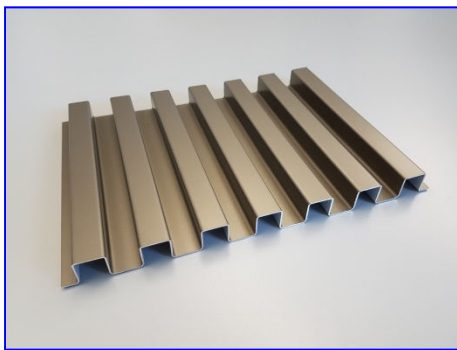


Environmental Product Declaration



Declaration Code: EPD-MNF-GB-41.0



MN Metall GmbH

External and internal wall claddings

Façade claddings



Basis:

DIN EN ISO 14025
EN15804

Company EPD
Environmental
Product Declaration

Publication date:
01.12.2020

Next revision:
01.12.2025



[www.ift-rosenheim.de/
published EPDs](http://www.ift-rosenheim.de/published-EPDs)

Environmental Product Declaration



Declaration Code: EPD-MNF-GB-41.0

Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim		
Practitioner of the LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim		
Declaration holder	MN Metall GmbH Industrieweg 34 23730 Neustadt		
Declaration code	EPD-MNF-GB-41.0		
Designation of declared product	Façade claddings		
Scope	Façade cladding for ventilated curtain wall (VCW).		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A1:2013. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) applies. The Declaration is based on the PCR documents "PCR Part A" PCR-A-0.2:2018 and "Façades and roofs made of glass and plastic" PCR-FA-3.1:2018.		
Validity	Publication date: 01.12.2020	Last revision: 14.10.2021	Next revision: 01.12.2025
	This verified Company Environmental Product Declaration (company EPD) applies solely to the specified products and is valid for a period of five years from the date of publication in accordance with DIN EN 15804.		
LCA basis	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The base data includes both the data collected at the production site of MN Metall GmbH and the generic data derived from the "GaBi 10" database. LCA calculations were carried out for the included "cradle to grave" life cycle including all upstream chains (e.g. raw material extraction, etc.).		
Notes	The "Conditions and Guidance on the Use of ift Test Documents" apply. The declaration holder assumes full liability for the underlying data, certificates and verifications.		

Christian Kehrer
Head of Certification and Surveillance Body

Dr. Torsten Mielecke
Chairman of Expert Committee
ift-EPD and PCR

Patrick Wortner
External verifier

1 General product information

Product definition

The EPD relates to the product group "External and internal wall claddings" and applies to:

1 m² and mm of façade cladding made by MN Metall GmbH.

The functional unit is obtained as follows:

Assessed product	Product weight	Weight per unit area	Product thickness
Façade cladding	1 kg	5.05 kg/m ²	1 mm

Table 1: Product group

As the façade claddings are deformed metal sheets and not composed building components like the usual façade in the meaning of EN 13830, the annual quantities were specified as functional units instead of the reference surface area according to EN 13830.

The average unit is declared as follows:

Directly used material flows are determined using the masses produced (kg) and assigned to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since no typical functional unit was available due to the great diversity of variants. The reference period is the year 2019.

The validity of the EPD is restricted to the following profiles:

- wellTEC® Group W (corrugated profiled sheet)
- wellTEC® Group S (special profiled sheet; SP, SQ, SR, ST, SW, SZ)
- wellTEC® Group Z (profiled zigzag sheet)
- wellTEC® Group T (profiled trapezoidal sheet)
- colTEC®
- planTEC® (embossed sheet)

Made of the following metals:

- aluminium
- steel
- stainless steel
- copper
- brass
- zinc

The EPD does NOT apply to:

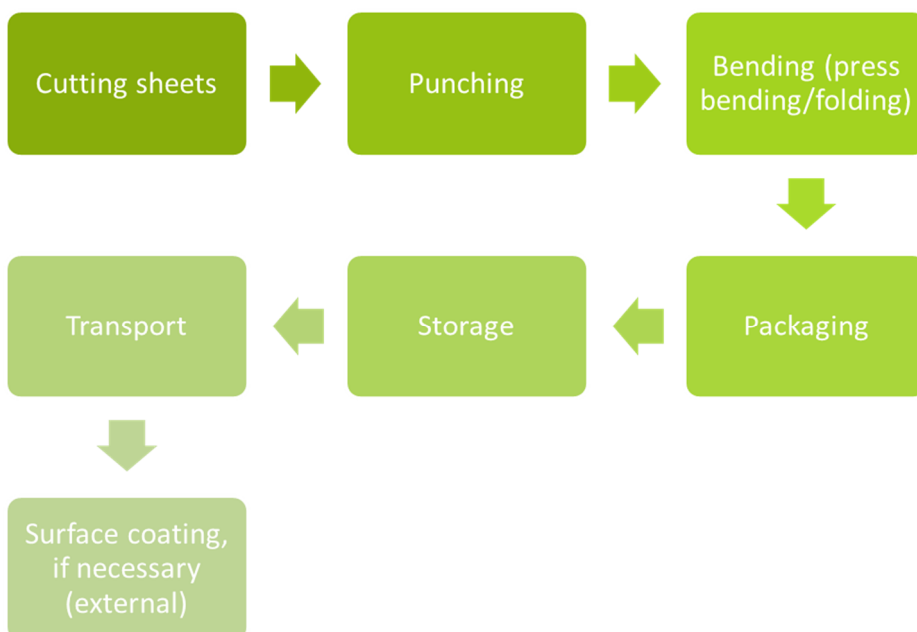
- façade claddings with interlayers

Product description

Multi-metal façade claddings of the wellTEC®, planTEC® and colTEC® brands in different designs. Customised to the client's requirements by mechanical press bending, folding and deep drawing. Sheet metal thickness options from 0.5 to 3.00 mm or on request.

