

ENVIRONMENTAL PRODUCT DECLARATION

DHARMA, GRANITO, GRAIN-HARMONI, KAYAR, LAVA, NATURA, SCREED-MASSETTO, UNI, ZEUS

ARTIGO: RUBBER FLOORING TECHNOLOGY
RESILIENT FLOOR COVERING



Rubber flooring with smooth or embossed surface in a variety of designs.

artigo
by MONDO

Rubber is a unique raw material with great elasticity and stress resistance, making it the ideal material for producing high-performance flooring that is perfect for a wide variety of indoor public spaces, such as schools, hospitals, laboratories, offices, museums, and more. In addition to its unmatched technical characteristics and durability, rubber flooring offers endless creative and tasteful design solutions. With a passion for innovation, quality, and beauty, we pride ourselves on being a reliable partner and offering flooring solutions that represent excellence for any of your projects.

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SCREED-MASSETTO, UNI, ZEUS

RESILIENT FLOOR COVERING

According to ISO 14025,
EN 15804, and EN 16810

| | | |
|---|--|--|
| EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE | UL Solutions 333 Pfingsten Road, Northbrook, IL 60611 | www.ul.com spot.ul.com |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER | General Program Instructions v.2.4 July 2018 | |
| MANUFACTURER NAME AND ADDRESS | Artigo Spa – Loc. Carpeneto, 17014, Cairo Montenotte (Sv), Italy (part of MONDO group) | |
| DECLARATION NUMBER | 4790957837.102.1 | |
| DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT | 1m ² | |
| REFERENCE PCR AND VERSION NUMBER | EN 15804+A2:2019+AC & EN 16810:2017 | |
| DESCRIPTION OF PRODUCT APPLICATION/USE | Rubber resilient flooring is classified in accordance with ISO 10874 and in reference to the FCSS to be installed in the following areas of application: Domestic 23, Commercial 34, Industrial 42 | |
| MARKETS OF APPLICABILITY | Global | |
| DATE OF ISSUE | March 1, 2024 | |
| PERIOD OF VALIDITY | 5 years | |
| RSL | 1 year | |
| EPD TYPE | Product-Specific Type III EPD | |
| EPD SCOPE | Cradle to grave | |
| YEAR(S) OF REPORTED PRIMARY DATA | 2022 | |
| LCA SOFTWARE & VERSION NUMBER | SimaPro v. 9.5.0.0 | |
| LCI DATABASE(S) & VERSION NUMBER | Ecoinvent v. 3.8 | |

The PCR review was conducted by:

European Standards

CSN EN 15804+A2

info@en-standard.eu

This declaration was independently verified in accordance with ISO 14025: 2006.

INTERNAL EXTERNAL

Cooper McCollum, UL Solutions

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

Sung Mo Yeon, H.I.P. Pathway

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.



1. Product Definition and Information

1.1. Description of Company/Organization

Artigo develops and produces innovative and high-performance rubber flooring that stems from research work that began with the Pirelli Group in the 1920s, later converging with MONDO group, established in 1948 and now a world leader in rubber flooring for commercial and sport applications. The coming together of two industrial cultures has produced a vast and diverse collection, with an exceptional number of different applications.

The company is dedicated to upholding the highest standards that honour both the environment and society. This commitment is reflected in the long-lasting, high-quality flooring we offer, which respects the environment in all its facets. Artigo ensures strict oversight of production, carefully selects raw materials, and holds prestigious international certifications for their finished products, all of which serve as evidence of our environmental dedication.

Artigo's factory conforms to the following Standards:

- ISO 14001 Environmental Management Systems;
- ISO 14064 Greenhouse Gas (GHG) Quantification and Reporting;
- ISO 9001 Quality Management Systems;
- ISO 50001 Energy Management Systems.



1.2. Product Description

Product Identification

Product Designation: Rubber flooring Artigo – in various designs named: Dharma, Granito, Grain-Harmoni, Kayar, Lava, Natura, Screed-Massetto, Uni, Zeus. This environmental product declaration covers the collection of resilient flooring produced by Artigo. These products are smooth or embossed rubber floorings with a variety of finishes with or without UV cured factory finish.



Product Specification

The main product characteristics may be found in Table 2. The product has technical specifications compliant with the standard EN 1817 – Resilient Floor Coverings: Specification for homogeneous and heterogeneous smooth rubber floor coverings, or EN 12199 – Resilient floor coverings: Specifications for homogeneous and heterogeneous relief rubber floor coverings. The product declared in this document complies with the following codes or regulations:

- EN 1817, EN 12199, EN 14041 (CE marking) for European market;
- ASTM F1344, ASTM F1859, for American market.

