ENVIRONMENTAL PRODUCT DECLARATION (EPD) FOR

ALUMINIUM ANODISED PROFILE - ALLOY 6060

PRODUCED BY GASTALDELLO SISTEMI SPA – POVEGLIANO VERONESE

Company: Gastaldello Sistemi Spa – Viale dell'artigianato 16, 37064, Povegliano Veronese (VR), Italy
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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

SUMMARY

1 PROGRAMME RELATED INFORMATION

This EPD is developed under the program The International EPD ® System, in compliance with the General Program Instruction version 4.00 for the EPD development and the Product Category Rules PCR "Construction products" 2019:14 version 1.3.4.

EPD owner has the sole ownership, liability and responsibility of the EPD.

More information about the International EPD ® System is available on the website: https://www.environdec.com/

2 PRODUCT RELATED INFORMATION

2.1 THE COMPANY

Gastaldello Sistemi S.p.A. has been operating in the field of design and distribution of aluminium window and systems for the building industry since 1959.

The company is specialized in manufacturing windows and doors with high technical performance and accurate design. The patented systems under the EUROline, ECOtherm and NEWTEC brands offer the designer a wide range of technical solutions and the manufacturer practicality, versatility and ease of processing.

The production process of the aluminium profile - from extrusion to painting and assembly - is managed completely in-house by the company.

Gastaldello Sistemi has two production sites in Italy. The main one is in Povegliano Veronese and is spread over an area of 20,000 square meters, of which about 12,000 are covered. Here, an 1850-ton press is used for the extrusion of the profiles, while the assembly of the profiles for the thermal break is automated.

The company also carries out - within the production site - the surface treatments of painting and sublimation (for wood effect). The painting, with the Qualicoat brand and certification, is carried out with a chrome-free horizontal automated system. The profiles produced are stored in modern highly automated warehouses and the entire process is integrated with the SAP management system.

The second production site is in Castelbelforte (MN) and is dedicated to processing and transformation of profiles.

The studied profiles are all produced in the production site of Povegliano Veronese.

The company is certified ISO 9001 since 2002.

2.2 THE PRODUCTS

Aluminium profiles from Gastaldello Sistemi are made from the extrusion of aluminium billets procured from qualified suppliers. Depending on the type and demand, surface treatments (painting, sublimation and oxidation) and thermal cut assembly are then carried out.

Aluminium profiles covered by the present EPD are anodised profiles implemented with the average aluminium billet 6060 purchased by the company.

The production process of all products covered by the present EPD is schematized in Figure 1.

The reference CPC code is 415 “Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys”.

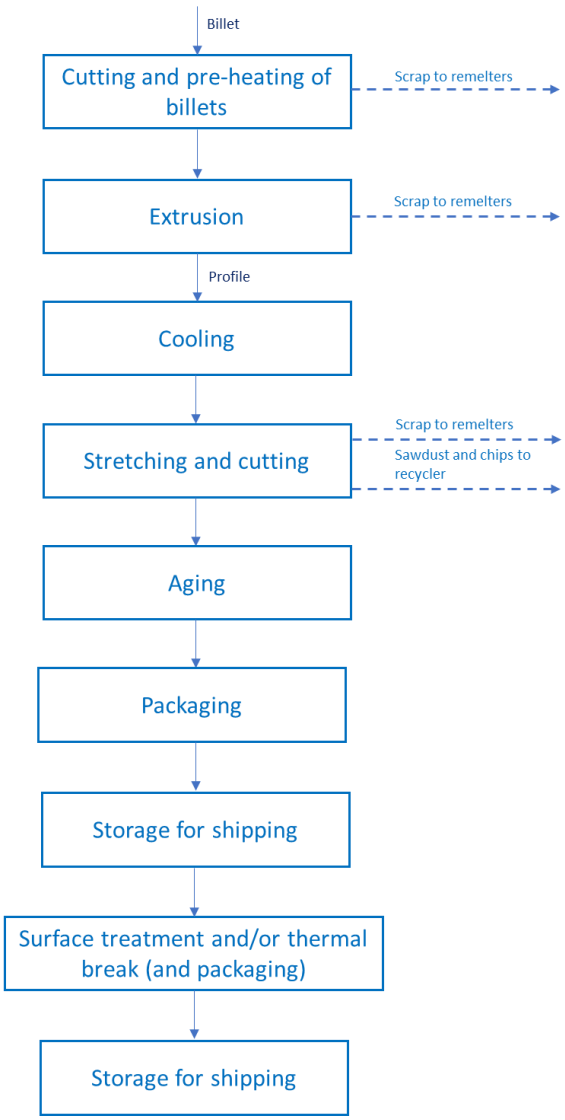


Figure 1: Production process of the aluminium profile 6060, produced in Povegliano Veronese by Gastaldello Sistemi.

