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and types of construction

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ETA-13/0549
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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

MISAPOR Standard 10/75
MISAPOR Standard Plus 10/50
MISAPOR Dynamic 10/50

Product family
to which the construction product belongs

Factory made cellular glass loose fill

Manufacturer

Misapor Management AG
Rossriedstrasse 2
7205 ZIZERS
SCHWEIZ

Manufacturing plant

MISAPOR AG
Werkstraße 32
CH-6252 Dagmersellen
MISAPOR AG
Bahnhofstraße 19
CH-7472 Surava

This European Technical Assessment
contains

11 pages including 1 annex which form an integral part of
this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 040394-00-1201

This version replaces

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Specific Part

1 Technical description of the product

This European Technical Assessment applies to cellular glass loose fills made of recycled waste glass powder. This foam glass gravel consists of factory made particles of cellular foamed glass, with typical size 10/50 mm or 10/75 (nominal sizes d/D). The cellular glass loose fills "MISAPOR" are manufactured in two standard classes.

Depending on particle size the cellular glass loose fills are designated as follows:

- particle size ≤ 75 mm "MISAPOR Standard 10/75",
- particle size ≤ 50 mm "MISAPOR Standard Plus 10/50" and
"MISAPOR Dynamic 10/50".

The European Technical Assessment has been issued for the product on the basis of agreed data/ information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed. The European Technical Assessment applies only to products corresponding to this agreed data/information.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The cellular glass loose fills are intended to be used as load bearing and thermal insulation layer. The load bearing function is limited to predominantly static loads. The typical application is underneath floor slabs.

Further applications are:

- a thermal insulation/frost protection layer in areas with in-ground frost
- a lightweight fill and water capillary barrier

The performance according to section 3 only applies if the cellular glass loose fills are installed according to the manufacture's installation instructions in a compressed state with a compression of 1.3:1 in accordance with the bulk density given in the ETA and if it is protected from precipitation, wetting or weathering during transport, storage and installation.

As to the application of the thermal insulation material, the respective national regulations shall in addition be observed.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the cellular glass loose fill of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the products and references to the methods used for its assessment

For sampling, conditioning and testing the provisions of the EAD No. 040394-00-1201 "Factory made cellular glass loose fill" apply.

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Oedometer modulus in accordance with ISO 17892-5:2017 and EAD No. 040394-00-1201, Annex A.1 "MISAPOR Standard 10/75" "MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"	See Annex A, table 1 See Annex A, table 1
Compressive stress at 10% deformation or compressive strength in accordance with EN 826:2013 "MISAPOR Standard 10/75" of the dry material after the freezing and thawing test "MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50" of the dry material after the freezing and thawing test	≥ 420 kPa 370 kPa ≥ 660 kPa 640 kPa
Characteristic value of compressive stress or compressive strength 5%-fractile value for a one-sided confidence level of 75 % under unknown or known variance using ISO 12491:1997 "MISAPOR Standard 10/75" "MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"	$\sigma_{0,05} = 432$ kPa (n = 50; $\sigma_{\text{mean}} = 478$ kPa; $s_{\sigma} = 27$ kPa) $\sigma_{0,05} = 657$ kPa (n = 50; $\sigma_{\text{mean}} = 712$ kPa; $s_{\sigma} = 33$ kPa)
Crushing resistance in accordance with EN 13055:2016, Annex C and under consideration of modifications acc. to EAD "MISAPOR Standard 10/75" "MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"	0.308 N/mm ² 0.306 N/mm ²
Creep strain	No performance assessed

Essential characteristic	Performance
<p>Behaviour under cyclic loading acc. to EAD</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p>	<p>Load changes: 50 kPa and 200 kPa; Initial height of the compacted specimen 459 mm</p> <p>After 100 charges $X_{total} = 0.0085$ m; $X_{load} = 1.8$ %</p> <p>After 500 charges $X_{total} = 0.010$ m; $X_{load} = 2.2$ %</p> <p>After 1000 charges $X_{total} = 0.011$ m; $X_{load} = 2.4$ %</p>
<p>Loose bulk density in accordance with EN 1097-3:1998</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p>	<p>125 - 150 kg/m³</p> <p>160 - 190 kg/m³</p>
<p>Installation-specific density based on EN 1097-3:1998</p> <p>Density after compaction 1.3:1, dry</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p> <p>Density after compaction 1.3:1, wet (At a moisture content 12 % by volume. Compaction 1.3 : 1 (Moisture content obtained after 28 days of immersion in accordance with EN 12087:2013))</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p>	<p>163 - 195 kg/m³</p> <p>208 - 247 kg/m³</p> <p>290 kg/m³</p> <p>310 kg/m³</p>
<p>Shear parameter in accordance with DIN 18137-3:2002</p> <p>"MISAPOR Standard 10/75"</p> <p>Cohesion c'</p> <p>Friction angle φ'</p> <p>Nominal shear stress</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p> <p>Cohesion c'</p> <p>Friction angle φ'</p> <p>Nominal shear stress</p>	<p>32.2 kN/m³</p> <p>34.6°</p> <p>See Annex A, table 2</p> <p>31.5 kN/m³</p> <p>35.1°</p> <p>See Annex A, table 2</p>