For a detailed product description refer to the manufacturer specifications or the product specifications of the respective offer/quotation.

Product manufacture



Applications

Façade cladding sheets made of different materials in different designs for ventilated curtain walls for office buildings, production halls, schools, kindergartens and private homes.

Verifications

The following verifications are held:

- product quality to EN 14782:2006

For further and updated verifications (incl. other national approvals) refer to www.mn-metall.de.

Management systems

The following management systems are in place:

- quality management system to DIN EN ISO 9001:2015

Additional information

For additional verification of applicability or conformity, if applicable, please refer to the documents accompanying the product.

2 Materials used

Primary materials

The primary materials used are listed in the LCA (see Section 7).

Declarable substances

The product contains no substances from the REACH candidate list (declaration dated 03 September 2020).

All relevant safety data sheets can be requested from MN Metall GmbH .



3 Construction process stage

Processing recommendations, installation

Observe the instructions for assembly/installation, operation, maintenance and disassembly, provided by the manufacturer. See www.mn-metall.de.

4 Use stage

Emissions to the environment

No emissions to indoor air, water and soil are known. There may be VOC emissions.

Reference service life (RSL)

The RSL information was provided by the manufacturer. The RSL refers to the declared technical and functional performance of the product within the building. It shall be established in accordance with specific rules set out in the European product standards and shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards provide guidance on determining RSL, such guidance shall have priority. If it is not possible to determine the service life as the RSL in accordance with ISO 15686, the BBSR table "Nutzungsdauer von Bauteilen zur Lebenszyklusanalyse nach BNB" (service life of building components for life cycle assessment in accordance with the sustainable construction evaluation system) can be used. For further information and explanations refer to www.nachhaltigesbauen.de.

For this EPD the following applies:

The reference service life (RSL) can be determined for a "cradle to gate with options" EPD only if all of the Modules A1-A3 and B1-B5 are specified; According to the BBSR table, the Façade claddings manufactured by MN Metall GmbH have a service life of >50 years.

The service life is dependent on the characteristics of the product and in-use conditions. The characteristics described in the EPD are applicable.

Specification of the reference conditions is based on the following manufacturer-specific product characteristics:

Parameters	Unit
Declared product characteristics (at gate) and information on details, etc.	The façade cladding made of different metals is supplied in customised dimensions and designs, with or without customised surface coating.
Parameters for the intended use, including instructions for appropriate use and directions for use.	The façade claddings are delivered fully prepared for installation and must be used for ventilated curtain walls (VCW).
Assumed quality of work if applied in accordance with the manufacturer instructions	Installation depends on the substructure and installation conditions and is in line with state of the art.
Outdoor environment (external application)	Certain impacts, e.g. exceptional weather conditions such as hail and mechanical damage, may have a negative effect.



	Standard weather conditions such as rain, solar irradiation and wind as well as temperature and fire do not have an effect because they are included in the design and planning of the installation.
Indoor environment (internal application)	No impacts known that may have a negative effect.
In-use conditions	The condition of use of the façade cladding is dependent on the previous processing steps carried out by the metal working and installation companies. Products used according to the intended use are not expected to exhibit any changes to their material composition during processing or use.
Inspection, maintenance, cleaning	The use stage is detailed in the descriptions of the life cycle scenarios.

Table 2: Reference service life (EN 15804+A1, Table 10)

The service life solely applies to the characteristics specified in this EPD or the corresponding references.

The reference service life (RSL) does not reflect the actual life span, which is usually determined by the service life and the refurbishment of a building. It does not give any information on the useful life, warranty referring to performance characteristics or guarantees.

5 End-of-life stage

Possible end-of-life stages

The Façade claddings are shipped to central collection points. There the products are usually shredded and sorted into their original constituents. The end-of-life stage depends on the site where the products are used and is therefore subject to the local regulations. Observe the locally applicable regulatory requirements.

This EPD shows the end-of-life modules according to the market situation. Specific metal parts are recycled. Residual fractions are sent to landfill.

Disposal routes

The LCA includes the average disposal routes.

All life cycle scenarios are detailed in the Annex.

6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle assessments (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

A life cycle assessment has been developed as the basis for Façade claddings. This LCA is in conformity with DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

The LCA is representative of the products presented in the Declaration and the specified reference period.

6.1 Definition of goal and scope

Goal

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. No other additional environmental impacts are specified.

