ENVIRONMENTAL PRODUCT DECLARATION

in accordance with /ISO 14025/ and /EN 15804/

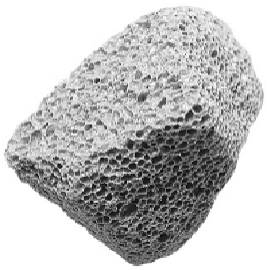
Owner of the declaration	MISAPOR AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-MIS-20200078-IBA1-DE
Issue date	25/09/2020
Valid to	24/09/2025

MISAPOR Standard Plus 10/50
MISAPOR Dynamic 10/50

MISAPOR AG - foam glass granulate

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com



MISAPOR

1. General Information

MISAPOR AG	MISAPOR Standard 10/50
Programme holder Institut Bauen und Umwelt e.V. (IBU) Panoramastrasse 1 10178 Berlin	**Owner of the declaration** MISAPOR AG Rossriedstrasse 2 CH-7205 Zizers
Declaration number EPD-MIS-20200078-IBA1-DE	**Declared product/declared unit** 1 m³ MISAPOR Standard Plus 10/50 - foam glass
This declaration is based on the following product category rules: Mineral insulating material, 12/2018 (PCR tested and approved by the independent advisory board (SVR))	**Scope of application:** This document relates to the manufacture of 1 m³ of MISAPOR foam glass produced at the production site in Dagmersellen, Switzerland. A specific bulk density of 175 kg was assumed for conversion to m³.
Issue date 25/09/2020	The owner of the declaration is liable for the basic information and supporting evidence; any liability of the IBU in relation to manufacturer's information, LCA data and supporting evidence is excluded. This document is a translation from German to English. It is based on the original declaration number EPD-MIS-20200078-IBA1-DE. This EPD was compiled in accordance with the requirements of */15804+A1/*. In the following the standard is referred to more simply as *EN 15804*.
Valid to 24/09/2025	**Verification** The European */EN 15804/* standard serves as the core PCR. Independent verification of the declaration and statements by an independent body in accordance with */ISO 14025:2010/* ☐ internal ☒ external
 Dipl. Ing. Hans Peters (President of Institut Bauen und Umwelt e.V.)	 Dr. Frank Werner, Independent verifier appointed by SVR
 Dr. Alexander Röder (Executive Director Institut Bauen und	

2. Product

2.1 Product description/Product definition

MISAPOR foam glass is an artificially manufactured and broken granular mixture which is produced by puffing up ground recycled glass. The (dry) bulk density typically lies in the ranges from 125 to 150 kg/m³ (MISAPOR Standard 10/75) and from 160 to 190 kg/m³ (MISAPOR Standard Plus 10/50). MISAPOR thermal insulation is manufactured in several grain-size fractions.

EU regulation no. /305/2001/ (CPR) applies for putting the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account */ETA-13/0549/* of 21st June 2018 and CE labelling.

The respective national regulations apply to use.

2.2 Application

MISAPOR foam glass granulate is used as levelling thermal insulation for buildings against the ground, as technical lightweight aggregate in gardening and landscaping and also in infrastructure and road construction. In addition, the granulate is used as cement-bonded aggregate or as aggregate in lightweight and insulating concrete.

Common uses include:

- Thermal insulation layer against the soil
- Frost protection layer for roads/work sections in areas with ground frost
- Lightweight aggregate and drainage layer on work sections
- Lightweight aggregate for areas subject to traffic on building sites
- Road bed and embankment aggregates on poor ground
- Modelling and drainage layers for playgrounds and sports grounds
- Thermal renovation in old buildings (indoors and outdoors)
- Aggregates for insulating and light concrete

The declared performance is achieved with proper use.
The manufacturer's processing guidelines for thermal insulation aggregate with a compaction ratio of 1.3:1 for insulating fillers in accordance with /*ETA-13/0549/*. The respective national regulations must also be complied with when used as thermal insulation. Settlement behaviour in accordance with */ETA-13/0549/* applies for technical lightweight aggregates.