In addition, Artigo has been awarded with several international environmental certificates such as:

- GREENGUARD Gold: UL 2818-2022
- Blue Angel – DE-UZ 120
- Cradle to Cradle - SILVER
- A+
- GECA
- Eurofins IACG (Indoor Air Comfort Gold)
- Emission Class for building material M1



The following United Nations Standard Products and Services Code (UNSPSC) and Construction Specifications Institute (CSI) classification apply to the product:

- UNSPSC: 30161700 Flooring
- CSI: 09 65 00 Resilient flooring

This declaration covers products with the commercial references: Dharma, Granito, Grain-Harmoni, Kayar, Lava, Natura, Screed-Massetto, Uni, Zeus. An analysis has been performed on all products. The environmental impacts have a variation of $\pm 5\%$ compared to the median.



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1.3. Application

The products covered by this declaration are designed for use in schools, offices, hospitals, museums, indoor public spaces and other commercial environments. Artigo rubber flooring is classified in accordance with ISO 10874 (previously EN 685) and in reference to the FCSS (Floor Covering Standard Symbol) to be installed in the following areas of application :

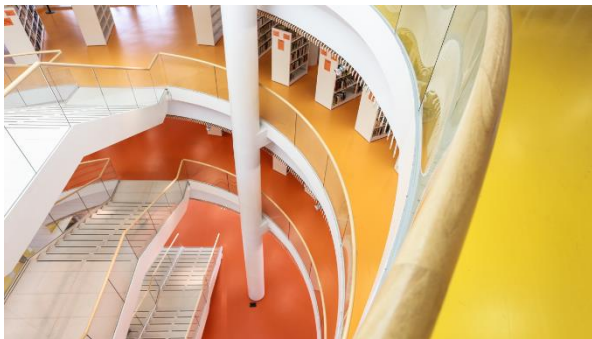


Figure 1: Example of application

| | | |
|-------------------|--|----------|
| Domestic | | Class 23 |
| Commercial | | Class 34 |
| Industrial | | Class 43 |

Table 1: Area of application

1.4. Declaration of Methodological Framework

For this project, a Cradle-to-Grave LCA approach has been applied, using a functional unit as reference. Specific data and background system have been modelled with generic data from the Ecoinvent 3.8 database. No known flows have been deliberately omitted from the calculation.

The Reference Service Life (RSL) and technical and functional performances described in this EPD are applicable as long as the product use complies with that defined by ISO 10874 (previously EN 685) and EN 1817 in accordance with the product’s classification.

Information concerning the LCA rules including cut-off and allocation rules to this study may be found in Chapter 2.

1.5. Technical Requirements

| Characteristics | Nominal Value | Unit | Standard |
|-----------------------------|----------------------|-------------------|-------------------------|
| Product Thickness | 3.0 | mm | - |
| Product Weight | 4.75 | kg/m ² | - |
| Abrasion Resistance | 150 | mm ³ | ISO 4649 (Met. A-5N) |
| Roll Width | 1.90 | m | - |
| Length | 10 | - | - |
| Tile Size | 0.61 x 0.61 1 x 1 | m | - |
| Hardness | 88 | Shore A | ISO 48-4 (ISO 7619) |
| Residual indentation | ≤ 0.20 | mm | EN/ISO 24343-1 (EN 433) |
| Fire behaviour | Bfl - sl | class | EN 13501-1 |
| Slip resistance | ≥0.30(DS) | class | EN 13893 |

Table 2: Average product characteristics





1.6. Material Composition

| Component | Material | Mass % | Availability | |
|------------------|---------------------------|--------|-----------------------|-------------------------|
| | | | Recycled | Non-Renewable |
| Binder | Synthetic rubber | 22 | | Non-Renewable - Limited |
| Filler | Calcium Carbonate | 15 | Post industrial waste | |
| | Reused & Recycled rubber | 20 | | |
| | Amorphous silica & Kaolin | 33 | | Abundant Mineral |
| Additives | Various | 7 | | Limited |
| Pigments | Titanium Dioxide | 2 | | Limited |
| | Other Pigments | 0,4 | | Limited |
| Finish | UV cured finish | 0,6 | | |

Table 3: Average product composition

Styrene Butadiene Copolymer: an elastomeric material that combines the rigidity of styrene with the flexibility of butadiene, making it suitable for various applications, including tires, gaskets and flooring.

Calcium Carbonate: an abundant mineral found in all parts of the world. A recycled alternative material is available by sourcing post-industrial waste from marble processing.