Data quality, data availability and geographical and time-related system boundaries

The specific data originate exclusively from the 2019 fiscal year. They were collected by the manufacturer on-site at the plant located in 23730 Neustadt and originate in parts from company records and values directly obtained by measurement. Validity of the data was checked by the ift Rosenheim.

The generic data originate from the "GaBi ts" professional and construction materials databases. The last update of both databases was in 2020. Data from before this date originate also from these databases and are not more than 4 years old. No other generic data were used for the calculation.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1% rule.

The life cycle was modelled using the sustainability software tool "GaBi 10" for the development of Life Cycle Assessments.

Scope / system boundaries

The system boundaries refer to the supply of raw materials and purchased parts, manufacture/production, use and end-of-life stage of the Façade claddings.

Additional specific data for the manufacture of the products are included from "Gesamtverband der Aluminiumindustrie e.V. (GDA)" (Confederation of the Aluminium Industry).

Cut-off criteria

All company data collected, i.e. all commodities/input and raw materials used, the thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the product-relevant data. Building sections/parts of facilities that are not relevant to the manufacture of the products, were excluded.

The transport distances of the raw materials and packaging were taken into consideration as a function of 100% of the mass of the product.

The criteria for the exclusion of inputs and outputs as set out in DIN EN 15804 are fulfilled. From the data analysis it can be assumed that the total of negligible processes per life cycle stage does not exceed 1% of the mass/primary energy. This way the total of negligible processes does not exceed 5% of the energy and mass input. The life cycle calculation also includes material and energy flows that account for less than 1%.

6.2 Inventory analysis

Goal

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared/functional units.

Life cycle stages

The entire life cycle of Façade claddings is shown in the Annex. The product stage "A1 – A3", construction process stage "A4 – A5", use stage "B2 – B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" were taken into consideration.

Benefits

The below benefits have been defined as per DIN EN 15804:

- benefits from recycling
- benefits (thermal and electrical) from incineration

Allocation of co-products

The manufacture of the product does not produce any allocations.

Allocations for re-use, recycling and recovery

If the products are reused/recycled and recovered during the product stage (rejects), the elements are shredded, if necessary and then sorted into their original constituents. This is done by various process plants, e.g. magnetic separators.

The system boundaries were set following their disposal, reaching the end-of-waste status.

Allocations beyond life cycle boundaries

Use of recycled materials in the manufacturing process was based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate) .

The system boundary set for the recycled material refers to collection.

Secondary material

The use of secondary materials by the company MN Metall GmbH was considered in Module A3. Secondary material is not used.

Inputs

The LCA includes the following production-relevant inputs per 1 m² and mm of façade cladding:

Energy

The gas input material is based on “Thermische Energie aus Erdgas Deutschland” (thermal energy from natural gas Germany). The electricity mix is based on “Strommix MN Metall” (MN metal electricity mix).

Electricity disclosure of energy supplier	Shares in %
Renewable energies	55.1
Natural gas	8.0
Coal	19.1
Other fossil resources	0.9
Nuclear energy	6.2

Table 3: "MN Metal" electricity mix

A portion of the process heat is used for space heating. This can, however, not be quantified, hence a “worst case” figure was taken into account for the product.

Water

The water consumed by the individual process steps for the production amounts to a total of 2.96E-03 l per 1 m² of the element.

The consumption of fresh water specified in Section 6.3 originates (among others) from the process chain of the pre-products and the process water for cooling.

Raw material / pre-products

The chart below shows the share of raw materials/pre-products in percent.

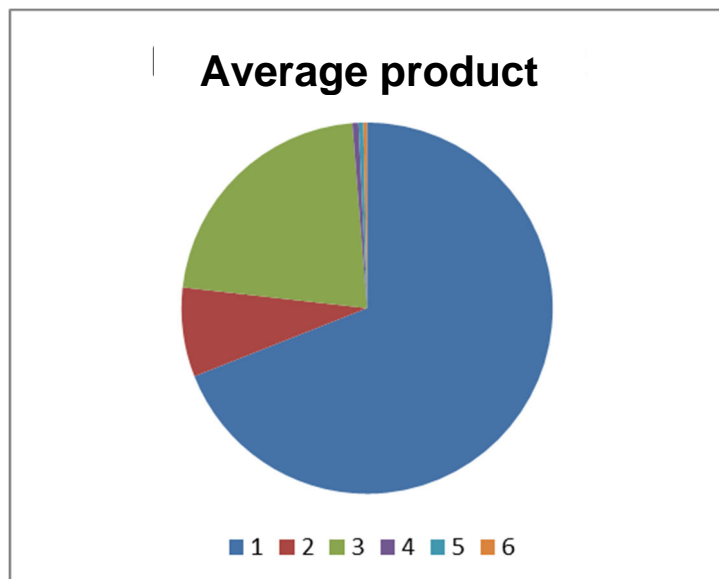


Figure 1: Percentage of individual materials per declared unit

No.	Material	Mass in %
1	Aluminium	69.0
2	Steel	7.8
3	Stainless steel	21,
4	Zinc	0.5
5	Copper	0.4
6	Brass	0.3

Table 4: Percentage of individual materials per declared unit

Ancillary materials and consumables

0.32 kg of ancillary materials and consumables are used.

