Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Zehnder painted towel radiator produced in Manisa, Türkiye

from

Zehnder Group International

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com
EPD of variety of products within one product group, based on the average results of the product group.

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804:2012+A2:2019/AC:2021 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, Version 1.3.4 and part B: "Teil B: Anforderungen an die EPD für Heizkörper", v8, 19.10.2023 from Institut Bauen und Umwelt e.V. (IBU). The EF reference package 3.1 was used. In addition, version 1.0.0 of 2024:06 NMD Determination method was used to determine the end-of-life scenario.
PCR review was conducted by: *Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.*
Life Cycle Assessment (LCA)
LCA accountability: Zehnder Group International AG, Moortalstrasse 1, 5722 Gränichen, Switzerland
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Jane Anderson, ConstructionLCA Ltd* Jane Anderson Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Zehnder Group International AG, Moortalstrasse 1, 5722 Gränichen, Switzerland

Contact: Barbara Scherrer, Sustainability Engineer, barbara.scherrer@zehndergroup.com

Description of the organisation: Zehnder Group provides worldwide leading solutions for a comfortable, energy-efficient and healthy indoor climate. The products and services of the Group include heating, cooling, indoor ventilation and air cleaning. The Group develops and manufactures its products at its own factories in Europe, China, and North America.

Product-related or management system-related certifications: ISO9001, ISO45001, ISO14001 and ISO50001

Name and location of production site(s): Sanpan Isıtma Sistemleri San. ve Tic. AŞ Emlakdere, Keçili Köy; MOSB 4.Kısım; Yusuf Karaoğlu Cd. No:3; Yunusemre/Manisa; 45030; Türkiye.

Product information

Product name: Zehnder Aura, PBN-120-50.

Product identification: Painted towel radiator produced at Manisa, Türkiye. All variants (all lengths and heights) except galvanized versions. Zehnder Aura, Zehnder Zeta, Zehnder Dero, Zehnder Impa, Zehnder Muralis, no name models based on the Zehnder models and Private label models.

Product description: Painted towel radiator transfers heat in the bathroom and serve as a towel rack. It generally comes with a custom finish, delivered in a single piece, ready to use to order. Height, width and length are made to order. The finish in the analysis is white.

UN CPC code: 44823 “Radiators for central heating, not electrically heated, of iron or steel.”

Geographical scope: The fabrication is based on the manufacturing site in Manisa, Türkiye (A3), the delivery of product (A4) is based on true data from 2023, while the end-of-life scenario (module C) was model according to NMD regulations.

LCA information

Functional unit / declared unit: 1 kg of painted towel radiator produced in Manisa, Türkiye.

Reference service life: 20 years; we choose to state a technical life span of 20 years, as this service life we also use in our sustainability for the scope 3 emissions.