2.3 Technical data

MISAPOR Standard Plus 10/50 technical data

Name	Value	Unit
Thermal conductivity (/EN 12667/)	0.093	W/(mK)
Rated value for thermal conductivity in accordance with general building supervisory approval	0.12	W/(mK)
Compressive strength (/EN 826/)	> 0.66	N/mm_2
Water vapour diffusion resistance level	2 - 4	-
Bulk density (/EN 1097-3/)	160 - 190	kg/m^3
Fire behaviour (/EN 13501-1/)	Class A1 non-flammable	

The product's performance values in accordance with the declaration of performance in relation to its main features in accordance with */ETA-13/0549/* of 18/06/2018.

2.4 Delivery status

MISAPOR foam glass generally has a grain size of 25 to 75 mm. It is supplied either in big bags or loose in a truck.

2.5 Base materials/ancillary materials

Average composition of MISPOR foam glass

Name	Value	Unit
Glass waste	98	%
Mineral activator	2	%

MISAPOR foam glass consists of naturally occurring mineral base materials. No additives or admixtures are used in the manufacturing process.
The glass waste is mainly obtained from locally available sources. The mineral activator is imported from Europe. There is no shortage of resources for either according to the current state of knowledge.

Does the product contain materials from the ECHA list of materials which are especially problematic for approval (dated 16/01/2020) at a mass % concentration of above 0.1: no.

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

Were biocidal products added to this building product or was it treated with biocidal products (is this therefore a processed product in terms of the EU Biocide Product Directive no. 528/2012): no.

2.6 Manufacturing

The raw material for the manufacture of MISAPOR foam glass is 98% recycled hollow glass and 2% mineral activator. This is freed from foreign matter and undergoes a multi-stage crushing and grinding process. After mixing with the activator, the glass mixture is puffed up in a belt conveyor furnace at 820 - 970°C. A 300 to 400°C hot glass foam plate emerges from the furnace. Rapid cooling causes tension cracks which cause this plate to disintegrate into the desired grain sizes.

2.7 Environment and health during use

No measures to protect the health of workers beyond those contained in national occupational safety regulations are necessary in any production steps during the entire manufacturing process.

2.8 Product processing/installation

No specific protective measures apart from normal occupational safety measures are additionally necessary during the processing of the specified products. Recommendations on processing can be found in the safety data sheet at www.misapor.com. Based on current knowledge, no hazards for water, air and soil can arise with appropriate processing of MISAPOR foam glass.

2.9 Packaging

The foam glass is supplied loose or in polypropylene-coated big bags. The big bags remain the property of MISAPOR and are brought to the building site in a loan basis and picked up or sent back and reused. The packaging can be thermally recycled without problems (recycling process R153 in accordance with the Swiss ordinance on handling waste (*VeVA*).

2.10 Condition of use

No changes to the material composition take place during use. MISAPOR foam glass is almost unlimitedly serviceable and reusable if used as intended. MISAPOR foam glass is resistant to pests, frost, damp, acids, lyes, oils, salts, organic solvents, gasoline and diesel.

2.11 Environment and health during use

Ingredients: There are no specific characteristics for the material composition for the period of use. All materials used are age- and damp-resistant in their installed state which means that the insulation properties and the mechanical properties remain unchanged during the entire period of use.
Based on current knowledge, hazards for water, air and soil can be excluded with appropriate processing of MISAPOR foam glass.

2.12 Reference period of use

No reference period of use (RSL) in accordance with /*ISO 15686/* was determined.
The period of use for MISAPOR foam glass granulate products is unlimited if used appropriately and exclusively limited by the period of use of the components and the entire building. The insulation properties are fully maintained across the entire period of use. The insulation properties can be impaired by extraordinary influences and damage to the construction. The thermal performance characteristics of thermal insulation are normally based on a minimum period of 50 years in accordance with */DIN EN 16783/*. The period of use of components for lifecycle analyses according to the Federal Office for Building and Regional Planning (BBSR) according to the sustainable building rating system (BNB) is ≥ 50 years for foam glass granulate (Code no. 335.151).

