

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025/ EN 15804

Metal ceiling system made of Steel



1-GENERAL INFORMATION

DECKON COMMERCIAL CEILING

Declaration Number:

EPD-DCKN-20190604-STL-01

Issue date:

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Valid to:

23.01.2025

Scope:

This declaration applies to all steel ceiling system production of DECKON factory. While preparing this declaration, it covers the EPD values used in steel suspended ceiling systems which are accepted all over the world and the accuracy of these values has been evaluated by different PROGRAM HOLDERS. The purpose of this declaration can be used in green building certification programs such as LEED, BREEM and DGNB.

Signed for and on behalf of the manufacturer by

Deckon Suspended Ceiling

Managing Director.

Murat Özkalpçı,



The owner of the declaration shall be liable for the underlying information and evidence; the DECKON shall not be liable with respect to manufacturer information, life cycle assessment data and evidences



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2-PRODUCT

2.1 Product description/definition

Steel ceiling systems are manufactured from folded, rollformed and partially stamped steel as complete kits or as individual components. The construction set comprises a top layer, e.g. linear panel or strip panel ceilings, as well as the substructure for fastening the metal ceiling. The substructure is either made of steel or steel. It can be attached directly to the raw ceiling, can have various suspension heights and depends in its design on the shape, functional requirements and the weight of the linear panel.

For the placing on the market of the product in the EU/EFTA, Regulation (EU) No. /305/2011/ (CPR) applies. The products require a declaration of performance taking into consideration the harmonized /EN 13964/, Suspended ceilings - Requirements and test methods and, the CE-marking. For the use and application of the product, the respective national provisions apply.

Metal ceilings according to the technical regulations of the EN- 13964 are fastened by hangers directly to the loadbearing component substructure or to the ceiling trim profile connected with a distance to the ceiling above.

2.2 Application

The metal ceiling systems made of steel are used for indoor purposes as a rectangular panel (also as special shape), panel ceiling, square cassette, expanded metal ceiling, grid ceiling or canopy ceiling used for ceiling cladding. The product is manufactured in accordance with the respective customer's requirements.

2.3 Technical Data

The following technical data apply to metal ceiling systems made of steel.

Constructional data

| Name | Value | Unit |
|---|--------------|-------------------|
| average Grammage | 6,83 | kg/m ² |
| Durability class (EN 13964) | A | - |
| Cooling output (EN 14240) | not relevant | W/m ² |
| Heating output (EN ISO 14037) | not relevant | W/m ² |
| Sound absorption coefficient (EN ISO 354, EN ISO 11654) | not relevant | % |
| Airborne sound reduction (EN 20140-9, ISO 140-3) | not relevant | dB |

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to /EN 13964:2014- 08/ Suspended ceilings - Requirements and test methods.

2.4 Delivery status

The metal ceiling systems, construction kits and components are produced in individual sizes and can be delivered with or without substructure. Packaging is usually on pallets and/or packed in cardboard. Weight per area (kg/m²) depends on the specific product and manufacturer. A conversion table is helpful for converting the declared unit (kg/m²) and can be requested from the respective manufacturer. Conversion is possible by means of simple multiplication of the results per kg by the specific basis weight.

2.5 Base materials / Ancillary materials

The base material of metal ceilings made of steel are:

| Name | Value | Unit |
|-----------------|-------|------|
| Steel | >97 | % |
| Surface coating | <2 | % |
| Acoustic tissue | <1 | % |

This product at least one partial article contains substances listed in the candidate list exceeding 0.1 percentage by mass: no.

This product at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no. Biocide products were added to this construction product or it has been treated with biocide

2.6 Manufacture

The system components for metal ceilings are manufactured in a continuous manufacturing process. The steel sheets are mainly uncoiled, perforated (optional), stamped (optionally aligned) clipped and folded or pressed. If not made of pre-coated material, the top layers are usually provided after the cleaning process with a powder or wet coating. Subsequently, an acoustic fleece insert can be applied to the back by means of heat in a continuous process. By adding heat, a hot melt adhesive embedded in the fleece is activated, which produces the adhesion of the fleece to the back of the sheet. Stamped and perforated waste is gathered, collected by local disposal companies and sent to the recycling loop. All production steps are carried out in compliance with the requirements and test specifications according to /EN 13964

2.7 Environment and health during manufacturing

Manufacturing conditions do not require any special health and safety protection measures other than those provided by the authorities for the specific work area, e.g. safety vest, safety shoes, dust mask.

