

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

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|--------------------------|--------------------------------------|
| Owner of the Declaration | BOSTIK |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
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STIX A600 EVOLUTION BOSTIK

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1. General Information

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| <p>BOSTIK</p> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-BST-20210114-IBA1-EN</p> <hr/> <p>This declaration is based on the product category rules: Dispersion adhesives and primers for floor coverings, 01.2019 (PCR checked and approved by the SVR)</p> <hr/> <p>Issue date 11/02/2022</p> <hr/> <p>Valid to 10/02/2027</p> <hr/> <p></p> <hr/> <p>Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p> | <p>STIX A600 EVOLUTION</p> <hr/> <p>Owner of the declaration Bostik GmbH Postfach 11 54 Borgholzhausen, 33825 Germany</p> <hr/> <p>Declared product / declared unit 1 kg STIX A600 EVOLUTION dispersion adhesive.</p> <hr/> <p>Scope: The Environmental Product Declaration refers to STIX A600 EVOLUTION dispersion adhesive. Data and calculation values refer to the BOSTIK plant located in BORGHOLZHAUSEN in Germany. It is based on data from 2017 which complies with the annual average.</p> <p>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.</p> <p>The EPD was created according to the specifications of <i>EN 15804+A2</i>. In the following, the standard will be simplified as <i>EN 15804</i>.</p> <hr/> <p>Verification</p> <p>The standard <i>EN 15804</i> serves as the core PCR</p> <p>Independent verification of the declaration and data according to <i>ISO 14025:2010</i></p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <hr/> <p></p> <hr/> <p>Vito D'Incognito (Independent verifier)</p> |
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2. Product

2.1 Product description/Product definition

Adhesives for flooring are adhesives that are used on a load-bearing substrate in order to generate permanent bonding between the floor covering and the substrate (*EN ISO 22636*).

Dispersion adhesives are suitable for bonding practically all types of flooring available on the market.

For the use and application of the product, the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

2.2 Application

The GLASS BALL technology is an exclusive Bostik patented technology based on micro glass spheres in combination with specific dispersions and raw materials.

This technology makes it possible to significantly reduce the density of the product while maintaining a high performance. This allows +30% surface area to be covered with the same quantity in weight as standard soft floor adhesive.

Glass Ball technology is based on the use of hollow glass microspheres to lighten the glue and thus obtain

a 25% weight gain while maintaining the mechanical performance of a standard glue.

The lightweight consistency of the STIX A600 EVOLUTION provides a smooth, creamy application with excellent workability and very ease of use. Our technology also provides easier handling of the material with higher coverage.

2.3 Technical Data

STIX A600 EVOLUTION complies with all of the requirements of *EN ISO 22636* on PVC and rubber flooring.

Constructional data

| Name | Value | Unit |
|------------------------------------------|------------------|-------------------|
| Peel strength acc. to EN ISO 22631 | greater than 1.2 | N/mm |
| Shear strength acc. to EN ISO 22632 | greater than 0.3 | N/mm ² |
| Dimensional changes acc. to EN ISO 22633 | less than 0.2 | max. % |

Performance data of the product with respect to its

characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

STIX A600 EVOLUTION is available ready for use in a 15 kg recycled bucket (*EuCertPlast n°0062-08-21-HTP-BM*).

2.5 Base materials/Ancillary materials

Our STIX A600 EVOLUTION is a solvent-free, phthalate-free and isocyanate-free formulation. It's primarily comprised of binding agents based on natural and synthetic resins 40-50 %, fillers such as chalk 20-30 %, water and a low percentage of auxiliaries (e.g. preservatives, defoaming agents).

BOSTIK STIX A600 EVOLUTION is a very low volatile organic compound (VOC) emission product. It contributes to preserve indoor air quality of the buildings.

It is certified EC1 Plus according to the *EMICODE protocol* also M1 and A+ certifications. It is compliant with the requirement of green building green building rating system such as *LEED* and *BREEAM*.

Cf. *Eurofins* test report dated 25 September 2020 and for the French regulations the internal certificate of October 22, 2020.

REACH regulation:

1) Does the product contain materials from the ECHA list of materials which are especially problematic for approval: Substances of Very High Concern – SVHC (Date 16/01/2020) above a mass percentage of 0.1: NO.

