

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804


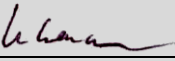

Owner of the Declaration	IFBS
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Profiled sheets made of aluminium for roof, wall and deck constructions IFBS

www.bau-umwelt.com



1. General Information

<p>IFBS</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin</p> <hr/> <p>Declaration number EPD-IFBS-2013111-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Thin walled profiles and profiled panels of metal, 19.07.2012 (PCR tested and approved by the independent expert committee (SVA))</p> <hr/> <p>Issue date 14.01.2013</p> <hr/> <p>Valid to 13.01.2018</p> <hr/> <p> Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p> Prof. Dr.-Ing. Hans-Wolf Reinhardt (Chairman of SVA)</p>	<p>Profiled sheets made of aluminium for roof, wall and deck constructions</p> <hr/> <p>Owner of the Declaration IFBS Europark Fichtenhain A 13a 47807 Krefeld</p> <hr/> <p>Declared product / Declared unit 1m² industrially produced trapezoidal profiles and folded profiles made of aluminium</p> <hr/> <p>Scope: The applicability of this document is restricted to profiled sheets made of aluminium produced by member companies of IFBS. Data has been provided by 6 member companies of IFBS for the year 2011. These companies represent 75% to 100% of IFBS members manufacturing aluminium profiles. Production volume of these companies contributes more than 90% to the German market. The owner of the declaration shall be liable for the underlying information and evidence.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The CEN Norm EN 15804 serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to ISO 14025</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p> Olivier Muller (Independent tester appointed by SVA)</p>	The CEN Norm EN 15804 serves as the core PCR		Independent verification of the declaration and data according to ISO 14025		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
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<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally						

2. Product

2.1 Product description

Prefabricated thin walled profiled sheets made of aluminium for self-supporting and non-supporting application in single- and double-layer roof, wall and ceiling structures.

The profiled sheets are made of a core of aluminium with organic coatings. The LCA is based on vertical averaging of the specific producer datasets under consideration of the respective yearly production amounts.

2.2 Application

Application as covering component in single- and double-layer roof and wall structures, as well as for the use in single- and double-layer roof and ceiling structures for mainly static loads.

The profiled sheets are used in interior and exterior application.

2.3 Technical Data

Technical specification for profiled sheets are given in:

- DIN 18807-6 to 9
- DIN EN 508-2

- DIN EN 1090-3

Constructional data

Trapezoidal profile 35/207	Value	Unit
Thickness of the sheet, according DIN 18807 or DIN EN 508	0.7	mm
Height of the profile, according DIN 18807 or DIN EN 508	35	mm
Surface weight	2.3	kg/m ²
Folded profile 65/400	Value	Unit
Thickness of the sheet, according DIN 18807 or DIN EN 508	0,7	mm
Height of the profile, according DIN 18807 or DIN EN 508	65	mm
Surface weight	3.5	kg/m ²

2.4 Placing on the market / Application rules

The placing on the market within the European Union is according to the declared use of the CE sign. The CE sign is based on harmonised European standards, e.g. DIN EN 1090, DIN EN 14782, DIN EN 14783.

Until the ending of the coexisting period of EN 1090, the placing on the market within Germany is still possible according to the label of signify compliance

(German Ü-Zeichen) and the special national regulations and requirements, e. g. DIN 18807.

The use can be load bearing, self-supported or non supported. The usage is declared according to the listed standards.

- DIN 18807-6 to 9: Trapezoidal sheeting in building, trapezoidal steel sheeting
- DIN EN 1090-1&3: Execution of steel structures and aluminium structures
- DIN EN 14782: Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements
- DIN EN 14783: Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements

German General Technical Approvals for folded profiles of the respective manufacturers of the represented manufacturer.

2.5 Delivery status

The profiled sheets will be ordered project-related, produced with the ordered length and delivered project- and object-related.

Order and delivery unit: square metre [m²]

2.6 Base materials / Ancillary materials

No REACH materials included.

Aluminium according

DIN EN 485-2 or **DIN EN 573-3**

Organic coating according

DIN EN 12944-1 (DIN 55634):

Polyester (SP), coil coating, 25 µm on the application side and max. 12 µm on the back side.

2.7 Manufacture

Trapezoidal profiles or folded profiles are profiled in continuously operating rollformer. The profiles are profiled in a cold forming process.

The rollforming process starts on the winch. The profile type is related to a defined number of rolls, the higher the profiles the higher the number of rolls. The profiling process runs inside out, starting in the middle. The process ends in the cutting and stacking zone.

The protection foil will be added adhesive in the beginning of the rollforming process.



Pic. 1: Rollforming of a trapezoidal sheet

2.8 Environment and health during manufacturing

No measures relating to safety, health and environment protection during the manufacturing process extending beyond national guidelines are known.

2.9 Product processing/Installation

The profiled sheets will be dropped of at the intended location on the application site manually or with the aid of lifting equipment or cranes. Prior to the installation the protective film must be removed.

