

natureplus e.V.

Award Guideline 0406

## **Cellular Glass Insulation Boards**

Issued: June 2015

For the Awardance of the Eco-Label





# Award Guideline 0406

## Cellular Glass Insulation Boards

Version: June 2015

## 1. Application Areas

The following criteria contain the requirements for the awardance of the natureplus eco-label for cellular glass insulation boards. Cellular glass is also known as foam glass. The award guideline is to be applied exclusively to those products mentioned in this guideline. Cellular glass granulate for insulation purposes is regulated in the natureplus Award Guideline GL0407 "Cellular Glass Granulate".

## 2. Award Criteria

The prerequisite for the awardance of the natureplus eco-label is the fulfilment of the basic criteria GL-0000, of the chemicals directive GL-5001 and of the guideline for facility inspections GL-5004.

Thermal insulation composite systems employing cellular glass insulation boards must also comply with the requirements of award guideline GL-0301.

### 2.1 Suitability of Application

The technical requirements for cellular glass are regulated in EN 13167 "Thermal insulation products for buildings - Factory made cellular glass (CG) products – Specification". The manufacturer must prove compliance with EN 13167 through the submission of appropriate documentation. The thermal nominal value at 23°C and 50% humidity as per the corresponding European standards must comply with the following requirements:

- Insulation not subject to pressure load  $\lambda_{23,50} \leq 0,045 \text{ W/mK}$
- Insulation functioning as plaster base  $\lambda_{23,50} \leq 0,055 \text{ W/mK}$
- Insulation subject to pressure load  $\lambda_{23,50} \leq 0,065 \text{ W/mK}$

All values stated, especially the declared value of thermal conductivity, must be tested and monitored by an accredited institution.

The product must be classified as non-flammable (class A1 and A2-s1,d0 according to EN 13501).



## Award Guideline 0406 Cellular Glass Insulation Boards Version: June 2015

Page 3 of 13

### 2.2 Composition, Forbidden Substances, Substance Restrictions

The cellular glass insulation boards must only be comprised of gas-proof and waterproof glasscells, which are joined together without the use of a binding agent. Approved foaming agents are carbonic substances (e.g. magnesium carbonate, calcium carbonate or sugar - among others) which fulfil Point 2.6 of the Basic Criteria GL0000. The boards may be laminated on one or both sides with bitumen coatings, glass fleeces or mineral-based coatings. Plastics (e.g. PVC) may not be used as lamination materials. Additional input substances such as hydrophobic (water resistant/repellent) additives are not dealt with in this guideline.

Halogenic organic compounds and polyurethane are not permitted.

The product is subject to laboratory analyses as laid down in section 3 and has to comply with the limit values stated therein.

### 2.3 Raw Material Sourcing, Production of Preliminary Products, Production

The extraction of mineral raw materials must be in compliance with the requirements as laid down in GL-5003.

A minimum of 60% of the glass employed should be the product of recycling processes (external production waste, building site waste, post-consumer waste). If quartz sand is used as an additive, the manufacturer must provide evidence that no danger was posed to the workforce from quartz dust during the production process. Relevant evidence includes: the pneumatic insertion of the quartz sand; no permanent workplaces in areas with high dust levels; dust extraction using high-efficiency filters; controls and inspections on a rotational basis by an official/governmental safety agency/inspectorate etc.

The manufacturer must demonstrate that a hazardous substance management according to national standards and regulations is available at the production facility for employee protection. Information on dust release and compliance with general dust limit values must be included therein. Where compliance with the general dust limit values or other occupational limit values cannot be guaranteed despite technical and organisational measures, personal protection equipment must be available. It must be aimed for a minimisation of avoidable burdens of the employees.

If the products are laminated, then efforts should be made to ensure a low-emission production process (the avoidance of concentrations of harmful substances in the production facility through the use of air/gas extraction equipment, the use of low emission adhesives etc.). This applies in particular to the use of bitumen laminations.



# Award Guideline 0406

## Cellular Glass Insulation Boards

Version: June 2015

Page 4 of 13

If bitumen is employed in the production of the product, the manufacturer must prove that no aerosols or dusts containing bitumen are released during the production process and occur at the work places. The total of all bitumen aerosols or fumes determined as per BIA 6305 or a comparable standard must not exceed the detection limit of 0,5 mg/m<sup>3</sup>. Evidence must be provided that the exposure to benzo[a]pyrene does not exceed 0,5 ug/m<sup>3</sup>.