Noise-intensive installations, such as punching and straightening systems are correspondingly insulated by structural measures.

The statutory health and safety regulations for metal and dry construction trades as well as the respective provisions of the construction industry, apply. The production-related exhaust air is cleaned in accordance with legal regulations.

Water/Ground: No contamination of water or soil occurs. All values determined inside and outside the production facilities are below the applicable national requirements for noise protection. /EN ISO 14001/ certificates and other manufacturer-specific documents on environmental and health protection can be requested from the manufacturer.

2.8 Product processing/Installation

The membrane of the metal ceiling system is attached to a substructure. The installation is to be carried out by trained personnel, usually from the area of drywall construction. The manufacturer's instructions must be observed.

2.9 Packaging

For packaging the metal ceiling systems and components wooden pallets, cardboard, polystyrene, plastic sheeting, steel and plastic straps are used. packaging material is easily separable and can be reused if necessary. It can be collected, sorted and sent to the regional recycling services. Residual material must be disposed of in accordance with the respective national guidelines.

2.10 Condition of use

Due to the many product variants no general cleaning and maintenance recommendation can be given. Conditions for a long service life are based on regular maintenance, care and repair of the product. The material composition does not change during service life. Documents can be requested from the respective metal ceiling system manufacturer.

2.11 Environment and health during use

There are no known interactions between the product, the environment and health. Volatile organic compounds (VOC) are below the valuation limit according to health-related Evaluation of Emissions of Volatile Organic Compounds from Building Products

2.12 Reference service life

Based on the useful lives of building components according to the Sustainable Building Assessment System , Service Lives of components for life cycle assessment according to Assessment System for Sustainable Building (BNB), the reference service life of metal ceilings exceeds 50 years.

2.13 Extraordinary effects Fire

The metal ceiling systems made of steel declared here correspond to the class A of building products regarding their fire performance, according to /EN 13501-1/. The class of flaming droplets is d0 and the class for smoke density is pre-defined as s1.

Fire protection

| Name | Value |
|-------------------------|--------------|
| Building material class | A2 |
| Smoke gas development | s1 |
| Burning droplets | d0 |

Water

There are no known effects on the environment in the event of unforeseen ingress of water.

Mechanical destruction

In the case of mechanical destruction, all of the substances remain bound. It is to be assumed that in the case of coated ceilings, lacquer chippings occur in such a small amount that there are no negative impacts on the environment.

2.14 Re-use phase

The metal ceiling systems can be removed and reused without damaging the product.

2.15 Disposal

In accordance with the Waste Classification Ordinance (AVV) and the European Waste List (EWL), the waste code is:

17 04 05 – Iron and steel.

17 04 02 – Aluminium.

3-LCA:CALCULATION RULES

3.1 Declared Unit

The declaration applies to 1 kg metal ceiling systems made of steel.

Declared unit

| Name | Value | Unit |
|---------------------------|--------------|-------------------|
| Conversion factor to 1 kg | 0.146 | - |
| Declared unit | 1 | kg |
| Grammage | 6.83 | kg/m ² |

3.2 System boundary

The Life Cycle Assessment considers the system boundaries "cradle to grave" and follows the modular construction system described by /EN 15804/. The LCA takes into account the following modules:

- A1: Raw material supply (Production of precursors, packaging)
- A2: Transport of precursors
- A3: Manufacturing (Energy usage, utilization of production residues)
- A4: Transport from the gate to the site
- A5: Assembly (Installation, recycling of packaging)
- B1: Use
- B4: Replacement
- B5: Refurbishment
- C1: De-construction demolition
- C2: Transport to waste-processing facility
- C3: Waste processing for reuse, recovery and/or recycling
- D: Potential for reuse, recovery and/or recycling as net flows and benefit

3.3 Estimates and assumptions

Specific data regarding the production process was provided by the DECKON Missing data was supplemented by estimates based on comparable substitutes or data used from the secondary literature and the database

Missing data set were modeled by the auditor. The thermal utilization of the packaging in the assembly stage was modeled with an R1 factor of the waste incineration plant

(MVA) with R1 value > 0.6.

