natureplus e.V.

Guideline 1105

Porous Concrete Blocks and Elements

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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 economicsustainability. 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 requiresus to undertake every effort to reduce these encroachments to the lowest level possible andto 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 healthyroom 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 305/20111: 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.

1 Application Areas

The following criteria contain the requirements for the awardance of the natureplus eco-label for porous concrete blocks and elements for walls. This awardance guideline is to be applied exclusively to the named product group.

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
- 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 manufacturer must, through the submission of relevant documentation, prove conformity with EN 771-4, including the increased requirements of DIN V 4165-100. Standardised building block elements require a special proof of the applicability of the product e.g. in the form of a building inspectorate general certificate of approval. Proof of conformity with DIN 4166 or an equivalent standard for non load-bearing standardised building blocks must be supplied.

A design value of the thermal conductivity - the thermal conductivity including a moisture content supplement – for porous concrete which is used for single-skinned external walls must be demonstrated. This must not exceed the numerical value in accordance with EN 1745, Table A 10 for $\lambda 10$ tr (P = 90%).

The manufacturer must demonstrate how an increased level of acoustic insulation (Rw = a minimum of 43 dB), for the exterior wall constructions that are recommended, may be achieved. If this can not be demonstrated, the manufacturer must indicate that the product is not suitable for applications in which increased acoustic insulation requirements are necessary.

2.2 Composition, Forbidden Substances, Substance Restrictions

The following components are permitted: building lime, sand, cement, recycling material from porous concrete waste (chunks/ breakage), water, recycled gypsum or recycled anhydrite and pore-producing additives (foaming agents). The use of further additives must be technically justified. Any aluminium used in the foaming agents must be from a recycled source.

The product must consist of at least 95% mineral-based components based upon the dry weight ofthe product. The production facility must be designed in such a manner that it is capable of utilising unmixed recycling material (from building site waste, demolition) according to its availability.

The proportion of hydrophobic (water resistant/repellent) additives and other polymeradditives within the product must not exceed 5 M%. Biocides and halogen-organic compounds are prohibited.

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

A certificate of origin must be provided for all renewable raw materials. If mineral raw materials are used, the requirements of GL-5003 must be complied with. Evidence of compliance needs to be provided.

The production facility must meet the most modern standards relating to

- the efficiency of the steam production equipment and
- the concentration of emissions

Atmospheric emissions from the steam production equipment must comply with the following limits:

	Parameter	**Limit value**	**Unit**
1	Dust particle emissions through combustion using natural gas	5	mg/m³
	Soot number according to DIN 51 402 through combustion using heatingoil	1	
2	Sulphur oxides		
	a) (declared as SO2) through combustion using natural gas	35	mg/m³
	b) Sulphur content of the heating oil through combustion using heating oil	0,2	%
3	Carbon monoxide through combustion using		
	a) Natural gas	100	mg/m³
	b) Heating oil	170	mg/m³
4	Nitrogen oxide (declared as NOx) through combustion using		
	a) Natural gas	200	mg/m³
	b) Heating oil	250	mg/m³

The declared concentrations within the emitted gas should be determined under standard reference conditions (273 K, 1013 hPa), dry and with an O2 volume concentration of 3 Vol.-%.

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 wet grinding 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 byan official/ governmental safety agency/inspectorate etc.

If the product contains more than 5% cement, the cement manufacturer must provide confirmation that the following requirements have been met:

- No raw materials have been used in the production of the cement which are classified as hazardous waste according to the German Directory of Waste Regulations (Abfallverzeichnisordnung (AVV)) or originate from areas which are classified are highly contaminated.
- The cement production equipment must meet modern standards for energy efficiency of the ovens and for the flue gas cleaning equipment. If waste products are also incinerated, then these waste products should be of a defined quality and not

adversely affect the emission balance of the incineration process. The emissions must comply with the guideline 2000/76/EC of 4th December 2000 concerning the incineration of waste - Point II.1 "Special Regulations for Cement Ovens in which Waste Products are Incinerated"

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

The products must be suitable for disposal in an inert materials disposal site/facility 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/EC".

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 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.

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.

- Details of warranty and warranty period

- Details of compatible renders and mortars

If the porous concrete is advertised as possessing increased storage capacity characteristics which serve to improve the quality of the room climate, then the specific heat capacity of the porous concrete must demonstrate a level of at least 1.50 kJ/(kg•K).

2.8 Processing and Installation

If the product must be used in conjunction with a thin-bed mortar, the manufacturer must recommend a natureplus-certified mortar. If such a mortar is not available, at least one low-emission mortar based on mineral compounds is to be recommended. This mortar must not contain more than a maximum of 5 M-% organic components and a maximum of 0.1 M.-% volatile organic compounds. This is subject to testing based on the full declaration of all input materials, supplemented with information supplied by the manufacturer of the mortar. The following additives are prohibited:

- Glycol ethers and -esters
- APEO's (Alkyl phenol ethoxylate)
- Formaldehyde separators/dispersers
- Halogen organic compounds

Thin-bed mortars containing cement must comply with EU-Guideline 2003/53/EC.

2.9 Packaging

The packaging used must be recyclable. The manufacturer must be 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 LaboratoryTests

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

No further requirements in this section.

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)	≤ 10
Chromium (Cr)	≤ 50
Copper (Cu)	≤ 35
Mercury (Hg)	≤ 0,3
Nickel (Ni)	≤ 20
Lead (Pb)	≤ 15
Antimon (Sb)	≤ 5
Tin (Sn)	≤ 5
Zinc (Zn)	≤ 120

In case the limit values are exceeded, an element analysis will be performed for the sand and cement raw materials. If the metal/ metalloid concentrations recorded can be linked to the raw materials, an additional eluate analysis of the product will be conducted. The requirements of the elemental analysis are deemed to be met if the measurements are in compliance with the eluate limit values as listed below. If the metal/metalloid concentrations can not be attributed to the raw materials, additional research is necessary to elucidate the causes of the element contents.

Element	**Limit value [mg/l]**
Arsenic (As)	≤ 0,05
Cadmium (Cd)	≤ 0,005
Copper (Cu)	≤ 0,1
Mercury (Hg)	≤ 0,001
Nickel (Ni)	≤ 0,2
Lead (Pb)	≤ 0,04

3.3 Other Analyses

Chromium VI

Test parameters	Limit values	Unit	Method
Chromium VI (Cr VI)	≤ 0,5	mg/kg	TRGS 613

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 ac-cording 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