

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	Aluminium Deutschland
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Issue date	16.01.2020
Valid to	15.01.2026

## Cold-formed aluminium sheet for outdoor uses Aluminium Deutschland

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## 1. General Information

### Aluminium Deutschland

#### Programme holder

IBU – Institut Bauen und Umwelt e.V.  
Hegelplatz 1  
10117 Berlin  
Germany

#### Declaration number

EPD-GDA-2019130-IBG2-EN

#### This declaration is based on the product category rules:

Products of aluminium and aluminium alloys, 01.08.2021  
(PCR checked and approved by the SVR)

#### Issue date

16.01.2020

#### Valid to

15.01.2026

Dipl.-Ing. Hans Peters  
(Chairman of Institut Bauen und Umwelt e.V.)

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(Managing Director Institut Bauen und Umwelt e.V.)

### Cold-formed aluminium sheet for outdoor uses

#### Owner of the declaration

Aluminium Deutschland  
Fritz-Vomfelde-Straße 30  
40547 Düsseldorf  
Germany

#### Declared product / declared unit

1 kg cold-formed aluminium sheet

#### Scope:

This declaration applies to the production of 1 kg cold-formed aluminium sheet. The underlying EPD is based on a representative application for a manufacturer's aluminium consisting of thin sheets for outdoor use. The data can be assumed to be representative due to the comparable production technologies of individual companies. The data was collected during 2017.

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

The EPD was created according to the specifications of EN 15804+A1. In the following, the standard will be simplified as *EN 15804*.

#### Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
<input type="checkbox"/> internally <input checked="" type="checkbox"/> externally

Dipl. Natw. ETH Sascha Iqbal,  
(Independent verifier)



## 2. Product

### 2.1 Product description/Product definition

Cold-formed aluminium sheet includes small formats, standing seam systems, façade panels and roof drainage systems and the appropriate fittings. These products are CE-labelled by means of a supplement to the delivery note and in the individual products' packaging units.

Small format:

Roof or façade applications which are manufactured industrially from thin aluminium sheet are known as small formats: R.16 roof panels, roofing shingles, 29 x 29 roof rhombuses, 44 x 44 roof rhombuses, FX.12 roof and façade panels, wall shingles 20 x 20 wall rhombuses, 29 x 29 wall rhombuses and 44 x 44 roof rhombuses.

These individual aluminium alloy pressed and edged elements. The individual elements are joined by overlapping and/or by means of hanging seams to form rainproof roof or façade cladding (depending on the product variant).

Standing seam system:

Roof and façade systems consisting of shaped thin aluminium sheet are handmade aluminium standing seam systems. Double standing seams are mainly used for roof coverings and angled standing seams mainly for façades.

Façade panel:

Façade panels are roll-formed aluminium panels. The panels are available in various widths and lengths and are used on façades. The elements are joined by means of tongue and groove connections to form façade cladding.

Roof drainage systems:

The aluminium roof drainage system includes gutters, pipes and the appropriate fittings. All system components consist mainly of aluminium.

The representative product was selected after considering three of the manufacturer's products. EU regulation no. 305/2011/ (CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). This product requires a declaration of performance taking into account the following harmonised standards:

- EN 14783, Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements
- EN 14782, Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements
- EN 612, Eaves gutters with bead stiffened fronts and rainwater pipes with seamed joints made of metal sheet
- EN 1462, Brackets for eaves gutters - Requirements and testing and CE labelling.

National regulations apply to use.

### 2.2 Application

Small formats are used for roof and façade cladding.

Façade systems are used as façade cladding.

Manually produced aluminium standing seam systems are installed as roof and façade cladding.

Roof drainage systems serve to drain water from roofs.

### 2.3 Technical Data

The construction data listed here is relevant for the product.

### Constructional data

Name	Value	Unit
Gross density /DIN 1306/	2700	kg/m <sup>3</sup>
Melting point /Kammer 2009/	660	°C
Electrical conductivity at 20°C /Kammer 2009/	37.7	m/Ωmm <sup>2</sup>
Thermal conductivity /ISO 7345/	235	W/(mK)
Coefficient of thermal expansion /ISO 6892-1/	23.1	10 <sup>-6</sup> K <sup>-1</sup>
Modulus of elasticity /ISO 6892-1/	70000	N/mm <sup>2</sup>
Specific heat capacity /ISO 7345/	0.9	kJ/kgK
Yield strength Rp 0,2 min. /ISO 6892-1/	35 - 250	N/mm <sup>2</sup>
Tensile strength Rm min./ISO 6892-1/	100 - 350	N/mm <sup>2</sup>
Tensile stress at break bzw. Bruchdehnbarkeit A5 min. /ISO 6892-1/	1 - 30	%

Alloys in accordance with EN 507 and EN 1396

Product performance data in accordance with the declaration of performance in relation to its main characteristics in accordance with:

- EN 507, Roofing and cladding products from metal sheet - Specification for fully supported products of aluminium sheet
- EN 1396, Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications (not part of CE labelling).