3.4 Cut-off criteria

All relevant data, i.e. all applied materials according to the recipe and the energy used originate from the production data acquisition and have been considered within the inventory analysis.

For the considered in- and outputs the actual transport distances were used. Material- and energyflows with a proportion of less than 1 % were collected. Waste of upstream products, which accumulate in small quantities(<1%) during the manufacturing process, was neglected. It can be assumed, that the sum of the neglected processes does not exceed 5 % of the impact categories.

4-LCA:SCENARIOS

The following technical information models the basis for the declared modules or can be used for developing specific scenarios within the context of a building appraisal if modules are not declared (MND). The reference service life according to /ISO 15686-1/ could not have been determined. The declaration of the reference service life underlies the assessment system of the Federal Institute for Research on Building, Urban Affairs and Spatial Development /BBSR/.

Transport to the building site (A4)

| Name | Value | Unit |
|---|--------|-------|
| Transport distance | 100 | km |
| Capacity utilization (including empty runs) | 50 | % |
| Payload | 27 | t |
| Vehicle type | 34-40t | USD 4 |

Installation into the building (A5) The installation is largely manual, so no further energy expenses are needed for the assembly.

Use or application of the installed product (B1)

The metal ceiling systems are durable. Metal ceilings need during the service life usually no

maintenance measures. Therefore during the use phase no further environmental effects are to be expected.

Replacement (B4) / Refurbishment (B5)

| Name | Value | Unit |
|-------------------|-------|-------------|
| Replacement cycle | 0 | Number/R SL |

The replacement in a cycle of 50 years is zero, as specified in /BBSR Table 2017/ in conjunction with the reference life from the Sustainable Building Assessment System.

Reference service life

| Name | Value | Unit |
|-------------------------------|-------|------|
| Life Span (according to BBSR) | ≥ 50 | a |

End of life (C1-C4)

| Name | Value | Unit |
|-----------------|-------|------|
| Recycling | 0.994 | kg |
| Energy recovery | 0.006 | kg |

5-LCA:RESULT

The table displayed below summarizes the results of the Life Cycle Assessment (LCA).

The results of the impact assessment do not provide any information on endpoints of the impact categories, exceedances of thresholds, safety margins or risks. The results refer to the declared unit of 1 kg metal ceiling systems made of steel. The LCA and Life Cycle Impact Assessment are based on the specifications of the European Standard using the CML method 2001 – April 2015.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---------------------|-----------|---------------|-------------------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | X | X | MND | MNR | X | X | MND | MND | MND | X | X | MND | X |

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg metal ceiling systems made of steel

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B4 | B5 | C2 | C3 | D |
|-----------|--|---------|----------|----------|---------|---------|---------|----------|----------|----------|
| GWP | [kg CO ₂ -Eq.] | 2.79E+0 | 7.64E-3 | 1.41E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 8.13E-3 | 7.81E-3 | -1.63E+0 |
| ODP | [kg CFC11-Eq.] | 2.33E-9 | 1.61E-16 | 4.77E-15 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.72E-16 | 2.63E-16 | 8.91E-9 |
| AP | [kg SO ₂ -Eq.] | 8.46E-3 | 3.16E-5 | 5.73E-5 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 3.12E-5 | 3.16E-6 | -3.18E-3 |
| EP | [kg (PO ₄) ³⁻ -Eq.] | 7.11E-4 | 8.02E-6 | 1.06E-5 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 7.90E-6 | 5.85E-7 | -2.41E-4 |
| POCP | [kg ethene-Eq.] | 7.44E-4 | -1.21E-5 | 3.37E-6 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -1.17E-5 | 1.86E-7 | -7.42E-4 |
| ADPE | [kg Sb-Eq.] | 1.85E-5 | 7.97E-10 | 6.46E-9 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 8.49E-10 | 3.57E-10 | -4.63E-6 |
| ADPF | [MJ] | 3.01E+1 | 1.03E-1 | 5.71E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.10E-1 | 3.15E-3 | -1.60E+1 |

