



Environmental Product Declaration Type III (EPD) ITB number 513/2023



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Mats:

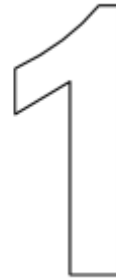
- bentonite GCL and GCL CS
- sand SandMat
- cement-sand TILTEX and TILTEX PLUS

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Basic Information



The declaration is a Type III Environmental Product Declaration (EPD) based on EN 15804 and verified in accordance with ISO 14025 by an independent auditor.

It contains information on the environmental impact of the declared building materials. Their aspects have been verified by an independent entity in accordance with ISO 14025. Basically, a comparison or evaluation of EPD data is only possible if all the comparable data have been created in accordance with EN 15804 (see clause 5.3 of the standard).

LCA analysis: A1 - A3, A4, C1 - C4 and D according to EN 15804 (from cradle to grave with options)

Year of development of the EPD: 2023

Declared product lifetime: 50 years

PCR: Document ITB-PCR A (based on EN 15804)

Declared unit: 1 m² product

Reason for implementation: B2B

Representativeness: Polish products, 2022

Manufacturer

Eurobent is one of the world's leading manufacturers of geosynthetic mats. In their products they mainly use bentonite. All activities carried out by Eurobent are based on customer satisfaction and respect for the environment.



The full offer of the company consists of: bentonite mats, sand mats, cement-sand mats and accessories such as bentonite or sealing tape.

In order to ensure the highest possible quality of manufactured products, Eurobent has created its own Quality Control Laboratory. It conducts research on materials and finished products, as well as numerous analyses, the results of which are used by all production departments of the company.

The production of bentonite, sand and cement-sand mats takes place in the production plant at 42 Kliczkowska Street in Świdnica (Poland).



Product description and application



Eurobent has many years of experience in the production and sale of geosynthetic mats. In the production of its mats it mainly uses bentonite, sand, cement-sand mixture but also other geosynthetics. The environmental declaration EPD developed within the scope of this document covers 3 products: bentonite mats GCL and GCL CS, sand mats SandMat and cement-sand mats TILTEX.

Bentonite mats GCL and GCL CS

Bentonite mat is an extremely versatile product. It consists of at least two layers of geotextiles and bentonite. The combination of bentonite, fabric and non-woven allows to create a durable and leak-proof material. EUROBENT bentonite mats provide strong protection against liquids, vapours and gases. The advantageous absorption and swelling properties of bentonite make the described mats extremely low permeability.

Bentonite mats are used in many industries. They are great for use in, among others:

- channels and storage reservoir,
- composters,
- sealing of ducts and buildings,
- filter and drain tanks,
- landfill security,
- anti-water protection of the structure.

CS bentonite mat differs from conventional bentonite mats in that it has an additional layer in the form of HDPE, LLDPE membrane. It is mainly used as hydro-insulation. The detailed needling process guarantees high strength parameters of the mat and expands the possibilities of its application. For CS products, the bonding phase is crucial, thanks to which the mat gains an additional layer of membrane.

The high strength of the product makes it ideal for use when erecting elements and construction objects such as:

- flat roofs,
- crevice walls and concrete piles,
- foundations and other elements embedded underground,
- tunnels.

Sand mat EUROBENT SandMat

Sand mat EUROBENT SandMat is a geocomposite consisting of a layer of non-woven geotextile, quartz sand and a geosynthetic composite mechanically bonded by a needling process. The innovative technology used in the production of the mat ensures high resistance to damage. The product is well suited for numerous applications related to water protection, filtration and drainage. SandMat mat has been designed primarily to protect waterways and the water environment. It is a great alternative to classic materials such as gravel. Due to its solid structure and high strength, it is a geocomposite ideally suited for the construction of fortifications and coastal structures (i. e. breakwaters, embankments or embankments).

One of the advantages of SandMat mats is the possibility of quick installation. When installing SandMat, a large number of specialised people are not required, which allows to reduce investment costs. Thanks to the application of a layer of sand in the mats, the installation process can be carried out in dry conditions, but also under water or with the use of vessels. SandMat mat is produced in rolls with a width of up to 5.1 m, which significantly reduces assembly time.

SandMat are environmentally friendly products and are ideal for use in the construction of waterways, where a high degree of filtration, high protection stability and high abrasion resistance are required. Their environmental and financial advantage is that they do not require the transport of large quantities of soil and aggregates. Mats are characterised by high water permeability, so their use does not hinder the growth of plants.

The SandMat production technology used by Eurobent allows for a high degree of personalization of the ordered products. On special order it is possible to produce rolls with dimensions chosen by the customer. In addition, the roll packaging has been designed in a way that minimises the risk of damage to the products. The packaging is UV-resistant sleeves, thanks to which the products are protected against adverse weather conditions. This also makes it easier to transport and store products on site.