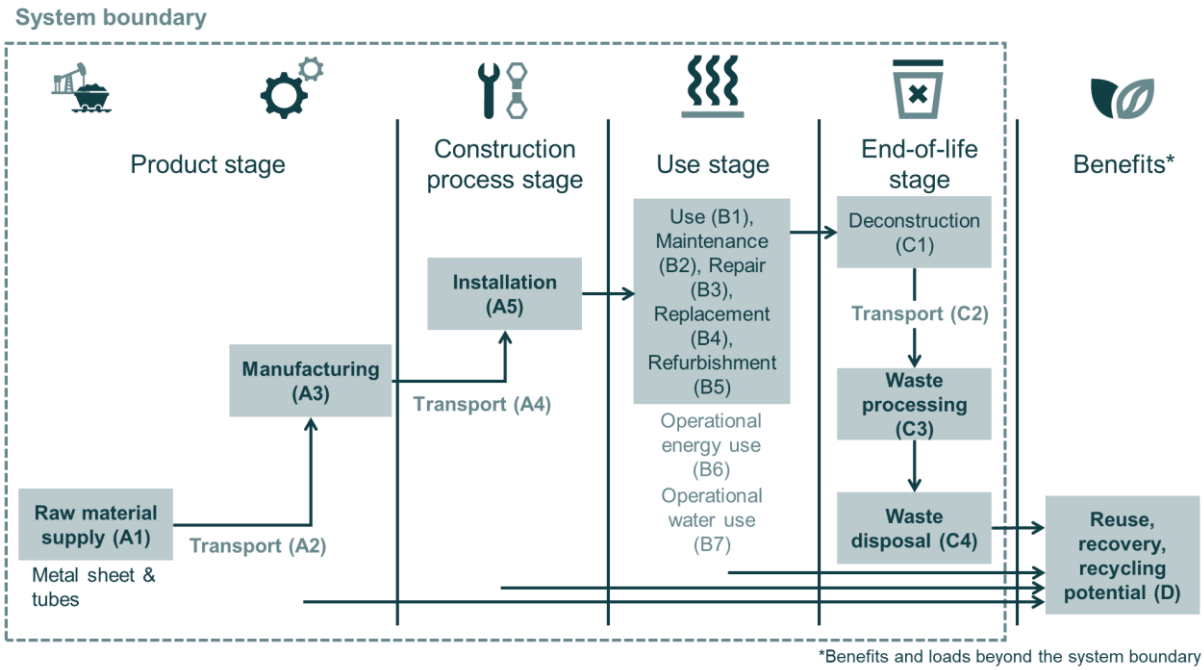
Time representativeness: 2023

Database(s) and LCA software used: SimaPro (version 9.6.0.1 multiuser) with Ecoinvent (version 3.11)

Description of system boundaries:

Cradle to grave and module D (A + B + C + D).

System diagram:



More information:
For further information on this product please visit the webpage under the following
Zehnder Aura - Hydronic operation | Zehnder Group Sales International

Modules include impacts and aspects related to losses or/and waste in the module in which the losses or waste occur (i.e. production, transport and waste processing and disposal of the lost waste products and materials). Impacts and aspects related to waste are considered in the module in which the waste occurs.

Module A1 to A3:

The product stage includes the raw material extraction and production, transport to the manufacturing site, and manufacturing and assembly of components. It considers the demand of energy, auxiliary and operational materials, packaging, as well as waste treatment to end-of-waste condition or disposal of end residues during the product stage.

The following dataset was used for modelling the used electricity: 73% Electricity, high voltage {TR}| electricity production, hydro, reservoir, non-alpine region | Cut-off, U (0.046 kg CO_2 eq. / kWh) including 0.8% loss for high to low voltage transformation and 27% is residual mix of untracked low voltage electricity, which is modelled according to i-track (https://www.trackingstandard.org/i-rece-residual-mix/) (0.645 kg CO_2 eq. / kWh).

Module A4 to A5:

The construction process stage includes transportation to the installation site by truck and installation. It considers the energy demand and auxiliary material including related Volatile Organic Compound (VOC) emissions.

Means of transport	Mass-distance [kgkm]
Truck unspecific	6.50E+02
Light commercial vehicle	2.25E+00

Treatment and disposal of packaging material in A5. Credits for potential avoided burdens due to energy substitution of electricity and thermal energy generation by the packaging waste are declared in module D and affects only the rate of primary material (no secondary materials). Installation into the building is done with simple tools and is therefore neglected.

Module B1 to B7:

The use stage of the products has no direct emissions (B1) and is designed so that no maintenance is required (B2) or parts need to be replaced (B4). Furthermore, no standard repairs (B3) or refurbishments (B5) are foreseen. The use of the product does not require any electricity consumption (B6) and water consumption (B7). These effects are therefore stated as zero.

Module C1 to C4:

The end-of-life stage includes the deconstruction, considering the energy demand and auxiliary materials, the transportation by truck to waste processing facilities, the waste processing, considering sorting, and the waste disposal, considering a scenario with recycling, incineration, and landfill. The scenario is built on today's practice. The removal of the radiator does only need handheld tools and is therefore neglected. The transport of end-of-life (EOL) stage (C2) considers 50 km, 150 km and 100 km for the shipment of collected waste to approved treatment centres by truck (Euro6) to recycling, incineration and landfill, respectively. The radiator materials are reused, recycled, incinerated with fly ash extraction and heat recovery or disposed to landfill according to the NMD disposal rules when available. The energy for the recycling of plastics is included in C3. The impact of material share, which is incinerated, is reported in C3 while in C4 the share disposed of in landfill is reported.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	TR	GLO	RER	RER	RER	RER	RER	RER	RER	RER	RER	RER	RER	RER	RER
Specific data used	85% GWP- GHG					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	NA			X	NR	-	-	-	-	-	-	-	-	-	-	-	-

X: Module declared, ND: Module not declared, NR= Module not relevant, TR: Türkiye, GLO: Global, RER: Europe.

In this document the results for 1 kg of painted towel radiator produced in Manisa, Türkiye is given. The analysed model is among the most sold sizes (PBN-120-50) and is a very good representation of the whole painted portfolio produced in the factory in Manisa, Türkiye.

