

# ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025/ EN 15804

**Metal ceiling system made of aluminium**



## 1-GENERAL INFORMATION

### DECKON COMMERCIAL CEILING

**Declaration Number:**

EPD-DCKN-20190604-ALM-01

**Issue date:**

22.01.2020

**Valid to:**

22.01.2025

**Scope:**

This declaration applies to all aluminium ceiling system production of DECKON factory. While preparing this declaration, it covers the EPD values used in aluminum 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, BREAM 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



Ferhatpaşa Mahallesi Akdal Sokak No:5

Ataşehir/İSTANBUL



+90-216-314-24-22/+90-216-314-24-33



info@deckon.com.tr

## 2-PRODUCT

### 2.1 Product description/definition

Product description / Product definition Aluminium ceiling systems are manufactured from folded, rollformed and partially stamped aluminium 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 aluminium 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 aluminium 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 aluminium.

#### Constructional data

Name	Value	Unit
average Grammage	5,15	kg/m <sup>2</sup>
Durability class (EN 13964)	A	-
Cooling output (EN 14240)	not relevant	W/m <sup>2</sup>
Heating output (EN ISO 14037)	not relevant	W/m <sup>2</sup>
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/m<sup>2</sup>) depends on the specific product and manufacturer. A conversion table is helpful for converting the declared unit (kg/m<sup>2</sup>) 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 aluminium are:

<b>Name</b>	<b>Value</b>	<b>Unit</b>
Aluminium	90	%
Steel	< 6	%
Surface coating	< 3	%
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 aluminium sheets are mainly uncoiled, perforated (optional), stamped (optionally aligned) clipped and folded or pressed. If not made of precoated 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 aluminium 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 aluminium.

#### Declared unit

Name	Value	Unit
Conversion factor to 1 kg	0.194	-
Declared unit	1	kg
Grammage	5.15	kg/m <sup>2</sup>

### 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	0.98	kg
Energy recovery	0.02	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 aluminium. 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 aluminium

Parameter	Unit	A1-A3	A4	A5	B1	B4	B5	C2	C3	D
GWP	[kg CO <sub>2</sub> -Eq.]	8.63E+0	7.45E-3	1.08E-1	0.00E+0	0.00E+0	0.00E+0	7.31E-3	4.04E-2	-6.73E+0
ODP	[kg CFC11-Eq.]	1.16E-11	1.58E-16	3.64E-15	0.00E+0	0.00E+0	0.00E+0	1.55E-16	1.36E-15	5.30E-10
AP	[kg SO <sub>2</sub> -Eq.]	4.04E-2	3.08E-5	4.60E-5	0.00E+0	0.00E+0	0.00E+0	2.80E-5	1.63E-5	-3.22E-2
EP	[kg (PO <sub>4</sub> ) <sup>3-</sup> -Eq.]	2.52E-3	7.83E-6	8.67E-6	0.00E+0	0.00E+0	0.00E+0	7.10E-6	3.02E-6	-1.87E-3
POCP	[kg ethene-Eq.]	2.30E-3	-1.18E-5	1.67E-6	0.00E+0	0.00E+0	0.00E+0	-1.05E-5	9.62E-7	-1.78E-3
ADPE	[kg Sb-Eq.]	1.06E-5	7.78E-10	4.98E-9	0.00E+0	0.00E+0	0.00E+0	7.63E-10	1.84E-9	-3.56E-6
ADPF	[MJ]	9.86E+1	1.00E-1	5.19E-2	0.00E+0	0.00E+0	0.00E+0	9.85E-2	1.63E-2	-7.28E+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



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

Parameter	Unit	A1-A3	A4	A5	B1	B4	B5	C2	C3	D
PERE	[MJ]	4.86E+1	6.79E-3	4.28E-1	0.00E+0	0.00E+0	0.00E+0	6.66E-3	2.04E-1	-3.73E+1
PERM	[MJ]	6.21E-1	0.00E+0	-4.20E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.01E-1	0.00E+0
PERT	[MJ]	4.92E+1	6.79E-3	8.09E-3	0.00E+0	0.00E+0	0.00E+0	6.66E-3	2.82E-3	-3.73E+1
PENRE	[MJ]	1.17E+2	1.01E-1	6.51E-1	0.00E+0	0.00E+0	0.00E+0	9.88E-2	1.87E-2	-8.67E+1
PENRM	[MJ]	5.93E-1	0.00E+0	-5.93E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	1.18E+2	1.01E-1	5.84E-2	0.00E+0	0.00E+0	0.00E+0	9.88E-2	1.87E-2	-8.67E+1
SM	[kg]	1.03E-2	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	[m³]	1.17E-1	7.87E-6	3.19E-4	0.00E+0	0.00E+0	0.00E+0	7.72E-6	1.19E-4	-9.74E-2