Product packaging

The amounts used for product packaging are as follows:

No.	Material	Mass in kg
1	Plastics	5.43E-02
2	Wood	2.79
3	Cardboard	3.45E-04

Table 5: Weight in kg of packaging per declared unit

Outputs

The LCA includes the following production-relevant outputs per 1 m² and mm of façade cladding:

Waste

Secondary raw materials were included in the benefits. See Section 6.3 Impact assessment.

Waste water

The manufacture produces 2.96E-03 l of waste water.

6.3 Impact assessment

Goal

The impact assessment covers both inputs and outputs. The impact categories applied are named below:

Impact categories

The models for impact assessment were applied as described in DIN EN 15804-A1.

The impact categories presented in the EPD are as follows:

- depletion of abiotic resources (fossil fuels);
- depletion of abiotic resources (mineral substances);
- acidification of soil and water;
- ozone depletion;
- global warming;
- eutrophication;
- photochemical ozone creation.



Waste

The waste generated during the production of 1 m² and mm of façade cladding is evaluated and shown separately for the fractions trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.



Results per 1 m² and mm of façade cladding

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Central environmental impacts																
GWP	kg CO ₂ eq.	17.70	5.12E-02	5.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.27E-02	5.45E-02	3.11E-03	-21.70
ODP	kg CFC -11 eq.	3.33E-10	8.97E-18	8.99E-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.74E-18	1.76E-15	1.70E-17	-1.04E-13
AP	kg SO ₂ eq.	0.10	2.00E-04	4.90E-04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28E-04	1.07E-04	1.87E-05	-8.99E-02
EP	kg PO ₄ ³⁻ eq.	7.03E-03	5.08E-05	1.06E-04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.25E-05	1.26E-05	2.13E-06	-5.33E-03
POCP	kg ethene eq.	6.36E-03	-7.64E-05	4.09E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4.89E-05	7.78E-06	1.43E-06	-5.16E-03
ADPE	kg Sb eq.	4.85E-04	4.49E-09	4.89E-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.87E-09	1.84E-08	1.14E-09	-1.78E-04
ADPF	MJ	272.00	0.70	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.61	4.24E-02	-249.00
Use of resources																
PERE	MJ	224.00	3.91E-02	44.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50E-02	0.45	5.86E-03	-112.00
PERM	MJ	44.60	0.00	-44.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	268.00	3.91E-02	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50E-02	0.45	5.86E-03	-112.00
PENRE	MJ	539.00	0.70	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.98	4.36E-02	-292.00
PENRM	MJ	1.11	0.00	-1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	540.00	0.70	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.98	4.36E-02	-292.00
SM	kg	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m ³	-0.04	4.48E-05	1.26E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.87E-05	4.41E-04	1.07E-05	-0.27
Waste categories																
HWD	kg	5.93E-08	3.54E-11	2.02E-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.26E-11	2.60E-10	4.62E-12	-3.47E-08
NHWD	kg	-1.28	1.04E-04	3.69E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.67E-05	6.97E-04	0.22	-5.21
RWD	kg	-4.95E-03	8.49E-07	6.20E-05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.43E-07	1.46E-04	4.57E-07	-1.67E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	7.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EET	MJ	0.00	0.00	13.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Key:

GWP – global warming potential ODP – ozone depletion potential AP - acidification potential EP - eutrophication potential POCP - photochemical ozone formation potential ADPE - abiotic depletion potential – non-fossil resources ADPF - abiotic depletion potential – fossil resources PERE - Use of renewable primary energy PERM - use of renewable primary energy resources PERT - total use of renewable primary energy resources PENRE - use of non-renewable primary energy PENRM - use of non-renewable primary energy resources 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 - net use of fresh water 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 EET - exported thermal energy

Product group: External and internal wall claddings

The environmental impacts of the profile highlighted in yellow were calculated per 1 m² and mm.

The relevant values of all the other listed profile types can be calculated using the factor and environmental impacts specified above.

A calculation example is given below:

Model calculation:

Selected product

W-4/10 profile:

Factor: 0.652

GWP A1- A3 for 1 m² and mm

198.40 kg CO₂ eq.

= 198.40 kg CO₂ eq. * 0.652 = 129.357 kg CO₂ eq.

