ENVIRONMENTAL PRODUCT DECLARATION
in accordance with ISO 14025 and EN 15804

Product	ELVAL ENF™ Sinusoidal Corrugated coil coated sheet 
Declaration holder	
Publisher and programme holder	
Declaration number	EPD EA 2015 – ELVAL COLOUR 5
Issue date	1 June 2015
Valid until	31 May 2021* *This EPD has been prolonged by one year in agreement with the verifier.
Weblink	https://www.european-aluminium.eu/resource-hub/building-products-epd-programme/

Declaration holder:	Programme holder:
ELVAL COLOUR Power to imagine	EUROPEAN ALUMINIUM

1. General information

Owner of the declaration	ELVAL COLOUR 3rd km. Inofyta Peripheral Rd., 32011 St. Thomas, Viotia Greece
Programme holder	European Aluminium (EA) AISBL (previously European Aluminium Association) Avenue de Broqueville, 12 B - 1150 Brussels Belgium  Dr Gerd Götz, Director General
PCR used for the verification	EAA Product Category Rules (PCR) for Aluminium Building Products – version of 30 January 2013
Verification	EN15804 serves as core PCR completed by EAA PCR Verification of the EPD by an independent third party in accordance with ISO 14025 ☐ Internally ☒ Externally
Verifier	Carl-Otto Nevén NEVÉN Miljökonsult/Environmental Cons.  Carl-Otto Neven
Declaration number	EPD EA 2015 – ELVAL COLOUR 5
Functional Unit	1 m² of ELVAL ENF™ Sinusoidal coil coated sheet
Product group covered and applicability	This EPD covers aluminium corrugated sheet (sinusoidal shape) of 0,5; 0,7; 0,9 or 1,2 mm thickness coated with a PVDF coating (25±3μm) or polyester coating (22±3μm). This EPD has been calculated from a modelling tool developed by thinkstep via an i-report in GaBi 6. The data and parameters used in the tool have been calculated on basis of production figures collected among four aluminium coil coaters companies (including ELVAL COLOUR) for the years 2011 and 2012. The results generated by the collective tool can be considered as a good proxy to model coil coated sheet produced by ELVAL COLOUR. Process data of the corrugating process have been collected from ELVAL COLOUR plant only.
Liability	The owner of the declaration is liable for the underlying manufacturing information and evidence; European Aluminium, i.e. the programme holder, is not liable in this respect.

2. Product

2.1. Product description and application

This Environmental Product Declaration (EPD) is for business to business communication. The EPD refers to “ELVAL ENF Corrugated” Sinusoidal sheets product family which is composed of aluminium coil-coated sheets specifically adapted for external cladding and roofing applications. The aluminium and aluminium alloy sheets are preliminary rolled to the requisite thickness and treated thermally in accordance with customer specifications. Aluminium coil is then pre-treated and then coated. Finally,

the flat coil coated sheet are corrugated into a sinusoidal shape to provide more rigidity to the sheet. The type of coating and the delivery dimensions (i.e. corrugated sheet cut to length) are customised according to client requirements.

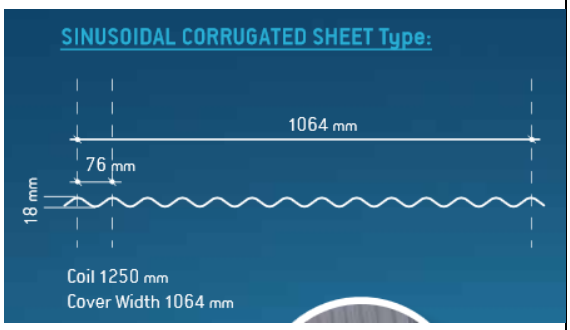
ELVAL ENF^{TM} Sinusoidal corrugated coil coated sheets are semi-finished products which are usually further processed (e.g. by cutting, forming or machining operations) to be converted into a final product to be installed on a building, e.g. cladding panel.