2.2.1 TECHNICAL CHARACTERISTICS OF THE PRODUCT

Aluminium profiles produced by Gastaldello Sistemi Spa are used for the production of EUROline, ECOtherm and NEWTEC branded aluminium systems, but also by design for use in various industries. The studied aluminium profiles are products used in several markets, among all building and construction, industrial and general engineering. Profiles are manufactured starting from billets which are then extruded in presses. The produced profiles can undergo further processing such as finishing treatments (painting, sublimation or anodising) and/or thermal break.

2.2.2 PRODUCT COMPOSITION

Profiles are made of aluminium billets (input metal), sourced from different companies. The result for process and post-consumer scrap is weighted average of the different input billets.

The composition of the products covered by the present EPD is reported in Table 1. The content of SVHC does not exceed 0,1 % of the total weight.

Table 1: Composition of the aluminium profile.

Composition (% in weight) of product	
	Anodised
Aluminium, of which	**100%**
Process scrap	8,66%
*Post consumer scrap**	11,44%
Packaging weight (kg), per declared unit	
	Anodisation
Wood	5,75E-03
Cardboard	5,48E-03
Paper	8,20E-03
Metal	2,09E-04
Plastic	5,45E-03

**It is the recycled material considered to be without any burden, it consists of all the post-consumer recycled material.*

3 ENVIRONMENTAL PRODUCT DECLARATION

3.1 METHODOLOGY

The study behind the present EPD has been performed according to the state of art of the LCA methodology, with specific reference to the construction sector, in accordance with the following standard and guidelines:

- EN ISO 14040:2006/Amd 1:2020 - Environmental management -- Life cycle assessment -- Principles and framework
- EN ISO 14044:2006/Amd 2:2020 - Environmental management -- Life cycle assessment -- Requirements and guidelines
- EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
- General Programme Instructions (GPI) for the International EPD® VERSION 4.0
- The International EPD® System Product Category Rules (PCRs) for construction products, 2019:14 version 1.3.4.

The EPD is mainly addressed to the business-to-business communication. The data elaboration has been performed with the LCA for Expert, version 10.8.0.14. The database used is 2022.2. More in detail, main database used is Sphera, European Aluminium and IAI. The LCIA method used is the method EN 15804:2012+A2:2019, EN 15804 reference package version 3.0.

3.2 DECLARED UNIT

The declared unit is 1 kg of aluminium profile, plus its packaging.

3.3 SYSTEM BOUNDARY

The EPD is a "Cradle to Gate with modules C1-C4 and D". Modules A4-A5 and B1 to B7 are excluded as they are strongly dependent on the specific application within the reference market.

The included modules are listed here below (and represented in Table 2 and Figure 2):

Product stage

- **Module A1 -** raw material extraction and processing, processing of secondary material input (e.g. recycling processes) and generation of electricity, steam and heat from primary energy sources, also including their extraction, refining and transport thereof;
- **Module A2 -** transportation up to the factory gate and internal transport
- **Module A3 –** production of ancillary (auxiliaries) or pre-products; manufacturing of products and co-products; waste disposal; manufacturing of packaging for the finished products**.**

The system boundary to nature concerns the wood, which is used in the model for the packaging. The process used for the wood representation includes the forestry.

End of life stage

- **Module C1 –** De-construction, demolition processes.
- **Module C2 –** Transport from collection point to waste processing and disposal site
- **Module C3 –** Shredding and sorting of fractions for recycling
- **Module C4 –** Disposal of material fractions not entering the recycling treatment

Benefit and load beyond the product system (Module D): transport to recycling treatment site, remelting process and benefit due to the avoided production of primary aluminium.