GWP for W-4/10 = 129.357 kg CO₂ eq. / m² and mm

The precise weights per unit area and the conversion factors for additional profiles can be requested directly from the manufacturer at: info@mn-metall.de

wellTEC	Thickness in mm	kg/m ² façade	Factor
W-4/10	1	3,294	0,652
W-6/15	1	3,475	0,688
W-6/32	1	2,865	0,567
W-8/25	1	3,216	0,637
W-8/120	1	2,722	0,539
W-10/60	1	2,843	0,563
W-15/40	1	3,402	0,674
W-18/76	1	3,062	0,606
W-20/40	1	3,910	0,774
W-20/50	1	3,483	0,690
W-20/80	1	3,105	0,615
W-27/100	1	3,065	0,607
W-27/111	1	3,162	0,626
W-30/135	1	2,981	0,590
W-40/125	1	3,108	0,616
W-45/60	1	4,801	0,951
W-45/129	1	3,256	0,645
W-45/150	1	3,694	0,732
W-48/100	1	3,259	0,645

T-2,5/82	1	2,716	0,538
T-10/30	1	3,429	0,679
T-15/45	1	3,429	0,679
T-20/60	1	3,529	0,699
T-25/75	1	3,556	0,704
T-26/167	1	3,008	0,596
T-50/150	1	3,734	0,740
T-100/275	1	3,740	0,741

Z-10/30	1	3,186	0,631
Z-13/26	1	3,799	0,752
Z-15/45	1	3,205	0,635
Z-20/40	1	3,775	0,748
Z-20/60	1	3,308	0,655
Z-25/80	1	3,197	0,633
Z-50/120	1	3,615	0,716

SQ-5/5-R10	1	4,401	0,872
SQ-12/12-R24	1	4,725	0,936
SQ-20/20-R40	1	5,049	1,000
SQ-23/23-R46	1	4,965	0,983
SQ-30/30-R60	1	5,130	1,016

SR-15/22-R57	1	3,505	0,694
SR-15/40-R60	1	3,286	0,651

SP1-40/50-R100	1	5,009	0,992
SP2-40/50-R100	1	4,023	0,797
SP3-50/60-R100	1	3,942	0,781



6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of the manufacture of the façade claddings result mainly from the use of the aluminium and stainless steel and their upstream chains. In addition, the environmental impacts result mainly from energy supply and the use of steel and the respective upstream chains.

For scenario C4 only marginal consumptions arising from the physical pre-treatment and management of the disposal site are expected. Allocation to individual products is almost impossible for site disposal.

As regards the recycling of the product, approx. 21% of the environmental impacts of the metals can be assigned as benefits to scenario D.

The chart below shows the allocation of the main environmental impacts.

The values obtained from the LCA calculation are suitable for building certification.

Chart

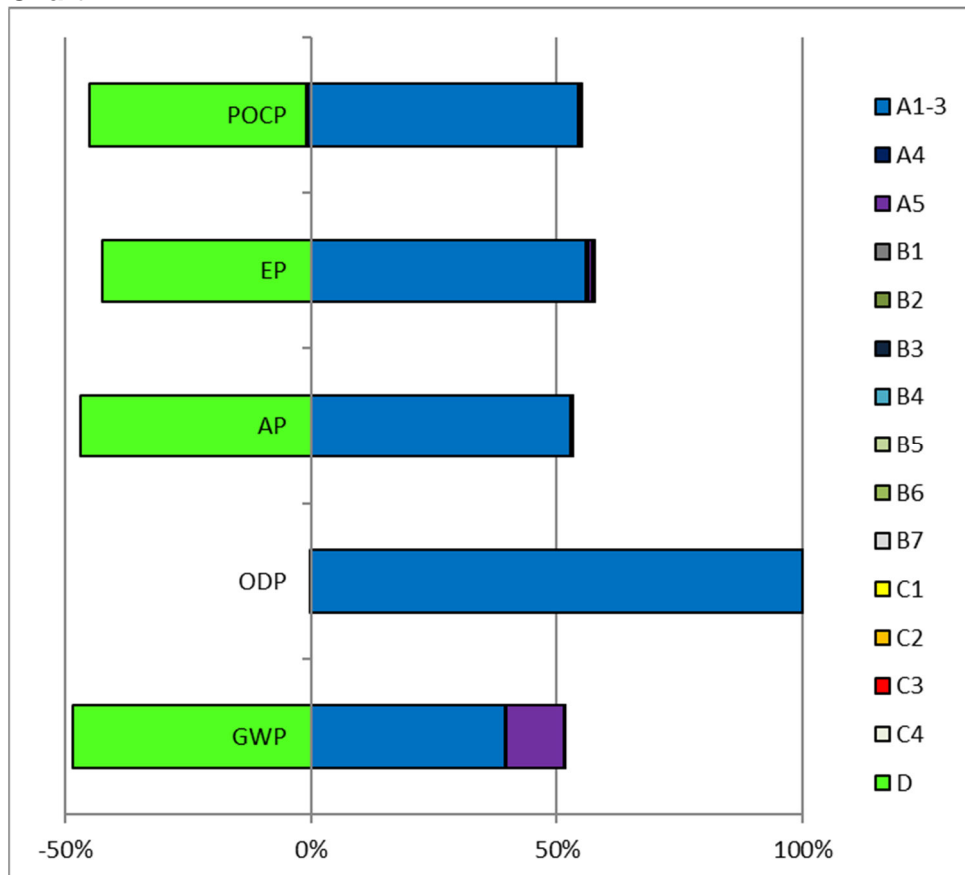


Figure 2: Percentage of the modules for selected environmental impact categories



Product group: External and internal wall claddings

Report

The LCA underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as DIN EN 15804 and DIN EN ISO 14025. It is not addressed to third parties for reasons of confidentiality. It is deposited with the ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.