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire classified according to EN 13501-1: 2007+ A1:2009	Class A1*
* according to decision 96/603/EC (as amended)	

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance																		
Content, emission and/or release of dangerous substances																			
CMR-Substances "MISAPOR Standard 10/75" "MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"																			
Substance/s classified as EU-cat. Carc. 1A and/or 1B ^a	The product does not contain these dangerous substances. ^b																		
Substance/s classified as EU-cat. Muta. 1A and/or 1B ^a																			
Substance/s classified as EU-cat. Repr. 1A and/or 1B ^a																			
Recycled glass is used and the glass powder therefore assessed. ^c																			
Leachable Substances	<table border="1"> <thead> <tr> <th>Solids content acc. to EN 13657:2002</th> <th>Eluate concentration acc. to EN 12457-4:2002</th> </tr> </thead> <tbody> <tr> <td>Arsenic (As)</td> <td>< 45 mg/kg</td> </tr> <tr> <td>Lead (Pb)</td> <td>< 210</td> </tr> <tr> <td>Cadmium (Cd)</td> <td>< 3</td> </tr> <tr> <td>Chromium (total) (Cr)</td> <td>< 180</td> </tr> <tr> <td>Copper (Cu)</td> <td>< 120</td> </tr> <tr> <td>Nickel (Ni)</td> <td>< 150</td> </tr> <tr> <td>Mercury (Hg)</td> <td>< 1.5</td> </tr> <tr> <td>Zinc (Zn)</td> <td>< 450</td> </tr> </tbody> </table>	Solids content acc. to EN 13657:2002	Eluate concentration acc. to EN 12457-4:2002	Arsenic (As)	< 45 mg/kg	Lead (Pb)	< 210	Cadmium (Cd)	< 3	Chromium (total) (Cr)	< 180	Copper (Cu)	< 120	Nickel (Ni)	< 150	Mercury (Hg)	< 1.5	Zinc (Zn)	< 450
Solids content acc. to EN 13657:2002	Eluate concentration acc. to EN 12457-4:2002																		
Arsenic (As)	< 45 mg/kg																		
Lead (Pb)	< 210																		
Cadmium (Cd)	< 3																		
Chromium (total) (Cr)	< 180																		
Copper (Cu)	< 120																		
Nickel (Ni)	< 150																		
Mercury (Hg)	< 1.5																		
Zinc (Zn)	< 450																		
Release scenario regarding BWR 3: S/W 1																			

^a In accordance with Regulation (EC) No 1272/2008.

^b Assessment based on the detailed manufacturer's statements.

^c Statement according to test report.

3.4 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
<p>Thermal conductivity test acc. to EN 12667:2001 and/ or EN 12664:2001 and EN 13167:2012+A1:2015, Annex A</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p> <p>Moisture correction factor (condition 1) at water absorption in accordance with EN 12087:2013 determined</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p>	<p>$\lambda_D = 0.080 \text{ W/(m}\cdot\text{K)}$</p> <p>$\lambda_D = 0.093 \text{ W/(m}\cdot\text{K)}$</p> <p>(at 1 - 5 Vol-% moisture) 1.20</p> <p>(at 1 - 5 Vol-% moisture) 1.20</p>
<p>Water absorption by total immersion (test duration 28 days) in accordance with EN 12087:2013, method 2A</p> <p>"MISAPOR Standard 10/75" compacted specimens</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50" compacted specimens</p>	<p>$\leq 10 \text{ Vol. \%}$</p> <p>$\leq 10 \text{ Vol. \%}$</p>
<p>Freeze/ thaw resistance with the guidelines in EN 12091:2013 and in acc. with EAD No. 040394-00-1201, clause 2.2.13.1</p> <p>"MISAPOR Standard 10/75" compacted specimens</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50" compacted specimens</p> <p>Freeze/thaw resistance in traffic areas</p>	<p>$\leq 8 \text{ Vol. \%}$</p> <p>$\leq 8 \text{ Vol. \%}$</p> <p>No performance assessed.</p>
<p>Particle size distribution in accordance with EN 933-1:2012 Nominal aggregate size</p> <p>"MISAPOR Standard 10/75"</p> <p>"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"</p>	<p>$d/D = 10 - 75 \text{ mm}$ see Annex A, table 3</p> <p>$d/D = 10 - 50 \text{ mm}$ see Annex A, table 3</p>