2) Does the product contain further Category 1A or 1B CMR materials which are not on the candidate list at a mass % concentration of above 0.1 in at least one partial product: NO.

3) Biocide products were added to this construction product or it has been treated with biocide products: YES.

The biocides included in this product and their function are:

- 2-methyl-4-isothiazolin-3-one (In-can)
- 1,2-benzisothiazoline-3-one (In-can)
- bronopol (In-can)
- 5-chloro-2-méthyl-2H-isothiazol-3-one (In-can)
- 2-methyl-2H-isothiazol-3-one (In-can)

Information on hazardous substances (if any) contained in this product can be found in the product specific Safety Data sheet. The latest version is available at the Bostik Website:
<https://www.bostik.com/global/en/safety-data-sheets/>

2.6 Manufacture

All raw materials are weighed, mixed and filled in accordance with the formula.

The BOSTIK German plant is certified to the Quality Management system in accordance with *EN ISO 9001*.

2.7 Environment and health during manufacturing

Apart from the customary measures concerning hygiene and safety in the workplace, no particular protective measures need to be observed during production.

2.8 Product processing/Installation

Apply an even coat over the whole area to be covered using a standardized notched spatula (according to the European standard TKB type A2). The coverage is from 200 to 300 g/m² depending on the type of covering and the notched trowel used.

Temperature, humidity and substrate porosity affect the waiting time and open time.

For best results, maintain adhesive, floor covering, and room at a stable temperature of 15°C-30°C continuously for 48 hours before and after installation. Relative humidity must be maintained between 60-65 %.

It is necessary to respect waiting time: approx. 10 to 15 minutes. Lay the floor covering while the adhesive remains tacky and receptive. Use a rubbing block and/or roller to expel trapped air and ensure good transfer of the adhesive.

Follow the flooring manufacturer's installation guidelines; otherwise, restrict foot traffic for 24 hours after installation.

2.9 Packaging

BOSTIK STIX A600 EVOLUTION is packaged in a recycled bucket made of 30 % of post consumer recycled plastic (*EuCertPlast n°0062-08-21-HTP-BM*).

Materials for packaging (for 1kg of product):

| Material | For 1kg of product |
|----------|--------------------|
| Wood | 0.0458 kg |
| Plastic | 0.0268 kg |
| Steel | 0 kg |

2.10 Condition of use

No environmental impact is incurred by the product during use.

2.11 Environment and health during use

The emissions have been tested according to the requirements of the French regulations defined in decree n° 2011-321 of 23 March 2011 and the government order of April 19, 2011. The product has been classified A+ (April 23, 2020) following internal tests carried out.

Moreover, the BOSTIK STIX A600 EVOLUTION bears the *EMICODE/ EC 1 PLUS* "very low emissions". It also complies with the requirements of *BREEAM International: New Construction 2016*. (Test report dated of the September 25, 2020).

The dried adhesive layer does not result in any emissions of relevance to indoor air in the case of adhesives rated "very low emissions".

2.12 Reference service life

The reference service life (RSL) cannot be declared according to *ISO EN 15686*. The service life of dispersion adhesives is based on the floor covering's service life. The service life of floor coverings made of PVC and rubber is 20 years.

The service life is based on the Federal office for building and regional planning (*BBSR: Bundesinstitut*

für Bau-, Stadt- und Raumforschung); table "Service lives of components for life cycle assessment according to BNB").

2.13 Extraordinary effects

Fire

There are no normative requirements on fire safety for this product.

The fire performance displayed by the floor structure is primarily determined by the type and model of floor covering and/or insulating layers installed. The fire resistance class of the floor covering to be bonded is, therefore, to be observed for assessing the fire performance in accordance with *DIN EN 13501*.

Fire protection

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

Water

When exposed to water, the bond between the floor and the covering can be reduced by the adhesive layer dissolving. No substances are washed out which could be hazardous to water.

Mechanical destruction

Not of relevance.

2.14 Re-use phase

Removal and disposal of the adhesive are dependent on the removal of the bonded floor covering. PVC and rubber floor coverings and any adhesive residue on the back of the covering are landfilled.

2.15 Disposal

The *EWC* waste code in accordance with the European Waste Catalogue / List of Waste Ordinance (AVV) for liquid dispersion residue is 080416 (aqueous, liquid adhesive waste); cured dispersion waste bears the *EWC* waste code 080410 (adhesive and sealing compound waste).