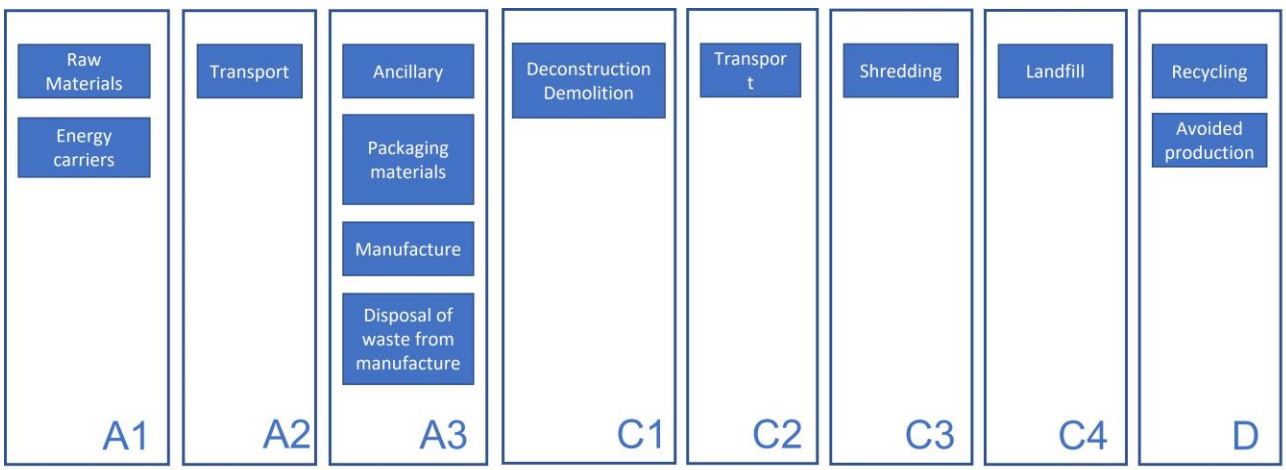
The reference period of the study is 2023.

Table 2: Life cycle stages included in the study for the aluminium profiles by Gastaldello Sistemi Spa.

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE	END-OF-LIFE STAGE				BENEFITS and LOADS BEYOND SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1 to B7	C1	C2	C3	C4	D
	Raw Material Supply	Transport	Manufacturing	Transport	Construction/Installation	Use, Maintenance, Repair, Replacement, Refurbishment, Operational energy use, Operational water use	Dismantling/De-construction/Demolition	Transport	Waste processing	Disposal	Reuse, Recycling potential
	X	X	X	ND	ND	ND	X	X	X	X	X
Geography	EU, extra-EU, GLO	EU, extra-EU, GLO	EU, IT	-	-	-	EU	GLO, EU	EU	EU	EU, GLO
Specific data*	>90%			-	-	-	-	-	-	-	-
Proxy data	<10%			-	-	-	-	-	-	-	-
Variation products	0%										
Variation sites	0%										

*Share of GWP-GHG indicator in A1-A3 coming from product-specific LCI data. For the aim of the present table, definitions of specific data and proxy data differ from definitions in the GPI.

Figure 2: System boundaries for the study of the aluminium profiles produced by Gastaldello Sistemi



3.4 MAIN ASSUMPTIONS, CUT-OFFS, BACKGROUND DATA INFORMATION AND SCENARIOS

3.4.1 DATA QUALITY

Specific data are used for all Gastaldello Sistemi's processes based on the reference production period. All background data used in the study are from LCI database and are not older than 5 years.

In addition, the thermal energy consumed in the site is produced using natural gas, while the electricity purchased for the site is modelled using the Italian residual mix from AIB 2023[1], with GWP-GHG of 0,17 kgCO2eq./kWh.

3.4.2 ALLOCATION

The allocation is made in accordance with the provisions of EN 15804. Energy and resources (water and ancillary) in input and waste and emissions in output are allocated to the profile production based on the mass.

3.4.3 CUT-OFFS CRITERIA

Raw and packaging materials are fully included as well as the energy for manufacturing. In the same way, all auxiliaries, manufacturing waste (including hazardous waste) and air emissions are accounted for.

The construction of the manufacturing site (capital goods) is not included. Minor input and output are also excluded being negligible in terms of mass (namely, minor auxiliaries).

3.4.4 SCENARIOS FOR OPTIONAL MODULES

The end-of-life scenario is Europe-based and relates to the application in building&construction. No impacts of dismantling or demolition processes are allocated to the profiles.

After collection, aluminium is shredded, sorted, and sent to remelting. Material lost at the collection and waste treatment sites is sent to landfill. Collection and waste processing efficiency are reported in Table 3, whereas Table 4 reports transport information.

Table 3: Applied collection and waste processing efficiency for the End-of-life.

