ENVIRONMENTAL PRODUCT DECLARATION

LAVA, GRAIN HARMONI, KAYAR, MULTIFLOOR ND/UNI, NATURA, SCREED/MASSETTO

ARTIGO: RUBBER FLOORING TECHNOLOGY
RESILIENT FLOOR COVERING

Lava – Smooth rubber flooring with stone effect embossed surface
Grain Harmoni – Smooth surface with multicolored granules
Kayar – Smooth surface with natural fibers
Multifloor / ND-UNI – Smooth surface in solid colors
Natura – Smooth rubber surface with linear marbling
Screed/Massetto – Smooth surface with painted concrete look

artigo

Rubber is a raw material that has unique stress-resistance and elasticity characteristics, suitable for producing a wide range of high-performance flooring. Innovative products that stem from the partnership of Artigo, with its research work that began within the Pirelli Group in the 1920's, and Mondo, established in 1948 and world leader in rubber applications for business and the sports industry. The coming together of two industrial cultures has produced a vast and diverse collection, with an exceptional number of different applications.

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LAVA, GRAIN HARMONI, KAYAR, MULTIFLOOR ND/UNI, NATURA, SCREED/MASSETTO
Resilient Floor Covering

According to ISO 14025, EN 15804, and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road, Northbrook, IL 60611 https://www.ul.com/ https://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
DECLARATION NUMBER	4789196803.102.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Lava – 1m²
REFERENCE PCR AND VERSION NUMBER	Part A: Life Cycle Assessment Calculation Rules and Report Requirements | UL 10010 | V3.2 Part B: Flooring EPD Requirements | UL 10010-7 | 2nd Edition
DESCRIPTION OF PRODUCT APPLICATION/USE	Lava 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 43
PRODUCT RSL DESCRIPTION (IF APPL.)	35 years
MARKETS OF APPLICABILITY	US / Europe / Global
DATE OF ISSUE	April 1, 2020
PERIOD OF VALIDITY	5 years
EPD TYPE	Product Specific
RANGE OF DATASET VARIABILITY	-
EPD SCOPE	[Cradle to grave]
YEAR(S) OF REPORTED PRIMARY DATA	2018
LCA SOFTWARE & VERSION NUMBER	Simapro 9
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.5
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1, Ev-DEC 1.17

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	 María José Monteagudo Arrebola
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	 Thomas P.Gloria, Industrial Ecology Consultants

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CERTIFIED
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Resilient Floor Covering

According to ISO 14025, EN 15804 and ISO 21930:2017

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 manufacture high performance rubber surfaces, ideal for flooring of schools, offices, hospitals, museums and indoor public spaces. Artigo is committed to achieving the highest standards that respect both our ecosystem and society around us. Thus offering our users lasting, high quality flooring that respects the environment in all its aspects. Strict controls on production, the strict selection of raw materials and the prestigious international environmental certification of our finished products are proof of our commitment to the environment. Artigo's factory conforms to the ISO 14001 Environmental Management System.

1.2. Product Description

Product Identification

Product Designation: LAVA (reference product), GRAIN HARMONI, KAYAR, MULTIFLOOR ND/UNI, NATURA, SCREED/MASSETTO

This environmental product declaration covers the "Lava", "Grain Harmoni", "Kayar", "Multifloor Nd/Uni", "Natura" and "Screed/Massetto" collections of resilient floorings produced by Artigo. These products are smooth surfaced rubber floorings with varying finishes. To create this collective EPD, all products were evaluated and the product with the greatest impact was retained as reference for the declaration. The product retained for this declaration is Lava.