Kaolin: obtained by quarrying the abundant mineral kaolinite.

Amorphous silica: an inorganic material characterized by its particulate structure, derived from abundant minerals. It is used for its positive contribution to mechanical properties.

Titanium Dioxide & pigment: a white pigment produced by an industrial chemical processing of rutile, a natural form of titanium dioxide. Other colour pigments are mainly iron oxide based.

Reused & Recycled rubber – post-industrial scrap material coming as a result of Artigo production or from other factories. The material is grinded, processed and used as a raw material into new flooring.

Various other additives: auxiliary materials and sulfur needed for vulcanization.

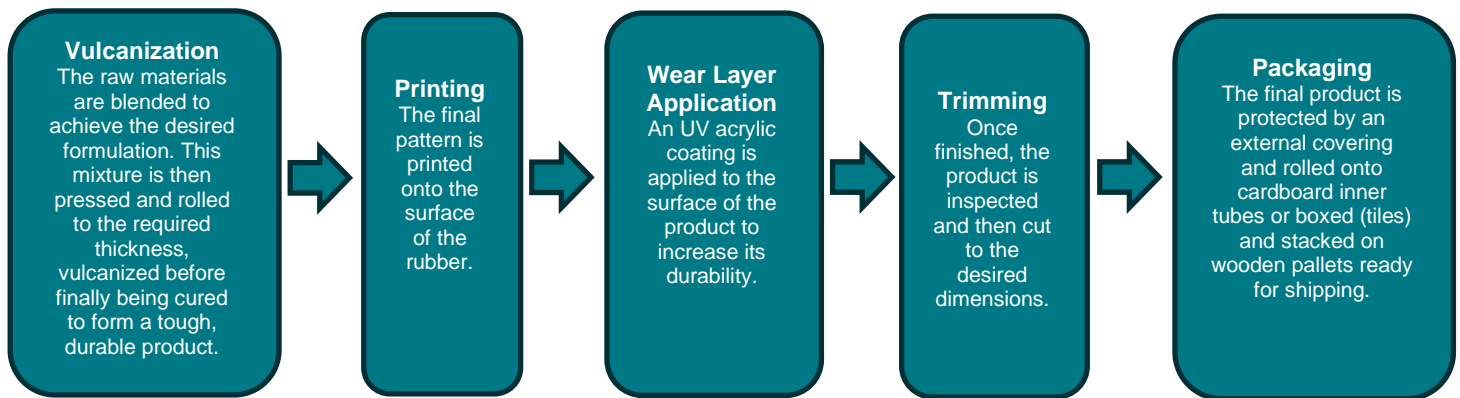
Finish: the factory applies a protective UV cured coating based on an acrylate dispersion.





1.7. Manufacturing

The production of the resilient flooring is divided into the following stages:



- Production scraps are re-used into the new production process, with the rest being collected and recycled externally. Packaging materials are likewise collected and disposed or recycled externally.
- Artigo has solar panels installed on its factory to provide electricity. The remaining electricity is supplied by a certified renewable energy supplier.

1.8. Packaging

All packaging materials are recyclable, however due to the variability of waste treatment on construction sites the hypothesis are divided into landfill, incineration and recycling, excluding wooden pallets for which reuse has been considered, has been retained for this EPD.

1.9. Transportation

Sales take place in Europe, Far East (China) and North America. For sales in Europe the product is delivered by truck, while for sales abroad it is shipped by sea from the port of Genoa, 50 km from the factory. On average every square meter of floor is transported as follows:

| | |
|--|---------|
| Transport Distance 7.5-16T Truck: | 364 km |
| Transport Distance 16-32T Truck: | 365 km |
| Transport Distance Transoceanic Freight: | 1280 km |



1.10. Product Installation

The product is installed by hand using steel or carbide trowels. Approximately 300g/m² of an acrylic water-based low emission adhesive is used to glue the flooring in place. Following installation, a first cleaning is performed with a neutral detergent (0.0149 kg/m²) diluted in water (0.1999 kg/m²), either by mop or floor scrubber (electricity consumption: 0.0404 kWh/ m²). For this LCA the following scenario has been used as 50% using the Mop and 50 % using machine. During the installation approximately 5% of the material is lost as off-cuts. In the modelling, in module A5, a contribution of 5% of modules A1- A3 + A4 was considered. The waste was assumed to be 50% landfilled and 50% recycled (for cement production). A distance of 50 km was assumed from the installation site to the disposal/recovery plant. The waste generated during the installation phase is the packaging of the finished product. For the simulation of the end-of-life of the packaging, the treatment/disposal site was assumed to be 50 km from the installation site. For the Pallet, it was considered a reuse.