This EPD provide LCA results for the following ELVAL ENF^{TM} Sinusoidal Corrugated coil coating sheets:

- Four aluminium sheet thicknesses: 0,5; 0,7; 0,9 or 1,2 mm
- Two types of coating: PVDF (25±3µm) or Polyester (22±3µm)

2.2. Technical data

Main technical data are reported in the next table

Sinusoidal corrugated sheet of 0,5; 0,7; 0,9 or 1,2 mm thickness Coil coating type Coating: PVDF or Polyester Width (before corrugation): 1250 mm Width (after corrugation): 1064 mm Ratio between width of flat sheet (starting sheet and width of corrugated sheet: 118% Length: up to 13 m	

Composition of the sheet (according to EN 573-3)

Alloy	Composition
EN AW 3004	Si:0,30% max; Fe: 0,70% max, Mn: 1,0-1,50 %, Mg: 0,80-1,30%, Cu: 0,25% max, Ti: 0,05% max, Zn: 0,25% max, Cr: 0,05% max, Other elements: each 0,05% max, total others: 0,15% max, Al (%): Remainder
EN AW 3105	Si:0,60% max; Fe: 0,70% max, Mn: 0,30-0,80 %, Mg: 0,20-0,80%, Cu: 0,35% max, Ti: 0,05% max, Zn: 0,40% max, Cr: 0,20% max, Other: 0,05% max, total others: 0,15% max, Al (%):Remainder
EN AW 5754	Si (%) : 0,40 max, Fe (%) : 0,40 max, Mn (%) : 0,50 max (0,30 min), Cu (%) : 0,10 max, Mg (%): 2,60-3,60, Cr (%) : 0,30 max, Zn (%) : 0,20 max, Ti (%) : 0,15 max, Mn (%) + Cr (%): 0,10-0,60, Other elements: each 0,05 % max, Total others : 0,15 % max, Al (%):Remainder

Mechanical properties according to alloy and temper (EN1396)

Properties	Alloy and temper				
	EN AW 3004 / H44	EN AW 3105 / H44	EN AW 3105 / H46	EN AW 5754 / H42	EN AW 5754 / H46
Rm (MPa)	210-265	150-200	175-225	220-270	260-310
Rp0,2 (MPa)	≥180	≥120	≥150	≥140	≥190
A50(%)	≥4%	≥3%	≥2%	≥8%	≥4%

2.3. Relevant Standards for market Applications

Most relevant standards for applications of aluminium sheet products in buildings are EN 485-2, EN 507, EN 508-2, EN 573-3, EN 1396, EN 13501-1, EN 14782, EN 14783, EN 13964/+A1.

2.4. Delivery status

The material is supplied semi-finished in customised dimensions and with customised surface coating for further processing

2.5. Metal and sheet production (background processes)

The most significant base material is aluminium which is extracted from bauxite via alumina refining followed by an electrolysis to produce primary aluminium (see /EAA EPR/). Aluminium supply may also come from recycling of aluminium scrap. However, in this EPD, only primary aluminium has been considered for the aluminium supply. This is a conservative assumption since aluminium recycling generates much less environmental impact than primary production. After electrolysis, the liquid primary aluminium is mixed with small quantities of alloying elements such as silicon, iron, magnesium and zinc. The ELVAL ENF^{TM} Sinusoidal coil coated sheet are composed of EN AW 3004, EN AW 3105 or EN AW 5754. The composition is provided in the previous section 2.2. The alloying elements are not considered in the LCA model and are substituted by primary aluminium. This proxy appears as reasonable considering that alloying elements contribute to less than 5% of the weight of the aluminium sheet.

The liquid alloy is then casted into slabs, i.e. starting material for the sheet production process. The slabs are produced by DC (Direct Chill) casting in cast house.

Aluminium sheets are produced through the rolling process. The slabs are hot rolled at temperature around 400-500°C and then cold rolled. Typical thickness of aluminium sheets are comprised between 0,5 to 1,2 mm. The aluminium sheet is delivered as an uncoated coil to the coil coating process.

