plastic packaging components.

### 2.10 Condition of use

Once applied and fully cured, the silicone sealant forms a stable, elastic joint seal. No significant changes in material composition are expected over the service life of the product under normal conditions of use. *VOC* emissions may occur during application and the curing phase immediately following installation. After full cure, no further environmentally relevant substance release is expected under typical in-service conditions.

### 2.11 Environment and health during use

The cured silicone sealant does not release environmentally relevant substances under normal conditions of use. During application and the curing phase, adequate ventilation should be ensured. A silicone-typical odour may be perceived until full cure is achieved.
The product has been assessed in accordance with the *EMICODE* classification system. The product has been awarded the *EMICODE EC1 Plus* classification.

### 2.12 Reference service life

The use stage modules B1–B7 are not declared in this EPD. A reference service life (RSL) in accordance with *ISO 15686* is therefore not required and has not been determined.

A service life of 25 years is indicated on the basis of the *BBSR* table "Service lives of components for life cycle assessment according to *BNB*". This value applies under normal conditions of use and proper installation in accordance with the manufacturer's specifications and the applicable rules of technology. When applied in accordance with the rules of technology, the ageing behaviour of the product is mainly influenced by UV radiation, temperature fluctuations, moisture, joint movement, chemical exposure, and contact with incompatible adjacent materials. These influences may affect the sealant over time by causing changes in elasticity, adhesion, surface appearance, and colour stability and, in unfavourable cases, may reduce the long-term performance of the joint. Under normal service conditions, however, stable long-term performance is expected. Further details are provided in the manufacturer's technical data sheet.

### 2.13 Extraordinary effects

**Fire**

**Fire protection**

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

**Water**

The cured silicone sealant is water-resistant and does not dissolve or degrade under prolonged water exposure under normal conditions of use. In the event of unforeseeable water influence, such as flooding, no significant release of environmentally relevant substances from the cured product is expected.

The uncured product is classified as water hazard class WGK 1 (slightly hazardous to water) in accordance with AwSV. Contact of uncured material with water bodies or drainage systems should be avoided.

**Mechanical destruction**

In the event of mechanical destruction of the cured sealant, e.g. during demolition or renovation works, solid silicone fragments may be released. These fragments are chemically inert and do not release environmentally relevant substances under normal conditions. The material should be collected and disposed of in accordance with applicable national waste regulations.

### 2.14 Re-use phase

The cured silicone sealant cannot be reused or mechanically recycled after removal from the joint. Energy recovery via

incineration is the applicable end-of-life pathway for the cured product. HDPE cartridge packaging is not suitable for mechanical recycling due to contamination with silicone residues and is therefore directed to energy recovery.

### 2.15 Disposal

The cured sealant and application residues are to be disposed of in accordance with applicable national waste regulations. Waste adhesives and sealants are assigned waste code 08 04 10 (waste adhesives and sealants other than those mentioned in 08 04 09) in accordance with the European Waste Catalogue (*EWC*). Plastic packaging is assigned waste code 15 01 02 and cardboard packaging waste code 15 01 01.

### 2.16 Further information

Additional information on the product, including the technical data sheet and safety data sheet, is available at: www.wuerth.de

## 3. LCA: Calculation rules

### 3.1 Declared unit

This EPD refers to the declared unit of 1 kg of 4-in-1 natural stone sealant applied into the building with a density of 1.0–1.5 g/cm³ in accordance with the *IBU PCR Part B* for construction sealants.

**Declared unit and mass reference**

| Name | Value | Unit |
|---|---|---|
| Density (wie deklariert) | 1000 | $kg/m^3$ |
| Declared unit | 1 | kg |
| Productiveness | 1.25 | l/m |
| Gross density | 1 - 1.5 | g/cm³ |

For a standard joint dimension of 10 x 10 mm and a product density of 1.25 g/cm3, the consumption of ready-mixed product is 0.125 kg per metre of joint, corresponding to a yield of 8 m per kg. The actual consumption depends on the respective joint width and depth.

The results of the Life Cycle Assessment provided in this declaration have been selected from the product with the highest environmental impact (worst-case scenario). Depending on the application, a corresponding conversion factor, such as the density, must be taken into consideration to convert volumetric use to mass.

The LCA results are considered robust. The declared product is manufactured at a single production site in Germany using a consistent and well-documented manufacturing process. Primary data were collected directly from the production site for the reference year 2024, covering all relevant material inputs, energy consumption, packaging, and production waste. Variability in the production process is considered low, as the product is based on a standardised formulation with controlled raw material inputs. Overall, the LCA results are considered sufficiently representative and robust for use in external communication and as the basis for an EPD.