Product Specification

The product characteristics may be found in Table 1. The product has technical specifications compliant with the standard EN 1817 – Resilient Floor Coverings: Specification for homogenous and heterogenous smooth rubber floor coverings. The product decalared in this document complies with the following codes or regulations :

- EN 13893 Slip Resistance (Normative value DS: ≥ 0.30)

The product has the following accreditations:

- Greenguard Gold: UL 2818 -2013
- Blue Angel Environmental Certification : RAL UZ 120

The following UNSPSC code and Construction Specifications Institute (CSI) classification apply to the product:
UNSPSC: 30161700 Flooring
CSI: 06 65 00 Resilient flooring

Manufacturer Specific EPD

This declaration covers six products with the commercial references "Lava", "Grain Harmoni", "Kayar", "Multifloor Nd/Uni", "Natura" and "Screed/Massetto" (depending on the market, the final products may be sold as "Screed" or "Massetto". A sensitivity analysis has been performed on all products and Lava has been selected as the reference product, having the greatest overall impacts. The impacts of the products have a variation of less than ±10% from the median. As described in Section 2.8, an allocation based on surface area of flooring produced is used to determine the manufacturing flows attributed to each product.

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.

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 systems have been modelled with generic data from the ecoinvent 3.5 database. No known flows have been deliberately omitted from the calculation.

The Reference Service Life and technical and functional performances described in this EPD are applicable as long as the product use complies with that defined by EN 685 and EN 1817 in accordance with the product's classification.

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

1.5. Technical Requirements

Characteristics	Nominal Value	Unit	Standard
Product Thickness	3.00	mm	-
Product Weight	4.7	kg/m²	-
Abrasion Resistance	140	mm^3	ISO 4649 (Met. A-5N)
Roll Width **Length**	1.90 10.00	m	- -
Tile Size	0.61 x 0.61	m	-
Type of Manufacture	Vulcanization	-	-
Density	1567	kg/m^3	

Table 1: Product Characteristics

1.6. Market Placement / Application Rules

The product decalared in this document complies with the following codes or regulations :

- EN 13893 Slip Resistance (Normative value DS: ≥ 0.30)

Lava resilient flooring is classified in accordance with ISO 10874 (previously EN 685) and in reference to the FCSS (Floor Covering Standard Symbols) to be installed in the following areas of application:

Domestic	
Commercial	
Industrial	

Table 2: Area of application

1.7. Material Composition

Component	Material	Mass %	Availability	Origin of raw materials
Binder	Styrene-Butadiene Copolymer	35.4	Non-Renewable -- Limited	Europe
Filler	Calcium Carbonate	1.9	Abundant Mineral	Europe
Reinforcement	Kaolin Silica	46.7	Abundant Mineral Abundant Mineral	Europe
Additives	Various	9.4		Europe
Pigments	Titanium Dioxide Rubber Chips Other Pigments	6.4	Non-Renewable – Limited Non-Renewable -- Limited Non-Renewable	Europe
Finish	Anti-UV	0.3	Non-Renewable -- Limited	Europe

Table 3: Product Composition

Styrene Butadiene Copolymer – an industrial polymerisation process of the monomers styrene and butadiene.

Calcium Carbonate – obtained by quarrying abundant minerals such as limestone or chalk.

Kaolin – obtained by quarrying the abundant mineral kaolinite.

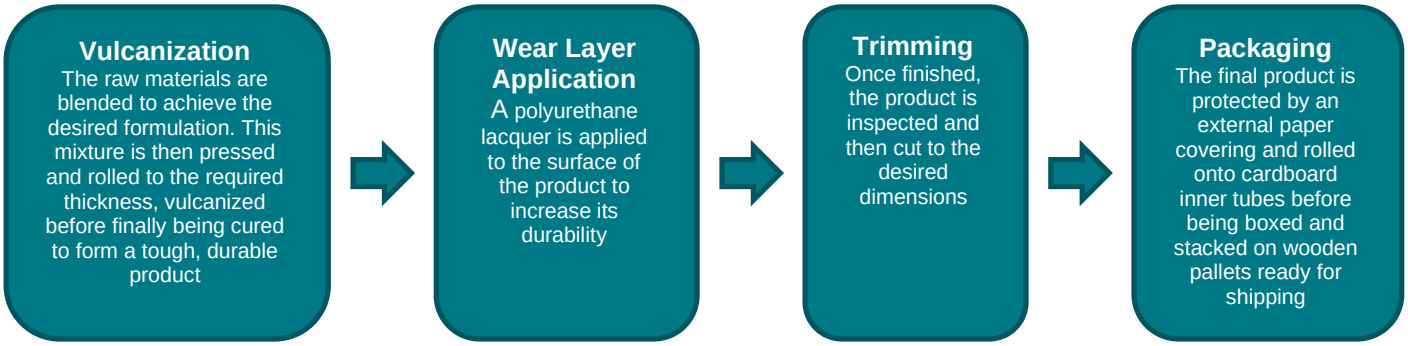
Silica – an abundant mineral obtained by quarrying.