1.11. Use

The service lifetime of a floor covering for a certain application on a floor is too widespread to give one common number. For this EPD model the reference service life (RSL) is set to one year, according with EN 16810:2017. This means that all impacts for the use phase are based on the cleaning and maintenance model for one year. Depending on the area of use, the technical lifetime advised by the manufacturer and estimated time on the floor by customer, the service lifetime can be determined. The use phase impacts should be calculated with the foreseen service life to arrive at the total environmental impact. The service lifetime recommended by Artigo is 35 years.

Cleaning and maintenance

For the calculations the following cleaning routine is considered:

- Daily cleaning (if necessary): simply clean with a soft brush.
- Routine cleaning (once a week or when necessary): clean with 0.7441 kg/ m² *year neutral detergent diluted in water or 0.0339 kg/ m² *year of alkaline detergent using a mop for small zone. For larger areas the cleaning is combined with an electric machine with an electricity consumption of 0.1444 kWh/ m² *year. The wet cleaning includes a water consumption of 10.374 kg/ m² *year. For LCA calculations, 50 routine cleanings per year and 2 extraordinary cleanings per year are assumed.

Prevention of structural damage

To avoid excessive wear, usage should be restricted to the stated areas of application as outlined by the norm ISO 10874 (previously EN 685).

Health aspects during usage

The products are compliant with BlueAngel, GREENGUARD Gold and Eurofins IACG specifications.



1.12. End of life

It is assumed that no specific impacts should be attributed to the deconstruction phase, as this process is either carried out by hand or in the case of a building demolition, the product adds no impact to the overall impact of the demolition.

For the end-of-life phase, two different scenarios have been assumed and the results are indicated separately in module C:

1. 100% landfill disposal
2. 100% it was assumed that the material is recycled to the cement factory for use as CSS "End of Waste"

For Scenario 1 and 2, it has been assumed that 100% of the product is respectively sent to landfill and to cement factory at the end of its useful life. The transport between installation site and landfill/cement factory is by truck, with an estimated distance of 50 km.

Reuse, Recycling, and Energy Recovery

Module D includes the avoided impacts of all net end-of-life flows. This encompasses the avoided impacts related to the percentages of material sent for recycling/recovery in modules A5 and C3. Specifically, the benefit typically derived from the production of thermal energy following the use of the pavement as CSS 'waste end of life' in cement production has been considered (with a fossil fuel substitution rate of 52.2%). As a precaution, the benefits arising from the energy recovery and material recovery of packaging in module A5 have not been taken into account.

2. Life Cycle Assessment Background Information

A full Life Cycle Assessment has been performed according to ISO 14040, ISO 14044 and in compliance with EN15804 and EN 16810.

2.1. Functional or Declared Unit

The functional unit is one square meter of installed product and the use stage is considered for one year of service life.

| | Value | Unit |
|--------------------------|-------|----------------|
| Functional Unit | 1 | m ² |
| Conversion factor to 1kg | 0.211 | - |