The two above processes constitute the background processes as described in the flow diagram below. The average LCI datasets reported in /EAA EPR/ have been used.

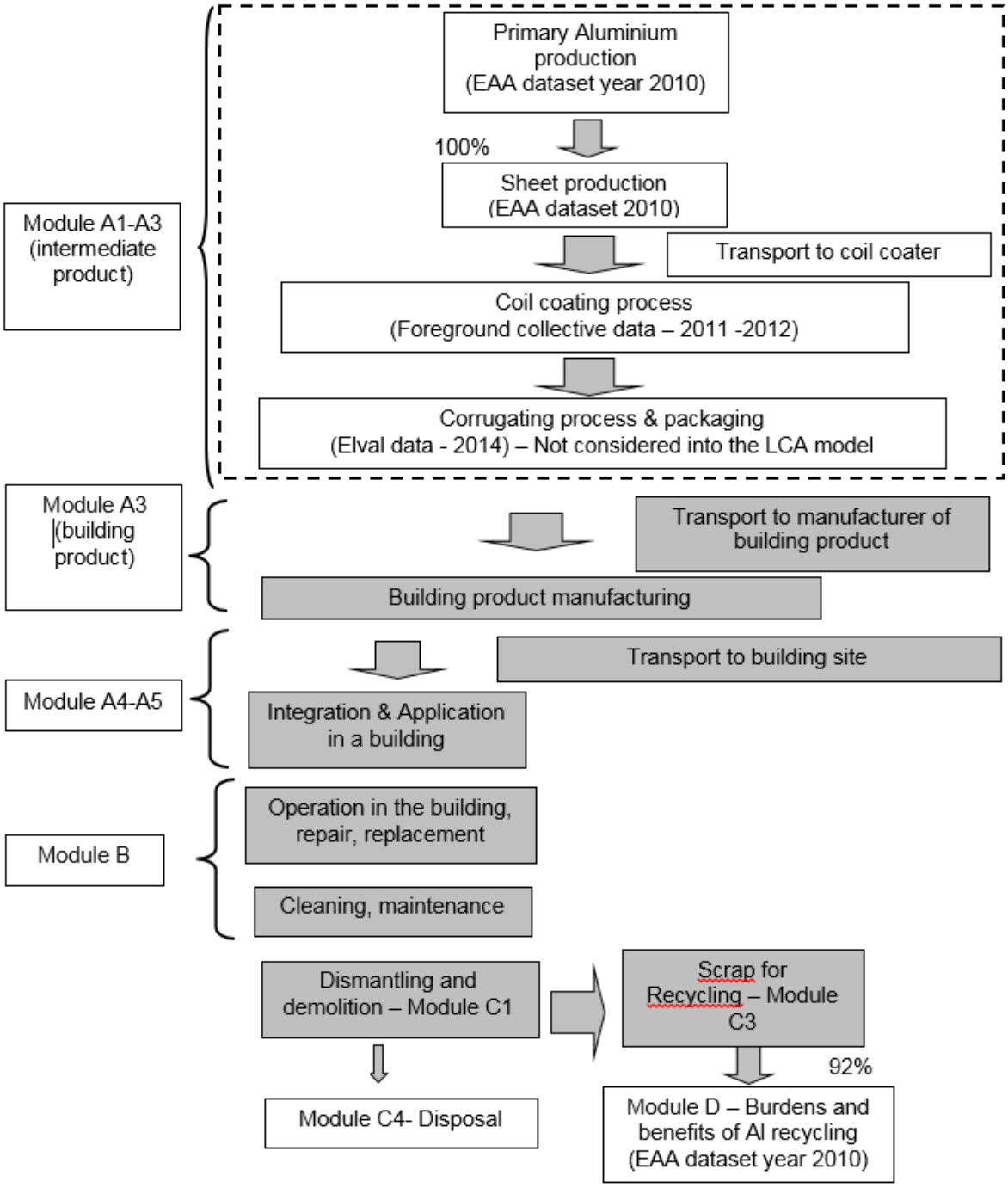


Figure 1. Life cycle flow diagram of the coil coated sheet, processes and life cycle stages (processes not covered are in grey boxes)