2.13 Extraordinary influences - Fire

MISAPOR foam glass is allocated to building component class A1 in accordance with *EN 13501*. Building products in this class have no hazard potential with regard to smoke generation, flammability and flaming droplets.

Fire protection

Name	Value
Building material class	A1
Flaming droplets	no
Flue gas development	no

Water

MISAPOR foam glass is not affected by water. No ingredients which are hazardous to water are washed out.

Mechanical destruction

MISAPOR foam glass is compacted differently depending on use. Compaction brings about the Controlled breaking of the granulate, the grains grip one another and additionally increase surface stability. After compaction, the MISAPOR foam glass layer is finished and fulfils the set specifications in accordance with *ETA-13/0549*. With normal use, no further risk of mechanical destruction or hazards for the environment occur.

2.14 End-of-life phase

The possibilities for reuse are unlimited with careful dismantling and minimal mixing with foreign matter. The following use applications are normally available if the glass has not been completely freed of contaminants.

- Light aggregates on buildings
- Light aggregates for roadbuilding
- Pipe insulation
- Gabion filling
- Flexible slope drainage with MISAPOR drain bags
- Vertical insulation with MISAPOR wall bags
- Modellings on green roofs
- Backfilling supporting walls

No further preparation steps are necessary before renewed installation of the dismantled material.

2.15 Disposal

Foam glass collected after demolition can be deposited as normal building rubble without pre-treatment due to its non-leaching mineral content.

2.16 Further information

Further information on MISAPOR foam glass can be found online on the manufacturer's website www.misapor.ch.

3. LCA: Calculation rules

3.1 Declared unit

The declared unit related to 1 m³ of MISAPOR foam glass. The mean bulk density of this product is 175 kg/m³. The transferral of the results to other bulk densities is possible via a linear scale.

Declared unit

Name	Value	Unit
Declared unit	1	m³
Conversion factor to 1 kg	0.0057	-
Loose bulk density	175	kg/m³

3.2 System boundary

The cradle-to-grave with options system boundaries were selected. These include the manufacture of the product including the pre-chain (provision and proportional transport of raw materials) up to the finished product ready for loading at the factory gate in Dagmersellen (Switzerland), use including transport and installation (with the exception of Modules B3-B5) and the product's end of life including dismantling and reuse and also disposal.

3.3 Estimations and assumptions

A loss quota of 1 % is assumed for installation losses.

3.4 Cut-off rules

All data from the operating data collection, i.e. all raw materials used according to formulations and energy carriers and also all direct production waste are included in the LCA. Packaging was not included as it consists of big bags which are mainly reused. Assumptions regarding transport costs were made for all in- and outputs which are included. It can therefore be assumed that the total of the processes not included does not exceed 5 % of the impact categories. Machines and equipment required for manufacture are not included.

3.5 Background data

Data for the production of MISAPOR Standard Plus 10/50 was collected in the Dagmersellen plant for 2018. The entire manufacturing process and also upstream processes and waste treatment were modelled with data from the /Gabi/ databases (SP 40). All flows in the LCA were able to be depicted with a corresponding data set from the GaBi databases. The electricity mix drawn corresponds to the Swiss supply mix.

3.6 Data quality

The quality of data which was collected at MISAPOR can be regarded as being good. All material input and output parameters were either recorded metrologically at the factory gate (products) or known due to the supply quantities (raw materials). The energy quantities drawn are also known due to the supply quantities. Regionally specific background data was used wherever possible.

3.7 Review period

The data basis for this LCA is based on MISAPORT AG primary data from 2018.

3.8 Allocation

The production process produces no ancillary products. In the LCA model on which the LCA is based, no allocation of resources and environmental burdens on ancillary products has therefore been carried out.

3.9 Comparability

Generally, a comparison or evaluation of EPD data is only possible if all data to be compared was created in accordance with /*EN 15804*/ and the building context and product-specific features are taken into account.

thinkstep AG's /GaBi/ software system for integrated lifecycle assessment was used to model the lifecycle of the declared product . The underlying database is the */GaBi/ LCA Database* 2020 SP40.

