

natureplus e.V.

Guideline 0111

Blow-in insulating materials from straw

Issue: October 2019

For the Awardance of the Eco-Label





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1. Application Areas

The following award criteria contain requirements for awarding the natureplus® eco-label to blow-in insulating materials made of straw. The award criteria is to be applied exclusively to the mentioned product group.

2. Award Criteria

The prerequisite for labelling a product with the natureplus® eco-label is compliance with the following award guidelines, where applicable:

- GL-5001 Chemicals Directive
- GL-5004 Transparency and social responsibility
- GL-5010 Low emission building products
- GL-5020 Climate compatibility and energy efficiency

2.1 Functional Suitability

The product must be approved by the building authorities. This must be proven by a country-specific or European technical approval. Compliance with the usability requirements associated with this approval must be ensured by internal or external monitoring and the relevant evidence, e.g. monitoring/quality assurance protocols and test reports for factory production control, certificate of conformity from the notified monitoring body, must be submitted. The verification must take the following test parameters into account, whereby the specified requirements for the building physics characteristics apply:

- Nominal value of thermal conductivity according to EN 12667 or equivalent standard: $\lambda_{10, \text{dry}, 90/90} \leq 0.045 \text{ W/m K}$
- Building material class according to EN 13501-1 at least E
- Bulk density ρ 90 kg/m³ 115 kg/m³
- Settling behaviour under vibration (S_v) and under vibration (S_D) or under cyclical temperature and humidity loading (S_{cyc}) in accordance with EN 15101-1 or equivalent standard¹
- Fiber dimensions: Fiber width max. 5 mm, fiber length max. 30 mm
- Moisture content according to EN ISO 12571 $u_m \leq 15\%$
- humidity conversion factor
- Resistance to micro-organisms according to EN 15101-1 or equivalent standard¹

¹ Determination and declaration. No further requirements



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If the product is delivered to countries in which requirements other than those specified in the standards apply, these must also be complied with. The manufacturer names the countries of distribution and provides evidence of the requirements by submitting test certificates from recognised test centres. In this case, however, the requirements carried out by natureplus must not be undercut.

2.2 Composition, Forbidden Substances, Substance Restrictions

At least 95 % by mass of the product must consist of renewable raw materials. Excluded from this are products with increased fire protection properties. These must consist of at least 85 wt. % renewable raw materials.

The following substance bans and restrictions apply in addition to those listed in the natureplus® Chemicals Directive GL-5001:

- No organohalogen compounds may be added
- No synthetic-organic flame retardants may be added. Products classified in building material class D or higher according to EN 13501-1 or equivalent may contain up to 15 % by mass of mineral flame retardants.
- The use of boron compounds is not permitted.
- The use of biocides is not permitted. Mineral raw materials with a biocidal effect which meet the requirements of the Chemicals Directive GL-5001 are excluded from this. The ecological and human-toxicological harmlessness and the additional technical benefit of these components must be proven. The definition of "biocide" corresponds to the definition in Regulation (EU) No. 528/2012 on the placing on the market and use of biocidal products.

The product shall be subjected to tests in accordance with Section 3 and shall comply with the limit values set out therein.

2.3 Raw Material Sourcing, Production of Preliminary Products, Production

Guarantees of origin must be maintained for the main components.

The manufacturing company undertakes to obtain declarations of conformity from its raw material suppliers that no synthetic pesticides are used in the cultivation of the vegetable fibres. If possible, internationally recognised labels should be used as evidence. Compliance with the criterion is additionally checked by laboratory tests. For this purpose, the product to be awarded is comprehensively screened for pesticide residues on the basis of L 00.00-115/1. This method allows the detection of approx. 500 pesticides in biogenic products. If a pesticide is detected, it is assessed in individual cases



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whether the result can be tolerated or whether measures are necessary to avoid it. This assessment is based on the toxico-logical classification of the pesticide, analogies to the pesticides already evaluated and the suspected source of contamination. For products in which pesticide residues have been detected, more frequent control measurements may be established, even if the limit values in Section 3 have not been reached.

The manufacturer shall ensure, through delivery specifications, incoming raw material controls and product quality controls, that

- the amount of weeds and residual grain in the straw is as low as possible
- the straw has no active mould infestation
- the moisture content of the straw is low ($u_m \leq 15\%$)
- the straw is transported dry and stored protected from the weather and rising soil moisture until it is ready for processing
- for factory processing:
- the bulk density is not less than 90 kg/m^3 and not more than 115 kg/m^3 .
- the maximum fibre width is 5 mm and the maximum fibre length is 30 mm
- the product is installed dry and settling-proof.