Cement-sand mat TILTEX

Cement-sand mat TILTEX is a composite formed in the process of needling. It consists of a combination of cement and sand, embedded between two layers of geotextile and optionally reinforced with an additional layer of geomembrane. The combination of cement and sand used by the TILTEX system was created as a result of numerous tests, which aimed to ensure the greatest possible durability and comfort of use of the mats. The distinguishing feature of the product is the way it behaves in contact with water. After a few hours of hydration, it hardens, but still retains a bit of its elasticity. The layers of geotextile, between which a cement-sand mixture is embedded, further strengthen the entire structure, ensuring uniformity and security of the whole, even if cracks appear in the middle layer of the mat. This technologically advanced product can be conveniently and quickly moulded into any shape. It is definitely more convenient and faster to use material than classic substitutes, and a detailed quality control of the raw materials from which TILTEX mats are made ensures the highest quality of the finished product.

Cement-sand mats TILTEX are used, among others, for:

- reinforcement of concrete structures,
- stabilisation of embankments, slopes and soil,
- covers of ditches, slopes, reservoirs,
- protection of underground cable networks.

Overview of exemplary properties of EUROBENT 5000 bentonite mats and EUROBENT CS 0.2(5000)

Properties	Values for 5000	Values for CS 0.2 (5000)	Test methods
Mass per unit area of bentonite	5000 g/m ²	5000 g/m ²	EN 14196
Mass per unit area of product	5 300 g/m ² (±10%)	5 500 g/m ² (±10%)	EN 14196
Thickness	7.4 mm (±1 mm)	7.6 mm (±1 mm)	EN ISO 9863-1/-2
Leakage rate	≤ 5.0 x 10 ⁻⁹ m ³ /m ² /s	IMPERMEABLE	ASTM D 5887
Water permeability	≤ 5,0x10 ⁻¹¹ m/s	IMPERMEABLE	ASTM D 5887
Tensile strength along	≥ 10.4 kN/m (-1kN/m)	≥ 10.4 kN/m (-1kN/m)	EN ISO 10319
Tensile strength across	≥ 8.5 kN/m (-0.8kN/m)	≥ 10.4 kN/m (-1kN/m)	EN ISO 10319
Static resistance	≥ 1.8 kN (-0.2kN)	≥ 1.8 kN (-0.2kN)	EN ISO 12236
Peel strength	≥ 60 N/10cm (-6N/10cm)	≥ 60 N/10cm (-6N/10cm)	ASTM D 6496

Overview of properties of EUROBENT SandMat

Properties	Frequencies	Values	Test methods
Mass per unit area of silica sand	4 000 m ²	4700 g/m ²	EN 14196
Mass per unit area of product	4 000 m ²	5 500 g/m ² (±10%)	EN 14196
Thickness	4 000 m ²	9.5 mm (±1 mm)	EN ISO 9863-1/-2
Tensile strength along	4 000 m ²	40 kN/m (-4kN/m)	EN ISO 10319
Tensile strength across	4 000 m ²	60 kN/m (-6kN/m)	EN ISO 10319
Elongation at break along	4 000 m ²	70% (±30%)	EN ISO 10319
Elongation at break across	4 000 m ²	70% (±30%)	EN ISO 10319
Puncture resistance	4 000 m ²	7.0 kN (-0,7kN)	EN ISO 12236
Characteristic pore size	25 000 m ²	73.9 μm (±20μm)	EN ISO 12956
Water permeability	25 000 m ²	17.65 mm/s (-0.41mm/s)	EN ISO 11058
Abrasion resistance	1/Rok	TAK	RPG of BAW
Resistance to dynamic load of perforations	1/Rok	1800 Nm	RPG of BAW
Hydraulic filtration efficiency depending on soil type	1/Rok	BTC	RPG of BAW

Overview of properties of TILTEX cement-sand mats

Main features				
Properties	TILTEX 7	TILTEX 9	TILTEX 10	TILTEX 12
Mass per unit area (EN 14196)	7600 g/m ² (±10%)	9600 g/m ² (±10%)	10600 g/m ² (±10%)	12600 g/m ² (±10%)
Thickness (EN ISO 9863-1/-2)	7.0 mm (±1 mm)	9.0 mm (±1 mm)	10.0 mm (±1 mm)	12.0 mm (±1 mm)
Tensile strength longitudinal/ transverse	EN ISO 10319		20.0 / 20.0 kN/m (-2 kN/m)	
Elongation at break length/cross section	EN ISO 10319		40 / 40 % (-10%)	
Static resistance	EN ISO 12236		3.0 kN (-0.3 kN)	
Dynamic puncture resistance	EN 13433		0 mm (+1 mm)	
Effectiveness of protection	EN 14574		5.0 kN (-0.5 kN)	
Additional features				
Start of the setting time	PN EN 196-3		> 90 min	
Compressive strength	PN EN 196-1		40 MPa	
Bending strength	PN EN 12467:2016-08.5.4.3		6.0 MPa - Class 1	
Water permeability	PN EN 12467:2016-08.5.4.5-6		IMPERMEABLE	
Freezing and thawing resistance	PN EN 12467:2016-08.5.5.2		RL ≥ 0.75 Pass	
Heat resistance	PN EN 12467:2016-08.5.5.3		RL ≥ 0.75 Pass	
Resistance to hot water	PN EN 12467:2016-08.5.5.4		RL ≥ 0.75 Pass	
Wet strength	PN EN 12467:2016-08.5.5.5		RL ≥ 0.75 Pass	
Reaction to fire	PN EN 12467:2016-08.5.5.6		B-s1, d0*	
Rooting resistance	AFTER CEN/TS 14416:2014		RESPONSIBLE	
Manning coefficient of roughness	ASTM D 6460		n = 0.022	