Small format:

- EN 14783
- EN 14782

Manually produced standing seam system:

- EN 14783

Façade cladding:

- EN 14782

Roof drainage:

- EN 612
- EN 1462

### 2.4 Delivery status

Small format packaging:

On Euro pallets (120 x 80cm).

Small formats are packed in boxes. Different box sizes are used depending on the product. The packaging unit is normally between 10 and 15 m<sup>2</sup>.

Standing seam system packaging:

The material is normally supplied as rolled strip in 60 or 500 kg coils. Wooden pallets and cardboard wrapping are used as packaging material.

Façade packaging:

In continuous cardboard on wooden pallets (< 6 m).

Roof drainage systems packaging:

Gutter collar in various iron frames, pipe cardboard. 3050 x 295 x 460 mm.  
(Gutter and pipe with polyethylene foil).

### 2.5 Base materials/Ancillary materials

The most significant raw material is aluminium which is gained from electrolysis from bauxite or by recycling aluminium scrap.





Alloying elements such as silicon, iron, magnesium and zinc in varying concentrations are also used as further raw materials. The aluminium content of the finished product is more than 90%. Typical aluminium alloys for the construction sector comply with the 3000 and 5000 series in accordance with EN 573-3. 90% water-based alloy-specific synthetic and mineral-based oil emulsions are used as auxiliary materials in the rolling process. These emulsions are managed within an enclosed cycle. Does the product contain more than a 0.1% concentration of any substance which is on the ECHA candidate list (dated 16/07/2019): No. Does the product contain further Category 1A or 1B CMR substances (carcinogenic, mutagenic or toxic to reproduction) which are not on the ECHA candidate list at above 0.1 mass %: No. Have biocidal products been added to this building product or has it been treated with biocidal products (is it a treated product in terms of the Ordinance on Biocidal Products): No.

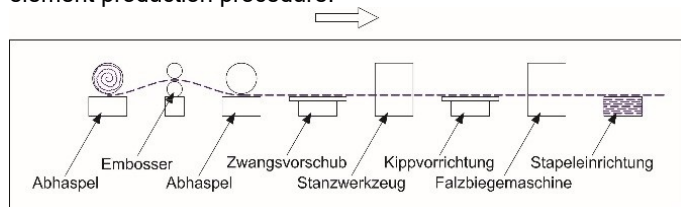
## 2.6 Manufacture

The paint-coated aluminium strips supplied as a pre-product (see EPD coil coated aluminium sheet no. EPD-GDA-2019131-IBG1-DE) are clamped in a defined width to a decoiler in coils up to a maximum of 1600 mm diameter and fed into the production line.

### Example: Manufacturing process for PREFA roof panels

The sheet metal strip is shaped for stucco embossing with an embossing roller. The synchronised, defined lengths are fed in with a pneumatic step feeder. The cutting outlines are punched and partly functionally stamped at the same time as they are cut to size. The cut lengths are fed into a reversing device via a conveyor belt and finished in the seam folding machine after turning. The roof panels are then placed in a buffer store where the carton is pushed in once the correct number of panels is reached.

PREFA roof shingles or rhombuses are produced on a similar production line as that for roof panels. Example diagram of the element production procedure:



## 2.7 Environment and health during manufacturing

The European semi-finished aluminium products market has made great efforts to conserve resources and the environment in recent years. For example, the continuous optimisation of rolling and coating processes for aluminium sheets contributes to resource efficiency (European Aluminium Association 2018). This is guaranteed by management systems (e.g. ISO 14001, ISO 50001 und ISO 45001) and continuously monitored by accredited certification companies. No specific environmental impacts occur during the manufacture of cold-formed aluminium sheets as no thermal processes for example take place. Residues (oils) which occur are collected in the works and recycled thermally externally. No measures beyond statutory requirements are demanded.