4. LCA: Scenarios and further technical information

Transport to the building site (A4)

A diesel-engined Euro 5 articulated vehicle is used for transport to the building site.

Name	Value	Unit
Transport distance	70	km

Installation into the building (A5)

Name	Value	Unit
Diesel auxiliary product	0.0574	kg
Installation waste	1	%

Use phase (B1-B7)

Generally, no maintenance and repair measures are necessary during the reference period of use. In addition, no energy and no water are used so that no environmental loads accrue.

Name	Value	Unit
Water consumption	0	m^3
Auxiliary material	0	kg
Other resources	0	kg
Electricity consumption	0	kWh

Reference period of use

Name	Value	Unit
Service life (minimum according to BBSR)	50	a

End-of-life (C1-C4)

Two scenarios are under consideration for the end-of-life scenario.
Scenario 1: Disposal of dismantled material in landfill (C3/1, C4/1 and D/1)
Scenario 2: The dismantled material is passed to the recycling plant (C3/2, C4/2 and D/2).

Name	Value	Unit
To recycling	175	kg
To landfill	175	kg
Transport	50	km
Diesel for dismantling	0.0817	kg

Reuse, recovery or recycling potential (D), relevant scenarios

Scenario 1 (D/1): The dismantled material is disposed of on landfill and is not credited.
Scenario 2 (D/2): The dismantled material is used for road building as a replacement for gravel. A credit is given for this.

Name	Value	Unit
Material to landfill	175	kg
Material to recycling	175	kg

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

Production stage			Construction process stage		Use stage							End of life stage				Credits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse, recovery or recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with EN 15804+A1: 1 m³ MISAPOR foam glass 10/50

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
GWP	[kg CO_2 eq.]	19.90	0.82	0.45	0.00	0.00	0.00	0.00	0.30	0.59	0.00	0.00	2.39	0.00	0.00	-4.86
ODP	[kg CFC11 eq.]	4.65E-13	1.70E-16	4.83E-15	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.58E-17	1.27E-17	0.00E+0	0.00E+0	1.31E-14	0.00E+0	0.00E+0	-9.40E-15
AP	[kg SO_2 eq.]	2.88E-2	1.78E-3	2.05E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.38E-4	1.27E-3	0.00E+0	0.00E+0	1.53E-2	0.00E+0	0.00E+0	-3.43E-3
EP	[kg $(PO_4)^{3-}$ eq.]	4.11E-3	4.11E-4	4.59E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.28E-5	2.94E-4	0.00E+0	0.00E+0	1.72E-3	0.00E+0	0.00E+0	-6.28E-5
POCP	[kg Ethene eq.]	1.45E-3	-6.08E- 4	1.87E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.57E-5	-4.34E-4	0.00E+0	0.00E+0	1.15E-3	0.00E+0	0.00E+0	-2.27E-4
ADPE	[kg Sb eq.]	5.44E-5	3.29E-8	5.62E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.22E-8	2.35E-8	0.00E+0	0.00E+0	9.19E-7	0.00E+0	0.00E+0	-4.58E-7
ADPF	[MJ]	164.00	11.20	5.08	0.00	0.00	0.00	0.00	4.15	7.98	0.00	0.00	33.80	0.00	0.00	-78.60
Key	GWP = Global warming potential; ODP = Depletion potential for the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential for tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources (ADP – materials); ADPF = Abiotic depletion potential for fossil resources (ADP – fossil energy carriers)															

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with EN 15804+A1: 1 m³ MISAPOR foam glass 10/50