Titanium Dioxide – a white pigment produced by an industrial chemical processing of rutile, a naturally occuring ore.

Rubber Chips – a synthetic product made from the polymerisation of petroleum-based monomers.

1.8. Manufacturing

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



- At present 10% of off-cuts are re-injected into the production process, with the rest being collected and recycled externally. Packaging materials are likewise collected and recycled externally.
- Artigo have solar panels installed on their factory to provide electricity. The remaining electricity is supplied by a certified renewable energy supplier. The results for both a standard energy mix (A3 standard) and the renewable energy supplier (A3*) are included in the results tables.

1.9. Packaging

All packaging materials are recyclable, however due to the variability of waste treatment on construction sites the hypothesis of 100% packaging material to landfill has been retained for this EPD.

1.10. Transportation

The majority of sales are within Europe, with the primary markets being Italy, Germany and France. For European sales the product is delivered by truck, with overseas sales being shipped by transoceanic freight from the port of Savona, 30 km from the factory.

Transport Distance 16-32T Truck (factory to distributor):	881 km
Transport Distance 16-32T Truck (distributor to client):	50 km
Utilization Capacity (including empty runs):	63%
Transport Distance Transoceanic Freight:	363 km

1.11. Product Installation

The product is installed by hand using tungsten carbide trowels. Approximately 300g/m² of a water-based low emission adhesive is used to fix the flooring in place. Following installation, a “first clean” is performed with a neutral detergent diluted in water, either by mop or combined machine. For this LCA the machine scenario has been used. During the installation approximately 5% of the material is lost as off-cuts – this waste is generally sent to landfill unless other site-specific valorization schemes are in place.

1.12. Use

Cleaning and maintenance

Daily cleaning of the installed floor involves a soft brush and has not been included in this study. The manufacturer advises routine cleaning once per month with a neutral detergent diluted in water. An extraordinary clean may be performed every six months with a mild alkaline detergent diluted in water. Cleaning may be performed by mop or machine, however only the machine has been taken into account for this study.

Prevention of structural damage

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

Health aspects during usage

The products are compliant with BlueAngel and GreenGuard Gold specifications.

1.13. Reference Service Life and Estimated Building Service Life

For this product, the stated RSL is 35 years. It should be noted, however, that the service life of a resilient floor covering may vary depending on the amount and nature of floor traffic and the type and frequency of maintenance. The manufacturer has provided this service life on the basis of over 80 years experience of flooring manufacture and supply. This RSL is applicable as long as the product use complies with that defined by EN 685 and EN 1817 in accordance with the product’s classification.

1.14. Reuse, Recycling, and Energy Recovery

Although it is technically possible to recycle rubber floorings to create other products, there is not a large infrastructure in place to deal with this waste stream, and as such the majority is sent to landfill.

1.15. Disposal

For the purpose of this LCA, it has been assumed that 100% of the product is sent to landfill at the end of its useful life. The transport between construction site and landfill facility is by truck, with an estimated distance of 30 km.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The functional unit is one square meter of installed product. The reference service life considered is 30 years.

	Value	Unit
Functional Unit	1	m²
Conversion factor to 1kg	0.213	-

Table 4: Functional Unit

2.2. System Boundary

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

A1 – A3: 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: 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.