### 2.4 Usage

The product must not exhibit any unpleasant or foreign smells or odours.

The emissions during use have to be in compliance with the limit values according to section 3.

### 2.5 Recycling/ Disposal

A recycling concept must be submitted containing details of the feasibility of the following disposal methods according to a distinction between building site waste and demolition waste:

- Recovery of cellular glass (only for demolition waste)
- Options for the recycling of materials (re-smelting, ...)
- Options for re-use or alternative usage (as loose-fill thermal insulation, as a lightweight aggregate in concrete...)
- Instructions on environmentally-compatible landfill (e.g. separation of layers, condensing/compressing, ...)

This recycling concept should contain descriptions and evaluations, in the most concrete terms possible, relating to their technical applicability and their ecological compatibility.

The components must generally be suitable for disposal in a landfill for inert waste according to the "Decision of the EU council of the 19th December 2002 on the definition of criteria and procedures for the receipt and acceptance of waste products at waste disposal sites according to article 16 and appendix 2 of the guideline 1999/31/EG".

### 2.6 Ecological Parameters

The manufacturing of all products of this product group must be in compliance with the ecological parameters listed below.

# Award Guideline 0406

## Cellular Glass Insulation Boards

Version: June 2015

Ecological parameters per kg	Guide values <sup>1</sup>
Primary energy input of non renewable total resources (PENRE <sup>2</sup> ) [MJ]	45
Primary energy input of non renewable and renewable total resources (PET <sup>3</sup> ) [MJ]	50
Photochemical ozone creation potential (POCP) [kg ethylen-equiv.]	0,0007
Acidification potential (AP) [kg SO <sub>2</sub> -equiv.]	0,01
Eutrophication potential (EP) [kg PO <sub>4</sub> <sup>3-</sup> -equiv.]	0,006
Global-warming potential (GWP) [kg CO <sub>2</sub> equiv.]	2,6
Abiotic depletion potential (ADP) [kg Sb equiv.]	0,000005

If a single guide value is exceeded, it will be decided on a case by case basis whether this is permissible for the purpose of optimising the complete product manufacturing process.

<sup>1</sup>Testing method: Calculation of the ecological parameters according to natureplus® implementing provisions for life cycle assessments; inventory analysis analogous to ISO 14040ff; efficiency categories according to CML-IA version 4.1 from October 2012 and characterised as baseline; primary energy requirement according to Frischknecht 1996; global-warming potential 1994/100 years; system limits: raw material sourcing to products ready for shipment

<sup>2</sup> PENRE: **p**rimary **e**nergy input of **n**on renewable **e**nergy resources

<sup>3</sup> PET: **p**rimary **e**nergy inputs of renewable and non renewable **t**otal resources

## 2.7 Declaration

The product packaging should display a full declaration of the input materials listed, analogue to the EU-Cosmetic Regulations, according to the declining mass percentage. If it is not possible to display this information directly on the product packing, it should be provided with the product in a technical datasheet or sales leaflet (in English or in the national language). If intermediate/preliminary products or formulations are used as input substances and the proportion present in the final product is >0.1 M-%, then all the substances used within these must also be taken into account for the declaration.

## Award Guideline 0406 Cellular Glass Insulation Boards Version: June 2015

For naming the input materials as part of the declaration the following applies:

- More than 1 M-% - designation of the substance in question
- Less than 1 M-% - at least a functional designation (e.g. “moth proofing agent“)

Furthermore, it is obligatory to provide the following information in a suitable form to the consumer or user (eg. online):

- Instructions for use and safety precautions
- Indications for storage and disposal
- Batch numbers
- City/town and country of production
- Indication of geographical origin of the key input material

When employing components with a potential for environmental hazard, the manufacturer has to suitably indicate measures to be taken to ensure environmental protection during removal and demolition (i.e. controlled deconstruction).

Additionally, the following product-specific information must be made available to the consumer or user.