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	[MJ]	261.00	0.06	2.68	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	4.56	0.00	0.00	-1.94
PERM	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	[MJ]	261.00	0.06	2.68	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	4.56	0.00	0.00	-1.94
PENRE	[MJ]	240.00	11.20	5.85	0.00	0.00	0.00	0.00	4.17	8.02	0.00	0.00	34.80	0.00	0.00	-79.20
PENRM	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	[MJ]	240.00	11.20	5.85	0.00	0.00	0.00	0.00	4.17	8.02	0.00	0.00	34.80	0.00	0.00	-79.20
SM	[kg]	183.34	0.00	1.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.00
RSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	[m³]	3.13E-1	9.21E-5	3.25E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.42E-5	6.58E-6	0.00E+0	0.00E+0	8.78E-3	0.00E+0	0.00E+0	-1.03E-2
Key	PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water															

RESULTS OF THE LCA: OUTPUT FLOWS AND WASTE CATEGORIES TO EN 15804+A1: 1 m³ MISAPOR foam glass 10/50

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	[kg]	4.45E-5	2.95E-9	4.59E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.10E-9	2.11E-9	0.00E+0	0.00E+0	5.31E-7	0.00E+0	0.00E+0	-1.47E-7
NHWD	[kg]	8.67E+0	1.21E-3	1.84E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.50E-4	8.67E-4	0.00E+0	0.00E+0	1.75E+2	0.00E+0	0.00E+0	-3.66E+0
RWD	[kg]	2.97E-2	1.85E-5	3.06E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.85E-6	1.32E-5	0.00E+0	0.00E+0	3.97E-4	0.00E+0	0.00E+0	-2.46E-4
CRU	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.00	0.00	0.00	0.00	0.00
MER	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EET	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Key	HWD = Hazardous waste disposal; NHWD = Non-hazardous waste disposal; RWD = Radioactive waste disposal; CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy EET = Exported thermal energy															

SM = A1-A3: Total of all secondary materials which the product contains (recycled glass + SiC). A5: 1% of SM in A1-A3 (estimated installation loss).

6. LCA: Interpretation

A dominance analysis was performed to interpret the results.
Within the modules examined, thermal and electrical energy provision during production has the greatest influence on the primary energy requirement and almost all impact categories apart from POCP and ADPE. The ADPE results are mainly influenced by the production of steel straps which are used during production. The largest contribution to the POCP results is supplied by the electricity used during manufacture and the disposal in landfill of waste.

The absolute values of the results are extremely small due to the high proportion of secondary materials which do not involve environmental impacts. This leads to a slight distortion of the overall results as certain processes may possibly significantly influence the results during the lifecycle whilst the same processes for an equivalent product which is mainly produced from primary materials may be hardly visible.
The results of the dominance analysis should not therefore be over-interpreted.

7. Requisite evidence

Leachable substances
The emission of metals is checked in the course of ETA approval. The following table shows the required limit values (in accordance with */ETA-13/0549/*) and also the typical measurement values (test report 62/19, Analytics Centre, Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB), D-70569 Stuttgart, in accordance with */DIN EN 12457-4:2002/*).

Threshold and typical measurement values

Name	Value	Unit
Eluate concentration in accordance with DIN EN 12457-4:2002	Measurement value	
Arsenic (As)	< 5	µg/l
Lead (Pb)	< 10	µg/l
Cadmium (Cd)	< 1	µg/l
Chrome (Cr)	6.7	µg/l
Copper (Cu)	< 15	µg/l
Nickel (Ni)	< 10	µg/l
Mercury (Hg)	< 1	µg/l
Zinc (Zn)	< 20	µg/l
Eluate concentration in accordance with DIN EN 12457-4:2002	Threshold value	Unit
Arsenic (As)	< 20	µg/l
Lead (Pb)	< 80	µg/l
Cadmium (Cd)	< 3	µg/l
Chrome (Cr)	< 25	µg/l
Copper (Cu)	< 60	µg/l
Nickel (Ni)	< 20	µg/l
Mercury (Hg)	< 1	µg/l

Radioactivity
Not relevant for foam glass granulate.

Formaldehyde and VOC emissions
Not relevant for foam glass granulate.

8. References

/ISO 14025/
2006/07: Environmental labels and declarations Type III Environmental declarations – Principles and procedures

/EN 15804 + A1/
2013/05: Sustainability of construction works - Environmental product declarations - Core-rules for the product category of construction products

Confirmation of the declared thermal conductivity
in accordance with SIA 279, insulating building materials, 2018 Edition, available at www.misapor.ch.