The mounting of the profiled sheets to the substructure and the interconnection with fasteners must refer to the national approval Z-14.1-537 or relevant European technical approvals. The required holes for mounting either pre-drilled or the connecting elements intersect the wellbore during the setting process using drill bits.

Careful planning limit cuts and sheers on the construction site to a minimum. For technical correct construction site cuts shears, electric metal shears, nibbler, special stitch, circular or chain saws or oscillating multi-cutter has to be used. The used blades must be suitable for the use, working without spark or heat. If cuts have to be done with angle grinder or plasma cutters the coil coated surface has to be protected against injury. At risk of corrosion (e. g. outdoor areas), a post-treatment of the cut surfaces is required.

For use in an airtight and heat-insulating building envelope sealant strips according to DIN 18542 and insulation made of polyurethane or mineral wool are in use. There are appropriate EPDs available published by the different manufacturer of insulation and sealant strips.

The IFBS guidelines for lightweight metal construction has to be observed during the design and execution process (www.ifbs.de)

2.10 Packaging

Transport and delivery runs on packaging racks made of wood. The packages will be foiled to avoid damage and dirt. The edges will be contributed with slides made of metal, plastics or wood.

The packages can be handled with stacker or cranes.

Packaging materials shall be collected separately for recycling.

2.11 Condition of use

The substantial composition during the use phase refers to the composition during the manufacture.

2.12 Environment and health during use

Adverse effects emanating from profile sheets of aluminium, are not known.

2.13 Reference service life

The term of protection depends on the location, weather conditions and the quality of the coating, if exists.

Thin walled profiled sheets made of aluminium exhibit an estimated service life of > 50 years. This declaration depends on Life Cycle Assessment and relies on the use conditions.

2.14 Extraordinary effects

Fire

Thin walled profiled sheets made of aluminium correlate to building material class A1, non-flammable according to DIN EN 13501-1.

Fire protection

Name	Value
Building material class according DIN EN 13501	A1

Water

No risks for the environment and living organisms are known under unforeseeable water effects.

Mechanical destruction

No risks for the environment and living organisms are known under unforeseeable mechanical destruction.

2.15 Re-use phase

Thin walled profiled sheets made of aluminium can be collected and recycled after the phase of use.

2.16 Disposal

The disposal code for thin walled profiled sheets made of aluminium, refer to the German List of Wastes Ordinance (/AVV/) and European Waste Catalogue (EWC):

17 04 02 – Aluminium

2.17 Further information

Please find further technical information about products, static calculation, engineering and execution in the IFBS guidelines for lightweight metal construction.

www.ifbs.de.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² of aluminium profile or aluminium profiled panel with the technical characteristics declared in 2.3. Averaging was done vertically based on the specific datasets under consideration of the yearly production amounts in square meter.

Trapezoidal profile 30/207	Value	Unit
Declared unit	1	m ²
Surface weight	2.3	kg/m ²
Conversion factor to 1 kg	1/2.3	-
Folded profile 65/400	Value	Unit
Declared unit	1	m ²
Surface weight	3.5	kg/m ²
Conversion factor to 1 kg	1/3.5	-

3.2 System boundary

Type of EPD: cradle to gate with options

Production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing.

For the end of life a collection rate of 90% is assumed. The 10% lost product is modelled with landfilling. The 90% recollected aluminium is modelled with a credit given as if it was pre-treated (as old scrap) and re-melted to produce secondary aluminium ingot and substituted by the same amount of primary aluminium ingot.

3.3 Estimates and assumptions

For the end of life a collection rate of 90% is assumed (see 3.2).

3.4 Cut-off criteria

In this study, all available data from production are considered, i.e. all raw materials used, utilised thermal

energy and electric power consumption. Thus material and energy flows contributing less than 1% of mass or energy are considered Transport expenditure for all considered raw materials are included.

3.5 Background data

All relevant background datasets are taken from the GaBi 5 software database. The aluminium data set represents aluminium production in Europe

3.6 Data quality

The data quality can be described as good. The primary data collection has been done thoroughly, all relevant flows are considered. Technological, geographical and temporal representativeness is given.

3.7 Period under review

Period under review is 2011.

3.8 Allocation

Estimations regarding recycling are described in chapter 3.2. Specific information on allocation within the background data is given in the GaBi datasets documentation. In most cases the assessed production sites use the same assembly line to produce different product types (not declared in this EPD). The allocation of material and energy to produce the declared product was determined by the participants during the data collection process based on the yearly production amounts under consideration of the declared unit in square meter (m²).

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

The following technical information is a basis for the declared modules.