- Labelling according to the guidelines of the European Community (Communauté Européenne, CE marking) or the respective general technical approval, including a scope specification
- General data according to corresponding European standards or indications about product characteristics
- Density  $\rho$  [kg/m<sup>3</sup>]
- Indications about the product's fire behaviour

## 2.8 Processing/Installation

In the installation and processing, a differentiation is made between adhesive-bonded and loose laid variants. Bonded installations of cellular glass boards are applied using either hot bitumen or cold adhesives. Cold adhesives are used, above all, in wall and ceiling insulation installations. If, due to structural reasons, a vapour-proof installation is required (e.g. for interior insulation), the cellular glass boards are laid on mineral substrates such as concrete, bricks, lime-sand blocks etc. using a full-surface application of bitumen cold adhesive which is also applied between the board joints.

For all other installation applications, it is possible to use mineral-based adhesives. For such installations, a solvent-free adhesive should be available which meets the requirements of Points 2.5 and 2.6 of the natureplus awardance guideline GL0000 “Basic Criteria”. The adhesive must not contain any halogenated Isothiazolinone. The product undergoing certification will be subject to



# Award Guideline 0406

## Cellular Glass Insulation Boards

Version: June 2015

an analysis for halogenated Isothiazolinone, polycyclic aromatic hydrocarbons as well as an emissions test for applications may affect interior air quality. These analyses must be performed in accordance with section 3 and must fulfil the specified thresholds contained therein (Point 3.2 “Test Requirements: Adhesives”).

Hot bitumen is used, above all, for bonding purposes in (flat) roof insulation and floor insulation which is subject to increased moisture levels. For installations which do not require additional sealing measures, the surface of the cellular glass boards is protected and stabilised with a hot bitumen topcoat. During the processing of hot bitumen it is possible that polycyclic aromatic hydrocarbons and bitumen fumes may be emitted. In order to protect the installer/processor, the manufacturer must take measures during the product development and by informing the workers through appropriate product information of the risks of exposure to bitumen fumes, in order that this exposure is reduced to a minimum.

It should be stated that hot bitumen should only be used in an environment in which a continuous fresh-air exchange can be guaranteed. A natureplus-certification covering the use of hot bitumen in interior areas is only intended for rooms which are subject to high moisture levels (wet-rooms, industrial kitchens, swimming pools etc.) and does not apply to the use of hot bitumen in residential or office rooms. In the case of loose-laid installations, large-format, fleece-coated cellular glass boards are laid upon a bed of sand or stone chips. This form of installation is used above all in exterior and interior floor insulation applications which are not subject to high moisture levels.

The manufacturer should inform the user in an appropriate form that the loose-laying method should be preferred, where this is technically possible, and that hot bitumen should only be used in external installations or where a high resistance to moisture (e.g. wet-rooms) is required.

## 2.9 Packaging

The packaging used must be recyclable. The manufacturer must participate in a recycling system if there is one for the corresponding material.

Paper and cardboard packaging must be made from recycled paper. Alternatively, paper from sources as per GL-5002 is permitted.

Plastic packaging must be comprised from polyolefins. PET, polystyrene or polycarbonates are allowed exceptionally in reasonable cases. Packaging made from PVC is generally not permitted.

Packaging must not contain biocides.

The natureplus certification mark has to be printed on the packaging after the awardance of the product.

## 3. Laboratory Tests

The products are subject to laboratory analyses to test for harmful substances and undesirable ancillary ingredients. A representative sample is collected during the site inspection. If the sample collection can not be conducted by a natureplus examiner, an independent person designated by natureplus can collect the sample. For products with different sizes but the same composition, a single sample is sufficient.

### 3.1 VOC - TVOC

The product is subject to a test-chamber examination to survey the emissions of VOC, SVOC and other volatile compounds and to check compliance with the limit values. Measurements usually occur after 3 and 28 days. When low VOC emissions are to be expected, the emissions test can be terminated early, if a measurement 7 days after loading of the test chamber does not object to this. The test-chamber examination is performed according to the current version of the test method TM-01 VOC.

