



natureplus e.V.

Guideline 0406

Cellular Glass Insulation Boards

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for the awardance of the eco-label

0 Introduction

The International Association for Sustainable Building and Living – natureplus e.V. – has set itself the goal, through the awardance of a quality label (eco-label), of promoting the use of those construction products which are especially suited to achieving the goal of economic sustainability. The three classic pillars of sustainability (the environment, social aspects and the economy) are reflected in natureplus's the three fundamental requirements: the environment, health and functional quality.

Every construction activity encroaches upon the natural environment and is connected with the consumption of limited resources. Our responsibility towards future generations requires us to undertake every effort to reduce these encroachments to the lowest level possible and to limit our use of resources to a necessary minimum. In view of the foreseeable exhaustion of the reserves of fossil fuels, for example, and the dangers to the earth's climate, such an approach is the only possible means to ensure sustainable and socially equitable development. For the building sector this means promoting the use and application of construction products which help to minimize the consumption of fossil fuels and limited resources. It is natureplus's intention to help promote the commercial success of those products which fulfil these demands.

Energy-saving building methods and the avoidance of uncontrolled ventilation facilitates the accumulation of volatile chemical compounds in the interior air that are emitted by building products and the inventory contained within the building. This presents a(n) (avoidable) danger to the health of the occupants. Also, the accretion of chemical contaminants (especially phthalates/plasticisers) from building products on house dust, the increasing use of biocides in everyday products and the dangers posed by mould growth due to negative product characteristics give rise for concern. An increasing proportion of the population are exhibiting reactions, such as allergies, to the negative health-related effects of these construction products. natureplus therefore evaluates the compatibility of construction products, especially in the usage phase, according to strict standards in order to actively promote those materials which pose no risk to health and are, in addition, conducive to a healthy room climate.

The natureplus®-Eco-label is an award for construction products which meet the highest standards of sustainability by exhibiting the best possible performance in terms of the environment, health and functionality. Scope of the assessment is the building material as raw material and as component. Only the best products in a particular product group are eligible for certification in order to act as an orientation for all building professionals and consumers towards the promotion of a culture of sustainable building. The natureplus®-Eco-label has anticipated the requirements of construction products of the European Construction Products Directive EU CPR 305/2011: In the future this regulation requires a declaration of performance with evidence of the sustainable use of natural resources and of compliance with requirements in terms of low impact, over their entire life cycle, on the environmental quality or on the climate, energy-efficiency and the hygiene, health and safety of people. The natureplus®-Eco-label already provides these proofs of performance in relation to the essential characteristics of construction products. This is gauged by natureplus according to criteria and requirements which, as a rule, far exceed the legal requirements and as a minimum comply in each case with the strictest recognised standards applicable.

The natureplus®-Eco-label is classified as a Type I environmental label as per ISO 14024, taking into consideration the EU Ecolabel Regulation and the EMAS regulation on environmental auditing, and is valid across the whole of Europe according to uniform criteria. The pre-requirements for a construction product to be certified with the natureplus®-Eco-label are its especially high performance characteristics in terms of the environment, health and sustainability. The main focuses are on the protection of limited resources by the minimisation of the use of petrochemical substances, sustainable raw material extraction/harvesting, resource-efficient production methods and the longevity of the products. Therefore, building products made from renewable raw materials, raw materials which are unlimited in their availability or from secondary raw materials will be favoured for certification.

I 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 a product to be awarded the natureplus® quality label in accordance with these guidelines is compliance with the following award guidelines:

- GL-5001 Chemicals Directive

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- GL-5001 Chemicals Directive
- GL-5003 Nature Conservation when Exploiting Mineral Resources
- GL-5004 Transparency and Social Responsibility
- GL-5010 Low-emission building products
- GL-5020 Climate compatibility and energy efficiency

2.1 Functional Suitability

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 $\lambda_{23,50} \leq 0,065 \text{ W/mK}$

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

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

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.

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/m³. Evidence must be provided that the exposure to benzo[a]pyrene does not exceed 0,5 ug/m³.

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

All products in this product group must be manufactured in such a way that the ecological parameters listed in RL 5020 are fulfilled.

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 packaging, 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.

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 ρ [kg/m³]

- Indications about the product's fire behaviour

2.8 Processing and 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 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 production audit. If the sample collection cannot 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 Volatile Organic Compounds VOC / TVOC

To check the emission of VOC and to determine the TVOC and TSVOC, an emission chamber test is carried out with the product. Measurements are usually performed after 3 and 28 days. If a low VOC emission is to be expected, a termination measurement can also be carried out after 7 days. The test-chamber examination is performed according to the current version of natureplus guideline 5010. The product must comply with the limit values specified in guideline 5010.

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 [mg/kg]
Arsenic (As)	≤ 40
Cadmium (Cd)	≤ 1
Cobalt (Co)	≤ 20
Chromium (Cr)	≤ 50
Copper (Cu)	≤ 35
Mercury (Hg)	≤ 0,5
Nickel (Ni)	≤ 20
Lead (Pb)	≤ 150
Antimon (Sb)	≤ 20
Tin (Sn)	≤ 150
Zinc (Zn)	≤ 250

3.3 Other Analyses

Halogenic organic compounds

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

Odour

Test parameters	Limit values	Unit	Method
Odour	≤ 3	Odour intensity	TM-04 Odour

Polycyclic aromatic hydrocarbons (PAH)

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.

Test parameters	Limit values	Unit	Method
Polycyclic aromatic hydrocarbons	≤ 50	mg/kg	HPLC/GC-MS

4 Appendix

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

TM-05 Pesticides: DFG S 19 extended by natureplus implementing regulations

TM-08 Foreign fibres and foreign substances: scanning electron microscopy SEM

TM-09 Monomeric isocyanates: 24h after test chamber loading

TM-10 PAH: HPLC / GC-MS, sum according to EPA