2.6. Coil coating and corrugating processes (foreground processes)

ELVAL COLOUR has its own coating line and uses then an aluminium coil as a starting material. The production of the aluminium coil has been modelled using the average datasets published by the European Aluminium as described in the Environmental profile report /EAA EPR/. This proxy appears

as reasonable considering the material supply to ELVAL COLOUR which comes mainly from European producers.

Before applying the coil coating, the aluminium sheet is pre-treated through cleaning, etching and chemical conversion. The chemical conversion used by ELVAL COLOUR is based on Cr6+ compounds pre-treatment. The coating involves application of organic coating materials to the sheets with a typical thickness of 19 to 28 µm.

The coil is positioned at the beginning of the line, and then unwound at a constant speed, passing through the various pre-treatment and successive painting & backing processes before being recoiled. Two strip accumulators found at the beginning and the end of the line enable the work to be continuous. Coil coating constitutes the main foreground process for which collective LCI datasets have been used, including ELVAL COLOUR production site.

The corrugating process is a very simple process consisting in cold shaping the coil coated sheet through a rolling process using shaped rolled deforming the sheet into trapezoidal or sinusoidal cross section to improve the rigidity of the sheet. After such process the sheet are cut to length according to client needs. Considering the very low impact of the corrugating process, a cut off rules has been applied and such process was not considered in the LCA, except its effect on the mass of the functional unit, i.e. the projected surface area of the corrugated sheet.

2.7. Health and safety aspects during production and installation

The coating process requires the use of organic solvents as well as hazardous substance for the chemical conversion (i.e. Cr6+ solution).

The [Cr (VI)] containing solution used for the formation of the chemical conversion coating has a very low consumption rate. This chemical conversion coating significantly improves the corrosion resistance and the adhesion of the paint on the aluminium substrate. The chemical conversion process is automated and takes place in well controlled and confined area so that there is no spoilage of Cr(VI) solution or contact with workers.

Waste solution and VOC are systematically collected and properly treated according with the respective European Norms. VOC are directly incinerated within the coating backing furnace at the plant location. No measures exceeding statutory requirements are necessitated.

There are no relevant aspects of occupational health and safety during the further processing and installation of the ELVAL ENF^{TM} Sinusoidal sheets. Under normal installation, no measurable environmental impacts can be associated to the chromium presence from Cr-based pre-treated aluminium.

2.8. Packaging

The material is supplied as corrugated sheets in the dimensions specified by the customer. Wooden pallets, cardboard paper, recycled plastic foil and straps made of steel are used as packaging materials. After use, packaging materials can be re-used or recycled. Wooden pallets, plastic, paper and straps can be collected separately and directed to the recycling circuit.

2.9. Further processing, use and reference service life

Corrugated coil coated sheet are intermediate products which are used for the production of various aluminium products used in the building sector. This EPD does not cover the downstream processes to convert this intermediate product into a final building products.

During the chemical conversion process, the Cr6+ ions reacts entirely with the aluminium substrates to generate a stable chromium oxide layer. Hence, even in case of damage of the organic coating, there is no measurable release of chromium during the use phase.

Since the use phase is not modelled, no specific information can be given about the reference Service Life. Main uses are cladding and roofing of buildings. In practice, a service life of 50 years can be assumed in normal use for such application /DURABILITY/. In normal use, aluminium building products are not altered or corroded over time. A regular cleaning (e.g. once a year) of the product suffice to secure a long service life. However, the use of cleaning solution too alkaline (pH >10) or too acid (pH < 4) should be avoided.

In case of fire, aluminium is a non-combustible construction material Aluminium (European Fire Class A1) in accordance to EN 13501 as well as Directive 96/603/EC, and do not therefore make any contribution to fire..