## 2.8 Product processing/Installation

The products are sold to commercial enterprises which have the necessary tools (e.g. sheet metal workers' tools) and expertise to be able to process this product correctly. Various fittings can be added during installation (e.g. roof ridge ventilators, snow stoppers or gable strips). No specific conservation measures are required when handling cold-formed aluminium sheets. The general health and safety

instructions for the construction sector apply.

## 2.9 Packaging

Cartons, wrapping foil, polyethylene foil and Euro and wooden pallets are used as packaging material. The packaging materials can be reused or recycled after use. Wooden pallets, plastic and paper can thus be collected separately and recycled. The most frequently used packaging materials are paper and plastic foil.

## 2.10 Condition of use

The condition of use of the material, which is supplied as a semi-finished product, depends on the previous processing by metalworking and installation companies. No changes in the product's material composition are to be expected during either processing or use if the product is used properly.

## 2.11 Environment and health during use

No cause-and-effect relationship with regard to the environment and health is known of from the use of cold-formed aluminium sheet if it is used as intended.

## 2.12 Reference service life

The period of use for many aluminium applications in the construction sector is frequently determined by how long the building is used. Repairs and maintenance are low due to the self-passivating surface. A period of use of more than 70 years can be expected with proper use.

## 2.13 Extraordinary effects

### Fire

Aluminium and aluminium alloys comply with building material class A1 in accordance with DIN 4102 and EN 13501 and also Directive 96/603/EC and thus do not contribute to fire. Aluminium's melting point is 660°C.

Name	Value
Building material class	A1
Burning droplets	NA
Smoke gas development	none
Toxizität der Brandgase	NA

### Water

No effects which are detrimental to the environment emanate from the unexpected effect of water on aluminium. The product itself is insensitive to water.

## Mechanical destruction

All materials remain bonded in case of mechanical destruction.

## 2.14 Re-use phase

Reuse of the product is not intended. The material can be completely recycled. After use the product can be passed to a company which specialises in recycling aluminium. The material produced by recycling can be reused like primary material. Data recently collected by European Aluminium (EA) showed an average recycling rate of over 95% in Germany and the EU.

## 2.15 Disposal

Aluminium scrap from construction applications is an important raw material for the future supply of aluminium. The recycling infrastructure is established and available worldwide.

The European Waste Catalogue (EWC) waste code for aluminium is 17 04 02.

Disposal of packaging materials is important to conserve resources. The waste codes for paper, plastic, wood, metal and composite packaging are 15 01 01, 15 01 02, 15 01 03, 15 01



04, 15 01 05.

## 2.16 Further information

Further information is available from:

[www.aluinfo.de](http://www.aluinfo.de).

## 3. LCA: Calculation rules

### 3.1 Declared Unit

The declared unit relates to 1 kg cold-formed aluminium sheet.

#### Angabe der deklarierten Einheit

Name	Value	Unit
Declared unit	1	kg
Conversion factor to 1 kg	1	-

### 3.2 System boundary

EPD type: cradle to factory gate – with options. This LCA includes the lifecycle stage of product manufacture and end-of-life (EoL).

- The product stage includes Modules A1 (Raw material provision), A2 (Transport) und A3 (Manufacture).
- EoL contains the environmental impacts which occur during waste treatment (material recycling of the aluminium sheet). The quantity of aluminium which is recycled (Material for Recycling, MFR) is declared in C3. The assumed material losses are balanced in C4.
- Credits from reuse, recovery and recycling potential are shown in Module D in accordance with EN 15804.

Due to the low environmental influence of the packaging its disposal was cut off in Module A5 and the EoL of the packaging not included (cut-off).

### 3.3 Estimates and assumptions

Data from the EPD for coil coated aluminium sheet (declaration number: EPD-GDA-2019131-IBG1-DE) was used for the pre-product.

A distance of 350 km was assumed for transporting the aluminium bars to the manufacturing location. This assumption is based on empirical values from the association.

### 3.4 Cut-off criteria

All operational data collected was included in the balance. Processes which contribute a total of less than 1% by mass to the final result and in all impact categories to be included are ignored. It can be assumed that the ignored processes contribute less than 5% to the impact categories included.

## 4. LCA: Scenarios and additional technical information

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO<sub>2</sub>.