When installed, the product quality is significantly influenced by the moisture properties of the selected overall construction. In this context, the planning and processing requirements in Section 2.8 Processing apply.

Compliance with the criteria for "transparency and social sustainability" throughout the entire supply chain is to be achieved in accordance with natureplus® Certification Criteria GL-5004. In addition to the proofs mentioned in GL-5004, awards with demeter or Naturland are suitable.

The manufacturer must demonstrate that the production site has a hazardous substance management system in place that complies with the relevant national standards and legal regulations for the protection of employees. This must also include information on dust release and compliance with the general dust limits. Where technical or organisational measures cannot ensure compliance with general dust limits or other workplace limits, suitable personal protective equipment must be provided. The aim shall be to minimise avoidable burdens on workers.

2.4 Usage

The product must not have any unpleasant or foreign odors. Emissions must not exceed the natureplus limit values for VOC/TVOC in accordance with the GL-5010 Low Emission Building Products Directive.



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2.5 Recycling/Disposal

The manufacturer must submit a dismantling concept with the aim of high-quality reuse of the product and provide proof of existing recycling processes, e.g. suction.

Irrespective of the recycling efforts and the actual recycling rates, the product must be easily disposable in waste incineration plants.

2.6 Ecological Parameters

The product must be manufactured in such a way that it meets the requirements of the GL-5020 Climate Compatibility and Energy Efficiency Directive.

2.7 Declaration

On the product packaging - should this not be possible, as close as possible to the product, in the technical leaflet or in the sales prospectus - a full declaration of the ingredients (in the national language or in English) must be stated, analogous to the EU Cosmetics Regulation, in decreasing proportions by mass. Input substances from precursors or preparations which remain in the end product with a mass content of > 1% must also be taken into account in the full declaration.

The following applies to the naming of input substances in the context of the full declaration:

- above 1 % by mass the name of the substance
- less than 1 % by mass at least the functional designation

Furthermore, there is an obligation to attach the following information to the product or to make it available to the consumer or user in an appropriate manner (e.g. on the Internet):

- Processing instructions and safety instructions
- Storage and disposal instructions
- batch numbers
- Indication of place and country of manufacture of the product
- Designation of origin of the main feedstock

When using substances with an environmentally hazardous potential, the manufacturer must indicate in a suitable place which measures are to be taken to protect the environment within the framework of dismantling and demolition work (e.g. controlled dismantling).

In addition, the following product-specific information must be made available to the consumer or user:

- Marking in accordance with the building authority approval and, if not included therein,
- Product characteristics according to section 2.1



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2.8 Processing

The product may be processed at the factory or on site.

The manufacturer must provide detailed processing guidelines and technical product information, including design examples, in particular for the flow-free and condensate-free design of components. The manufacturer must provide proof of the moisture-technical suitability of the design.

The manufacturer must prove at least one safe method of insertion into hollow spaces to be insulated and prove that this method is available to the processors of the product. The manufacturer must provide the processor with sufficient information on how the product is to be introduced in a settlement-safe manner. The manufacturer must oblige the processor to use a method by which the results of each processing operation can be checked. The manufacturer must declare that he obliges the processor to provide proof of sufficient compaction for each application and to document this to the customer.

The manufacturer must also ensure that low-dust processing is guaranteed when processing on the construction site. The particular dangers associated with the generation of dust and the protective measures to be taken must be pointed out. This is done by informing and training the user about the use of suitable methods (e.g. vented injection technology). This information must also be appropriately displayed on the packaging (pictograms and text). Delivery may only be made to suitably trained processors. The product may only be used by trained users within the company where it is to be used and in compliance with occupational health and safety conditions.

2.9 Packaging

The packaging used must be recyclable. The manufacturer must belong to a recycling system, if one exists.

Paper and cardboard packaging must be made of recycled paper or paper from sources in accordance with the natureplus® Certification Criteria GL -5002. Plastic packaging must be made of polyolefins. Justified exceptions include PET, polystyrene and polycarbonates. PVC packaging is generally not permitted. Packaging must not be equipped with biocides.

The natureplus® certification mark must be printed on the packaging after it has been awarded.

3. Laboratory Tests

The products are tested for harmful substances and undesirable secondary components by means of laboratory analysis. For the laboratory analyses a representative sample is taken during the inspec-

tion of the plant. If the sampling cannot be carried out by the natureplus inspector, another independent person can also take the sample on behalf of natureplus. In the case of products with different dimensions and the same composition, one test sample is sufficient.