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

6-INTERPRETATION

RESULTS OF THE LCA - RESOURCE USE: 1 kg metal ceiling systems made of steel

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B4 | B5 | C2 | C3 | D |
|-----------|---|---------|---------|----------|---------|---------|---------|---------|----------|----------|
| PERE | [MJ] | 4.77E+0 | 6.95E-3 | 1.03E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 7.40E-3 | 9.34E-2 | 8.50E-1 |
| PERM | [MJ] | 1.11E+0 | 0.00E+0 | -1.02E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -9.29E-2 | 0.00E+0 |
| PERT | [MJ] | 5.88E+0 | 6.95E-3 | 9.88E-3 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 7.40E-3 | 5.46E-4 | 8.50E-1 |
| PENRE | [MJ] | 3.09E+1 | 1.03E-1 | 8.28E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.10E-1 | 3.63E-3 | -1.55E+1 |
| PENRM | [MJ] | 7.62E-1 | 0.00E+0 | -7.62E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PENRT | [MJ] | 3.16E+1 | 1.03E-1 | 6.57E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.10E-1 | 3.63E-3 | -1.55E+1 |
| SM | [kg] | 2.11E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| RSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| NRSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | [m ³] | 3.14E-3 | 8.06E-6 | 4.19E-4 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 8.58E-6 | 2.31E-5 | 2.00E-3 |
| Caption | PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water | | | | | | | | | |

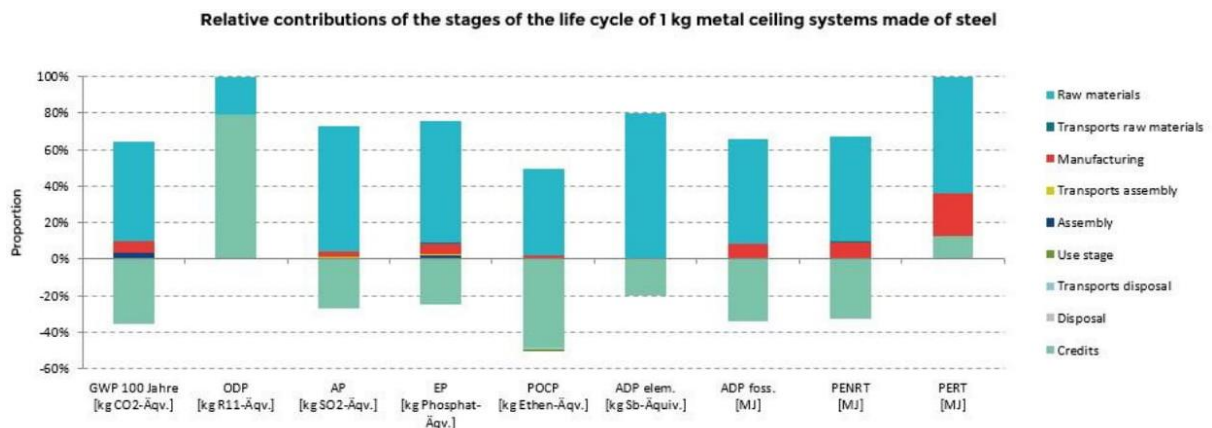
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg metal ceiling systems made of steel.

| Parameter | Unit | A1-A3 | A4 | A5 | B1 | B4 | B5 | C2 | C3 | D |
|-----------|---|----------|---------|----------|---------|---------|---------|---------|----------|----------|
| HWD | [kg] | -2.20E-7 | 6.62E-9 | 3.04E-10 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 7.05E-9 | 1.68E-11 | -1.04E-6 |
| NHWD | [kg] | 1.34E+1 | 5.57E-4 | 2.81E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 5.92E-4 | 1.55E-3 | 1.09E-1 |
| RWD | [kg] | 5.67E-4 | 1.25E-7 | 3.42E-6 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.33E-7 | 1.89E-7 | -2.72E-5 |
| CRU | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MFR | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 9.94E-1 |
| MER | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | [MJ] | 0.00E+0 | 0.00E+0 | 1.57E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 8.69E-3 | 0.00E+0 |
| EET | [MJ] | 0.00E+0 | 0.00E+0 | 2.95E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.63E-2 | 0.00E+0 |
| Caption | HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy | | | | | | | | | |

*MND: Module not declared

**MDR: Module not relevant

The following figure shows the relative contributions of different Life Cycle processes and the primary energy demand in the form of a dominance analysis.