Overview of dimensions of EUROBENT mats

Standard roll size	Values	Test methods
GCL & GCL CS		
Width x Length	5.1 m x 40 m ($\pm 1\%$)	Typical
Quantity	204 m ²	Typical
EUROBENT SandMat		
Width x Length	5.0m x 35m	Typical
Quantity	175 m. ²	Typical
TILTEX		
Width x Length	5.0 x 20 m ($\pm 2\%$)	Typical
Quantity	100 m ²	Typical
Width x Length	2.5 x 20 m ($\pm 2\%$)	Typical
Quantity	50 m ²	Typical
Width x Length	1.0 x 5 m ($\pm 2\%$)	Typical
Quantity	5 m ²	Typical

Life Cycle Assessment (LCA) - general principles



Declared unit

The declared unit is the production of 1 m² of bentonite, sand and cement-sand mats of different densities, described in the section “Product description and application”.

Allocation

Allocation in this study was created in accordance with ITB PCR A guidelines. Production takes place at the Świdnica plant, for which input data have been inventoried. The results obtained are representative average for all bentonite, sand and cement-sand mats produced in Świdnica. The allocation of impacts is based on the m² of the product. The proportion of production in the reference year is as follows: 80% bentonite mats, 13% sand mats and 7% cement-sand mats. All revenues from the extraction of raw materials used in production are allocated to module A1. Production of products is based on 100% raw materials. Module A2 is the transport of raw materials to the production plant in Świdnica. The energy, fuel and waste consumption for the entire production process has been inventoried and included in module A3.

System Boundaries

The life cycle analysis of the declared products includes the production stage (modules A1 - A3), A4, C1-C4+D (“from cradle to grave with options”) according to EN 15804 and ITB PCR A.

System Limits

100% of the input materials and 100% of the electricity and fuel consumption were inventoried at the Świdnica plant. The assessment takes into account all relevant parameters from the collected production data, i. e. all materials used

for production, electricity used, fuels and direct production waste. Substances with a percentage of less than 1% of total weight were excluded from the calculation. It is assumed that the total sum of omitted processes does not exceed 0.5% of all impact categories. Packaging materials were inventoried: finished products are wound on sleeves and wrapped in foil.

Modules A1 and A2 Extraction and transport of raw materials

Raw materials for production, i. e. non-woven, fabric, bentonite, cement, sand, packaging materials and accessories such as needles, nozzles, ink are transported from different European countries: Poland, Czech Republic, Italy, Greece, Slovakia, Germany. Module A1 presents the impact of production and extraction of raw materials further used in the production of mat. Data on the transport of raw materials shall be recorded by the plant. Means of transport include trucks. European fuel averages have been used for the calculation of module A2.

Module A3 Production

The production process of bentonite mats is illustrated in the diagrams on page 12. The production line consists of feeders of non-woven, fabric and bentonite which are subjected to the needling process. On a separate production line it is possible to glue the film. The direct waste from production is the scraps of the finished product formed as a result of trimming the edges of the mat. The production process uses electricity from two suppliers.

Modules A4 Transport

Finished products are transported to customers in Poland and abroad, the average transport distances are calculated in proportion to the quantity of transported products. Finished products are transported by cars or ships. The most common form of transport is road transport. Rolls are packed in foil and during transport they are held by safety belts. Smaller rolls can be packed on pallets and are also protected with foil for transport. For loading, forklifts are used.

The largest recipients of orders are in Europe, where they are transported by trucks, transport outside Europe is carried out by sea. The fuels used depend on the means of transport used, but the majority is diesel. Below is the average mileage for the largest customers of each type of mat over the last 12 months:

Transport of bentonite mats		
Country	Distance [km]	Type of transport
Austria	504	lorry
Belgium	1010	lorry
Czech Republic	319	lorry
France	1363	lorry
Greece	1780	lorry
Spain	2478	lorry
Germany	714	lorry
Norway	1316	lorry
Poland	70	lorry
Sweden	610	lorry
Italy	1403	lorry
Ireland	1970	lorry
Peru	12500	ship
Argentina	13250	ship
Colombia	10700	ship

Transport of sand mats		
Country	Distance [km]	Type of transport
Germany	503	lorry
India	15500	ship

Transport of cement and sand mats		
Country	Distance [km]	Type of transport
France	1377	lorry
Germany	1100	lorry
Sweden	1170	lorry
Italy	2010	lorry
Australia	19200	ship
India	13200	ship

Module C1 Deconstruction and Demolition

It is assumed that deconstruction of the mats is possible in parallel with the demolition of the structure, and during such a process the impacts from deconstruction of the mats are negligibly small. No information on the impact of deconstruction in the construction sector or any other sector is available for the EUROBENT mats. Therefore, no contribution to the impact categories of this module has been reported and the module is equal to 0.