2.10. End of life stage

Aluminium coated sheet is fully recyclable. ELVAL ENF^{TM} Sinusoidal Aluminium sheet should be specifically collected in special containers or locations and directed to specialised recyclers. The economic value of aluminium sheet at tend of life should largely cover the possible costs related to those operations.
Hence, after use, the product is in most cases collected and directed to a specialist company for aluminium recycling. Recycled aluminium produced by these recyclers is used again as primary material. A survey by the European Aluminium Association has established an average collection rate of 96% for aluminium applications in the construction sector /EAA DELFT/.
Only a small fraction of the aluminium coated sheet escapes the recycling route. This small fraction (4%) is then considered as landfilled in the LCA model.
From collected scrap up to the new aluminium ingot, it is assumed that 4% of the metal is lost. Hence, the overall recycling rate of aluminium has been fixed to 92%.

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

3. LCA: Calculation rules

3.1. Functional Unit and specific mass

The functional unit corresponds to 1 m^2 of projected surface area of corrugated coil-coated aluminium sheet with a Sinusoidal shape. The corresponding mass of the functional are reported in the next table

Sheet thickness	Mass of the functional unit (1 m^2 of projected area)
0,5 mm	1,59 kg
0,7 mm	2,23 kg
0,9 mm	2,87 kg
1,2 mm	3,82 kg

The ratio between the surface area of the flat sheet and the corrugated sheet is 118%.

3.2. System boundaries

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 96% is assumed and directed to recycling (module D). The 4% lost product is modelled through landfilling (module C4). Considering the few losses along the recycling chain, it is assumed that 92% of the Al sheet is effectively recycled as new ingot. Hence, an end of life recycling rate of 92% is used within module D to reflect the benefits of recycling through the substitution principle.
According to the PCR document, modules C1, C2 and C3 shall be addressed in the EPD. Since aluminium products covered in these EPDs are intermediates building products for which it is difficult to define deconstruction and transport scenarios, it has been decided not to cover these three modules. For building products made of ELVAL ENF^{TM} Sinusoidal aluminium sheet, the contribution of these modules are usually moderate and their omission can be considered as reasonable.

3.3. Estimates and assumptions

It has been assumed that the aluminium sheet was composed of primary aluminium only. In practice, aluminium sourcing can also be based partly on recycled aluminium. This assumption is then conservative. Alloying elements were not considered and a pure aluminium sheet has been assumed as a proxy..

3.4. Cut-off criteria

All known operating data was taken into consideration in the analysis except a cut-off rule applied to the corrugating process which has not been integrated in the LCA model. This cut-off is reasonable considering the very low impact of such process.
Considering the long experience of data collection within the European Aluminium Industry, it can be assumed that the other ignored processes or flows contribute to much less than 5% to the impact categories under review.

3.5. Background data

GaBi 6 2014- the software system for comprehensive analysis developed by thinkstep (previously PE International) – was used for modelling the life cycle for the manufacture of coil-coated aluminium sheet. Generic GaBi 6 data sets have been used for energy, transport and consumables. For the aluminium primary production, recycling and sheet production, the datasets described in the EAA environmental report have been used /EAA EPR/.

3.6. Foreground data and EPD-data tool

Foreground data refers to the coil coating process. The coil coating data are collective data generated from 6 European plants from 4 companies, including ELVAL COLOUR. Data are from the year 2011 or 2012. The collective data have been used then for developing an EPD-data tool which generates EPD indicators based on several key product specifications. This EPD-data tool has been used to generate the EPD results.

3.7. Data quality

The data quality can be considered as good. The primary data collection has been done thoroughly, all relevant flows are considered. Technological geographical and temporal representativeness is appropriate. The use of collective data can be considered as a reasonable proxy of the ELVAL COLOUR processes.