#### Emission measurement after 3 days

Test parameters	Limits	Unit
VOC (VOC, VVOC, SVOC) classified in:  Regulations (EC) No. 1272/2008: categories Carc. 1A und 1B, Muta 1A und 1B, Repr. 1A und 1B; TRGS 905: K1, K2, M1, M2, R1, R2; IARC groups 1 u. 2A; DFG MAK-list III1, III2	< 1	$\mu\text{g}/\text{m}^3$
Total volatile organic compounds (TVOC)	$\leq 3000$	$\mu\text{g}/\text{m}^3$

#### Emission measurement after 28 days

Test parameters	Limits	Unit
Total volatile organic compounds (TVOC)	$\leq 300$	$\mu\text{g}/\text{m}^3$
of which:		
Total bicyclic terpenes	$\leq 200$	$\mu\text{g}/\text{m}^3$
Total sensitising substances per MAK IV, BgVV-list cat. A, TRGS 907	$\leq 100$	$\mu\text{g}/\text{m}^3$
Total VOC (VOC, VVOC, SVOC) classified in:	$\leq 50$	$\mu\text{g}/\text{m}^3$



Regulation (EC) No. 1272/2008: Categorie Carc. 2, Muta 2, Repr. 2; TRGS 905: K3, M3, R3; IARC: group 2B; DFG MAK-list: III3		
Total aldehyde, C4-C11, acyclic, aliphatic	≤ 100	µg/m <sup>3</sup>
Styrene	≤ 10	µg/m <sup>3</sup>
Methylisothiazolinone (MIT)	< 1	µg/m <sup>3</sup>
Benzaldehyde	≤ 20	µg/m <sup>3</sup>
Total (VOC) without non-identified compounds	≤ 100	µg/m <sup>3</sup>

A calculation of the r-value is performed. The limit value is ≤ 1.

#### Other emission measurements after 28 days

Test parameters	Limit values	Unit
Total semi-volatile organic compounds (TSVOC)	≤ 100	µg/m <sup>3</sup>
Formaldehyde	≤ 24 <sup>(1)</sup>	µg/m <sup>3</sup>
Acetaldehyde	≤ 24 <sup>(1)</sup>	µg/m <sup>3</sup>

<sup>(1)</sup> 24 µg/m<sup>3</sup> ≈ 0,02 ppm

#### Termination criteria:

The emissions test can be terminated 7 days after loading the test chamber, if the values measured at this time are lower than 50% of the 28-day threshold limits.

## 3.2 Element Analyses

The product is subject to an element analysis to determine the content of harmful elements and to check for undesirable contaminations. The measurements have to be in compliance with the limit values. The analysis is performed according to the current version of the test method TM-02 metals.

Element	Limit value	Unit
Arsenic (As)	40	mg/kg
Cadmium (Cd)	1	mg/kg
Cobalt (Co)	20	mg/kg
Chromium (Cr)	50	mg/kg

Copper (Cu)	35	mg/kg
Mercury (Hg)	0,5	mg/kg
Nickel (Ni)	20	mg/kg
Lead (Pb)	150	mg/kg
Antimony (Sb)	20	mg/kg
Tin (Sn)	150	mg/kg
Zinc (Zn)	250	mg/kg

If the limits are exceeded, an additional eluate analysis will also be performed. If the product complies with the eluate limits then compliance with the requirements of the metal/metalloid tests will be deemed to have been successful. If the metal/metalloid concentrations recorded cannot be linked to the raw materials then compliance with the requirements of the metal/metalloid tests will be deemed to have been unsuccessful. For the eluate analysis, the following limit values apply:

Element	Limit values	Unit
Arsenic (As)	0,05	mg/l
Cadmium (Cd)	0,004	mg/l
Cobalt (Co)	0,2	mg/l
Chromium (Cr)	0,05	mg/l
Copper (Cu)	0,2	mg/l
Mercury (Hg)	0,001	mg/l
Nickel (Ni)	0,04	mg/l
Lead (Pb)	0,05	mg/l
Antimony (Sb)	0,006	mg/l
Tin (Sn)	0,05	mg/l

### 3.3 Other Analyses

Test parameters	Limit values	Unit	Method
Halogenic organic compounds: AOX/EOX	≤ 1	mg/kg	TM-03 Halo

Odour	≤ 3	<b>Odour intensity</b>	TM-04 Odour
Total PAH (Polycyclic Aromatic Hydrocarbons) <sup>(1)</sup> , according to EPA	≤ 50	<b>mg/kg</b>	HPLC/GC-MS

<sup>1</sup> For cellular class insulation boards laminated with bitumen. The limit value applies for pure bitumen. If the bitumen is mixed with other (e.g. mineral) components, the limit value drops in accordance with the mixing ratio.