Essential characteristic	Performance
Capillary water suction height "MISAPOR Standard 10/75"	< 150 mm (at 8.3 kg/m ² moisture content after 21 days)
"MISAPOR Standard Plus 10/50", "MISAPOR Dynamic 10/50"	< 150 mm (at 15 kg/m ² moisture content after 21 days)

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 040394-00-1201, the applicable European legal act is: 1995/467/EC

The systems to be applied are:

- a) for uses as load bearing and thermal insulation layer: 1
- b) for uses as thermal insulation layer without load bearing function: 3

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 18 August 2020 by Deutsches Institut für Bautechnik

Maja Tiemann
Head of Department

beglaubigt:
Wendler

MISAPOR Standard 10/75
MISAPOR Standard Plus 10/50
MISAPOR Dynamic 10/50

Annex A

Table 1: Oedometer modulus

MISAPOR Standard 10/75				
Test specimen: Mean values of 8 tests on dry specimen Mean value of loose bulk density 149 kg/m ³ (single value 133 - 163 kg/m ³) Initial height of the compacted specimen 460 mm Degree of compaction 1.3:1				
Initial thickness reduction, X ₀ (%)	Load (kPa)	Total deformation, X _{total} (mm)	Related thickness reduction, X _{load} (%)	Oedometer Modulus, E _{oed} According to ISO 17892-5; Annex A.3 (kPa)
0.87	80	6.10	1.33	8780
	100	6.99	1.52	10380
	125	8.08	1.76	10460
	150	9.15	1.99	10810
	200	11.51	2.50	9720
	250	14.50	3.15	7700
	300	18.49	4.02	5750
	400	30.82	6.70	3730
500	48.95	10.64	2530	
MISAPOR Standard Plus 10/50, MISAPOR Dynamic 10/50				
Test specimen: Mean values of 9 tests on dry specimen Mean value of loose bulk density 179 kg/m ³ (single value 160 - 198 kg/m ³) Initial height of the compacted specimen 460 mm Degree of compaction 1.3:1				
Initial thickness reduction, X ₀ (%)	Load (kPa)	Total deformation, X _{total} (mm)	Related thickness reduction, X _{load} (%)	Oedometer Modulus, E _{oed} According to ISO 17892-5; Annex A.3 (kPa)
0.46	80	3.77	0.82	11220
	100	4.67	1.02	10200
	125	5.58	1.21	12690
	150	6.59	1.43	11420
	200	8.22	1.79	14040
	250	9.78	2.13	14750
	300	11.53	2.51	13170
	400	16.43	3.57	9390
	500	25.77	5.60	4920

MISAPOR Standard 10/75
MISAPOR Standard Plus 10/50
MISAPOR Dynamic 10/50

Annex A

Note:

In case the cellular glass loose fill is used under concentrated/ centered loads an additional assessment could be necessary.

Table 2: Shear parameter

MISAPOR Standard 10/75			
Test specimen: Mean value of density (after compaction) 177 kg/m ³ Degree of compaction 1.3:1			
Vertical stress load (kN/m ²)	Rates of deformation (mm)	Shear displacement, (mm)	Nominal shear stress (kN/m ²)
25	0.9	72.8	43.6
50	2.7	85.1	67.3
100	6.8	98.4	110.6
150	13.0	> 49.1	> 134.6
200	16.6	> 46.7	> 166.5
MISAPOR Standard Plus 10/50, MISAPOR Dynamic 10/50			
Test specimen: Mean value of density (after compaction) 205 kg/m ³ Degree of compaction 1.3:1			
Vertical stress load (kN/m ²)	Rates of deformation (mm)	Shear displacement, (mm)	Nominal shear stress (kN/m ²)
25	2.0	69.8	48.5
50	4.1	78.3	64.8
100	4.4	79.5	107.0
200	7.9	> 61.6	> 134.3
250	10.7	92.2	172.1

MISAPOR Standard 10/75
MISAPOR Standard Plus 10/50
MISAPOR Dynamic 10/50

Annex A

Table 3: Particle size distribution

MISAPOR Standard 10/75									
Specified test sieves	Passage through the sieve with a mesh size of								
	0.063	10	16	31.5	45	56	63	75	125
Passage in % by weight	0.1	0.7	0.8	1.9	23.7	61.4	85.8	93.9	100
MISAPOR Standard Plus 10/50, MISAPOR Dynamic 10/50									
Specified test sieves	Passage through the sieve with a mesh size of								
	0.063	10	16	31.5	45	56	63		
Passage in % by weight	0.4	1.4	1.6	26.8	78.7	95.9	100		