/GaBi/ LCA Database
/GaBi/ ts, Leading Sustainability & LCA Software, www.thinkstep.com,
Thinkstep AG, Hauptstrasse 111–113,
70771 Leinfelden-Echterdingen, Germany.

/EU Ordinance 305/2011/
2011-03-09: Regulation No. 305/2011 of the European Parliament and of the Council of 9th March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.

/EN 12457-4/:
2003-01: Characterization of waste - Leaching; Compliance test for leaching of granular waste materials and sludges

/IBU 2019/
Product category rules for building-related products and services, Part A: Calculation rules for the LCA and requirements of the background report, Version 1.8, 04/07/2019.

/IBU 2018/
PCR Product category rule guidance for building-related products and services, Part B: Requirements of the EPD for reaction resin products, Institut Bauen und Umwelt e.V. (IBU), Version 1.1, 11/12/2018.

/ISO 14044/
/DIN EN ISO 14044:2018-05/: Environmental management - Life cycle assessment - Requirements and guidelines

/ISO 15686/
2011/05: Buildings and constructed assets - Service life planning - Part 1: General principles and framework

/DIN EN 16783/
2017/07: Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations.

/ETA-13/0549/
European Technical Approval ETA-13/0549 for “Factory-produced bulk foam glass granulate”

Approval Z-23.34-1390
General supervisory building approval by the German Institute for Structural Engineering (DIBt) for “MISAPOR Standard Plus 10/50“ bulk foam glass granulate and “MISAPOR standard 10/75“ as load-bearing insulation below foundation slabs.

/VeVA/
Ordinance on Waste Processing of 22nd June 2005 (last amended 1st January 2018).

/EN 13501/
2019/05: Fire classification of construction products and building elements.

/EAK/
European Waste Catalogue in accordance with the Waste Catalogue Ordinance (AVV) of 10th December 2001 (Federal Legal Gazette I p. 3379), which was last amended by Article 2 of the ordinance of 17th July 2017 (Federal Legal Gazette I p. 2644).

/EN 12667/
2001/05: Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance.

/EN 826/
2013/05: Thermal insulating products for building applications - Determination of compression behaviour.

/EN 1097-3/
1998/06: Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids. Determination of loose bulk density and voids.

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Appendix
to MISAPOR Standard Plus 10/50 – foam glass

for the

ENVIRONMENTAL PRODUCT DECLARATION
in accordance with /ISO 14025/ and /EN 15804/

Owner of the declaration	MISAPOR AG
Declaration number	EPD-MIS-20200078-IBA1-DE
Issue date	25/09/2020
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MISAPOR

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EPD APPENDIX

MISAPOR Standard Plus 10/50 – foam glass

This appendix to the Environmental Product Declaration for MISAPOR Standard Plus 10/50 – foam glass is intended to document the environmental impact of the additional product variant MISAPOR Standard 10/75 - foam glass.

This product variant has the following features:

Name	Bulk density [m^3/kg]
10/75	137.5

The following tables illustrate the environmental impact of 1 m^3 MISAPOR 10/75 Standard. All declared modules are marked with an 'x'.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)																
Production stage			Construction process stage		Use stage							End of life stage				Credits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport from the gate to the location of use	Assembly	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Reuse, recovery or recycling potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

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LCA results: 1 m³ MISAPOR Standard 10/75