B1 – B7: includes provision and transport of all materials, products 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. (MND – B3, B4, B5)

C1 – C4: includes provision and transport of all materials, products and services related to the end of life phase of the product, including energy and water consumption, as well as the end of life processing of the product. (MND – C3)

2.3. Estimates and Assumptions

The estimates and assumptions applied during this LCA are as follows

- Raw materials containing multiple elements have been modelled according to MSDS, TDS and literature research. For certain raw materials, exact percentages of each element were unavailable – in these cases an equal percentage was applied to each element.
- Raw material rigid plastic packaging is modelled as a 50/50 mix of polyethylene (LDPE) and polypropylene (PP) in the absence of specific data.
- Production losses have been calculated as the difference between the sum of raw materials entering the factory and the sum of finished product leaving the factory.
- Distances for delivery of the final product are calculated from the factory gate to the centre of the destination country. These distances have been averaged according to the percentage of sales to each respective country.
- For the maintenance routine, a machine cleaning regime has been assumed, being the scenario with the greatest impact. This scenario has been elaborated according to the manufacturer's instructions.
- 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.

2.4. Cut-off Criteria

The cut -off criteria considered are 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.

For this study, all input and output flows have been considered at 100%, including raw materials as per the product composition provided by the manufacturer and packaging of raw materials as well as the final product. Energy and water consumptions have also been considered at 100% according to the data provided.

2.5. 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, developed by Pré, has been used in conjunction with the LCA database ecoinvent v3.5.

There were no instances of missing data.

2.6. 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 (2018). Generic data is taken from the ecoinvent 3.5 database, the entirety of which was updated in 2018. 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.

2.7. Period under Review

This study is based on primary data collected for the year 2018.

2.8. 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.

2.9. Comparability (Optional)

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 Scenarios

The physical characteristics of the product may be found in Table 1.

Table 5. Transport to the building site (A4)

NAME	VALUE	UNIT
Fuel type	Diesel	
Liters of fuel	0.0045	l/100km
Vehicle type	Truck 16-32T	
Transport distance	881	km
Capacity utilization (including empty runs, mass based	63	%
Gross density of products transported	1567	kg/m^3
Weight of products transported (if gross density not reported)	-	kg
Volume of products transported (if gross density not reported)	-	m^3
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	0.48	-

Table 6. Installation into the building (A5)

NAME	VALUE	UNIT
Ancillary materials	0.3	kg
Net freshwater consumption specified by water source and fate (evaporated)	0.000033	m^3
Other resources	0.0001	kg
Electricity consumption	0.00041	kWh
Other energy carriers	0	MJ
Product loss per functional unit	0.235	kg
Waste materials at the construction site before waste processing, generated by product installation	0.503	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	-	kg
Biogenic carbon contained in packaging	0.384	kg CO_2
Direct emissions to ambient air, soil and water	-	kg
VOC emissions	100	µg/m^3

Table 7. Reference Service Life

NAME	VALUE	UNIT
RSL	**35**	years
Declared product properties (at the gate) and finishes, etc.	**-**	Units as appropriate
Design application parameters (if instructed by the manufacturer),	**-**	Units as

including references to the appropriate practices and application codes)		appropriate
An assumed quality of work, when installed in accordance with the manufacturer's instructions	-	Units as appropriate
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	-	Units as appropriate
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure)	-	Units as appropriate
Use conditions, e.g. frequency of use, mechanical exposure.	-	Units as appropriate
Maintenance, e.g. required frequency, type and quality of replacement components	12	Cleaning / year

Table 8. Maintenance (B2)

NAME	VALUE	UNIT
Maintenance process information (cite source in report)	Monthly cleaning according to manufacturer's instructions	-
Maintenance cycle	360	Number/ RSL
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0.4 L of city water disposed to sewer per year	L/m²/year
Ancillary materials specified by type (e.g. cleaning agent)	0.008 kg cleaning agent 0.0012 kg buffer pads	kg/year
Other resources	-	kg
Energy input, specified by activity, type and amount	0.005	kWh
Other energy carriers specified by type	-	kWh
Power output of equipment	1.2	kW
Waste materials from maintenance (specify materials)	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	

Table 9. End of life (C1-C4)