3.8. Allocation

Any aluminium scrap produced at sheet production or coil coating process level is recycled by the producer or sent to recycling to a recycler. This recycling loop has been modelled in the GaBi model so that the ELVAL ENF^{TM} Sinusoidal coil coated sheet is the only product exiting the gate. Hence, the production process does not deliver any co-products.
For the end-of-life stage, sheet scrap is sent to a recycling treatment (melting process) and credits are calculated. Both the recycling and the credits are modelled in module D

3.9. Comparability

As a general rule, a comparison or evaluation of EPD data is only possible when all of the data to be compared has been drawn up in accordance with EN 15804 and the building context or product-specific characteristics are taken into consideration.

4. LCA scenarios and additional technical information

Modules A4, A5, B1-B7 and C1-C3 are not taken into consideration in this Declaration. Only primary aluminium is used as sourcing. Hence, end of life credits are fully reported in Module D based on a recycling rate of 92% and a full conservation of the inherent properties through recycling.

Production			Installation		Use stage							End-of-Life				Next product system
Raw material supply (extraction, processing, recycled material)	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to EoL	Waste processing for reuse, recovery or recycling	Disposal	Reuse, recovery or 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	X	X

5. LCA results

The results for the 4 ELVAL ENF Sinusoidal coil coated sheet are reported in the next table. The terminology used in this table is explained below:

- “Corr- PE-05 – sinusoidal” & “Corr- PVDF-05 – sinusoidal”: 0,5mm thick corrugated sheet with respectively a polyester or a PVDF coating
- “Corr- PE-07 – sinusoidal” & “Corr- PVDF-07 – sinusoidal” : 0,7mm thick corrugated sheet with respectively a polyester or a PVDF coating
- “Corr- PE-09 – sinusoidal” & “Corr- PVDF-09 – sinusoidal” : 0,9mm thick corrugated sheet with respectively a polyester or a PVDF coating
- “Corr- PE-12 - sinusoidal” & “Corr- PVDF-12 – sinusoidal”: 1,2mm thick corrugated sheet with respectively a polyester or a PVDF coating