End-of-life - collection and processing efficiency	
Collection efficiency - %	
Aluminium collected	**96**
Aluminium lost at the collection site	**4**
Processing efficiency (shredding) - %	
Aluminium sent to recycling after shredding	**95**
Aluminium lost in the shredding	**5**

[1] https://www.aib-net.org/facts/european-residual-mix/2022

Table 4: Distance and transport means applied for the End-of-life.

End-of-life – transport information for modules C and D		
Transport mean	**Utilisation ratio - %**	**Distance travelled - km**
Materials not collected and sent to landfill (module C2)		
Diesel truck, Euro IV, > 32 t	61	200
Material collected and sent to waste processing (module C2)		
Diesel truck, Euro IV, > 32 t	61	200*
Materials from waste processing to remelter (module D)		
Diesel truck, Euro IV, > 32 t	61	200

*no additional transport is assumed for material which is landfilled after waste processing.

Module D address burden and benefit from net output flows leaving the product system, i.e. from flows leaving the product system, lowered of the recycled content (%) initially included in the product.

The primary aluminium ingot consumed in Europe is considered for the accounting of benefits from remelted aluminium.

3.5 PARAMETERS DESCRIBING THE ENVIRONMENTAL IMPACT

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

Table 5. Impacts of anodised profiles - 6060 per declared unit (1 kg) according to EN 15804:2012+A2:2019 plus additional GWP-GHG indicator required by PCRs.

Impacts of anodised profile implemented with billet 6060. Method EN15804+A2						
Core impact indicators	**A1-A3*****	**C1**	**C2**	**C3**	**C4**	**D**
Climate Change – total - GWPtot [kg CO2 eq.]	2,21E+01	0,00E+00	1,30E-02	1,90E-02	1,28E-03	-6,64E+00
Climate Change, fossil - GWPf [kg CO2 eq.]	2,21E+01	0,00E+00	1,29E-02	1,89E-02	1,31E-03	-6,62E+00
Climate Change, biogenic - GWPb [kg CO2 eq.]	1,61E-01	0,00E+00	-1,18E-05	1,70E-04	-3,89E-05	-1,38E-02
Climate Change, land use and land use change - GWPluc [kg CO2 eq.]	2,16E-03	0,00E+00	7,17E-05	4,01E-06	2,42E-06	-1,19E-03
Ozone depletion - ODP [kg CFC-11 eq.]	3,82E-07	0,00E+00	7,70E-16	2,77E-13	3,09E-15	-4,97E-11
Acidification – AP [Mole of H+ eq.]	4,73E-01	0,00E+00	7,64E-05	4,13E-05	9,31E-06	-3,85E-02
Eutrophication, freshwater – Epfr [kg P eq.]	4,90E-03	0,00E+00	3,84E-08	5,53E-08	2,23E-09	-2,96E-06
Eutrophication, marine - EPmar [kg N eq.]	2,30E-02	0,00E+00	3,75E-05	9,29E-06	2,38E-06	-5,55E-03
Eutrophication, terrestrial – Epter [Mole of N eq.]	2,30E-01	0,00E+00	4,15E-04	9,74E-05	2,62E-05	-6,07E-02
Photochemical ozone formation, human health – POCP [kg NMVOC eq.]	1,28E-02	0,00E+00	7,22E-05	2,51E-05	7,23E-06	-1,68E-02
Abiotic depletion potential for mineral and metals – ADPe [kg Sb eq.]*	1,17E-05	0,00E+00	1,07E-09	5,16E-09	1,35E-10	-1,49E-06
Abiotic depletion potential for fossil resources – ADPf [MJ]*	2,88E+02	0,00E+00	1,72E-01	3,42E-01	1,72E-02	-8,12E+01
Water deprivation potential - WDP [m³ world equiv.]*	2,59E+00	0,00E+00	1,15E-04	4,24E-03	1,44E-04	-9,82E-01
Additional indicator required by PCRs	**A1-A3*****	**C1**	**C2**	**C3**	**C4**	**D**
Climate change - GWP-GHG [kg CO2 eq.]**	2,21E+01	0,00E+00	1,29E-02	1,90E-02	1,27E-03	-6,64E+00

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

** The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

*** The usage of the results of modules A1-A3 without considering the results of modules C is discouraged.

3.6 INDICATORS OF RESOURCES USE, WASTE AND OUTPUT FLOWS, BIOGENIC CONTENT

The LCI indicators are calculated using the Method EN15804+A2 implemented in LCA for Expert.