NAME		VALUE	UNIT
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method and transportation)			
Collection process (specified by type)	Collected separately	0	kg
	Collected with mixed construction waste	4.7	kg
Recovery	Reuse	0	kg

(specified by type)	Recycling	0	kg
	Landfill	4.7	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	0	
Disposal (specified by type)	Product or material for final deposition	4.7	kg
Removals of biogenic carbon (excluding packaging)		0	kg CO_2

Table 10. Reuse, recovery and/or recycling potentials (D), relevant scenario information

NAME	VALUE	UNIT
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	0	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	0	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0	MJ
Process and conversion efficiencies	-	
Further assumptions for scenario development (e.g. further processing technologies, assumptions on correction factors);	-	

4. Life Cycle Assessment Results

Table 11. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION 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	X	X	MND	MND	MND	X*	X*	X*	X	MND	X	MND

*module has been considered but has no associated inputs/outputs, therefore does not appear in the results.

Note: In the following tables, A3* refers to the manufacturing stage calculated with a 100% renewable energy mix (certified by Artigo's energy provider)

4.1. Life Cycle Impact Assessment Results

Table 12. North American Impact Assessment Results

TRACI v2.1	A1	A2	A3	A3*	A4	A5	B1	B2	C2	C4
GWP 100 [kg CO_2 eq]	1.03E+01	5.57E-01	2.39E+00	1.12E+00	7.38E-01	1.36E+00	-	1.07E+00	2.32E-02	2.73E-01
ODP [kg CFC-11 eq]	1.67E-06	1.37E-07	4.30E-07	2.50E-07	1.81E-07	3.73E-07	-	7.63E-08	5.69E-09	1.19E-08
AP [kg SO_2 eq]	5.41E-02	2.00E-03	1.61E-02	5.84E-03	2.99E-03	5.67E-03	-	4.52E-03	8.31E-05	2.90E-04
EP [kg N eq]	7.08E-03	3.10E-04	1.83E-03	1.20E-03	4.18E-04	1.54E-03	-	4.57E-03	1.29E-05	4.32E-04
SFP [kg O_3 eq]	4.19E-01	4.23E-02	1.20E-01	6.33E-02	6.07E-02	5.49E-02	3.60E-07	4.69E-02	1.76E-03	6.12E-03
ADP_{fossil} [MJ, LHV]	2.74E+01	1.23E+00	4.87E+00	3.20E+00	1.62E+00	2.54E+00	-	8.16E-01	5.11E-02	1.16E-01

Table 13. EU Impact Assessment Results

CML v4.2	A1	A2	A3	A3*	A4	A5	B1	B2	C2	C4
GWP 100 [kg CO_2 eq]	1.03E+01	5.57E-01	2.37E+00	1.12E+00	7.37E-01	1.12E+00	-	1.07E+00	2.32E-02	2.73E-01
ODP [kg CFC-11 eq]	1.61E-06	1.03E-07	3.72E-07	2.20E-07	1.36E-07	3.57E-07	-	6.66E-08	4.28E-09	9.00E-09
AP [kg SO_2 eq]	5.77E-02	1.80E-03	1.56E-02	5.86E-03	2.72E-03	5.74E-03	-	4.21E-03	7.46E-05	2.38E-04
EP [kg PO_4^{-3} eq]	5.18E-03	2.98E-04	2.24E-03	8.83E-04	4.20E-04	9.77E-04	-	2.43E-03	1.24E-05	2.07E-04
POCP [kg ethene eq]	7.83E-03	2.89E-04	1.27E-03	8.85E-04	3.99E-04	7.95E-04	3.77E-08	7.16E-04	1.20E-05	7.98E-05
$ADP_{element}$ [kg Sb-eq]	1.06E-04	1.71E-06	8.37E-06	1.16E-05	2.21E-06	6.91E-06	-	4.96E-06	7.10E-08	4.78E-08
ADP_{fossil} [MJ, LHV]	1.90E+02	8.45E+00	3.79E+01	2.25E+01	1.12E+01	1.85E+01	-	7.56E+00	3.51E-01	8.25E-01