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 aluminium**

Parameter	Unit	A1-A3	A4	A5	B1	B4	B5	C2	C3	D
HWD	[kg]	1.20E-7	6.46E-9	7.72E-10	0.00E+0	0.00E+0	0.00E+0	6.34E-9	8.67E-11	-1.29E-7
NHWD	[kg]	1.20E+1	5.43E-4	2.15E-2	0.00E+0	0.00E+0	0.00E+0	5.33E-4	8.03E-3	-8.03E+0
RWD	[kg]	7.30E-3	1.22E-7	2.61E-6	0.00E+0	0.00E+0	0.00E+0	1.19E-7	9.75E-7	-5.46E-3
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	8.50E-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	1.20E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.81E-2	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	2.25E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.27E-2	0.00E+0

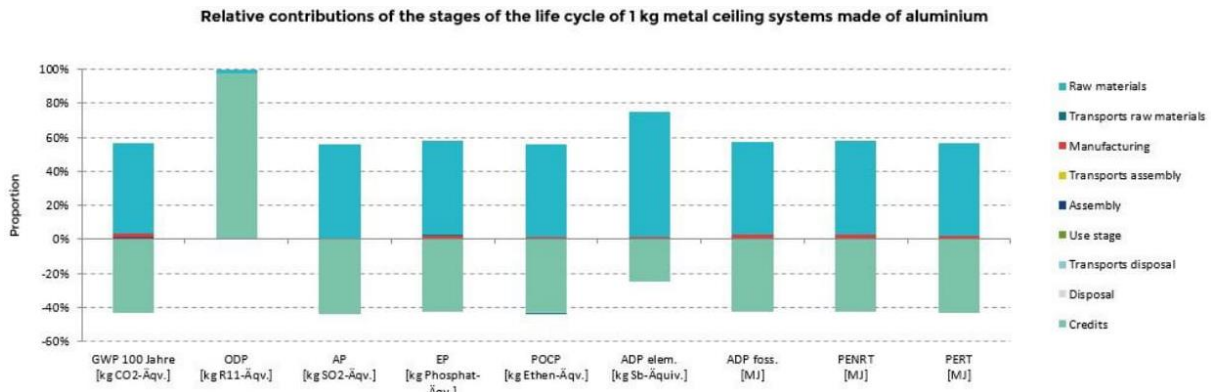
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
---------	---

\*MND: Module not declared

\*\*MDR: Module not relevant

## 6-INTERPRETATION

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 metal 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 aluminium primary products, including the upstream chains has the greatest influence on the GWP factor of > 96 %. However, at the end of life, the cost of providing the aluminium precursors is offset by the environmental benefits in the form of credits for the recycling of aluminium products. Along the entire life cycle, approximately 76 % of GWP emissions are credited by metal recycling at the end of life.

**Depletion potential of the stratospheric ozone layer (ODP)** The Ozone depletion potential is dominated by steel scrap recycling at the end of life. The ODP mainly carries R11 and R114 emissions from the upstream chain of power supply (especially electricity from nuclear energy).

#### Acidification potential of land and water (AP)

The Acidification potential is triggered to 100 % in the production stage by the raw material supply (mainly aluminium sheets). A credit of approximately 66 % of the total AP emissions along the life cycle is credited mainly by aluminium and steel recycling.

#### Eutrophication potential (EP)

The greatest contribution to the EP arises from the provision of raw materials with 97 %, in particular due to the high energy demand in the form of natural gas and electricity.

**Potential of tropospheric ozone photochemical oxidants (POCP)** The POCP value is generated to 100% in the production stage by the provision of raw materials in the form of aluminium and steel sheets.

### 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 aluminium 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 96 %). A credit of about 74 % is obtained mainly through the recycling of aluminium and steel.

Within the production (A1-3), the total primary energy demand is divided between approx. 71 % nonrenewable energy sources and approx. 29 % 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 90 % to the production caused by the aluminium and steel sheets. The production of the metal ceiling systems contributes about 4 % to non-renewable energy consumption. A credit is issued at the end of life (60 %), 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 96 % from the upstream chains associated with the preliminary products (A1), and the production of the metal ceiling systems (A3) with 4 %. At the end of life, credits (module D) of 60 % can be credited for metal recycling.

### 7-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	$\leq 10000$	12	$\leq 1000$
Total SVOC (C16-C22)	< 1	-	< 1	100
R (dimensionsless)	0,01	-	0	$\leq 1$
Total VOS o. NIK	9	-	8	$\leq 100$
(EU-Kat 1 and 2)	< 1	$\leq 10$	< 1	$\leq 1$

### 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