Table 4: Functional Unit





2.2. System Boundary

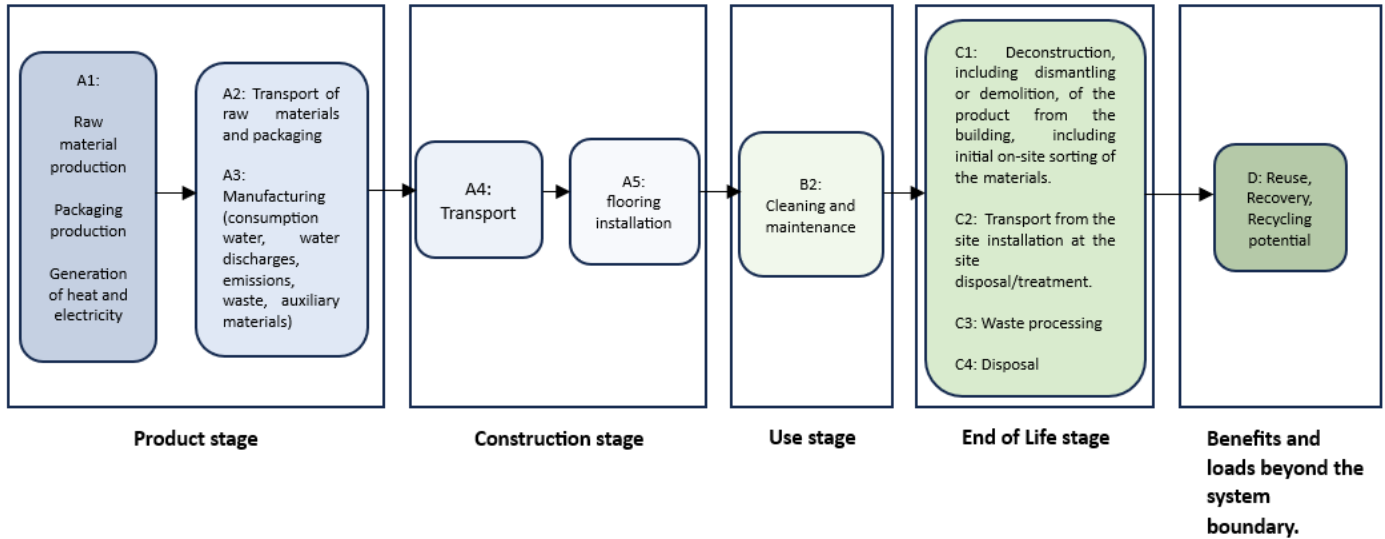


Figure 2: Flow diagram of the Life Cycle Assessment

This EPD is a cradle-to-grave analysis, consisting of the following steps:

A1 – A3: Product stage - includes the provision of all raw materials and their packaging, transport to the production site and energy consumption during the manufacturing of the product, as well as processing of waste generated by the factory.

A4 – A5: Construction stage - includes the transport from the factory to the final customer, packaging of the final product and the installation of the product, as well as all consumables and energy required, and processing of waste generated during the installation.

B2: Use Stage (Maintenance of the floor) – includes provision and transport of all materials, product and services related to the use phase of the product, as well as their related energy and water consumption, and the processing of any resulting waste. For floor coverings the modules B1, B3 to B7 are not relevant to the environmental performance of a product.

C1 – C4: End of Life Stage (Deconstruction, Transport, Waste processing, Disposal). Two different End of Life scenarios are declared:

- Scenario 1: 100% landfill disposal
- Scenario 2: it was assumed that the material would be sent to the cement factory for use as CSS "End of Waste".

D: Benefits and loads beyond the system boundary (Reuse, Recovery, Recycling potential).





2.3. Cut-off Criteria

The cut - off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows per module shall be a maximum of 5% of energy usage and mass.

In practice, in this assessment, all data from the production data acquisition are considered, i.e. all raw materials used as per formulation, use of water, electricity and other fuels, the required packaging materials, and all direct production waste. Transport data on all considered inputs and output material are also considered.

2.4. Data Sources

As a general rule, specific data derived from specific production processes or average data derived from specific production processes have been used as the first choice as a basis for calculating an EPD.

To model the life cycle of the product in question, the software SimaPro 9.5, developed by PRé, has been used in conjunction with the LCA database Ecoinvent v3.8.

There were no instances of missing data.

2.5. Data Quality

The requirements for data quality and LCA data are in accordance with the specifications of the PCR. All generic data has been checked for plausibility both internally and by the manufacturer.

Temporal Coverage – producer specific data is averaged over 1 year of production and from within the last 5 years (2022). Generic data is taken from the Ecoinvent 3.8 database. Inputs to and outputs from the system are accounted for over a period of 100 years from the year for which the data set is deemed relevant.

Technological Coverage – the technological coverage of the data reflects the physical reality of the declared product.

Geographical Coverage – whenever possible, country specific data reflecting the reality of the Artigo supply chain has been used. If country specific data is unavailable, European regional data is used in preference to global data sources.

2.6. Period under Review

This study is based on primary collected for the year 2022.

2.7. Allocation

The overall values for the factory's material and energy consumptions during a period of one year have been divided by the annual production of each product to supply a value per square meter of flooring produced. All factory data is measured in square meters, and it is assumed that the process consumptions are governed by area of flooring processed rather than mass.

2.8. 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.



3. Life Cycle Assessment Results

| | PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY |
|---|---------------------|-----------|---------------|-----------------------------|------------------|-----------|-------------|--------|-------------|---------------|--|---|-------------------|-----------|------------------|----------|---|
| | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| | Raw material supply | Transport | Manufacturing | Transport from gate to site | Assembly/Install | Use | Maintenance | Repair | Replacement | Refurbishment | Building Operational Energy Use During Product Use | Building Operational Water Use During Product Use | Deconstruction | Transport | Waste processing | Disposal | Reuse, Recovery, Recycling Potential |
| EPD Type | X | X | X | X | X | MNR | X | MNR | MNR | MNR | MNR | MNR | X | X | X | X | X |
| Description of the system boundary (X= included in LCA; MNR=MODULE NOT RELEVANT for EN 16810) | | | | | | | | | | | | | | | | | |