Critical review

The critical review of the LCA and of the report took place in the course of verification of the EPD and was carried out by Patrick Wortner, MBA and Eng., Dipl.-Ing. (FH), an external verifier.

7 General information regarding the EPD

Comparability

This EPD was prepared in accordance with DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804.

Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.

For comparing EPDs of construction products, the rules set out in DIN EN 15804 (Clause 5.3) apply.

Communication

The communications format of this EPD meets the requirements of EN 15942:2012 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to DIN EN 15804.

Verification

Verification of the Environmental Product Declaration is documented in accordance with the ift "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in DIN EN ISO 14025.

The Declaration is based on the PCR documents "PCR Part A" PCR-A-0.2-0.2:2018 and "Façades and roofs made of glass and plastic" PCR-FA-3.1:2018.

The European standard EN 15804 serves as the core PCR ^{a)}
Independent verification of the Declaration and statement according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Independent third party verifier: ^{b)} Patrick Wortner
^{a)} Product category rules ^{b)} Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)



Revisions of this document

No.	Date	Note:	Practitioner of the LCA	Verifier
1	01.12.2020	External Verification	Zwick	Wortner
2	13.10.2021	Review	Hilz	Wortner

8 Bibliography

1. **Research project. "EPDs für transparente Bauelemente" (EPDs for transparent building components) -Final report.** Rosenheim : ift Rosenheim GmbH, 2011 SF-10.08.18.7-09.21/II 3-F20-09-1-067.
2. **Klöpffer, W und Grahl, B. Ökobilanzen (LCA).** Weinheim: Wiley-VCH-Verlag, 2009.
3. **Eyerer, P. und Reinhardt, H.-W. Ökologische Bilanzierung von Baustoffen und Gebäuden - Wege zu einer ganzheitlichen Bilanzierung. (LCA of building materials and buildings - Routes to integrated LCA).** Basel: Birkhäuser Verlag, 2000.
4. **Gefahrstoffverordnung – GefStoffV (Hazardous substances regulation) Verordnung zum Schutz vor Gefahrstoffen (Regulation on protection against hazardous substances),** Berlin: BGBl. (Federal Gazette) I S. 3758, 2017.
5. **Chemikalien-Verbotsverordnung – ChemVerbotsV (Chemicals Prohibition Regulation) Verordnung über Verbote und Beschränkungen des Inverkehrbringens gefährlicher Stoffe, Zubereitungen und Erzeugnisse Chemikaliengesetz (Regulation on bans and restrictions of the placing on the market of hazardous substances, formulations and products covered by the Chemicals Law),** Berlin: BGBl. (Federal Gazette) I S. 1328, 2017.
6. **DIN EN ISO 14040:2018-05. Environmental management - Life cycle assessment - Principles and framework.** Berlin: Beuth Verlag GmbH, 2018.
7. **DIN EN ISO 14044:2006-10. Environmental management - Life cycle assessment - Requirements and guidelines..** Berlin: Beuth Verlag GmbH, 2006.
8. **EN ISO 14025:2011-10. Umweltkennzeichnungen und -deklarationen Typ III Umweltdeklarationen - Grundsätze und Verfahren.(Environmental labels and declarations - Type III environmental declarations - Principles and procedures)** Berlin: Beuth Verlag GmbH, 2011.
9. **OENORM S 5200:2009-04-01 Radioactivity in construction materials.** Berlin: Beuth Verlag GmbH, 2009.
10. **PCR Part B - Façades and roofs made of glass and plastic. Product category rules for environmental product declarations as per EN ISO 14025 and EN 15804** Rosenheim: ift Rosenheim, 2018
11. **EN 15942:2012-01. Sustainability of construction works - Environmental product declarations - Communication format business-to-business.** Berlin: Beuth Verlag GmbH, 2012.
12. **EN 15804:2012+A1:2013. Sustainability of construction works - Environmental product declarations - Rules for the product categories.** Berlin: Beuth Verlag GmbH, 2013.
13. **Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) Berlin, Leitfaden Nachhaltiges Bauen (Guidance on Sustainable Building)** Berlin: s.n., 2016.
14. **DIN EN ISO 16000 Part 6, 9 11 Indoor air: Determination of the emission of volatile organic compounds from building products and furnishing** Berlin: Beuth Verlag GmbH, 2012, 2008, 2006.
15. **ISO 21930:2017-07. Sustainability in building construction - Environmental declaration of building products** Berlin: Beuth Verlag, 2017.
16. **Bundesimmissionsschutzgesetz – BImSchG (Federal Immission Law) Gesetz zum Schutz vor schädlichen Umwelt-**
einwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnlichen Vorgängen (Law on harmful environmental impacts by air contamination, noise, vibrations and similar processes. Berlin: BGBl. (Federal Gazette) I S. 3830, 2017.
17. **Chemikaliengesetz – ChemG (Chemicals Act Chemikaliengesetz – ChemG (Chemicals Act) Gesetz zum Schutz vor gefährlichen Stoffen Unterteilt sich in Chemikaliengesetz und eine Reihe von Verordnungen; hier relevant (Law on protection against hazardous substances - Subdivided into Chemicals Law and a series of regulations; of relevance here): Gesetz zum Schutz vor gefährlichen Stoffen (Law on protection against hazardous substances)** Berlin: BGBl. (Federal Gazette) I S. 1146, 2017.
18. **IKP Universität Stuttgart and PE Europe GmbH GaBi 8: Software and database for LCA.** Leinfelden-Echterdingen: s.n, 2017
19. **Lumitos AG. chemie.de. List of densities of gaseous substances.** [Online] 2020. [Quotation from: 29 October 2020.] https://www.chemie.de/lexikon/Liste_der_Dichte_gasf%C3%B6rmiger_Stoffe.html.
20. **DIN EN ISO 12457 Part 1-4 Characterization of waste - Leaching; Compliance test for leaching of granular waste materials and sludges - Part 1-4:** Berlin: Beuth Verlag GmbH, 2003.
21. **ift-Guideline NA-01/3. Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen (Guidance on preparing Type III Environmental Product Declarations)** Rosenheim : ift Rosenheim GmbH, 2015
22. **PCR Part A. Product category rules for environmental product declarations as per EN ISO 14025 and EN 15804.** Rosenheim: ift Rosenheim, 2018