Module C2 Transport

It is assumed that the end-of-life product will be transported by truck to the nearest waste treatment plant (truck, diesel) within 100 km.

Module C3 Waste treatment

No re-use, recovery or recycling of mats is envisaged, therefore this module is equal to 0.

Module C4 Disposal

After the end of use, 100% of the product goes to the landfill.

Module D Benefits and Loads Outside the System Boundaries

Module D presents the burdens and benefits of recycling. Benefits are assessed at the functional equivalence point, i.e. where substitution of primary raw material takes place. As the mats and their parts are not recycled this module is equal to 0.

Period of data collection

The input data for the calculation of declared products shall cover the period from January to December 2022. The Life Cycle Assessment has been prepared for Poland as a reference area.

Data Quality

The data for the calculation of modules A1-A4 are derived from verified LCI inventory data from each plant. According to Annex E of PN-EN 15804 + A2 data quality assessment was carried out. For technical representativeness, processes with "very good" quality represent 99% of the values for climate change indicators. For geographical and temporal representativeness, the process rating was "very good".

Assumptions and estimates

The impacts of representative products were aggregated using a weighted average. The results obtained for representative products can be related proportionally to all EUROBENT mats from the analysed groups.

Calculation rules

LCA was made in accordance with PN-EN 15804 standard and ITB PCR A document.

Databases

The calculation data comes from the Ecoinvent v. 3.6, Ecoinvent v. 3.8 and from the databases available in the Bionova OneClickLCA software. Characteristic factors are CML ver. 4.2 based on EN 15804+A2.

Production schedules for EUROBENT mats

Diagram 1 - Main production line - for needling

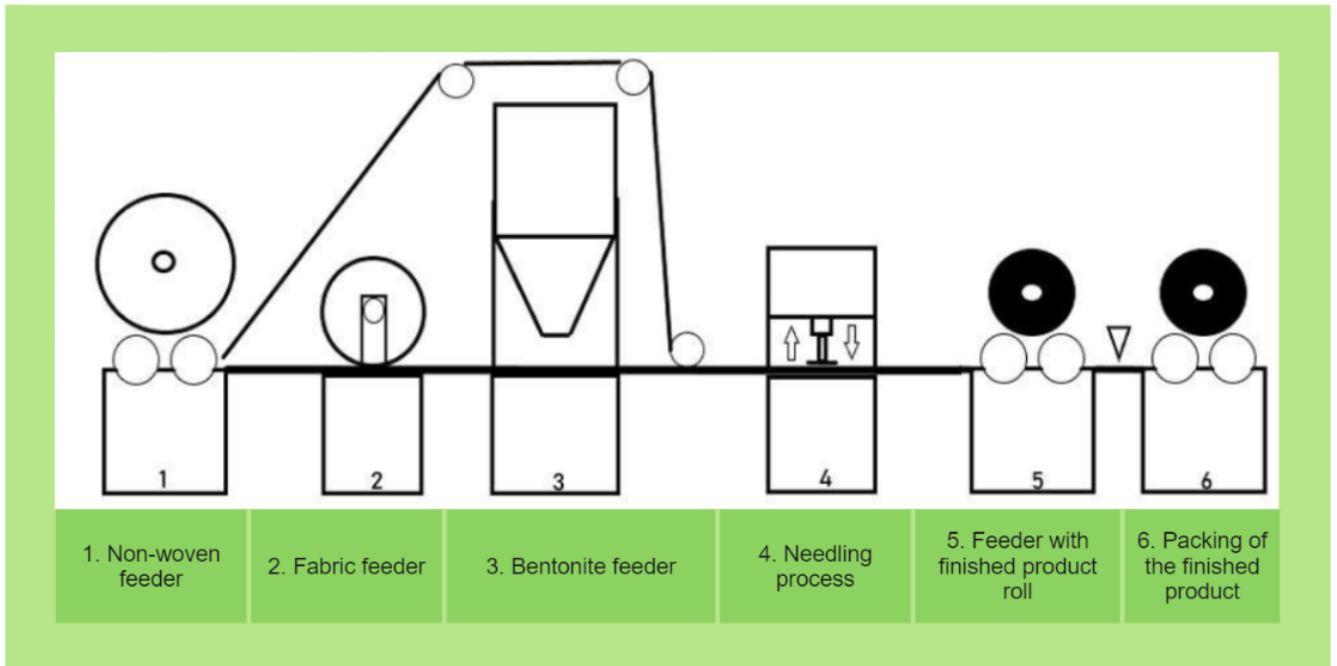
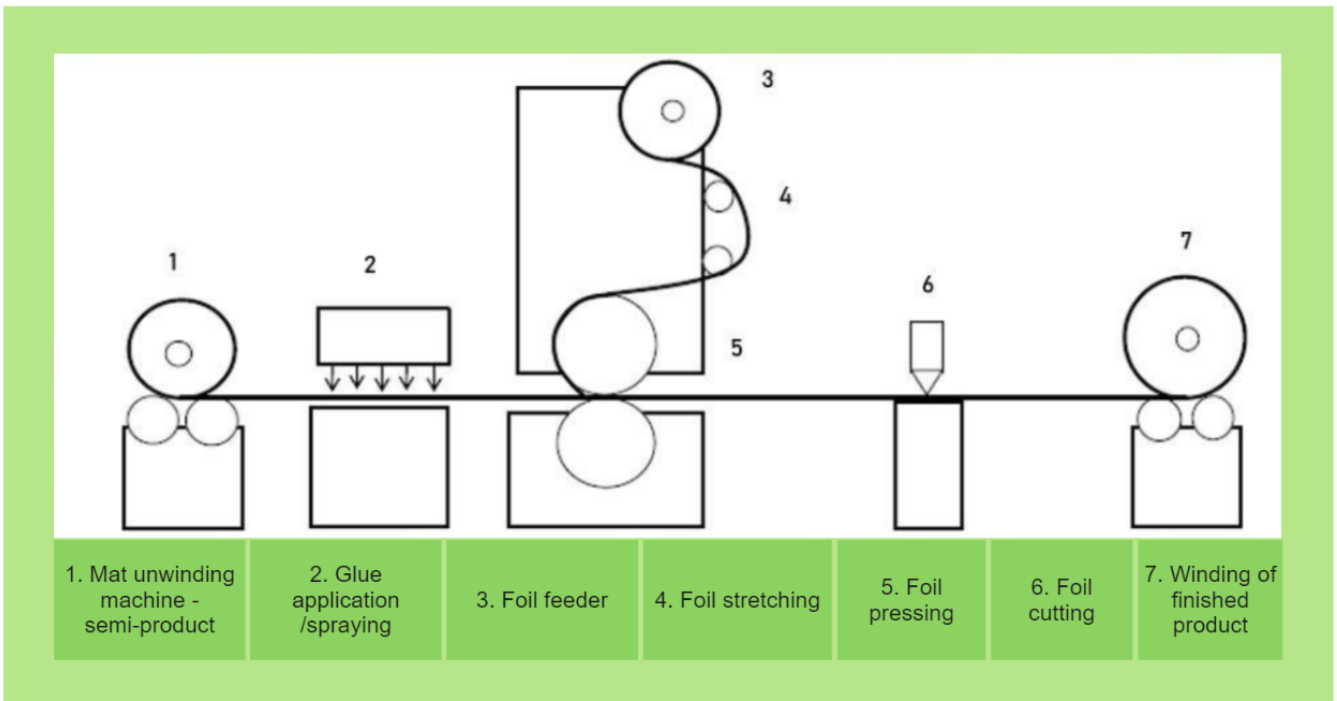