3.1. Life Cycle Impact Assessment Analysis

| Indicator | Unit | A1-A3 | A4 | A5 | B2 | C1 | C2 | C3/s1-s2 | C4/s1 | D/s1 | D/s2 |
|------------------|-----------------------|-----------|-----------|----------|-----------|----|----------|----------|----------|-----------|-----------|
| GWP - total | kg CO ₂ eq | 6,68E+00 | 5,95E-01 | 7,46E-01 | 3,02E-01 | 0 | 4,18E-02 | 0 | 5,25E-01 | -3,45E-02 | -1,41E+00 |
| GWP - Fossil | kg CO ₂ eq | 6,85E+00 | 5,95E-01 | 7,34E-01 | 2,98E-01 | 0 | 4,18E-02 | 0 | 5,24E-01 | -3,45E-02 | -1,41E+00 |
| GWP - Biogenic | kg CO ₂ eq | -1,67E-01 | 1,65E-04 | 1,05E-02 | -9,18E-03 | 0 | 1,21E-05 | 0 | 3,81E-04 | -1,21E-05 | -4,97E-04 |
| GWP - luluc | kg CO ₂ eq | 6,63E-03 | 8,08E-06 | 8,80E-04 | 1,36E-02 | 0 | 6,95E-07 | 0 | 1,28E-05 | -9,33E-07 | -3,83E-05 |
| ODP | kg CFC11 eq | 8,76E-06 | 1,30E-07 | 2,66E-07 | 1,37E-08 | 0 | 9,48E-09 | 0 | 4,47E-09 | -4,38E-09 | -1,79E-07 |
| AP | mol H ⁺ eq | 4,38E-02 | 1,47E-02 | 4,38E-03 | 1,68E-03 | 0 | 1,87E-04 | 0 | 2,57E-04 | -4,33E-05 | -1,77E-03 |
| EP - freshwater | kg P eq | 1,93E-04 | 3,25E-07 | 2,13E-05 | 2,28E-05 | 0 | 8,35E-08 | 0 | 3,77E-07 | -2,30E-08 | -9,41E-07 |
| EP - marine | kg N eq | 8,28E-03 | 3,72E-03 | 8,49E-04 | 6,52E-04 | 0 | 6,74E-05 | 0 | 6,58E-04 | -1,05E-05 | -4,31E-04 |
| EP - terrestrial | mol N eq | 9,92E-02 | 4,13E-02 | 9,34E-03 | 3,41E-03 | 0 | 7,42E-04 | 0 | 1,10E-03 | -1,15E-04 | -4,70E-03 |
| POCP | kg NMVOC eq | 2,82E-02 | 1,05E-02 | 3,01E-03 | 1,48E-03 | 0 | 1,93E-04 | 0 | 4,17E-04 | -4,25E-05 | -1,74E-03 |
| ADPF | kg Sb eq | 7,81E-06 | 1,29E-08 | 9,86E-07 | 4,42E-07 | 0 | 3,17E-09 | 0 | 1,20E-09 | -3,96E-11 | -1,63E-09 |
| ADPE | MJ | 1,66E+02 | 7,93E+00 | 1,63E+01 | 4,72E+00 | 0 | 5,88E-01 | 0 | 3,56E-01 | -5,51E-01 | -2,26E+01 |
| WDP | m ³ eq | 4,51E+00 | -1,39E-03 | 5,28E-01 | 2,07E-01 | 0 | 1,73E-04 | 0 | 1,13E-03 | -8,30E-04 | -3,40E-02 |

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP - terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element); ADPF = abiotic depletion potential (fossil); WDP = water scarcity