9 Annex

Description of life cycle scenarios for Façade claddings

Product stage			Construction stage		Use stage							End-of-life stage				Benefits and loads from beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/Installation	Use	Inspection, maintenance, cleaning	Repair	Exchange / Replacement	Improvement / Modernisation	Operational energy use	Operational water use	Deconstruction	Transport	Waste management	Disposal	Re-use Recovery Recycling potential
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Calculation of the scenarios was based on a building service life of 50 years (in accordance with RSL of Section 4 Use stage).

The scenarios were based on information provided by the manufacturer. The scenarios were furthermore based on the research project “EPDs for transparent building components (1).

Note: The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

- ✓ Included in the LCA
- Not included in the LCA

A4 Transport to the construction site				
No.	Scenario	Description		
A4	Direct shipment to construction site/branch	28-40 t truck (Euro 4), 22 t payload, 85% capacity used, approx. 150 km and empty return Weight: 7.89 kg/m ² and volume: 1 mm ² x 1 mm thickness/m ²		
Since only one scenario is used, the results are shown in the relevant summary table.				
A5 Construction/Installation				
No.	Scenario	Description		
A5.1	Manually	According to the manufacturer the products are installed without additional lifting and auxiliary devices No surface coating		
A5.2	Manually, powder coating	According to the manufacturer the elements are installed without additional lifting and auxiliary devices With powder coating		
A5.3	Manually, anodised coating	According to the manufacturer the elements are installed without additional lifting and auxiliary devices With anodised coating		
In case of deviating consumption during installation/assembly of the products which forms part of the site management, they are covered at the building level.				
Ancillary materials, consumables, use of water, material losses and waste as well as transport distances during installation are negligible.				
It is assumed that the packaging material in the Module construction / installation is sent to waste handling. Waste is only thermally recycled in line with the conservative approach. Transport to the recycling plants is not taken into account.				
Benefits from A5 are specified in Module D. Benefits from waste incineration: electricity replace (EU 28) electricity mix; thermal energy replaces thermal energy from (EU 28) natural gas.				
A5 Construction/Installation	Unit	A5.1	A5.2	A5.3
Central environmental impacts				
GWP	kg CO ₂ eq.	0.00	3.48	2.87
ODP	kg R11 eq.	0.00	6.29E-14	7.43E-14
AP	kg SO ₂ eq.	0.00	1.58E-02	4.36E-03
EP	kg PO ₄ ³⁻ eq.	0.00	1.67E-03	1.00E-03
POCP	kg C ₂ H ₄ eq.	0.00	7.61E-04	3.18E-04
ADPE	kg Sb eq.	0.00	2.35E-06	2.43E-06
ADPF	MJ	0.00	49.16	37.26
Use of resources				
PERE	MJ	0.00	11.18	13.05
PERM	MJ	0.00	0.00	0.00
PERT	MJ	0.00	11.18	13.05
PENRE	MJ	0.00	53.38	42.04
PENRM	MJ	0.00	0.00	0.00
PENRT	MJ	0.00	53.38	42.04

SM	kg	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00
FW	m ³	0.00	1.10E-02	8.87E-03
Waste categories				
HWD	kg	0.00	3.23E-08	2.93E-08
NHWD	kg	0.00	0.32	0.13
RWD	kg	0.00	1.67E-03	1.90E-03
Output material flows				
CRU	kg	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00
EEE	MJ	0.00	0.00	0.00
EET	MJ	0.00	0.00	0.00

B1 Use (not relevant)

Refer to Section 5 Use stage - Emissions to the environment. Emissions cannot be quantified.

B2 Inspection, maintenance/servicing, cleaning (not relevant)**B2.1 Cleaning (not relevant)**

According to the manufacturer, cleaning of the elements is not anticipated.