The end-of-life for average aluminium sheets consists of 90% recycling and 10% disposal in landfill with the corresponding credits and impacts. The disposal of the packaging in Module A5 was ignored due to its negligible influence (cut-off). Module D contains the charges for recovering (remelting) and credits to the value of the expenses for primary material.

The credits and impacts used are based on a Europe-wide average for aluminium scrap and not necessarily the specific

### 3.5 Background data

The GaBi 8 software system for integrated balancing developed by thinkstep AG was used to model the lifecycle for manufacturing raw aluminium sheet. The consistent data contained in the GaBi database is documented and can be inspected online at <http://www.gabi-software.com/international/support/gabi/gabi-database-2018-lci-documentation/>. The GaBi database basic data was used for energy, transport and auxiliary materials.

### 3.6 Data quality

Data from association members of European Aluminium (EA) for the production year 2015 was used to model the aluminium pre-chain. All other relevant background data was taken from the GaBi 8 software's database. The background data used was not more than five years old.

### 3.7 Period under review

The LCA's data basis is based on data recorded in 2017. The period under review was 12 months.

### 3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Germany

### 3.9 Allocation

The aluminium scrap which accrues in the system from production and end of life is initially deducted from the quantity of scrap required for manufacture. This means that the system's net amount of scrap is calculated, i.e. the quantity of scrap which exceeds the system boundary. A credit is awarded with primary material less the costs of recasting. This credit (substitution of primary material) is allocated to Module D taking into account a recovery rate (recycling rate 90%).

### 3.10 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. The GaBi database was used to model the product lifecycle.

scrap value of the sheets manufactured.

#### End of life (C4)

Name	Value	Unit
For disposal in landfill	10	%

#### Reuse, recovery and recycling potential (D), relevant scenario information

Name	Value	Unit
Recycling rate	90	%



## 5. LCA: Results

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

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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 kg kaltumgeformtes Aluminiumblech

Parameter	Unit	A1-A3	C2	C3	C4	D
Global warming potential (GWP)	kg CO <sub>2</sub> eq	6.39E+00	5.94E-03	0	9.65E-04	-4.44E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.74E-10	1.63E-16	0	2.15E-16	-6.18E-11
Acidification potential of land and water (AP)	kg SO <sub>2</sub> eq	3.02E-02	2.48E-05	0	5.7E-06	-2.26E-02
Eutrophication potential (EP)	kg PO <sub>4</sub> <sup>3-</sup> eq	2.06E-03	6.33E-06	0	7.88E-07	-1.44E-03
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg Ethen eq	1.52E-03	-9.26E-06	0	4.43E-07	-1.2E-03
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	2.97E-06	4.91E-10	0	3.7E-10	-2.16E-06
Abiotic depletion potential for fossil resources (ADPF)	MJ	7.18E+01	8.14E-02	0	1.25E-02	-4.66E+01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 kg kaltumgeformtes Aluminiumblech

Parameter	Unit	A1-A3	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	3.23E+01	4.5E-03	0	1.61E-03	-2.48E+01
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	3.23E+01	4.5E-03	0	1.61E-03	-2.48E+01
Non renewable primary energy as energy carrier (PENRE)	MJ	8.32E+01	8.16E-02	0	1.3E-02	-5.49E+01
Non renewable primary energy as material utilization (PENRM)	MJ	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	8.32E+01	8.16E-02	0	1.3E-02	-5.49E+01
Use of secondary material (SM)	kg	3.94E-01	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	1.77E-12	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	2.08E-11	0	0	0	0
Use of net fresh water (FW)	m <sup>3</sup>	8.01E-02	8.3E-06	0	2.47E-06	-6.3E-02

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 kg kaltumgeformtes Aluminiumblech

Parameter	Unit	A1-A3	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.18E-07	4.72E-09	0	2.23E-10	-3.86E-08
Non hazardous waste disposed (NHWD)	kg	1.67E+00	6.84E-06	0	6.08E-02	-1.34E+00
Radioactive waste disposed (RWD)	kg	4.48E-03	1.12E-07	0	1.86E-07	-3.27E-03
Components for re-use (CRU)	kg	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	5.68E-01	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0

## 6. LCA: Interpretation

Modules A1-A3 bear the main environmental impacts of the lifecycle. Pre-product provision for the cold-formed aluminium sheet dominates in all impact categories. The influence is to be classified as significant (> 50%). Compared to the old EFP from 2013, the greenhouse gas potential in the manufacturing is significantly reduced as approximately 43% secondary material is used in the cold-formed aluminium sheet. The environmental impacts have also been significantly reduced in all impact

categories by the increased secondary share. On the other hand, the environmental impacts of cold-forming are generally insignificant in all impact categories (<10%).