Table 5: Results of the LCA – Environmental Impacts





3.2. Resource use

| Indicator | Unit | A1-A3 | A4 | A5 | B2 | C1 | C2 | C3/s1-s2 | C4/s1 | D/s1 | D/s2 |
|-----------|----------------|----------|----------|----------|----------|----|----------|----------|----------|-----------|-----------|
| PERE | MJ | 7,84E+00 | 8,31E-03 | 5,40E-01 | 3,33E-01 | 0 | 5,80E-04 | 0 | 1,43E-02 | -8,05E-04 | -3,30E-02 |
| PERM | MJ | 5,88E+01 | 2,80E-03 | 2,42E+00 | 4,79E-01 | 0 | 2,08E-04 | 0 | 2,27E-03 | -8,97E-05 | -3,68E-03 |
| PERT | MJ | 6,66E+01 | 1,11E-02 | 2,96E+00 | 8,12E-01 | 0 | 7,88E-04 | 0 | 1,65E-02 | -8,95E-04 | -3,67E-02 |
| PENRE | MJ | 6,64E+01 | 7,54E+00 | 1,07E+01 | 2,92E+00 | 0 | 5,55E-01 | 0 | 3,35E-01 | -1,19E-01 | -4,89E+00 |
| PENRM | MJ | 9,95E+01 | 3,94E-01 | 5,61E+00 | 1,81E+00 | 0 | 3,33E-02 | 0 | 2,11E-02 | -4,32E-01 | -1,77E+01 |
| PENRT | MJ | 1,66E+02 | 7,93E+00 | 1,63E+01 | 4,73E+00 | 0 | 5,88E-01 | 0 | 3,56E-01 | -5,51E-01 | -2,26E+01 |
| SM | Kg | 1,66E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 1,22E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | m ³ | 9,14E-02 | 2,38E-05 | 1,22E-02 | 5,01E-03 | 0 | 1,17E-05 | 0 | 6,00E-05 | -3,28E-05 | -1,35E-03 |

Caption: 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

Table 6: Results of the LCA – Resource Use

3.3. Output Flows and Waste Categories

| Indicator | Unit | A1-A3 | A4 | A5 | B2 | C1 | C2 | C3/s1-s2 | C4/s1 | D/s1 | D/s2 |
|-----------|------|----------|----------|----------|----------|----|----------|----------|----------|-----------|-----------|
| HWD | kg | 2,36E-02 | 1,02E-04 | 3,29E-03 | 1,51E-03 | 0 | 9,05E-06 | 0 | 9,76E-05 | -2,27E-06 | -9,29E-05 |
| NHWD | kg | 9,91E-01 | 3,58E-04 | 1,88E-01 | 2,97E-02 | 0 | 1,33E-04 | 0 | 4,70E+00 | -6,39E-05 | -2,62E-03 |
| RWD | kg | 2,35E-04 | 5,70E-05 | 3,04E-05 | 1,23E-05 | 0 | 4,16E-06 | 0 | 2,22E-06 | -1,29E-07 | -5,29E-06 |
| CRU | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 1,50E-01 | 0 | 1,59E-01 | 0 | 0 | 0 | 4,75E+00 | 0 | 0 | 0 |
| MER | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EEE | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EET | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Caption: 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

Table 7: Results of the LCA – Output Flows and Waste

3.4. Biogenic Carbon Content

| Biogenic carbon content | Value | Unit |
|--|-------|------|
| Biogenic carbon content in product | 0,038 | kg C |
| Biogenic carbon content in accompanying packaging | 0,052 | kg C |
| Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO2 | | |

Table 8: Results of the LCA – Information describing the biogenic carbon content at the factory gate





4. Additional Environmental Impact Indicators

The following table contains the additional environmental impact indicators according to the European Standard EN15804+A2.

| Indicator | Unit | A1-A3 | A4 | A5 | B2 | C1 | C2 | C3/s1-s2 | C4/s1 | D/s1 | D/s2 |
|-----------|--------------------|----------|----------|----------|----------|----|----------|----------|----------|-----------|-----------|
| PM | Disease incidences | 4,17E-07 | 2,43E-08 | 3,69E-08 | 1,57E-08 | 0 | 2,72E-09 | 0 | 5,89E-09 | -9,08E-11 | -3,72E-09 |
| IR | kBq U-235 eq | 2,15E-01 | 3,46E-02 | 2,70E-02 | 1,62E-02 | 0 | 2,52E-03 | 0 | 1,67E-03 | -9,59E-05 | -3,93E-03 |
| ETF-fw | CTUe | 1,66E+02 | 2,75E+00 | 1,30E+01 | 1,42E+01 | 0 | 2,52E-01 | 0 | 1,84E+00 | -7,61E-02 | -3,12E+00 |
| HTP-c | CTUh | 8,43E-09 | 8,01E-11 | 4,30E-10 | 1,24E-10 | 0 | 3,30E-12 | 0 | 6,40E-12 | -1,25E-12 | -5,13E-11 |
| HTP-nc | CTUh | 1,29E-07 | 3,07E-09 | 9,14E-09 | 4,07E-09 | 0 | 3,46E-10 | 0 | 6,84E-10 | -4,60E-11 | -1,89E-09 |
| SQP | dimensionless | 2,18E+02 | 2,09E-02 | 9,28E+00 | 1,02E+00 | 0 | 2,82E-03 | 0 | 8,26E-01 | -5,05E-04 | -2,07E-02 |

Caption: PM = Particulate matter emissions; IR = Ionizing radiation, human health; ETF-fw = Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects; SQP = Soil quality potential/ Land use related impacts

Table 9: Results of the LCA – Additional environmental impacts.