4.2. Life Cycle Inventory Results

Table 14. Resource Use

PARAMETER	A1	A2	A3	A3*	A4	A5	B1	B2	C2	C4
RPR_E [MJ, LHV]	5.59E+00	9.04E-02	1.46E+01	3.10E+01	1.23E-01	1.89E+00	-	6.95E+00	3.76E-03	1.72E-02
RPR_M [MJ, LHV]	2.90E+00	-	5.80E+00	5.80E+00	-	4.35E-01	-	-	-	-
RPR_T [MJ, LHV]	8.49E+00	9.04E-02	2.04E+01	3.68E+01	1.23E-01	2.33E+00	-	6.95E+00	3.76E-03	1.72E-02
$NRPR_E$ [MJ, LHV]	1.39E+02	8.59E+00	4.02E+01	2.08E+01	1.14E+01	1.46E+01	-	9.20E+00	3.57E-01	8.59E-01
$NRPR_M$ [MJ, LHV]	6.47E+01	-	3.58E+00	3.58E+00	-	5.83E+00	-	-	-	-
$NRPR_T$ [MJ, LHV]	2.04E+02	8.59E+00	4.38E+01	2.44E+01	1.14E+01	2.04E+01	-	9.19E+00	3.57E-01	8.59E-01
SM [kg]	-	-	-	-	-	-	-	-	-	-
RSF [MJ, LHV]	-	-	-	-	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-	-	-	-	-
FW [m^3]	1.72E-01	1.56E-03	4.46E-02	5.32E-02	2.06E-03	2.88E-02	-	5.68E-02	6.47E-05	8.81E-04

Table 15. Output Flows and Waste Categories

PARAMETER	A1	A2	A3	A3*	A4	A5	B1	B2	C2	C4
WP [m^3]	1.03E+01	2.00E-01	1.12E+00	9.85E-01	2.64E-01	9.00E-01	-	5.11E+00	8.30E-03	4.18E-02
AP [m^3]	1.00E+03	5.94E+01	2.81E+02	1.58E+02	7.95E+01	1.21E+02	9.09E-04	1.19E+02	2.47E+00	5.44E+00
HWD [kg]	6.15E-01	5.31E-03	5.51E-02	5.95E-02	7.09E-03	5.00E-02	-	6.16E-02	2.21E-04	9.10E-04
NHWD [kg]	1.78E+00	4.46E-01	9.76E-01	7.25E-01	5.78E-01	8.24E-01	-	2.89E-01	1.85E-02	3.11E+00
HLRW [kg] or [m^3]	2.12E-05	4.93E-07	1.71E-05	4.82E-06	6.83E-07	4.47E-06	-	3.27E-06	2.05E-08	1.09E-07
ILLRW [kg] or [m^3]	1.49E-04	5.76E-05	9.69E-05	3.63E-05	7.60E-05	3.13E-05	-	1.84E-05	2.39E-06	5.13E-06
CRU [kg]	-	-	-	-	-	-	-	-	-	-
R [kg]	-	-	-	-	-	-	-	-	-	-
MER [kg]	-	-	-	-	-	-	-	-	-	-
EE [MJ, LHV]	-	-	-	-	-	-	-	-	-	-

Table 16. Carbon Emissions and Removals

PARAMETER	A1	A2	A3	A3*	A4	A5	B1	B2	C2	C4
BCRP [kg CO2]	-	-	-	-	-	-	-	-	-	-
BCEP [kg CO2]	-	-	-	-	-	-	-	-	-	-
BCRK [kg CO2]	-	-	3.84E-01	-	-	-	-	-	-	-
BCEK [kg CO2]	-	-	-	-	-	3.84E-01	-	-	-	-
BCEW [kg CO2]	-	-	-	-	-	-	-	-	-	-
CCE [kg CO2]	-	-	-	-	-	-	-	-	-	-
CCR [kg CO2]	-	-	-	-	-	-	-	-	-	-
CWNR [kg CO2]	-	-	-	-	-	-	-	-	-	-