## 3.4 Testing Requirements for Adhesives

### 3.4.1 VOC - TVOC

The product is subject to a test-chamber examination to survey the emissions of VOC and to determine both TVOC and TSVOC. Measurements occur after 3 and 28 days. When low VOC emissions are to be expected, the emissions test can be terminated early, if a measurement 7 days after loading of the test chamber does not object to this. The test-chamber examination is performed according to the current version of the test method TM-01 VOC.

#### Emission measurement after 3 days

Test parameters	Limits	Unit
VOC (VOC, VVOC, SVOC) classified in:  Regulations (EC) No. 1272/2008: categories Carc. 1A und 1B, Muta 1A und 1B, Repr. 1A und 1B; TRGS 905: K1, K2, M1, M2, R1, R2; IARC groups 1 u. 2A; DFG MAK-list III1, III2	< 1	<b>µg/m<sup>3</sup></b>
Total volatile organic compounds (TVOC)	≤ 3000	<b>µg/m<sup>3</sup></b>

#### Emission measurement after 28 days

Test parameters	Limits	Unit
Total volatile organic compounds (TVOC)	≤ 300	<b>µg/m<sup>3</sup></b>
of which:		
Total bicyclic terpenes	≤ 200	<b>µg/m<sup>3</sup></b>
Total sensitising substances per MAK IV, BgVV-list cat. A, TRGS 907	≤ 100	<b>µg/m<sup>3</sup></b>

Total VOC (VOC, VVOC, SVOC) classified in:  Regulation (EC) No. 1272/2008: Categorie Carc. 2, Muta 2, Repr. 2; TRGS 905: K3, M3, R3; IARC: group 2B; DFG MAK-list: III3	≤ 50	µg/m <sup>3</sup>
Total aldehyde, C4-C11, acyclic, aliphatic	≤ 100	µg/m <sup>3</sup>
Styrene	≤ 10	µg/m <sup>3</sup>
Methylisothiazolinone (MIT)	< 1	µg/m <sup>3</sup>
Benzaldehyde	≤ 20	µg/m <sup>3</sup>
Total (VOC) without non-identified compounds	≤ 100	µg/m <sup>3</sup>

A calculation of the r-value is performed. The limit value is ≤ 1.

#### Other emission measurements after 28 days

Test parameters	Limit values	Unit
Total semi-volatile organic compounds (TSVOC)	≤ 100	µg/m <sup>3</sup>
Formaldehyde	≤ 24 <sup>(1)</sup>	µg/m <sup>3</sup>
Acetaldehyde	≤ 24 <sup>(1)</sup>	µg/m <sup>3</sup>

<sup>(1)</sup> 24 µg/m<sup>3</sup> ≈ 0,02 ppm

#### Termination criteria:

The emissions test can be terminated 7 days after loading the test chamber, if the values measured at this time are lower than 50% of the 28-day threshold limits.

#### 3.4.2 Other Analyses

Parameter	Limit values	Unit	Method
Halogenic organic compounds: AOX/EOX	≤ 1	mg/kg	TM-03 Halo
Total PAH (polycyclic aromatic hydrocarbons), according to EPA	≤ 10	mg/kg	HPLC/GC-MS
Halogenated isothiazolinones	≤ 0,5	mg/kg	
Odour	≤ 3	<b>Odour intensity</b>	TM-04 Odour



**Award Guideline 0406**  
**Cellular Glass Insulation Boards**  
Version: June 2015

Page 13 of 13

## Test Methods

**TM-01 VOC:** Volatile Organic Compounds VOC/TVOC, formaldehyde, acetaldehyde and TSVOC: DIN EN ISO 16000 series expanded by the natureplus implementation rules.

**TM-02 Metals:** ICP-MS measurements according to DIN EN ISO 17294-2, supplemented with the natureplus implementation rules and a sample preparation adjusted to the issue analysed.

**TM-03 Halo:** Halogenic organic compounds after combustion, determined by microcoulometry according to the natureplus implementation rules "AOX/EOX".

**TM-04 Odour:** natureplus implementation rules "odour intensity", 6-degree grading scale 24h after loading the test chamber