End of life (C1-C4)

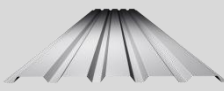

Name	Value	Unit
Recycling	90	%
Landfilling	10	%

5. LCA: Results

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	Construction-installation process	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² aluminium sheet

		 Trapezoidal profile 35/207			 Folded profile 65/400		
Parameter	Unit	A1 - A3	C4	D	A1 - A3	C4	D
GWP	[kg CO ₂ -Äq.]	25.20	0.00	-18.80	37.80	0.00	-28.30
ODP	[kg CFC11-Äq.]	6.55E-07	3.23E-12	-2.03E-06	9.88E-07	4.94E-12	-3.06E-06
AP	[kg SO ₂ -Äq.]	0.130	0.000	-0.093	0.195	0.000	-0.140
EP	[kg PO ₄ ³⁻ -Äq.]	0.006	0.000	-0.004	0.009	0.000	-0.006
POCP	[kg Ethen Äq.]	0.007	0.000	-0.005	0.011	0.000	-0.008
ADPE	[kg Sb Äq.]	1.07E-05	1.15E-09	-7.95E-06	1.59E-05	1.76E-09	-1.20E-05
ADPF	[MJ]	261.00	0.04	-172.00	389.00	0.07	-259.00

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 m² aluminium sheet

		Trapezoidal profile 35/207			Folded profile 65/400		
Parameter	Unit	A1 - A3	C4	D	A1 - A3	C4	D
PERE	[MJ]	101	-	-	152	-	-
PERM	[MJ]	0	-	-	0	-	-
PERT	[MJ]	101	0	-84	152	0	-127
PENRE	[MJ]	325	-	-	487	-	-
PENRM	[MJ]	0	-	-	0	-	-
PENRT	[MJ]	325	0	-246	487	0	-371
SM	[kg]	0	-	-	0	-	-
RSF	[MJ]	0.0	0.0	0.0	0.0	0.0	0.0
NRSF	[MJ]	0.1	0.0	0.0	0.2	0.0	0.0
FW*	[m 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
*The LCI information of the EAA datasets does not cover sufficient information for the assessment of the water quantity. Necessary data for the methodological approach of the "blue water consumption" assessment are not available and therefore are not declared. In case of following calculations using this EPD this needs to be considered.

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² aluminium sheet

		Trapezoidal profile 35/207			Folded profile 65/400		
Parameter	Unit	A1 - A3	C4	D	A1 - A3	C4	D
HWD*	[kg]	-	-	-	-	-	-
NHWD*	[kg]	-	-	-	-	-	-
RWD*	[kg]	-	-	-	-	-	-
CRU	[kg]	-	-	0	-	-	0
MFR**	[kg]	-	-	2.2	-	-	3.3
MER	[kg]	-	-	0	-	-	0
EEE	[MJ]	-	0	0	-	0	0
EET	[MJ]	-	0	0	-	0	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
* not declared. The advisory board of IBU clarified the declaration rules for the waste table in its last meeting of October 04, 2012. This environmental product declaration follows the approved interim solution.
** incl. 4% scrap from production waste

6. LCA: Interpretation

Production stage A1-A3 is mainly caused by the production of raw material A1 with 97-99%. The metal is the main contributor (98%). A3 representing the cold rolling process of the aluminium profile product (by the IFBS members) has a small contribution about 1-3% only. As the main contributor in the production stage is

the raw material a linear correlation between weight and environmental impact is given.

The end-of-life credit given to the aluminium scrap after use stage (with a collection rate of 90%) contributes a significant reduction (negative value) to most of the environmental impact category results.

7. Requisite evidence

Profiled sheets for the use as external layer in roof or wall application encloses the rooms without direct contact to the interior.

VOC emissions are not relevant for external use.

8. References

Institut Bauen und Umwelt e.V. (Ed.):

General principles

for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2011-06.

PCR Part A

Product Category Rules for Construction Products. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report, 2011-07.

PCR Part B

Product Category Rules for Construction Products Part B: Requirements on the EPD for Thin walled profiles and profiled panels of metal, 2012-07.

www.bau-umwelt.com

AVV: List of Wastes Ordinance of 10 December 2001 (BGBl. I S. 3379), as last amended by Article 5 of the Ordinance of 24 February 2012 (BGBl. I S. 212).

DIN EN ISO 14025:2011-10: Environmental labels and declarations – Type III environmental declarations – Principles and procedures

DIN EN 15804:2012-04: Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

DIN 18542:2009-07, Sealing of outside wall joints with impregnated sealing tapes made of cellular plastics - Impregnated sealing tapes - Requirements and testing

DIN 18807-6 to 9:1998-06, Trapezoidal sheeting in building; Aluminium trapezoidal sheeting and their connections; application and construction

DIN 55634:2010-04, Paints, varnishes and coatings - Corrosion protection of supporting thin-walled building components made of steel

DIN EN 485-2:2009-01, Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties

DIN EN 508-2:2009-07, Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet - Part 2: Aluminium

DIN EN 573-3:2009-08, Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products

DIN EN 1090-1&3:2012-02, Execution of steel structures and aluminium structures

DIN EN 14782:2006-03, Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements

DIN EN 14783:2006-12, Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements

GaBi 5: Software and databasis for Life Cycle Engineering. LBP, University of Stuttgart and PE International. 2011.





GaBi Documentation: Documentation of the GaBi 5 datasets. LBP, University of Stuttgart and PE International. 2011. <http://documentation.gabi-software.com/>

German **General Technical Approvals** for folded profiles of the respective manufacturers

IFBS Technical rules for lightweight metal construction

Following companies are represented with their products in this EPD:



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