Diagram 2 - Glue production line



Life Cycle Assessment (LCA) - results



Declared unit

The declared unit is 1 m² EUROBENT mats manufactured by Eurobent Sp. z o.o..

The following indicates which LCA assessment modules were included in the assessment:

Information on system boundaries (MA = module assessed, MNA = module not assessed)																
Product stage			Construction stage		Use stage							End of life				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction and installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Potential for reuse, recovery or recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MA	MA	MA	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MA	MA	MA	MA	MA

As the raw materials in the production stage provide the main contribution to the results of the environmental balance, there is a linear relationship between the surface of the raw materials and the environmental impact. For further results for other dimensions and variants of EUROBENT mats, please use the following formula:

$$P(x) = [P(x1)/x1]*x$$

P(x): indicator for the new, declared product

P(x1): indicator obtained for the product representing the product type, (e.g. global warming potential (GWP))

x: surface of the new declared product

x1: surface of the product representing the type of products

Results for bentonite mats GCL & GCL CS

Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Potential for creating a greenhouse effect - total	kg CO2 eq.	1,051E0	1,578E-1	1,623E-1	5,176E-1	0E0	4,549E-2	0E0	1,6E0	0E0
Potential for creating a greenhouse effect - resulting from the consumption of fossil fuels	kg CO2 eq.	1,044E0	1,576E-1	1,934E-1	5,171E-1	0E0	4,544E-2	0E0	2,57E-1	0E0
Potential for creating a greenhouse effect - biogenic	kg CO2 eq.	4,838E-3	1,146E-4	-3,12E-2	3,755E-4	0E0	3,3E-5	0E0	1,343E0	0E0
Potential for creating a greenhouse effect - land use and changes in land use	kg CO2 eq.	1,241E-3	4,749E-5	9,927E-5	1,556E-4	0E0	1,368E-5	0E0	0E0	0E0
Ozone-depleting potential of the stratosphere	kg CFC 11 eq.	6,898E-8	3,922E-8	6,257E-9	1,216E-7	0E0	1,068E-8	0E0	0E0	0E0
Acidification potential of soil and water	mol H+ eq.	5,612E-3	6,741E-4	1,542E-3	2,172E-3	0E0	1,909E-4	0E0	1,827E-4	0E0
Freshwater eutrophication potential	kg Pe	3,051E-5	1,284E-6	9,071E-6	4,207E-6	0E0	3,697E-7	0E0	6,846E-5	0E0
Eutrophication potential of marine waters	kg N eq.	1,243E-3	1,999E-4	2,178E-4	6,545E-4	0E0	5,752E-5	0E0	2,459E-3	0E0
Potential for terrestrial eutrophication	kg N eq.	1,431E-2	2,208E-3	2,596E-3	7,229E-3	0E0	6,352E-4	0E0	1,841E-5	0E0
Tropospheric ozone creation potential	kg NMVOC eq.	4,422E-3	7,121E-4	7,106E-4	2,324E-3	0E0	2,042E-4	0E0	1,465E-3	0E0
Abiotic depletion potential of non-fossil resources	kg Sb eq.	7,649E-6	2,666E-6	8,006E-7	8,824E-6	0E0	7,754E-7	0E0	0E0	0E0
Abiotic depletion potential of fossil fuels	MJ	2,559E1	2,577E0	2,976E0	8,043E0	0E0	7,068E-1	0E0	0E0	0E0
Water consumption	m ³	4,257E-1	9,232E-3	5,204E-2	2,992E-2	0E0	2,629E-	0E0	0E0	0E0