### 3.2 System boundary

**Type of EPD: Cradle to gate – with options**

The following life cycle modules are considered in this declaration:

Modules A1–A3 (Product stage): Module A1 covers the extraction and processing of all raw materials, including the provision of auxiliary materials and upstream energy. Module A2 covers the transport of raw materials to the manufacturing site. Module A3 covers the manufacturing of the product, including filling and packaging, energy consumption, and treatment of production waste.

Module A4 (Transport to the construction site): Transport of the finished product from the manufacturer to the construction site, based on sales-weighted average distances for the reference year 2024.

Module A5 (Installation): Manual application of the sealant into the joint. Includes VOC emissions during application and end-of-life treatment of packaging materials accompanying the product.

Module C1 (Deconstruction): Energy consumption associated with mechanical demolition of the building.

Module C2 (Transport to waste processing): Transport of post-consumer waste to waste treatment facilities.

Module C3 (Waste processing): Thermal treatment of the product via municipal solid waste incineration.

Module C4 (Disposal): No material is sent to landfill. The product is fully incinerated in Module C3.

Module D (Beyond system boundary): Avoided environmental impacts from energy recovery via incineration, substituting conventional electricity and heat generation from primary sources.
The emission factor resulting from the impact of the individual energy sources ('total GWP') is 0.514 kg $CO_2$ equivalent per kWh.

### 3.3 Estimates and assumptions

Transport (Module A4): Transport distances to the construction site were determined as sales-weighted average distances based on the 2024 sales distribution. An additional last-mile transport of 100 km by truck was added to account for the final delivery to the construction site.

Packaging end-of-life (Module A5): HDPE cartridge packaging is assumed to undergo 100 % energy recovery via incineration, as mechanical recycling is not applicable due to contamination with silicone residues. Cardboard packaging is assumed to be fully recycled. Wooden pallets are assumed to be reused 7.5 times on average before disposal.

Deconstruction (Module C1): In the absence of product-specific demolition data, energy consumption was estimated based on the typical fuel consumption of hydraulic excavators and a conservative material throughput assumption. The contribution of Module C1 to the total environmental impact is negligible across all assessed impact categories.

End-of-life (Module C3): The product is assumed to be fully treated via municipal solid waste incineration. No landfill disposal is assumed.

Module D: Avoided impacts from energy recovery are credited based on the substitution of a generic European electricity mix and heat generation from natural gas.

### 3.4 Cut-off criteria

No cut-off criteria were applied in this study. All available energy and material flow data for the processes within the defined system boundary have been included in the LCA model. The

system boundary was defined based on relevance to the goal of the study, and no mandatory life cycle stages, relevant processes, or data needs have been omitted.

### 3.5 Background data

All background data used in this LCA were sourced from the ecoinvent *EN 15804* database, version 3.11 (2024). The database provides consistent and up-to-date life cycle inventory data for raw materials, energy carriers, transport processes, and waste treatment scenarios in accordance with the requirements of *EN 15804:2012+A2:2019*.

### 3.6 Data quality

Foreground data: Primary data were collected directly from the production site for the reference year 2024 using customised data collection templates. The data cover all relevant material inputs, energy consumption, packaging materials, and production waste. Data provided by the manufacturer were reviewed for completeness and plausibility. The quality of the primary data is considered good with respect to temporal, geographical, and technological representativeness.

Background data: All background datasets were sourced from the *ecoinvent EN 15804 database version 3.11*, published in 2024. The datasets reflect the current state of the art for LCA background data and are considered temporally representative. Where specific datasets were not available, technically comparable proxy datasets were applied and documented transparently in the background report.

Robustness: The declared product is manufactured at a single production site in Germany using a standardised and well-documented formulation. Variability in the production process is considered low. The environmental impacts are dominated by upstream raw material production. Transport distances are based on sales-weighted averages from 2024 distribution data, providing adequate geographical representativeness for the declared market. Overall, the LCA results are considered sufficiently robust for use as the basis for this EPD.

### 3.7 Period under review

The production data underlying this LCA were collected for the reference year 2024. The data represent a single production site and reflect the standard manufacturing conditions for that period. No averaging over multiple years was applied.

### 3.8 Geographic representativeness

Country or region in which the declared product system is manufactured, used or handled at the end of the product's life span: Europe

### 3.9 Allocation

No multi-output allocation was applied, as the product system has a single output. Allocations within ecoinvent background datasets follow the methods documented in the respective dataset documentation.

Wooden pallets are modelled with 1/7.5 of their manufacturing impact attributed to the declared product, reflecting an assumed average reuse of 7.5 times (Module A1–A3).