2.16 Further information

Product and safety data sheet, *EMICODE EC 1 PLUS certificate*, *BREEAM Certificate*, and further information available at <https://www.bostik.com/>

3. LCA: Calculation rules

3.1 Declared Unit

This Declaration refers to 1 kg "STIX A600 EVOLUTION" dispersion adhesive manufactured by BOSTIK at its plant in BORGHOLZHAUSEN (Germany).

Declared unit

| Name | Value | Unit |
|---------------------------|-------|-------------------|
| Declared unit | 1 | kg |
| Productiveness | 0.2 | kg/m ² |
| Conversion factor to 1 kg | 1 | - |

The data quality can be regarded as being good. Plant-specific data is from 2017. The remaining data originates from the data bases referred to above, the content of which is examined for topicality on a regular basis.

Accordingly, the data used for the LCA is representative. The data sets are complete and correspond with the system boundaries and their cut off criteria for inputs and outputs.

The data quality therefore complies with the requirements of the *PCR, Part A*.

3.2 System boundary

This LCA is based on all of the product's life cycle stages i.e. from cradle to grave (A, B, C and D). Even if no environmental impact is incurred in some stages (B1-7; C3), the EPD is published as a cradle-to-grave EPD, according to *EN 15804*.

- Module A1 takes consideration of the production of raw materials, packaging and auxiliaries.
- A2 comprises transport of the raw materials, packaging and auxiliaries to the plant.
- A3 considers production in the plant.

According to the *EN 15804+A2*, modules A1, A2 and A3 are declared as an aggregated module A1-3.

- Module A4 comprises transport of the product to the construction site.
- Apart from installation of the product in the building, incl. drying, the emissions and loads associated with disposal of the product are allocated to Module A5.

Modules C1 to C4:

- C1, involves product deconstruction, demolition, in all cases with concrete support;
- C2 involves transport to disposal;
- C4 involves product landfilling.

The product is not reused, valued or recycled, it is landfilled with the soft flooring or the levelling compound. No fees and credits can be assigned in Module D.

3.3 Estimates and assumptions

It was assumed that 100 % of the adhesive is landfilled with the support (soft flooring or levelling compound).

3.4 Cut-off criteria

The standard rules according to *EN ISO 14044* were applied as cut-off criteria. These apply for the entire product system as well as for individual process modules and take consideration of mass, energy and environmental relevance. All inputs were incorporated in the LCA which account for more than 1 % of the total effects of an impact category. No more than 5 % of the flows were ignored with regard to the cut-off criteria.

3.5 Background data

Plant-specific data from the operating data records were used for product manufacturing. Data sets from

TEAM database suppliers and *Ecoinvent* were used for all other life cycle phases. The LCA model was generated in TEAM 5.4 software.

3.6 Data quality

The data quality can be regarded as being good. Plant-specific data is from 2017. The remaining data originates from the data bases referred to above, the content of which is examined for topicality on a regular basis.

Accordingly, the data used for the LCA is representative. The data sets are complete and correspond with the system boundaries and their cut off criteria for inputs and outputs.

The data quality, therefore, complies with the requirements of the *PCR, Part A*.

3.7 Period under review

Reference year 2017.

3.8 Allocation

Allocation relates to the assignment of input and output flows for a Life Cycle Assessment module to the product system tested (*EN ISO 14040*). Product manufacture: As various products such as floor covering adhesives are manufactured in the Bostik plant in Borgholzhausen, the input and output volumes recorded (e.g. electricity, water, waste) were calculated on a prorata basis from the annual production of waterbased products workshop for the declared unit of 1 kg STIX A600 EVOLUTION.

3.9 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 background database is used from *Team* software, version 5.4.

4. LCA: Scenarios and additional technical information

Characteristic product properties

Information on biogenic Carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.

If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

Note: 1 kg biogenic Carbon is equivalent to 44/12 kg of CO₂.

Information on describing the biogenic Carbon Content at factory gate

| Name | Value | Unit |
|----------------------------------------------------------|--------|------|
| Biogenic Carbon Content in product around | 0.086 | kg C |
| Biogenic Carbon Content in accompanying packaging around | 0.0043 | kg C |

The following technical information forms the basis for the declared modules:

The use of packaging material is declared in this EPD in Module A3.

Module A5 declares the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations are declared as technical scenario information for Module A5.