Cut-off Criteria

The cut-off rule excludes irrelevant flows of material or energy from system boundaries. The following flows are excluded: lubricants for machines. The production and maintenance of capital equipment, facilities and infrastructure needed for production are not the subject of this assessment. Long-term emissions (> 100 years) are not taken into consideration in the impact estimate.

Allocation

Information about allocation procedure of single datasets is documented in Ecoinvent (https://ecoquery.ecoinvent.org/).

Data collection and reference time period

The foreground data refer to annual data for 2023.

Estimates and assumptions

All relevant process steps are considered and modelled to represent the specific situations. The process chain is considered sufficiently complete regarding the goal and scope of this study.
The data quality of the inventory is assessed based on its precision (measured, calculated, literature s or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methods used) and representati valueveness (geographical, temporal, technological).
In order to do justice to these aspects and thus ensure reliable results, first-hand industrial data were used together with consistent background data from the Ecoinvent databases (version 3.10).

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Steel	9.50E-01	99.7%	0
Brass	4.62E-03	0	0
Copper solder	5.05E-04	0	0
Powder paint	2.52E-02	0	0
HDPE	3.46E-04	0	0
PA 6	1.99E-02	0	0
TOTAL	1.00E+00	0	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Nylon	1.34E-02	1%	0
Paper	8.50E-03	1%	3.35E-03
Corrugated board	5.22E-02	5%	2.18E-02
Solid construction timber	6.94E-02	7%	3.40E-02
TOTAL	1.43E-01	14%	5.58E-02

A comparison between the 232 substances in the updated list of 17 January 2023 and our products has shown that Zehnder radiator portfolio and their accessories do not contain any substances of the ECHA-list (European Chemical Agency) for substances of very high concern (SVHC) of more than 0.1%.

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1 to B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	3.91E+00	4.41E-01	4.35E-02	0	0	7.35E-03	4.53E-02	2.62E-03	-1.78E+00
GWP-biogenic	kg CO_2 eq.	-1.28E-01	3.66E-04	2.06E-01	0	0	4.56E-06	6.63E-06	1.52E-06	1.42E-01
GWP-luluc	kg CO_2 eq.	7.63E-02	1.67E-04	9.68E-06	0	0	2.55E-06	1.66E-07	1.89E-07	-1.34E-03
GWP-total	kg CO_2 eq.	3.83E+00	4.42E-01	7.82E-02	0	0	7.36E-03	4.53E-02	2.62E-03	-1.64E+00
ODP	kg CFC 11 eq.	1.48E-07	9.68E-09	2.61E-10	0	0	1.62E-10	1.23E-11	1.07E-11	-6.95E-09
AP	mol H^+ eq.	1.96E-02	2.04E-03	9.11E-05	0	0	3.38E-05	8.84E-06	2.45E-06	-8.07E-03
EP-freshwater	kg P eq.	1.27E-03	3.73E-06	2.84E-07	0	0	5.59E-08	9.22E-09	3.75E-09	-7.07E-05
EP-marine	kg N eq.	4.10E-03	7.69E-04	3.06E-05	0	0	1.32E-05	4.31E-06	1.25E-06	-1.48E-03
EP-terrestrial	mol N eq.	4.09E-02	8.47E-03	3.35E-04	0	0	1.45E-04	4.44E-05	1.04E-05	-1.73E-02
POCP	kg NMVOC eq.	1.74E-02	3.03E-03	1.21E-04	0	0	5.08E-05	1.10E-05	4.29E-06	-5.62E-03
ADP-minerals&metals*	kg Sb eq.	6.96E-05	1.84E-06	1.35E-07	0	0	2.41E-08	1.65E-09	6.47E-10	-2.62E-05
ADP-fossil*	MJ	3.25E+01	5.47E-01	3.78E-02	0	0	8.49E-03	1.17E-03	5.87E-04	-1.47E+01
WDP*	m^3	4.06E+00	2.71E-02	1.47E-03	0	0	4.40E-04	1.76E-04	-2.23E-03	-2.08E-01

Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1 to B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	3.96E+00	4.39E-01	4.34E-02	0	0	7.31E-03	4.53E-02	2.62E-03	-1.56E+00
PM	Disease incidences	4.09E-07	4.36E-08	1.72E-09	0	0	7.23E-10	4.16E-11	5.61E-11	-1.78E-07
IR	kBq U235 eq.	1.30E-01	3.33E-03	1.58E-04	0	0	4.75E-05	8.16E-06	3.26E-06	-1.21E-02
ETP-fw*	CTUe	7.29E+01	8.48E-01	1.30E-01	0	0	1.39E-02	8.36E-02	5.62E-03	-8.93E+00
HTP-c*	CTUh	1.53E-08	1.89E-10	2.16E-11	0	0	1.88E-12	9.77E-12	2.82E-13	-2.47E-09
HTP-nc*	CTUh	8.70E-08	4.33E-09	2.50E-10	0	0	7.38E-11	1.11E-10	7.64E-11	-2.34E-08
SQP*	Pt	3.60E+01	4.35E+00	9.75E-02	0	0	7.92E-02	1.66E-03	1.86E-02	-2.15E+01
Acronyms	ETP-fw = Potential Comparative Toxic Unit for ecosys-tems; HTP-c = Potential Toxic Unit for Humans toxicity, cancer; HTP-nc = Potential Toxic Unit for humans, non-cancer; IR = Potential Human exposure efficiency relative to U235, human health; PM = Potential incidence of disease due to Particulate Matter emissions; SQP = Potential soil quality index									

Disclaimer on IR: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1 to B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4.68E+00	0	0	0	0	0	0	0	0
PERM	MJ	3.53E-01	0	-3.53E-01	0	0	0	0	0	0
PERT	MJ	5.04E+00	0	-3.53E-01	0	0	0	0	0	0
PENRE	MJ	3.16E+01	5.47E-01	3.72E-01	0	0	8.49E-03	1.17E-03	5.72E-01	-1.47E+01
PENRM	MJ	9.06E-01	0	-3.35E-01	0	0	0	0	-5.71E-01	0
PENRT	MJ	3.25E+01	5.47E-01	3.78E-02	0	0	8.49E-03	1.17E-03	5.87E-04	-1.47E+01
SM	kg	1.01E+00	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m^3	-1.77E+01	-1.81E-01	-1.44E-02	0	0	-2.77E-03	-3.11E-03	-2.57E-03	1.15E+00
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Waste indicators

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1 to B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.40E-04	6.11E-05	5.35E-06	0	0	7.17E-07	1.70E-07	5.53E-08	-2.11E-04
Non-hazardous waste disposed	kg	2.37E-01	3.58E-01	9.74E-03	0	0	6.60E-03	2.93E-04	3.70E-02	-6.61E-02
Radioactive waste disposed	kg	9.10E-06	2.35E-06	1.09E-07	0	0	3.24E-08	6.07E-09	2.14E-09	-8.69E-06

Output flow indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1 to B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	5.64E-02	0	0	0	1.13E-01	0	0
Material for recycling	kg	0	0	5.34E-02	0	0	0	8.44E-01	0	0
Materials for energy recovery	kg	0	0	3.34E-02	0	0	0	1.93E-02	0	0
Exported energy, electricity	MJ	1.87E-03	0	1.11E-01	0	0	0	9.26E-02	0	0
Exported energy, thermal	MJ	3.91E-03	0	2.33E-01	0	0	0	1.94E-01	0	0

The results from modules A1-A3 should not be used without considering the results of module C.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Difference from previous version

Compared to the previous version of the EPD, the main changes made to the data being analysed are listed below:

- The Ecoinvent database used is the v.3.11, Mai 2025.
- Data declared to the supplier is used.

References

General Program Instructions of the International EPD® System. Version 4.0.

CEN/TR 15941	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; CEN/TR 15941:2010
CPR	Regulation (EU) No 305/2011 of the European parliament and of the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
EF3.1	Environmental Footprint 3.1 method
EN 15804+A2	EN 15804:2012+A2:2019 Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products
EN ISO 14025	EN ISO 14025:2011-10 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
EN ISO 14040	EN ISO 14040:2009-11 Environmental management - Life cycle assessment - Principles and framework
EN ISO 14044	EN ISO 14044:2006-10 Environmental management - Life cycle assessment - Requirements and guidelines
PCR 2019:14	PCR 2019:14: Construction products, version 1.3.4, environdec.
NMD Determination method	NMD Determination method Environmental performance Construction works v1.1 March 2022, foundation NMD
NMD waste regulations	Forfaitaire waarden voor verwerking-scenario's einde leven behorende bij: Bepalingsmethode Milieuprestatie Bouwwerken, Version: May 2022.
IBU PART A	PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2023

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