5. LCA Interpretation

Figure 3: Graph depicting the impact indicators as calculated by the TRACI method

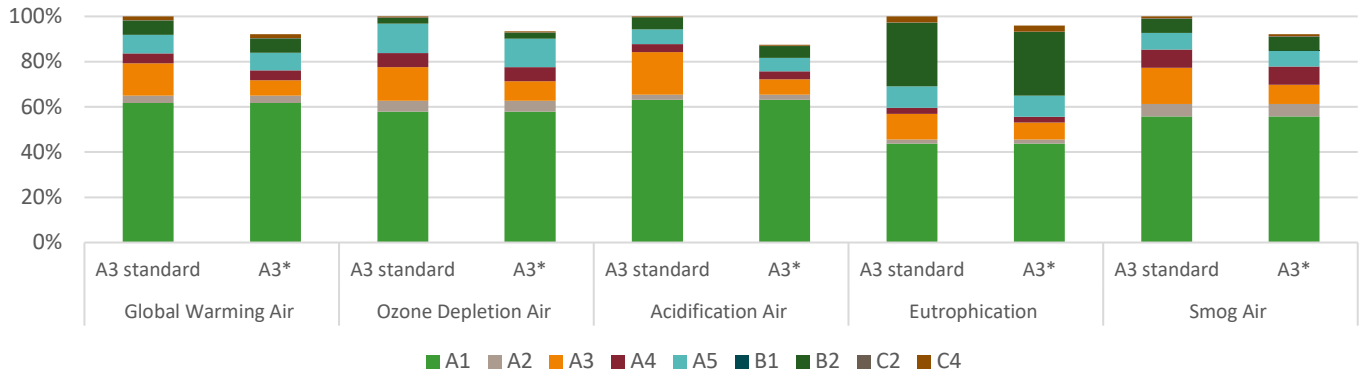
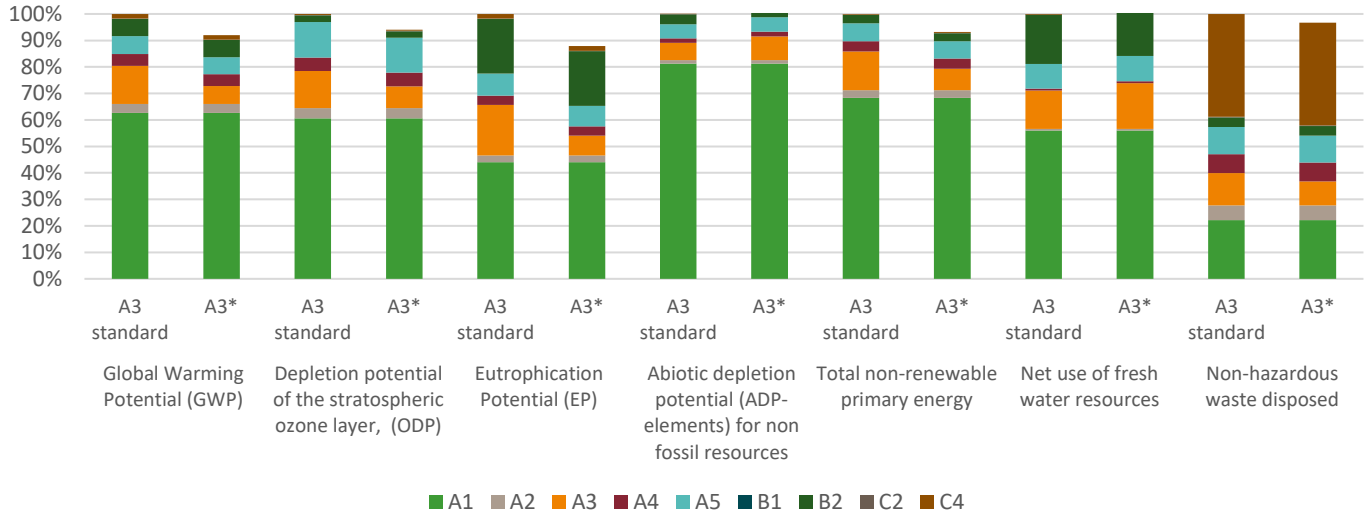