Transport to the building site (A4)

| Name | Value | Unit |
|----------------------------------------------|-------|-------------------|
| Litres of fuel | 38 | l/100km |
| Transport distance | 355 | km |
| Capacity utilisation (including empty runs) | 65 | % |
| Gross density of products transported | 1040 | kg/m ³ |
| Capacity utilisation volume factor less than | 1 | - |

Installation into the building (A5)

| Name | Value | Unit |
|-----------------------------------------------------|-------|----------------|
| Auxiliary | - | kg |
| Water consumption | 1E-05 | m ³ |
| Other resources | - | kg |
| Electricity consumption | - | kWh |
| Other energy carriers | - | MJ |
| Material loss | 0.02 | kg |
| Output substances following waste treatment on site | 0 | kg |
| Dust in the air | - | kg |
| VOC in the air | - | kg |

Use or application of the installed product (B1) see section 2.12 "Use"

The product is not have direct contact with the outside.

| Name | Value | Unit |
|------|-------|------|
|------|-------|------|

The reference service life (RSL) cannot be declared according to *EN ISO 15686*.

End of life (C1-C4)

| Name | Value | Unit |
|---------------------------------------|-------|------|
| Collected separately waste type | 0 | kg |
| Collected as mixed construction waste | 0.2 | kg |
| Reuse | 0 | kg |
| Recycling | 0 | kg |
| Energy recovery | 0 | kg |
| Landfilling | 0.2 | kg |

Reuse, recovery and/or recycling potentials (D), relevant scenario information

| Name | Value | Unit |
|------|-------|------|
|------|-------|------|

The product is not re-used, recovered or recycled, it is landfilled with the resilient flooring or the patching compound. Therefore, no fees or credits can be assigned in Module D.

Under the conservative assumption, biogenic carbon is accounted for as fossil carbon, which maximizes carbon dioxide emissions.

5. LCA: Results

In Table 1 "Description of the system boundary", all declared modules shall be indicated with an "X"; all modules that are not declared shall be indicated with "MND" (As default the modules B3, B4, B5 are marked as MNR – module not relevant). In the following tables, columns can be deleted for modules that are not declared. Indicator values should be declared with three valid digits (eventually using exponential form (e.g. 1,23E-5 = 0,0000123)). A uniform format should be used for all values of one indicator.

If several modules are not declared and therefore have been deleted from the table, the abbreviations for the indicators can be replaced by the complete names, while the readability and clear arrangement should be maintained; the legends can then be deleted.

If due to relevant data gaps, an indicator cannot be declared in a robust way, then the abbreviation "IND" (indicator not declared) should be used for this indicator.

- 0 – calculated value is 0
- 0 – value falls under the cut-off
- 0 – assumption which exclude any flows (e.g. exported electricity A1-A3)
- IND – in cases where the inventory does not support the methodological approach or the calculation of the specific indicator IND shall be used.

If no reference service life is declared (see chapter 2.13 "Reference Service Life"), the LCA results of the modules B1-B2 and B6-B7 shall refer to a period of one year. This shall then be indicated as an explanatory text below the tables. In addition, the formula for the quantification of such B-modules over the total life cycle shall be provided.

Disclaimer:

EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 | X | ND | MNR | MNR | MNR | ND | ND | X | X | ND | X | X |