The credit in the end-of-life results from the material recycling of the cold-formed aluminium sheet. The use of energy for recycling aluminium is up to 95% lower compared to primary manufacture.

## 7. Requisite evidence

The weathering of roof and façade products is subject to a number of influencing factors.

Apart from the alloy and the type of surface coating, the



environment (industry, coast, etc.) and regional weather conditions and prevailing environmental influences are some of the influencing factors.

Degradation of the surface can only be measured specifically on the respective item of property.

## 8. References

### **Biocidal Product Directive**

EU regulation no. 528/2012 of the European Parliament and Council of 22nd May 2012 concerning the making available on the market and use of biocidal products, European Union official gazette, 2012.

### **/DIN 1306/**

DIN 1306:1984-06, Density; concepts, presentation of values.

### **/DIN 4102/**

DIN 4102-1:1998-05, Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests.

### **/EN 13501-1/**

DIN EN 13501-1:2019-05, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

### **/EN 1396/**

DIN EN 1396:2023-10, Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications.

### **/EN 1462/**

DIN EN 1462:2004-12, Brackets for eaves gutters - Requirements and testing.

### **/EN 14782/**

EN 14782:2006-03, Selbsttragende Dachdeckungs- und Wandbekleidungsselemente für die Innen- und Außenanwendung aus Metallblech - Produktspezifikation und Anforderungen.

### **/EN 14783/**

DIN EN 14783:2013-07, Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements.

### **/EN 507/**

DIN EN 507:2019-10, Roofing and cladding products from metal sheet - Specification for fully supported products of aluminium sheet.

### **/EN 573-3/**

DIN EN 573-3:2024-03, Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products.

### **/EN 612/**

DIN EN 612:2005-04, Eaves gutters with bead stiffened fronts and rainwater pipes with seamed joints made of metal sheet.

### **/European Waste Catalogue/**

Commission Decision 2000/532/EC

### **/European Aluminium Association 2018/**

European Aluminium Association: 2018-02, Environmental Profile Report.

### **/GaBi database/**

GaBi software and database for lifecycle engineering, IABP, University of Stuttgart und thinkstep AG, 2018, <http://www.gabi-software.com/international/support/gabi/gabi-database-2018-lci-documentation/>.

### **/GaBi 8/**

GaBi 8 software and database for lifecycle engineering. (SP 36), IABP, University of Stuttgart und thinkstep AG, 2018.

### **/ISO 14001/**

ISO 14001:2015-09, Environmental management systems – Requirements with guidance for use (ISO 14001:2015).

### **/ISO 45001/**

DIN EN ISO 45001:2023-12, Occupational health and safety management systems - Requirements with guidance for use.

### **/ISO 50001/**

ISO 50001:2018-08, Energy management systems - Requirements with guidance for use.

### **/ISO 6892-1/**

DIN EN ISO 6892-1:2020-06, Metallic materials - Tensile testing - Part 1: Method of test at room temperature.

### **/ISO 7345/**

DIN EN ISO 7345:2018-07, Thermal performance of buildings and building components - Physical quantities and definitions.

### **/Kammer 2009/**

Kammer 2009: Aluminium pocket book 2009, 16th edition, Dr.-Ing. C.Kammer, Aluminium-Verlag Marketing und Kommunikation GmbH, Düsseldorf.

### **/Candidate list/**

European Chemicals Agency (ECHA) candidate list of substances of very high concern for authorisation: <https://echa.europa.eu/candidate-list-table> (Date: 16/07/2019; 201 entries)

### **/PCR Part A/**

PCR Part A, Calculation rules for the LCA and requirements of the project report, Version 1.7, Institut Bauen und Umwelt e.V., [www.ibu-epd.com](http://www.ibu-epd.com), 2018.

### **/PCR Part B/**

PCR Part B, Requirements of the EPD for products manufactured of aluminium and aluminium alloys, Version 1.6, Institut Bauen und Umwelt e.V., [www.ibu-epd.com](http://www.ibu-epd.com), 2017.

### **/Directive 96/603/EG/**

96/603/EC: Commission Decision of 4th October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products (Text with EEA relevance).

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