Energy recovered from incineration of production waste (Module A3), packaging materials (Module A5), and the product at the end of life (Module C3) is reported as exported energy (EEE, EET). Associated avoided burdens from the substitution of conventional energy generation are reported in Module D.

### 3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to *EN 15804* and the building context and product-specific performance characteristics are taken into account. The background data used in this study were sourced from the *ecoinvent EN 15804* database, version 3.11 (2024).

## 4. LCA: Scenarios and additional technical information

**Characteristic product properties of biogenic carbon**

The packaging material contains biogenic carbon which is presented below.

**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 | 0.1 | kg C |

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

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

| Name | Value | Unit |
|---|---|---|
| Transport distance Truck | 533.38 | km |
| Transport distance Ship | 173,32 | km |
| Gross weight | 15,9 | t |
| Truck loading | 5,79 | t |

**Installation into the building (A5)**

| Name | Value | Unit |
|---|---|---|
| VOC in the air | 0.0035 | kg |
| Packaging material | 0.3347 | kg |

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

| Name | Value | Unit |
|---|---|---|
| Collected as mixed construction waste | 1 | kg |
| Energy recovery | 1 | kg |

## 5. 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 | X | X | 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 4-in-1 natural stone sealant**

| Parameter | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg $CO_2$ eq | 9.12E+00 | 1.01E-01 | 5.14E-01 | 3.8E-03 | 9.25E-03 | 2.35E+00 | 0 | -6.61E-01 |
| GWP-fossil | kg $CO_2$ eq | 9.15E+00 | 1.01E-01 | 5.14E-01 | 3.69E-03 | 9.24E-03 | 2.35E+00 | 0 | -6.52E-01 |
| GWP-biogenic | kg $CO_2$ eq | -3.67E-02 | 6.46E-05 | 3.67E-02 | 1.05E-04 | 5.99E-06 | 1.53E-04 | 0 | -8.76E-03 |
| GWP-luluc | kg $CO_2$ eq | 1.22E-02 | 3.41E-05 | 4.04E-06 | 9.7E-06 | 3.12E-06 | 1.85E-05 | 0 | -7.79E-04 |
| ODP | kg CFC11 eq | 8.73E-04 | 2.19E-09 | 1.63E-10 | 1.05E-10 | 2.01E-10 | 7.45E-10 | 0 | -2.18E-08 |
| AP | mol $H^+$ eq | 3.4E-02 | 2.35E-04 | 1.17E-04 | 2.06E-05 | 1.98E-05 | 5.38E-04 | 0 | -1.6E-03 |
| EP-freshwater | kg P eq | 2.12E-03 | 6.96E-06 | 1.69E-06 | 3.15E-06 | 6.41E-07 | 7.74E-06 | 0 | -2.39E-04 |
| EP-marine | kg N eq | 6.76E-03 | 5.67E-05 | 6.68E-05 | 3.3E-06 | 4.78E-06 | 3.06E-04 | 0 | -3.53E-04 |
| EP-terrestrial | mol N eq | 6.86E-02 | 6.14E-04 | 5.69E-04 | 2.97E-05 | 5.16E-05 | 2.61E-03 | 0 | -3.29E-03 |
| POCP | kg NMVOC eq | 2.67E-02 | 3.56E-04 | 1.79E-03 | 1.25E-05 | 3.15E-05 | 6.55E-04 | 0 | -1.34E-03 |
| ADPE | kg Sb eq | 6.96E-05 | 3.51E-07 | 3.59E-08 | 4.45E-08 | 3.24E-08 | 1.64E-07 | 0 | -4.79E-07 |
| ADPF | MJ | 1.2E+02 | 1.43E+00 | 9.67E-02 | 1.01E-01 | 1.31E-01 | 4.43E-01 | 0 | -1.25E+01 |
| WDP | $m^3$ world eq deprived | 2.69E+00 | 7.56E-03 | 3.41E-02 | 2.13E-03 | 6.97E-04 | 1.56E-01 | 0 | -1.71E-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 4-in-1 natural stone sealant**