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: declared unit and product

| Core Indicator | Unit | A1-A3 | A4 | A5 | B1 | C1 | C2 | C4 | D |
|----------------|------------------------------------|---------|----------|---------|---------|----------|----------|---------|---------|
| GWP-total | [kg CO ₂ -Eq.] | 1.36E+0 | 2.06E-2 | 5.14E-2 | 0.00E+0 | 2.02E-11 | 3.17E-3 | 1.13E-2 | 0.00E+0 |
| GWP-fossil | [kg CO ₂ -Eq.] | 1.02E+0 | 2.06E-2 | 2.99E-2 | 0.00E+0 | 2.02E-11 | 3.17E-3 | 1.10E-2 | 0.00E+0 |
| GWP-biogenic | [kg CO ₂ -Eq.] | 3.47E-1 | 0.00E+0 | 2.15E-2 | 0.00E+0 | 4.82E-15 | 0.00E+0 | 3.17E-4 | 0.00E+0 |
| GWP-luluc | [kg CO ₂ -Eq.] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| ODP | [kg CFC11-Eq.] | 4.82E-8 | 1.86E-8 | 1.93E-9 | 0.00E+0 | 9.04E-19 | 2.85E-9 | 3.36E-9 | 0.00E+0 |
| AP | [mol H ⁺ -Eq.] | 4.03E-3 | 9.30E-5 | 8.20E-5 | 0.00E+0 | 1.61E-13 | 1.43E-5 | 7.09E-5 | 0.00E+0 |
| EP-freshwater | [kg P-Eq.] | 3.15E-5 | 2.46E-9 | 8.01E-7 | 0.00E+0 | 2.26E-17 | 3.78E-10 | 1.09E-6 | 0.00E+0 |
| EP-marine | [kg N-Eq.] | 5.97E-2 | 1.90E-4 | 1.20E-3 | 0.00E+0 | 4.09E-14 | 2.92E-5 | 7.54E-5 | 0.00E+0 |
| EP-terrestrial | [mol N-Eq.] | 1.20E-2 | 7.03E-4 | 2.84E-4 | 0.00E+0 | 2.23E-13 | 1.08E-4 | 3.31E-4 | 0.00E+0 |
| POCP | [kg NMVOC-Eq.] | 4.13E-3 | 1.76E-4 | 9.22E-5 | 0.00E+0 | 6.49E-14 | 2.71E-5 | ND | 9.62E-5 |
| ADPE | [kg Sb-Eq.] | 5.18E-6 | 1.84E-12 | 1.07E-7 | 0.00E+0 | 8.36E-18 | 2.82E-13 | 1.17E-8 | 0.00E+0 |
| ADPF | [MJ] | 2.70E+1 | 2.59E-1 | 5.06E-1 | 0.00E+0 | 4.53E-10 | 3.99E-2 | 2.57E-1 | 0.00E+0 |
| WDP | [m ³ world-Eq deprived] | 4.98E+2 | 3.36E-2 | 9.79E+0 | 0.00E+0 | 7.17E-10 | 5.16E-3 | 3.10E+1 | 0.00E+0 |

Caption: 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: declared unit and product

| Indicator | Unit | A1-A3 | A4 | A5 | B1 | C1 | C2 | C4 | D |
|-----------|------|---------|---------|----------|---------|----------|---------|---------|---------|
| PERE | [MJ] | 6.58E+0 | 1.27E-4 | 1.05E-1 | 0.00E+0 | 5.88E-11 | 1.95E-5 | 7.53E-3 | 0.00E+0 |
| PERM | [MJ] | 8.80E-1 | 0.00E+0 | 1.77E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PERT | [MJ] | 7.46E+0 | 1.27E-4 | 1.23E-1 | 0.00E+0 | 5.88E-11 | 1.95E-5 | 7.53E-3 | 0.00E+0 |
| PENRE | [MJ] | 1.90E+1 | 2.61E-1 | 5.61E-1 | 0.00E+0 | 3.82E-10 | 4.01E-2 | 2.57E-1 | 0.00E+0 |
| PENRM | [MJ] | 9.71E+0 | 0.00E+0 | -2.35E-2 | 0.00E+0 | 3.84E-12 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PENRT | [MJ] | 2.80E+1 | 2.61E-1 | 5.38E-1 | 0.00E+0 | 3.86E-10 | 4.01E-2 | 2.57E-1 | 0.00E+0 |
| SM | [kg] | 1.03E-2 | 0.00E+0 | 2.06E-4 | 0.00E+0 | 3.27E-16 | 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 |
| 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 |
| FW | [m³] | 9.44E-3 | 2.48E-5 | 2.18E-4 | 0.00E+0 | 1.09E-13 | 3.81E-6 | 2.78E-4 | 0.00E+0 |