3.1 VOC / TVOC

A test chamber test is carried out with the product to check the release of VOC, SVOC and other volatile substances. Measurements are usually taken after 3 and 28 days. The test chamber test is carried out in accordance with the GL-5010 directive on the award of contracts for low emissive building products. The limit values, demolition criteria, test chamber conditions and requirements for the test specimen listed there apply.

3.2 Element analyses

In order to check the content of critical elements and to control undesirable impurities, an element analysis is carried out on the product. The limit values must be adhered to.

Element	Limit value	Unit	Method
Arsenic (As)	2	mg/kg	ICP-MS measurement according to DIN EN ISO 17294-2. Extended by natureplus implementation regulations and sample preparation adapted to the problem.
Cadmium (Cd)	0,5	mg/kg	
Cobalt (Co)	5	mg/kg	
Chrome (Cr)	10	mg/kg	
Copper (Cu)	50	mg/kg	
Mercury (Hg)	0,2	mg/kg	
Nickel (Ni)	10	mg/kg	
Lead (Pb)	5	mg/kg	
Antimony (Sb)	2	mg/kg	
Tin (Sn)	10	mg/kg	
Thallium (Tl)	1	mg/kg	
Zinc (Zn)	500	mg/kg	

3.3 Other analyses

Test parameters	Limit value	Unit	Method
Organohalogen compounds: AOX/EOX	≤ 1	mg/kg	Organohalogen compounds after combustion and microcoulometric determination according to natureplus - "AOX/EOX" design specification

odour intensity	≤ 3	-	natureplus execution determination "Odour test", 6-stage scale 24h after test room loading
Flame retardants (organophosphates) –Individually: TMP, TEP, TPP, TiBP, TBP, TPhP, TKP, TEHP, TBEP, TCEP, TCPP, TDPP	≤ 1	mg/kg	

Test parameters	Limit value	Unit	Method
Pesticides - Total	≤ 1	mg/kg	Multi-method L 00.00-115/1, extended by natureplus implementa- tion provisions
Pesticides - Single:			
Organochlorine pesticides: Aldrin, Chlordan, DDD, DDE, DDT, Dichlofluanid, Dieldrin, Endrin, Heptachlor, Hexachlorbenzol, Lindan, Pentachlorophenol	≤ 0,5	mg/kg	
organophosphorus pesticides: Dimethoat, Fenthion, Parathion-methyl, Parathion- ethyl, Phosalon			
Pyrethroid: Cypermethrin, Lambda-Cyhalothrin, Permethrin			
Sonstige: Benomyl, Carbendazim, Prochloraz			

4. Test Methods and References

natureplus® Certification Criteria GL-5001 Chemicals Directive

natureplus® Certification Criteria GL-5004 Transparency and Social Responsibility

natureplus® Certification Criteria GL-5010 Low-emission building products

natureplus® Certification Criteria GL-5020 Climate compatibility and energy efficiency

European Assessment Document EAD 040138-01-12-01 In-situ formed loose fill thermal and/or acoustic insulation products made of insulation products made of vegetable fibres

EN 12667 Thermal performance of building materials and building products - Determination of thermal resistance by the plate and heat flow measuring plate method - Products with high and medium thermal resistance

EN 13501-1 Classification of construction products and construction types with respect to their reaction to fire - Part 1: Classification with results from reaction to fire tests of construction products



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EN 15101-1 Thermal insulation products for buildings - In-situ produced cellulosic (LFCI) thermal insulation products - Part 1: Specification for products before installation

EN ISO 12571 Thermal and moisture performance of building materials and building products - Determination of hygroscopic sorption properties

EN ISO 17294-2 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including isotopes of uranium

EU Cosmetics Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 concerning cosmetic products

ISO 846 Plastics - Determination of exposure of plastics to micro-organisms (ISO/DIS 846:2018)

L 00.00-115/1:2018-10 Examination of foodstuffs - New version of the multi-method for the determination of pesticide residues in plant foodstuffs using GC-MS and/or LC-MS/MS after acetonitrile extraction/distribution and purification with dispersive SPE (QuEChERS) (New version of method L 00.00-115 by the Working Group on Pesticides in accordance with § 64 LFGB)

Straw Construction Guideline SBR-2014, Fachverband Strohballenbau Deutschland e.V., Verden, 22.11.2014, available at <http://fasba.de/>

Stroh-Cert - Certification, Logistics and Quality Management for Straw Bale Construction, Reports from Energy and Environmental Research 36/2011, R. Wimmer, H. Hohensinner, S. Eikemeier, Publisher: BMVIT, available at <https://nachhaltigwirtschaften.at/de/hdz/projekte/stroh-cert-zertifizierung-logistik-und-qualitaetsmanagement-fuer-den-strohballenbau.php>

Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 on the placing on the market and use of biocidal products