| Parameter | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 1.68E+01 | 2.35E-02 | 3.15E+00 | 2.04E-02 | 2.17E-03 | 1.82E-02 | 0 | -1.37E+00 |
| PERM | MJ | 3.13E+00 | 0 | 3.13E+00 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 1.99E+01 | 2.35E-02 | 3.97E-03 | 2.04E-02 | 2.17E-03 | 1.82E-02 | 0 | -1.37E+00 |
| PENRE | MJ | 9.66E+01 | 1.43E+00 | 9.15E+00 | 7.99E-02 | 1.31E-01 | 1.58E+01 | 0 | -1.25E+01 |
| PENRM | MJ | 2.46E+01 | 0 | -9.24E+00 | 0 | 0 | -1.54E+01 | 0 | 0 |
| PENRT | MJ | 1.21E+02 | 1.43E+00 | 9.67E-02 | 1.01E-01 | 1.31E-01 | 4.43E-01 | 0 | -1.25E+01 |
| SM | kg | 2.17E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | $m^3$ | 6.3E-02 | 1.74E-04 | 5.79E-04 | 4.96E-05 | 1.61E-05 | 2.65E-03 | 0 | -3.98E-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 4-in-1 natural stone sealant**

| Parameter | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | 4.57E-01 | 2.07E-03 | 7.94E-03 | 1.89E-04 | 1.91E-04 | 3.64E-02 | 0 | -1.55E-02 |
| NHWD | kg | 1.39E+01 | 4.44E-02 | 2.39E-01 | 1.55E-02 | 4.09E-03 | 1.09E+00 | 0 | -1.2E+00 |
| RWD | kg | 1.4E-04 | 4.24E-07 | 4.17E-08 | 5.41E-07 | 3.91E-08 | 1.91E-07 | 0 | -4.36E-05 |
| CRU | kg | 0 | 0 | 9.17E-02 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 0 | 0 | 1.28E-01 | 0 | 0 | 0 | 0 | 0 |
| MER | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EEE | MJ | 0 | 0 | 8.34E-01 | 0 | 0 | 1.94E+00 | 0 | 0 |
| EET | MJ | 3.34E-01 | 0 | 1.63E+00 | 0 | 0 | 5.35E+00 | 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 4-in-1 natural stone sealant**

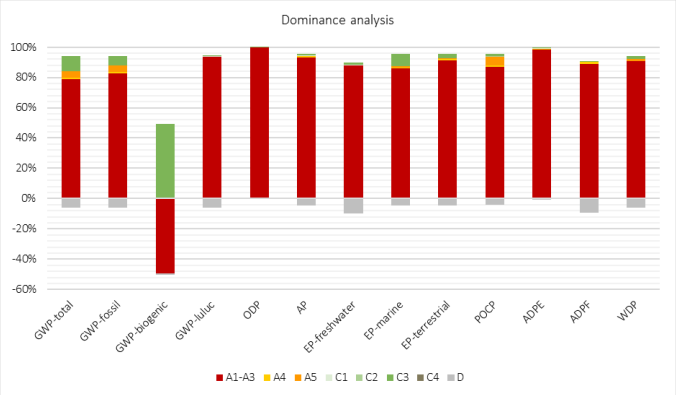
| Parameter | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 2.98E-07 | 7.51E-09 | 6.16E-10 | 8.25E-11 | 6.92E-10 | 2.82E-09 | 0 | -5.97E-09 |
| IR | kBq U235 eq | 5.62E-01 | 1.72E-03 | 1.65E-04 | 2.11E-03 | 1.59E-04 | 7.55E-04 | 0 | -1.7E-01 |
| ETP-fw | CTUe | 1.36E+03 | 1.92E-01 | 1.02E+00 | 1.16E-02 | 1.77E-02 | 4.63E+00 | 0 | -7.33E-01 |
| HTP-c | CTUh | 3.71E-08 | 1.7E-11 | 4.38E-11 | 1.04E-12 | 1.55E-12 | 2.01E-10 | 0 | -8.8E-11 |
| HTP-nc | CTUh | 4.63E-08 | 8.97E-10 | 1.9E-09 | 5.5E-11 | 8.28E-11 | 7.04E-09 | 0 | -2.13E-09 |
| SQP | SQP | 5.08E+01 | 8.53E-01 | 2.78E-02 | 1.6E-02 | 7.88E-02 | 1.27E-01 | 0 | -9.36E-01 |

PM = Potential incidence of disease due to PM emissions; IR = Potential human exposure efficiency relative to U235; ETP-fw = Potential comparative toxic unit for ecosystems; HTP-c = Potential comparative toxic unit for humans (carcinogenic); HTP-nc = Potential comparative toxic unit for humans (not carcinogenic); 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 – carcinogenic”, “Potential comparative toxic unit for humans - not carcinogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

## 6. LCA: Interpretation




The dominance analysis shows that the production stage (A1-A3) is the main driver for almost all impact categories, typically contributing around 85-100 % of the total results. This is particularly pronounced for ODP and ADPE, where A1-A3 is close to 100 %, and also for GWP-luluc, AP, EP-terrestrial, POCP, ADPF, and WDP, where A1-A3 generally remains above approximately 90 %.