Indicators of the impact assessment

The contributions from module A1 (raw materials) dominate in almost all environmental impact categories, except Depletion potential of the stratospheric ozone layer (ODP). Contributions from transport throughout the life cycle are below 1% for all environmental impact categories. The credits in module D originate from the avoided environmental effects in other product systems and arise almost exclusively through the recycling of steel scrap.

Global warming potential (GWP)

The global warming potential is mainly determined by the supply of raw materials, i.e. by the primary products. Within these, the production of steel primary products, including the upstream chains for steel recovery, has the greatest influence on the GWP factor of > 97%. However, at the end of life, the cost of providing the steel precursors is offset by the environmental benefits in the form of credits for the recycling of steel products. Along the entire life cycle, approximately 55 % of GWP emissions are credited by steel recycling at the end of life.

Depletion potential of the stratospheric ozone layer (ODP) The Ozone depletion potential is dominated by steel recycling at the end of life (about 66 %).

Acidification potential of land and water (AP)

The Acidification potential is triggered to 96 % in the production stage by the raw material supply. The remaining 4 % is caused by the production of the metal ceiling systems itself. A credit of approximately 37 % of the total AP emissions along the life cycle is credited mainly by steel recycling.

Eutrophication potential (EP) The greatest contribution to the EP arises from the provision of raw materials with 91 %, in particular due to the high energy demand in the form of natural gas and electricity. A total of 8 % results from the production of metal ceilings and 1 % from the transport of primary products and auxiliary materials.

Potential of tropospheric ozone photochemical oxidants (POCP)

About 97 % of the POCP value is generated in the production stage by the provision of raw materials in the form of steel sheets. Another 3 % arise from the metal ceiling manufacturing process. Abiotic depletion potential for non-fossil resources (ADPE)

The ADPE value is predominantly conditioned by the production stage module A1. Here, mainly the upstream chain of the steel sheet contributes almost 100 % to the overall ADPE.

Abiotic depletion potential for fossil resources (ADPF) Within the production (A1-3), the ADPF value mainly results from the upstream chains in module A1 (about 88 %). Almost 12 % is attributable to the production of the metal ceiling systems. A credit of about 52 % is obtained mainly through the recycling of the steel.

Within the production (A1-3), the total primary energy demand is divided between approx. 84 % nonrenewable energy sources and approx. 16 % renewable energies. Total use of non-renewable primary energy resources (PENRT) The upstream chains associated with manufacturing of the preliminary products (Module A1) contribute with 87 % to the production caused by the steel sheet. The production of the metal ceiling systems contributes about 13 % to non-renewable energy consumption. A credit is issued at the end of life (48 %), which is generated by the recycling of the preliminary products. Total use of renewable primary energy resources (PERT) The PERT value along the entire life cycle results to 64 % from the upstream chains associated with the preliminary products (A1), and the production of the metal ceiling systems (A3) with 23 %. Another 15 % is attributable to the credit (module D) from steel recycling.

6-REQUISITE EVIDENCE

VOC emissions

| | Test 3 day Later($\mu\text{g}/\text{m}^3$) | | Test 7 day Later($\mu\text{g}/\text{m}^3$) | |
|----------------------|--|--------------|--|-------------|
| | Result | Requirement | Result | Requirement |
| Total VOC (C6C16) | 16 | ≤ 10000 | 12 | ≤ 1000 |
| Total SVOC (C16-C22) | < 1 | - | < 1 | 100 |
| R (dimensionless) | 0,01 | - | 0 | ≤ 1 |
| Total VOS o. NIK | 9 | - | 8 | ≤ 100 |
| (EU-Kat 1 and 2) | < 1 | ≤ 10 | < 1 | ≤ 1 |

8-REFERENCES

EN 13501-1: 2010: Fire classification of construction products and building elements - Part 1: Classification using

data from reaction to fire tests; German version EN 13501-1:2007+A1:2009

EN 13964: 2014: Suspended ceilings - Requirements and test methods;

ISO 15686-1: 2015: Buildings and constructed assets - Service life planning - Part 1: General principles and framework.

ISO 14001: Environmental management systems - Requirements with guidance for use.

/ISO 14025/ DIN EN /ISO 14025:2011-10/, Environmental labels

/EN 15804/ /EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product