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: declared unit and product

| Indicator | Unit | A1-A3 | A4 | A5 | B1 | C1 | C2 | C4 | D |
|-----------|------|---------|---------|---------|---------|----------|---------|---------|---------|
| HWD | [kg] | 2.79E-2 | 7.92E-6 | 5.80E-3 | 0.00E+0 | 4.19E-13 | 1.22E-6 | 2.74E-4 | 0.00E+0 |
| NHWD | [kg] | 3.87E-1 | 3.37E-5 | 8.07E-3 | 0.00E+0 | 5.79E-12 | 5.18E-6 | 1.00E+0 | 0.00E+0 |
| RWD | [kg] | 2.64E-5 | 4.17E-6 | 7.57E-7 | 0.00E+0 | 1.57E-15 | 6.41E-7 | 1.53E-6 | 0.00E+0 |
| CRU | [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 |
| MFR | [kg] | 2.41E-2 | 1.09E-7 | 7.45E-2 | 0.00E+0 | 2.80E-14 | 1.67E-8 | 0.00E+0 | 0.00E+0 |
| MER | [kg] | 5.79E-1 | 0.00E+0 | 1.06E-2 | 0.00E+0 | 6.13E-17 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | [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 |
| EET | [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 |

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; EEE = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: [declared unit and product]

| Indicator | Unit | A1-A3 | A4 | A5 | B1 | C1 | C2 | C4 | D |
|-----------|---------------------|----------|----------|----------|---------|----------|----------|----------|---------|
| PM | [Disease Incidence] | 4.21E-5 | 1.16E-6 | 8.08E-7 | 0.00E+0 | 1.35E-15 | 1.78E-7 | 2.76E-6 | 0.00E+0 |
| IRP | [kBq U235-Eq.] | 2.20E-5 | 8.75E-9 | 5.10E-7 | 0.00E+0 | 5.68E-15 | 1.34E-9 | 1.23E-6 | 0.00E+0 |
| ETP-fw | [CTUe] | 3.50E+1 | 7.91E-2 | 7.54E-1 | 0.00E+0 | 2.46E-11 | 1.22E-2 | 1.70E+1 | 0.00E+0 |
| HTP-c | [CTUh] | 5.21E-10 | 7.23E-13 | 2.13E-11 | 0.00E+0 | 2.19E-21 | 1.11E-13 | 1.79E-10 | 0.00E+0 |
| HTP-nc | [CTUh] | 9.10E-9 | 7.83E-11 | 3.23E-10 | 0.00E+0 | 6.84E-20 | 1.20E-11 | 5.18E-9 | 0.00E+0 |
| SQP | [-] | 2.10E+1 | 0.00E+0 | 2.54E-1 | 0.00E+0 | 1.37E-11 | 0.00E+0 | 6.96E-1 | 0.00E+0 |

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 IRP

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 – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP

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 experience with the indicator.

6. LCA: Interpretation

The majority of life cycle energy consumption takes place during the production phase (A1-A3). Significant contributions to Primary Energy Demand – Nonrenewable (PENRT) derive from the energy resources used in the production of raw materials. The largest contributor to Primary Energy Demand – Renewable (PERT) is the consumption of renewable energy resources required for the generation and supply of electricity. During manufacturing (A1-A3) relevant influence also arises due to the wooden pallets used as packaging that need solar energy for photosynthesis.

Transportation to the construction site (A4) and the installation process (A5) make a minor contribution to almost all impacts.

In module A4, transportation processes are responsible for the emission of NO_x in the ground layer atmosphere. NO in particular can have an ozonedepleting effect.

All other potential impacts would increase with greater transportation distances, showing that transportation is a process leading to net environmental burdens.

In general, CO₂ is the most important contributor to Global Warming Potential (GWP). For the Acidification Potential (AP), NO_x and SO₂ contribute to the largest share.

| Environmental impacts / Stages | PRODUCTION STAGE (A1-A3) | CONSTRUCTION PROCESS STAGE (A4-A5) | USE STAGE (B1-B7) | END OF LIFE STAGE (C1-C4) | TOTAL LIFE CYCLE | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS (D) |
|------------------------------------------------------------------------|--------------------------|------------------------------------|-------------------|---------------------------|--------------------------------------------|----------------------------------------------------|
| Global Warming Potential - total <i>kg CO₂ equiv /UF</i> | 1,36 | 0,07 | 0,00 | 0,01 | 1,45 <i>kg CO₂ equiv /UF</i> | 0,00 |
| Abiotic depletion potential for fossil resources <i>MJ/UF</i> | 27,12 | 0,77 | 0,00 | 0,30 | 28,18 <i>MJ/UF</i> | 0,00 |
| Total use of primary energy resources [1] <i>MJ/UF</i> | 35,80 | 0,92 | 0,00 | 0,30 | 37,03 <i>MJ/UF</i> | 0,00 |
| Use of net fresh water <i>m³ /UF</i> | 0,01 | 0,00 | 0,00 | 0,00 | 0,01 <i>m³ /UF</i> | 0,00 |
| Waste disposed [2] <i>kg/UF</i> | 0,41 | 0,01 | 0,00 | 1,00 | 1,43 <i>kg/UF</i> | 0,00 |

[1] Sum : "Total use of renewable primary energy resources" + "Total use of non-renewable primary energy resources".
 [2] Sum : "Hazardous waste disposed" + "Non-hazardous waste disposed" + "Radioactive waste disposed".