RESULTS OF THE LCA – ENVIRONMENTAL IMPACTS: 1 m³ MISAPOR Standard 10/75

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
Global warming potential	[kg CO_2eq.]	1.72E+01	6.44E-01	4.10E-01	0.00E+00	2.96E-01	4.60E-02	0.00E+00	0.00E+00	1.87E+00	0.00E+00	0.00E+00	-3.82E+00
Depletion potential of the stratospheric ozone layer	[kg CFC11 eq.]	3.87E-13	1.39E-16	4.02E-15	0.00E+00	6.58E-17	9.94E-17	0.00E+00	0.00E+00	1.03E-14	0.00E+00	0.00E+00	-7.39E-15
Acidification potential of land and water	[kg SO_2eq.]	2.54E-02	1.40E-03	1.98E-03	0.00E+00	3.38E-04	9.97E-04	0.00E+00	0.00E+00	1.20E-02	0.00E+00	0.00E+00	-2.70E-03
Eutrophication potential	[kg $(PO_4)^{3-}$eq.]	3.52E-03	3.23E-04	4.48E-04	0.00E+00	6.28E-05	2.31E-04	0.00E+00	0.00E+00	1.35E-03	0.00E+00	0.00E+00	-4.93E-04
Formation potential for tropospheric ozone photochemical oxidants	[kg Ethene eq.]	1.34E-03	-4.78E-04	1.85E-04	0.00E+00	6.57E-05	-3.41E-04	0.00E+00	0.00E+00	9.04E-04	0.00E+00	0.00E+00	-1.78E-04
Abiotic depletion potential for non-fossil resources	[kg Sb eq.]	5.45E-05	2.58E-08	5.61E-07	0.00E+00	1.22E-08	1.84E-08	0.00E+00	0.00E+00	7.22E-07	0.00E+00	0.00E+00	-3.60E-07
Abiotic depletion potential for fossil resources	[MJ]	1.43E+02	8.78E+00	4.75E+00	0.00E+00	4.15E+00	6.27E+00	0.00E+00	0.00E+00	2.66E+01	0.00E+00	0.00E+00	-6.18E+01

RESULTS OF THE LCA – RESOURCE USE: 1 m³ MISAPOR Standard 10/75

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
Renewable primary energy as energy carrier	[MJ]	2.17E+02	4.43E-02	2.33E+00	0.00E+00	2.09E-02	3.16E-02	0.00E+00	0.00E+00	3.58E+00	0.00E+00	0.00E+00	-1.52E+00
Renewable primary energy resources as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	[MJ]	2.17E+02	4.43E-02	2.33E+00	0.00E+00	2.09E-02	3.16E-02	0.00E+00	0.00E+00	3.58E+00	0.00E+00	0.00E+00	-1.52E+00
Non-renewable primary energy as energy carrier	[MJ]	2.06E+02	8.82E+00	5.40E+00	0.00E+00	4.17E+00	6.30E+00	0.00E+00	0.00E+00	2.74E+01	0.00E+00	0.00E+00	-6.23E+01
Non-renewable primary energy resources as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	[MJ]	2.06E+02	8.82E+00	5.40E+00	0.00E+00	4.17E+00	6.30E+00	0.00E+00	0.00E+00	2.74E+01	0.00E+00	0.00E+00	-6.23E+01
Use of secondary materials	[kg]	1.46E+02	0.00E+00	1.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+02
Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	[m³]	2.63E-01	7.24E-05	2.73E-03	0.00E+00	3.42E-05	5.17E-06	0.00E+00	0.00E+00	6.90E-03	0.00E+00	0.00E+00	-8.12E-03

RESULTS OF THE LCA: OUTPUT FLOWS AND WASTE CATEGORIES: 1 m³ MISAPOR Standard 10/75

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
Hazardous waste disposal	[kg]	4.50E-05	2.32E-09	4.63E-07	0.00E+00	1.10E-09	1.66E-09	0.00E+00	0.00E+00	4.17E-07	0.00E+00	0.00E+00	-1.16E-07
Non-hazardous waste disposal	[kg]	8.57E+00	9.53E-04	1.46E+00	0.00E+00	4.50E-04	6.81E-04	0.00E+00	0.00E+00	1.38E+02	0.00E+00	0.00E+00	-2.88E+00
Radioactive waste disposal	[kg]	2.48E-02	1.45E-05	2.56E-04	0.00E+00	6.85E-06	1.04E-05	0.00E+00	0.00E+00	3.12E-04	0.00E+00	0.00E+00	-1.93E-04
Components for reuse	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00