5. LCA Interpretation

The analysis of the results has been conducted with due consideration to the assumptions and limitations outlined in the Environmental Product Declaration (EPD), encompassing both methodological and data-related constraints. The use phase results are based on a one-year use scenario.

By analyzing the entire life cycle of the product, the LCA study highlighted that the production phase (A1-A3) overwhelmingly influences all mandatory and additional environmental impact indicators. This predominant contribution is primarily attributed to the production of raw materials. Conversely, a considerably lesser impact stems from the utilization of thermal and electrical energy during the manufacturing process.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Artigo’s factory conforms to the ISO 14001 Environmental Management Systems and ISO 50001 Energy Management Systems. The product also conforms to the GREENGUARD Gold certification standard as described in §6.4.

6.2. Environment and Health During Installation

The manufacturer’s guidelines should be adhered to during the installation of this product.





DHARMA, GRANITO, GRAIN/HARMONI, KAYAR, LAVA, NATURA,
SCREED-MASSETTO, UNI, ZEUS
RESILIENT FLOOR COVERING

According to ISO 14025,
EN 15804 and EN 16810

6.3. Extraordinary Effects

Fire

- ASTM E 648 Critical radiant flux $\geq 0.45 \text{ W/cm}^2$
- ASTM E 662 Smoke Density < 450
- EN 13501-1 Fire Behavior $B_{fl} - sl$

Water

The product is impermeable to water.

Mechanical Destruction

Mechanical damage does not chemically alter the product.

6.4. Environmental Activities and Certifications

- GREENGUARD Gold: UL 2818-2022
- Blue Angel – DE-UZ 120
- Cradle to Cradle - SILVER
- A+
- GECA
- Eurofins IACG (Indoor Air Comfort Gold)
- Emission Class for building material M1



6.5. Further Information

Further information concerning the product may be found at the company website: www.artigo.com and www.mondocontractflooring.com



7. Supporting Documentation

All documentation necessary to confirm the data provided in this EPD has been submitted to the critical reviewer.

8. Disclaimers to the declaration of core and additional environmental impact indicators

According to the “ILCD Handbook: Recommendations for Life Cycle Impact Assessment in the European context” recommended characterization models and associated characterization factors are classified according to their quality into three levels:

- Type 1 (recommended and satisfactory);
- Type 2 (recommended but it need of some improvements);
- Type 3 (recommended, but to applied with caution).

| ILCD classification | Indicator | Disclaimer |
|--|---|------------|
| ILCD Type 1 | Global warming potential (GWP) | None |
| | Depletion potential of the stratospheric ozone layer (ODP) | None |
| | Potential incidence of disease due to PM emission (PM) | None |
| ILCD Type 2 | Acidification potential, Accumulated Exceedance (AP) | None |
| | Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) | None |
| | Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine) | None |
| | Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | None |
| | Formation potential of tropospheric ozone (POCP) | None |
| | Potential Human exposure efficiency relative to U235 (IRP) | 1 |
| ILCD Type 3 | Abiotic depletion potential for non-fossil resources (ADP-minerals&metals) | 2 |
| | Abiotic depletion potential for fossil resources (ADP-fossil) | 2 |
| | Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | 2 |
| | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-c) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-nc) | 2 |
| | Potential Soil quality index (SQP) | 2 |
| Disclaimer 1 - This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator. | | |
| Disclaimer 2 - The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. | | |

Table 9: Classification of disclaimers to the declaration of core and additional environmental impact indicators.





9. References

SUSTAINABILITY REPORTING STANDARDS

Database Ecoinvent v3.8 (www.ecoinvent.org)

EN 15804:2012-04+A1 2013: Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

EN 16810:2017 Resilient, textile and laminate floor coverings - Environmental product declarations - Product category rules

ISO 14025:2011-10: Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO 14040:2021 – Environmental management – Life cycle assessment - Principles and framework

ISO 14044:2021 – Environmental management – Life cycle assessment – Requirements and guidelines

Life Cycle Assessment – code: LCA001, rev.04 of 15th March 2024 released by Artigo S.p.a

EN 1817 – Resilient Floor Coverings: Specification for homogeneous and heterogeneous smooth rubber floor coverings.

EN 12199 – Resilient floor coverings: Specifications for homogeneous and heterogeneous relief rubber floor coverings.



10. Contact Information

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