7. Requisite evidence

7.1 VOC

TVOC* limit values EMICODE

Test institute: Eurofins Product Testing A/S, 8464 Galten, Denmark

Measuring process: GEV test method for determining the emissions of volatile organic compounds from building products according to *EN ISO 16000-11* in a test chamber

Testing for carcinogenic, mutagenic, reprotoxic (CMR) substances and TVOC/TSVOC after 3 and 28 days.

Date of test report: Eurofins test report dated 25 September 2020

Result: The product complies with the requirements according to the GEV test method for **"EMICODE EC 1 PLUS – very low emissions"** classification.

*TVOC = Total volatile organic compounds

| Test criteria | EC1 PLUS | EC1 | EC2 |
|----------------------------------------------------------------------------|---------------------------|---------------------------|---------------------------|
| Limit value TVOC (C6-C16) [$\mu\text{g}/\text{m}^3$] after 3 and 28 days | $\leq 750 / 60$ | $\leq 1,000 / 100$ | $\leq 3,000 / 300$ |
| Limit value TSVOC (C16-C22) [$\mu\text{g}/\text{m}^3$] after 28 days | ≤ 40 | ≤ 50 | ≤ 100 |
| CMR substances [$\mu\text{g}/\text{m}^3$] after 3 and 28 days | $\leq 10^* / \leq 1^{**}$ | $\leq 10^* / \leq 1^{**}$ | $\leq 10^* / \leq 1^{**}$ |
| Total formaldehyde and acetaldehyde [ppb] after 3 days | ≤ 50 | ≤ 50 | ≤ 50 |
| Total VOC without NIK [$\mu\text{g}/\text{m}^3$] after 28 days | ≤ 40 | -- | -- |
| R-value | ≤ 1 | -- | -- |
| * Total CMR after 3 days | | | |
| ** per substance after 28 days | | | |

AgBB scheme

The requirements on emission performance according to AgBB are automatically regarded as satisfied for products availing of EMICODE EC 1 PLUS classification.

French Regulation

The table below provides an overview of the main specifications of the French regulation as regards requirements after 28 days storage in a ventilated test chamber. Values given represent maximum values/limits.

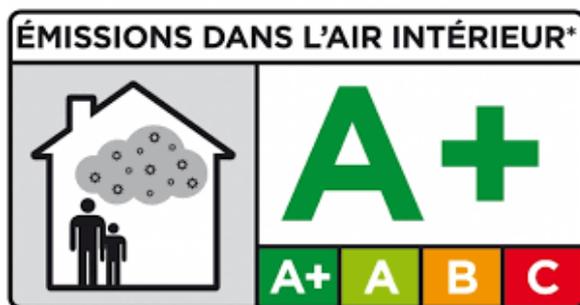
STIX A600 EVOLUTION" acrylic adhesive evaluated for quantitative measurements of Volatile Organic Compounds. The emissions tested according to the requirements of the French regulations defined in decree n ° 2011-321 of 23 March 2011 and the government order of April 19, 2011. **The product is classified A +.** (Internal certificate of October 22, 2020).

AgBB overview of results (28 days [$\mu\text{g}/\text{m}^3$])

| Name | Value | Unit |
|------------------------------------------------|-------------|--------------------------|
| TVOC (C6 - C16) Specific concentration | 6.8 | $\mu\text{g}/\text{m}^3$ |
| Sum SVOC (C16 - C22) Specific concentration | less than 5 | $\mu\text{g}/\text{m}^3$ |
| R (dimensionless) | 0.0023 | - |
| VOC without NIK Specific concentration | less than 5 | $\mu\text{g}/\text{m}^3$ |
| Carcinogenic Substances Specific concentration | less than 1 | $\mu\text{g}/\text{m}^3$ |