Figure 4: Graph depicting selection of impact indicator results calculated according to EN 15804



The primary contributor to the environmental impacts of the product is the Stage A1 – Extraction and supply of raw materials. The impacts during the Stage A3 – Manufacturing are mostly due to the electricity used by the factory. The Stage A5 – Installation also has high impacts, due to the quantity of product wasted during an average installation. Stage B2 – Maintenance has high associated impacts which correspond to low-impact cleaning activities repeated monthly over the lifetime of the product, resulting in a high lifetime impact.

The use of a renewable energy based electricity supply (A3*) allows a reduction of up to 12% of the impacts, with a 8% reduction in GWP.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Artigo's factory conforms to the ISO 14001 Environmental Management System. 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.

6.3. Extraordinary Effects

Fire

–	ASTM E 648	Critical radiant flux	≥0.45
–	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 Certification
Standard: UL 2818 - 2013 Standard for Chemical Emissions for Building Materials, Finishes and Furnishings
Lava Number: 73576-410
Grain Harmoni Number: 62440-410
Kayar Number: 62438-410
Nd-Uni Number: 62439-410
Natura Number: 62441-410
Screed/Massetto Number: 70645-410
Certification Status: Certified
Certification Period(s) 01/2016 - 10/2020

GREENGUARD Gold Certification
Standard: UL 2818 -2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings
Lava Number: 73576-420
Grain Harmoni Number: 62440-420
Kayar Number: 62438-420
Nd-Uni Number: 62439-410
Natura Number: 62441-420
Screed/Massetto Number: 70645-420
Certification Status: Certified
Certification Period: 01/2016 - 10/2020

Blue Angel Certification
Standard : RAL-UZ 120 Certificate for special environmental friendliness
Grain Harmoni Number: 24221
Kayar/Nd-Uni Number: 22291

French VOC regulation
Standard : decree no. 201 1-321 of March 23'd, 2011 (VOC) and executive decisions of May 28th, 2009 and April 30th, 2009 (CMR) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.
Result: A+

6.5. Further Information

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

7. Supporting Documentation

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

8. References

SUSTAINABILITY REPORTING STANDARDS

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

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

ISO 14040: 2006 – Environmental management – Life cyle assessment – Principles and framework

ISO 14044: 2006 – Environmental management – Life cyle assessment – Requirements and guidelines

ISO 21930: 2017 – Sustainability in buildings and civil engineering works – Core rules for environmental products declarations of construction products and services

UL ENVIRONMENT

UL Environment General Program Instructions July 2019, version 2.4

Product Category Rule (PCR) Guidance for Building-Related Products and Services:

- Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (September 2018 V3.2)
- Part B: Flooring EPD Requirements (September 2018 2nd Edition)

www.ul.com

RESILIENT FLOOR COVERING

ASTM F1344: Standard Specification for Rubber Floor Tile

ASTM F1859: Standard Specification for Rubber Sheet Floor Covering without Backing

LCI Database: ecoinvent V3.5

ecoinvent Life Cycle Inventory database Version 3

http://www.ecoinvent.org

9. Contact Information

	Publisher UL ECO-INSTITUT GmbH Sachsenring 69 50677 Cologne Germany	Tel +49 (0)221 931 245 30 Fax +49 (0)221 931 245 33 Mail environment@ul.com Web www.ul.com
	Author of the Life Cycle Assessment EVEA Conseil 11 rue Voltaire 44000 Nantes France	Tel +33 (0)9 63 48 50 16 Fax +33 (0)2 40 71 97 41 Mail info@evea-conseil.com Web www.evea-conseil.com
	Owner of the Declaration Artigo Spa Via Cascina Vione, 3 20080 Basiglio Italy	Tel +39 0290786415 Fax +39 0290786449 Mail sede@artigo.com Web http://www.artigo.com