Environmental aspects of resource use

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Renewable, primary energy as an energy carrier	MJ	7,812E-1	3,096E-2	5,497E-1	1,012E-1	0E0	8,897E-3	0E0	0E0	0E0
Renewable primary energy for material use	MJ	3,093E-3	0E0	3,008E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely renewable primary energy	MJ	7,843E-1	3,096E-2	8,505E-1	1,012E-1	0E0	8,897E-3	0E0	0E0	0E0
Non-renewable primary energy as a source of energy	MJ	1,685E1	2,448E0	2,809E0	8,043E0	0E0	7,068E-1	0E0	0E0	0E0
Non-renewable primary energy for material use	MJ	8,759E0	1,284E-1	1,67E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely non-renewable primary energy	MJ	2,561E1	2,577E0	2,976E0	8,043E0	0E0	7,068E-1	0E0	0E0	0E0
Use of secondary raw materials	kg	3,29E-3	6,748E-6	5,243E-4	0E0	0E0	0E0	0E0	0E0	0E0
Renewable secondary fuels	MJ	1,79E-4	1,188E-7	1,499E-3	0E0	0E0	0E0	0E0	0E0	0E0
Non-renewable secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Use of fresh water resources	m ³	1,031E-1	5,096E-4	2,745E-3	1,675E-3	0E0	1,472E-4	0E0	0E0	0E0

Other environmental information describing waste categories

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste destined for landfill	kg	4,815E-2	2,401E-3	9,063E-3	7,817E-3	0E0	6,869E-4	0E0	0E0	0E0
Recycled non-hazardous waste	kg	1,125E0	2,616E-1	3,682E-1	8,646E-1	0E0	7,598E-2	0E0	0E0	0E0
Radioactive waste disposed of	kg	3,76E-5	1,774E-5	2,756E-6	5,522E-5	0E0	4,852E-6	0E0	0E0	0E0
Components to be reused	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Recyclable materials	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Exported electricity	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0

Results for sand mat SandMat

Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Potential for creating a greenhouse effect - total	kg CO2 eq.	8,98E-1	1,876E-2	1,581E-1	2,233E-1	0E0	4,439E-2	0E0	1,562E0	0E0
Potential for creating a greenhouse effect - resulting from the consumption of fossil fuels	kg CO2 eq.	8,946E-1	1,875E-2	1,893E-1	2,231E-1	0E0	4,435E-2	0E0	2,508E-1	0E0
Potential for creating a greenhouse effect - biogenic	kg CO2 eq.	2,364E-3	1,375E-5	-3,124E-2	1,62E-4	0E0	3,221E-5	0E0	1,311E0	0E0
Potential for creating a greenhouse effect - land use and changes in land use	kg CO2 eq.	1,051E-3	5,687E-6	9,496E-5	6,714E-5	0E0	1,335E-5	0E0	0E0	0E0
Ozone-depleting potential of the stratosphere	kg CFC 11 eq.	4,406E-8	6,563E-9	5,549E-9	5,245E-8	0E0	1,043E-8	0E0	0E0	0E0
Acidification potential of soil and water	mol H+ eq.	4,386E-3	9,076E-5	1,507E-3	9,369E-4	0E0	1,863E-4	0E0	1,783E-4	0E0
Freshwater eutrophication potential	kg Pe	2,494E-5	1,537E-7	8,965E-6	1,815E-6	0E0	3,608E-7	0E0	6,681E-5	0E0
Eutrophication potential of marine waters	kg N eq.	9,348E-4	2,415E-5	2,075E-4	2,824E-4	0E0	5,613E-5	0E0	2,4E-3	0E0
Potential for terrestrial eutrophication	kg N eq.	1,02E-2	2,667E-4	2,468E-3	3,118E-3	0E0	6,2E-4	0E0	1,797E-5	0E0
Tropospheric ozone creation potential	kg NMVOC eq.	3,465E-3	8,786E-5	6,788E-4	1,003E-3	0E0	1,993E-4	0E0	1,43E-3	0E0
Abiotic depletion potential of non-fossil resources	kg Sb eq.	6,764E-6	2,963E-7	7,506E-7	3,807E-6	0E0	7,568E-7	0E0	0E0	0E0
Abiotic depletion potential of fossil fuels	MJ	2,341E1	4,166E-1	2,919E0	3,47E0	0E0	6,898E-1	0E0	0E0	0E0
Water consumption	m ³	1,898E0	1,196E-3	5,039E-2	1,291E-2	0E0	2,566E-3	0E0	0E0	0E0