Table 6: LCI indicators on resource use, output flows and biogenic carbon content in anodised profile.

Impacts of anodised profile implemented with billet 6060. Method EN15804+A2						
Resources use indicators	**A1-A3******	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy (PERE) [MJ]	5,74E+01	0,00E+00	9,77E-03	1,90E-01	2,58E-03	-3,69E+01
Primary energy resources used as raw materials (PERM) [MJ]*	4,54E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (PERT) [MJ]	6,20E+01	0,00E+00	9,77E-03	1,90E-01	2,58E-03	-3,69E+01
Use of non-renewable primary energy (PENRE) [MJ]	2,83E+02	0,00E+00	1,72E-01	3,42E-01	1,72E-02	-8,13E+01
Non-renewable primary energy resources used as raw materials (PENRM) [MJ]**	4,74E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (PENRT) [MJ]	2,89E+02	0,00E+00	1,72E-01	3,42E-01	1,72E-02	-8,13E+01
Input of secondary material (SM) [kg]	2,81E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF) [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water (FW) [m3]	2,42E+01	0,00E+00	1,10E-05	1,80E-04	4,37E-06	-9,33E-02
Output flows and waste categories	**A1-A3******	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD) [kg]	4,33E-02	0,00E+00	8,25E-13	2,96E-11	8,85E-13	-5,72E-08
Non-hazardous waste disposed (NHWD) [kg]	8,14E-01	0,00E+00	2,47E-05	2,58E-04	8,81E-02	-1,98E+00
Radioactive waste disposed (RWD) [kg]	4,30E-03	0,00E+00	2,12E-07	5,45E-05	1,92E-07	-4,84E-03
Components for re-use (CRU) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for Recycling (MFR) [kg]	3,69E-01	1,00E+00	9,60E-01	9,12E-01	0,00E+00	0,00E+00
Material for Energy Recovery (MER) [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE) [MJ]	2,20E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET) [MJ]	3,94E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Biogenic carbon content	**A1-A3******	**C1**	**C2**	**C3**	**C4**	**D**
Biogenic carbon content in packaging [kg]***	1,70E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

* Due to the presence of the wood bars, the calorific value of the wood chips was considered as 12,2 MJ/kg. (AIEL 2009)

** The calorific value of plastic was considered at 43 MJ MJ/kg. This is the value attributed to Polypropylene granulate (PP) mix by LCA FE dataset.

*** 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

**** The usage of the results of modules A1-A3 without considering the results of modules C is discouraged.

4 REFERENCES

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5 ADDITIONAL INFORMATION

5.1 ADDITIONAL INFORMATION CONCERNING THE PROGRAMME AND THE EPD

EPDs within the same product category but from different program operator may not be comparable.

EPDs of construction products may not be comparable if they do not comply with EN 15804. Environmental product declarations within the same product category from different programs may not be comparable. This EPD and the PCR 2019:14 “Construction products” are available on the website of The International EPD® System (www.environdec.com).

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 characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

The verifier and the Programme Operator do not make any claim nor have any responsibility of the legality of the products included in the present EPD. The LCA study and the present EPD have been issued with the technical scientific support of Ecoinnovazione S.r.l., spin-off ENEA (http://ecoinnovazione.it/?lang=en).

5.2 ADDITIONAL INFORMATION ON THE PRODUCT AND ON THE COMPANY

Aluminium profiles covered by the present EPD are produced in Povegliano Veronese.

For further information on product characteristics, typical applications, technical datasheets and case histories, please visit our website https://www.gastaldellosistemi.it/ or contact Francesco Sagripanti (francesco.sagripanti@gastaldellosistemi.it)

6 VERIFICATION AND REGISTRATION

CEN standard EN 15804 served as core PCR	
EPD Programme:	The International EPD® System For more information – www.environdec.com
GPI:	General Programme Instruction 4.0
PCR:	PCR 2019:14 Construction products version 1.3.4
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec/com/contact
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EPD valid within the following geographical area:	Global
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Independent verification of the declaration and data according to ISO 14025: 2006	EPD verification (external)
Third party verifier:	TÜV Italia SRL Viale Fulvio Testi 280/6 20126 Milano https://www.tuvsud.com/it-it
Accredited by:	Accredia, certificate n.0008VV
Procedure for follow-up during EPD validity involves third party verifier	Yes