For information regarding reconditioning/upgrade/refurbishment refer to „Anleitung für Montage, Betrieb und Wartung“ (instructions for assembly/installation, operation and maintenance) by the manufacturer.

Ancillary materials, consumables, use of energy and water, material losses and waste as well as transport distances during cleaning are negligible.

Since only one scenario is used, the results are shown in the summary table.

B2.2 Maintenance (not relevant)

According to the manufacturer, maintenance of the elements is not anticipated.

For information regarding reconditioning/upgrade/refurbishment refer to „Anleitung für Montage, Betrieb und Wartung“ (instructions for assembly/installation, operation and maintenance) by the manufacturer.

Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during maintenance are negligible.

Since only one scenario is used, the results are shown in the summary table.

B3 Repair (not relevant)

According to the manufacturer, repair of the elements is not anticipated.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from MN Metall GmbH .



Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during repair are negligible.

B4 Interchange / replacement (not relevant)

No.	Scenario	Description
B4.1	Normal and heavy use	<p>It is assumed that no replacement will be necessary during the 50-year service life according to the BBSR Table and the 50-year building service life.</p> <p>Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances during replacement are negligible.</p>
B4.2	Extraordinary use	<p>One replacement over a 50-year period*.</p> <p>The environmental impacts of the selected scenario originate from the product, construction and disposal phases (A+ C+ D Modules).</p> <p>Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances are taken into account.</p>

* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of performance.

The statements made in this EPD are only informative to allow evaluation at the building level.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from MN Metall GmbH .

B5 Improvement / modernisation (not relevant)

According to the manufacturer, improvement/modernisation of the products are is not anticipated.

For updated information refer to the relevant instructions for assembly/installation, operation and maintenance from MN Metall GmbH .

Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances during replacement are negligible.

Since only one scenario is used, the results are shown in the relevant summary table.

B6 Operational energy use use (not relevant)

There is no energy used during normal use.

There is no transport consumption for the use of energy in buildings. Ancillary materials, consumables and water, waste materials and other scenarios are negligible.

Since only one scenario is used, the results are shown in the relevant summary table.

B7 Operational water use (not relevant)

No water consumption when used as intended. Water consumption for cleaning is specified in Module B2.1.

There is no transport consumption for the use of water in buildings. Ancillary materials, consumables, waste materials and other scenarios are negligible.

Since only one scenario is used, the results are shown in the relevant summary table.

C1 Deconstruction

No.	Scenario	Description
C1	Deconstruction	100% deconstruction; Further deconstruction rates are possible, give adequate reasons.

No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible.

In case of deviating consumption the removal of the products forms part of the site management and is covered at the building level.

Since only one scenario is used, the results are shown in the summary table.

C2 Transport

No.	Scenario	Description
C2	Transport	Transport to collection point using 28-40 t truck (Euro 4), 22t payload, 80% capacity used 50 km

Since only one scenario is used, the results are shown in the summary table.

C3 Waste management

No.	Scenario	Description
C3	Disposal	Share for recirculation of materials: <ul style="list-style-type: none"> • steel 98% in melt (UBA, 2017) • aluminium 95% in melt (GDA, 2018) • remaining metals 97% in melt (UBA, 2017) • remainder to landfill

As the products are placed on the European market, the disposal scenario is based on average European data sets.

The below table presents the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned shares in percent related to the declared unit of the product system.



Product group: External and internal wall claddings

C3 Disposal	Unit	C3
Collection process, collected separately	kg	5.05
Collection process, collected as mixed construction waste	kg	0.00
Recovery system, for re-use	kg	0.00
Recovery system, for recycling	kg	4.83
Recovery system, for energy recovery	kg	0.00
Disposal	kg	0.22

Since only one scenario is used, the results are shown in the summary table.

C4 Disposal

No.	Scenario	Description
C4	Disposal	The non-recordable amounts and losses within the re-use/recycling chain (C1 and C3) are modelled as “disposed”.

The consumption in scenario C4 results from physical pre-treatment, waste recycling and management of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to Module D, e.g. electricity and heat from waste incineration.

Since only one scenario is used, the results are shown in the summary table.

D Benefits and loads from beyond the system boundaries

No.	Scenario	Description
D	Recycling potential	Aluminium recyclate from C3 excluding the recyclate used in A3 replaces 60% of aluminium compound; Steel scrap from C3 excluding the scrap used in A3 replaces 60% of steel; Stainless steel scrap from C3 excluding the scrap used in A3 replaces 60% of stainless steel; Benefits from waste incineration: electricity replaces (EU 28) electricity mix; thermal energy replaces thermal energy from (EU 28) European natural gas.

The values in Module D result from recycling of the packaging material in Module A5 and from deconstruction at the end of service life.

Since only one scenario is used, the results are shown in the summary table.

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Notes

This EPD is mainly based on the work and findings of the Institut für Fenstertechnik e.V., Rosenheim (ift Rosenheim) and specifically on the ift-Richtlinie NA-01/3 Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen. (Guideline NA.01/3 - Guidance on preparing Type III Environmental Product Declarations)

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