AgBB overview of results (3 days [$\mu\text{g}/\text{m}^3$])

| Name | Value | Unit |
|------------------------------------------------|-------------|--------------------------|
| TVOC (C6 - C16) Specific concentration | 280 | $\mu\text{g}/\text{m}^3$ |
| Sum SVOC (C16 - C22) Specific concentration | 24 | $\mu\text{g}/\text{m}^3$ |
| R (dimensionless) | 0.1 | - |
| VOC without NIK Specific concentration | 13 | $\mu\text{g}/\text{m}^3$ |
| Carcinogenic Substances Specific concentration | less than 1 | $\mu\text{g}/\text{m}^3$ |



8. References

PCR 2020, Part A

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rule for Construction Products from the range of Environmental Product Declarations of Institute Bauen und Umwelt (IBU), Part A: Calculation rules for the Life Cycle Assessment and requirements on the project report according to EN 15804+A2. www.bau-umwelt.de

PCR 2013, Part B: 2013-07

Product Category Rules for Construction Products, Part B: Requirements on the EPD for dispersion adhesives and primers for floor coverings.

DIN EN ISO 14025

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

DIN EN ISO 14040

DIN EN ISO 14040: 2006, Environmental management – Life cycle assessment – Principles and framework (ISO 14040:2006); German and English versions EN ISO 14040:2006.

DIN EN ISO 14044

DIN EN ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines (ISO 14044:2006); German and English versions EN ISO 14044:2006.

EN 15804

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

DIN EN ISO 16000-11

DIN EN ISO 16000-11:2006-06, Indoor air – Part 11: Determination of the emission of volatile organic compounds from building products and furnishings – Sampling, storage of samples and preparation of test specimens.

DIN EN ISO 22631

DIN EN ISO 22631:2019, Adhesives - Test method for adhesives for floor and wall coverings - Peel test.

DIN EN ISO 22632

DIN EN ISO 22632:2019, Adhesives - Test method for adhesives for floor and wall coverings - Shear test.

DIN EN ISO 22633

DIN EN ISO 22633:2019, Adhesives - Test methods for adhesives for floor coverings and wall coverings - Determination of dimensional changes of a linoleum floor covering in contact with an adhesive.

DIN EN ISO 22636

DIN EN ISO 22636:2021, Adhesives - Adhesives for floor coverings - Requirements for mechanical and electrical performance.

DIN EN 13501-1

DIN EN 13501-1:2019, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

DIN ISO 15686

DIN ISO 15686:2017, Buildings and constructed assets -- Service life planning.

DIN EN ISO 9001

DIN EN ISO 9001:2015, Quality management systems – Requirements.

Further References

Software TEAM

version 5.4.2006.22. DEAM database and Ecoinvent.

IBU 2021

General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

AgBB

AgBB: German Committee for Health-Related Evaluation of Construction Products Health-related

evaluation of emissions by volatile organic compounds (VOC and SVOC) from construction products; valid as of June 2012.

www.umweltbundesamt.de/produkte/bauprodukte/agbb.htm

French COV Regulation

The emissions tested according to the requirements of the French regulations defined in decree n ° 2011-321 of 23 March 2011 and the government order of April 19, 2011. The product is classified A +. (Internal certificate of October 22, 2020).

GEV/EMICODE

GEV – Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e. V., Düsseldorf; www.emicode.de/

BREEAM International

BREEAM is the world's leading sustainability assessment method for masterplanning projects, infrastructure and buildings. The tested product complies with the requirements of BREEAM International: New Construction 2016, Technical Manual: Hea 02 Indoor air quality (version SD233 issue 2.0 of July 2017).

LEED

Leadership in Energy & Environmental Design by USGBC. The tested product qualifies for LEED v4 specifications on VOC emissions and VOC content complying with VOC emissions specifications in LEED EQ credit "Low-emitting products".

Eurofins

Eurofins Product Testing A/S in Denmark; Denomination test: Determination of radiocarbon content according to ASTM D6866. www.eurofins.dk/dk/product-testing

REACH Regulation

Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93, Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, 2006-12

EWC

European Waste Catalog established by Commission decision 2000/532/EC. <http://www.environment-agency.gov.uk/>

Certificate for recycled packaging

European Certification of Plastics Recyclers (EuCertPlast) number 0062-08-21-HTP-BM of the 19/08/2021 by the HTP GmbH & Co. KG.

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