Environmental aspects of resource use

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Renewable, primary energy as an energy carrier	MJ	6,875E-1	3,764E-3	5,475E-1	4,368E-2	0E0	8,683E-3	0E0	0E0	0E0
Renewable primary energy for material use	MJ	0E0	0E0	3,008E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely renewable primary energy	MJ	6,875E-1	3,764E-3	8,483E-1	4,368E-2	0E0	8,683E-3	0E0	0E0	0E0
Non-renewable primary energy as a source of energy	MJ	1,492E1	2,882E-1	2,755E0	3,47E0	0E0	6,898E-1	0E0	0E0	0E0
Non-renewable primary energy for material use	MJ	8,493E0	1,284E-1	1,644E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely non-renewable primary energy	MJ	2,341E1	4,166E-1	2,919E0	3,47E0	0E0	6,898E-1	0E0	0E0	0E0
Use of secondary raw materials	kg	1,649E-3	6,748E-6	4,924E-4	0E0	0E0	0E0	0E0	0E0	0E0
Renewable secondary fuels	MJ	1,053E-4	1,188E-7	1,497E-3	0E0	0E0	0E0	0E0	0E0	0E0
Non-renewable secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Use of fresh water resources	m ³	2,343E-2	5,985E-5	9,515E-4	7,224E-4	0E0	1,436E-4	0E0	0E0	0E0

Other environmental information describing waste categories

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste destined for landfill	kg	4,155E-2	3,02E-4	8,887E-3	3,372E-3	0E0	6,704E-4	0E0	0E0	0E0
Recycled non-hazardous waste	kg	1,059E0	2,936E-2	3,653E-1	3,73E-1	0E0	7,416E-2	0E0	0E0	0E0
Radioactive waste disposed of	kg	2,689E-5	2,913E-6	2,448E-6	2,382E-5	0E0	4,736E-6	0E0	0E0	0E0
Components to be reused	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Recyclable materials	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Exported electricity	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0

Results for cement-sand mat TILTEX

Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Potential for creating a greenhouse effect - total	kg CO2 eq.	3,91E0	6,598E-2	1,581E-1	4,422E-1	0E0	8,942E-2	0E0	3,146E0	0E0
Potential for creating a greenhouse effect - resulting from the consumption of fossil fuels	kg CO2 eq.	3,874E0	6,591E-2	1,893E-1	4,417E-1	0E0	8,933E-2	0E0	5,053E-1	0E0
Potential for creating a greenhouse effect - biogenic	kg CO2 eq.	3,345E-2	4,801E-5	-3,124E-2	3,208E-4	0E0	6,488E-5	0E0	2,641E0	0E0
Potential for creating a greenhouse effect - land use and changes in land use	kg CO2 eq.	2,561E-3	1,988E-5	9,496E-5	1,329E-4	0E0	2,689E-5	0E0	0E0	0E0
Ozone-depleting potential of the stratosphere	kg CFC 11 eq.	1,587E-7	1,765E-8	5,549E-9	1,039E-7	0E0	2,1E-8	0E0	0E0	0E0
Acidification potential of soil and water	mol H+ eq.	1,324E-2	2,889E-4	1,507E-3	1,855E-3	0E0	3,752E-4	0E0	3,592E-4	0E0
Freshwater eutrophication potential	kg Pe	2,494E-5	5,374E-7	8,965E-6	3,594E-6	0E0	7,267E-7	0E0	1,346E-4	0E0
Eutrophication potential of marine waters	kg N eq.	3,366E-3	8,386E-5	2,075E-4	5,591E-4	0E0	1,131E-4	0E0	4,834E-3	0E0
Potential for terrestrial eutrophication	kg N eq.	3,822E-2	9,26E-4	2,468E-3	6,175E-3	0E0	1,249E-3	0E0	3,62E-5	0E0
Tropospheric ozone creation potential	kg NMVOC eq.	1,058E-2	2,999E-4	6,788E-4	1,986E-3	0E0	4,015E-4	0E0	2,881E-3	0E0
Abiotic depletion potential of non-fossil resources	kg Sb eq.	2,852E-4	1,101E-6	7,506E-7	7,538E-6	0E0	1,524E-6	0E0	0E0	0E0
Abiotic depletion potential of fossil fuels	MJ	3,884E1	1,15E0	2,919E0	6,871E0	0E0	1,39E0	0E0	0E0	0E0
Water consumption	m ³	2,851E0	3,925E-3	5,039E-2	2,556E-2	0E0	5,169E-3	0E0	0E0	0E0