The transport to site (A4) and installation (A5) stages are visible only in a few categories and remain small, generally in the low single-digit range. The VOC release during installation is reflected in the POCP result reported for Module A5. The most noticeable additional contributions occur for POCP and EP-freshwater, where A4 and A5 together account for only a few percent of the total bar.

For the end-of-life stage, C3 (incineration/waste processing) appears as a small but visible contributor in several indicators, most clearly for GWP-total and GWP-fossil, where it contributes about 5-10 %. In most other categories, C1, C2, and C4 remain negligible.

The comparison of the assessed product variants shows a relevant variation in the LCA results. For GWP-total (without Module D), the worst-case scenario amounts to approximately 12.14 kg $CO_2$-eq. per declared unit, while the other assessed variants are approximately 21 % and 34 % lower, respectively. This variation is mainly attributable to differences in packaging configuration and, to a lesser extent, to general differences between the assessed product variants. Due to its very low contribution, GWP-luluc did not have a significant influence on the overall GWP result and was therefore not identified as a relevant driver in the analysis.

## 7. Requisite evidence

Evidence for indoor emission behaviour is provided through the *EMICODE EC1 Plus* classification, which is accepted as an alternative to *AgBB* scheme testing for joint sealants in accordance with the *IBU PCR Part B* for construction sealants.

The product Würth Natursteindichtstoff 4 in 1 has been classified and awarded the *EMICODE EC1 Plus* licence by the *GEV* (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V.). Testing was performed in accordance with the GEV testing method, comprising VOC determination in a test chamber using Tenax/thermal desorption with subsequent GC/MS analysis. Licence number: 11285/12.01.11. Date of application/licensing: 23.01.2020.

1) Installation products, adhesives and construction products

| Parameter | EC 1 PLUS | EC 1 | EC 2 |
|---|---|---|---|
| | max. allowed concentration [µg/m³] | | |
| TVOC after 3 days | ≤ 750 | ≤ 1000 | ≤ 3000 |
| TVOC after 28 days | ≤ 60 | ≤ 100 | ≤ 300 |
| TSVOC after 28 days | ≤ 40 | ≤ 50 | ≤ 100 |
| R value based on German AgBB LCI (NIK) after 28 days | ≤ 1 | ≤ 1 | - |
| Sum of non-assessable VOC | ≤ 40 | - | - |
| Formaldehyde after 3 days | ≤ 50 | ≤ 50 | ≤ 50 |
| Formaldehyde after 28 days | ≤ 10 | ≤ 10 | ≤ 10 |
| Acetaldehyde after 3 days | ≤ 50 | ≤ 50 | ≤ 50 |
| Sum of form- and acetaldehyde | ≤ 0.05 ppm | ≤ 0.05 ppm | ≤ 0.05 ppm |
| Sum of volatile C1A/C1B after 3 days | < 10 | < 10 | < 10 |
| Any volatile C1A/C1B after 28 days | < 1 | < 1 | < 1 |

2) Products for floor surface treatments for parquet, mineral floors and resilient floorings

| Parameter | EC 1 PLUS | EC 1 | EC 2 |
|---|---|---|---|
| | max. allowed concentration [µg/m³] | | |
| Sum TVOC + TSVOC after 28 days | ≤ 100 thereof max. 40 SVOC | ≤ 150 thereof max. 50 SVOC | ≤ 400 thereof max. 100 SVOC |
| R value based on German AgBB LCI (NIK) after 28 days | ≤ 1 | ≤ 1 | - |
| Sum of non-assessable VOC | ≤ 40 | - | - |
| Formaldehyde after 3 days | ≤ 50 | ≤ 50 | ≤ 50 |
| Formaldehyde after 28 days | ≤ 10 | ≤ 10 | ≤ 10 |
| Acetaldehyde after 3 days | ≤ 50 | ≤ 50 | ≤ 50 |
| Sum of form- and acetaldehyde | ≤ 0.05 ppm | ≤ 0.05 ppm | ≤ 0.05 ppm |
| Sum of volatile C1A/C1B after 3 days | < 10 | < 10 | < 10 |
| Any volatile C1A/C1B after 28 days | < 1 | < 1 | < 1 |

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**Publisher**

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

**Programme holder**

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

**Author of the life cycle assessment**

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-17
74653 Künzelsau
Germany

+49 7940/15-0
info@wuerth.com
www.wuerth.de

**Owner of the Declaration**

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-17
74653 Künzelsau
Germany

+49 7940/15-0
info@wuerth.com
www.wuerth.de