Environmental aspects of resource use

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Renewable, primary energy as an energy carrier	MJ	1,813E0	1,3E-2	5,475E-1	8,649E-2	0E0	1,749E-2	0E0	0E0	0E0
Renewable primary energy for material use	MJ	0E0	0E0	3,008E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely renewable primary energy	MJ	1,813E0	1,3E-2	8,483E-1	8,649E-2	0E0	1,749E-2	0E0	0E0	0E0
Non-renewable primary energy as a source of energy	MJ	3,035E1	1,022E0	2,755E0	6,871E0	0E0	1,39E0	0E0	0E0	0E0
Non-renewable primary energy for material use	MJ	8,493E0	1,284E-1	1,644E-1	0E0	0E0	0E0	0E0	0E0	0E0
Completely non-renewable primary energy	MJ	3,884E1	1,15E0	2,919E0	6,871E0	0E0	1,39E0	0E0	0E0	0E0
Use of secondary raw materials	kg	1,667E-3	6,748E-6	4,924E-4	0E0	0E0	0E0	0E0	0E0	0E0
Renewable secondary fuels	MJ	1,053E-4	1,188E-7	1,497E-3	0E0	0E0	0E0	0E0	0E0	0E0
Non-renewable secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Use of fresh water resources	m ³	4,054E-2	2,126E-4	9,515E-4	1,431E-3	0E0	2,893E-4	0E0	0E0	0E0

Other environmental information describing waste categories

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste destined for landfill	kg	1,081E-1	1,015E-3	8,887E-3	6,678E-3	0E0	1,35E-3	0E0	0E0	0E0
Recycled non-hazardous waste	kg	3,246E0	1,082E-1	3,653E-1	7,386E-1	0E0	1,494E-1	0E0	0E0	0E0
Radioactive waste disposed of	kg	8,511E-5	7,95E-6	2,448E-6	4,717E-5	0E0	9,539E-6	0E0	0E0	0E0
Components to be reused	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Recyclable materials	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Exported electricity	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0

Verification

The verification process of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a period of 5 years. There is no need for recalculation after 5 years if the input data has not changed significantly.

<p>EN 15804 serves as the basis for ITB PCR-A Independent verification according to ISO 14025 (subsection 8.1.3.) [] internal [X] external</p>
<p>External verification of EPD: Michał Piasecki, Professor ITB, m.piasecki@itb.pl Input verification, LCI audit, LCA: Agnieszka Kaczmarek, JW+A, a.kaczmarek@jw-a.pl LCA verification: Michał Piasecki, Professor ITB, m.piasecki@itb.pl</p>

The declaration owner has the sole ownership, liability, and responsibility for the declaration. Declarations within the same product category but from different programmes may not be comparable. Declarations of products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- EN 15804 +A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 13361:2004/A1:2006 "Geosynthetic barriers – Characteristics required for use in the construction of reservoirs and dams"
- EN 13362:2005 "Geosynthetic barriers – Characteristics required for use in the construction of canals"
- EN 13491:2004/A1:2006 "Geosynthetic barriers – Characteristics required for use as a fluid barrier in the construction of tunnels and underground structures"
- EN 13492:2004/A1:2006 "Geosynthetic barriers – Characteristics required for use in the construction of liquid waste disposal sites, transfer stations or secondary containment"
- EN 13493:2005 "Geosynthetic barriers – Characteristics required for use in the construction of solid waste storage and disposal sites"
- EN 15382:2013 "Geosynthetic barriers – Characteristics required for use in transportation infrastructure"
- EN 13967:2012 "Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet - Definitions and characteristics"
- EN 13249:2016 "Geotextiles and geotextile-related products - Characteristics required for use in the construction of roads and other trafficked areas (excluding railways and asphalt inclusion)"
- EN 13250:2016 "Geotextiles and geotextile-related products - Characteristics required for use in the construction of railways"
- EN 13252:2016 "Geotextiles and geotextile-related products - Characteristics required for use in drainage systems"
- EN 13253:2016 "Geotextiles and geotextile-related products - Characteristics required for use in erosion control works (coastal protection, bank revetments)"
- EN 13254:2016 "Geotextiles and geotextile-related products - Characteristics required for the use in the construction of reservoirs and dams"
- EN 13255:2016 "Geotextiles and geotextile-related products - Characteristics required for use in the construction of canals"
- EN 13265:2016 "Geotextiles and geotextile-related products - Characteristics required for use in liquid waste containment projects"



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CERTIFICATE № 513/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

**Mats: bentonite GCL and GCL CS, sand SandMat
and cement-sand TILTEX and TILTEX PLUS**

Manufacturer:

Eurobent Sp. z o.o.

ul. Kliczkowska 42, 58-100 Świdnica Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2

**Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.**

This certificate, issued on 29th August 2023 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department



Agnieszka Winkler-Skałna, PhD



Deputy Director
for Research and Innovation



Krzysztof Kućzyński, PhD

Warsaw, August 2023