		Corr-PE-05-Sinusoidal			Corr-PVDF-05-Sinusoidal			Corr-PE-07-Sinusoidal			Corr-PVDF-07-Sinusoidal			Corr-PE-09-Sinusoidal			Corr-PVDF-09-Sinusoidal			Corr-PE-12-Sinusoidal			Corr-PE-12-Sinusoidal		
	Kg Al	1,59			1,59			2,23			2,23			2,87			2,87			3,82			3,82		
Parameter	**Unit**	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D	A1-A3	C4	D
GWP	[kg CO_2-eq.]	16,2	0,0	-11,8	16,5	1,20E-03	-16,5	22,1	1,20E-03	-16,5	22,4	1,20E-03	-16,5	28,0	1,55E-03	-21,2	28,3	1,55E-03	-21,2	36,7	2,07E-03	-28,2	37,1	2,07E-03	-28,2
ODP	[kg CFC11-eq.]	7,45E-07	1,43E-14	-6,44E-07	1,55E-06	1,99E-14	-9,02E-07	1,04E-06	1,99E-14	-9,02E-07	1,84E-06	1,99E-14	-9,02E-07	1,35E-06	2,56E-14	-1,16E-06	2,14E-06	2,56E-14	-1,16E-06	1,79E-06	3,42E-14	-1,55E-06	2,58E-06	3,42E-14	-1,55E-06
AP	[kg SO_2-eq.]	0,062186	5,3336E-06	-0,047082	0,063956	7,4694E-06	-0,065962	0,084488	7,4694E-06	-0,065962	0,086258	7,4694E-06	-0,065962	0,106908	9,6052E-06	-0,084842	0,10856	9,6052E-06	-0,084842	0,14042	1,2862E-05	-0,113044	0,1416	1,2862E-05	-0,113044
EP	[kg PO_4^{3-}-eq.]	3,76E-03	7,69E-07	-2,71E-03	3,86E-03	1,08E-06	-3,80E-03	5,12E-03	1,08E-06	-3,80E-03	5,22E-03	1,08E-06	-3,80E-03	6,47E-03	1,38E-06	-4,90E-03	6,56E-03	1,38E-06	-4,90E-03	8,50E-03	1,85E-06	-6,53E-03	8,59E-03	1,85E-06	-6,53E-03
POCP	[kg ethene-eq.]	0,0043188	5,1802E-07	-0,0029028	0,004425	7,2452E-07	-0,004071	0,0057702	7,2452E-07	-0,004071	0,0058764	7,2452E-07	-0,004071	0,0072098	9,322E-07	-0,0052274	0,007316	9,322E-07	-0,0052274	0,009381	1,239E-06	-0,0069738	0,0094872	1,239E-06	-0,0069738
ADPE	[kg Sb-eq.]	8,32E-06	3,07E-10	-5,14E-06	9,44E-06	4,30E-10	-7,21E-06	1,11E-05	4,30E-10	-7,21E-06	1,23E-05	4,30E-10	-7,21E-06	1,38E-05	5,52E-10	-9,26E-06	1,50E-05	5,52E-10	-9,26E-06	1,81E-05	7,36E-10	-1,24E-05	1,91E-05	7,36E-10	-1,24E-05
ADPF	[MJ]	187,62	0,0112808	-122,72	192,34	0,015812	-172,28	251,34	0,015812	-172,28	257,24	0,015812	-172,28	316,24	0,020296	-221,84	322,14	0,020296	-221,84	413	0,02714	-296,18	418,9	0,02714	-296,18
Parameter	**Unit**																								
PERE	[MJ]	62,186			62,776			86,258			86,848			110,33			110,92			146,32			147,5		
PERM	[MJ]	0			0			0			0			0			0			0			0		
PERT	[MJ]	62,186	0,00112926	-53,69	62,776	1,58E-03	-75,166	86,258	1,58E-03	-75,166	86,848	1,58E-03	-75,166	110,33	2,03E-03	-96,642	110,92	2,03E-03	-96,642	146,32	2,71E-03	-128,62	147,5	2,71E-03	-128,62
PENRE	[MJ]	239,54			245,44			323,32			329,22			407,1			414,18			533,36			539,26		
PENRM	[MJ]	0			0			0			0			0			0			0			0		
PENRT	[MJ]	239,54	0,011741	-164,02	245,44	1,64E-02	-230,1	323,32	1,64E-02	-230,1	329,22	1,64E-02	-230,1	407,1	2,11E-02	-296,18	414,18	2,11E-02	-296,18	533,36	2,82E-02	-394,12	539,26	2,82E-02	-394,12
SM	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m^3]	0,12862	2,1712E-06	-0,108324	0,13216	3,0444E-06	-0,15222	0,17818	3,0444E-06	-0,15222	0,18172	3,0444E-06	-0,15222	0,22774	3,9176E-06	-0,1947	0,23128	3,9176E-06	-0,1947	0,3009	5,2156E-06	-0,2596	0,30444	5,2156E-06	-0,2596
Parameter	**Unit**																								
HWD	[kg]	0,00022656	3,717E-09	0	1,16E-03	5,2038E-09	0	2,27E-04	5,2038E-09	0	1,16E-03	5,2038E-09	0	2,27E-04	6,7024E-09	0	1,16E-03	6,7024E-09	0	2,27E-04	8,9326E-09	0	1,16E-03	8,9326E-09	0
NHWD	[kg]	3,3394	8,9798E-05	-2,7612	3,3394	1,26E-04	-3,8704	4,6492	1,26E-04	-3,8704	4,6492	1,26E-04	-3,8704	5,959	1,62E-04	-4,9678	5,959	1,62E-04	-4,9678	7,9296	2,16E-04	-6,6316	7,9296	2,16E-04	-6,6316
RWD	[kg]	0,021476	1,7936E-07	-0,016874	0,02183	2,5134E-07	-0,023718	0,0295	2,5134E-07	-0,023718	0,029854	2,5134E-07	-0,023718	0,037524	3,2332E-07	-0,030444	0,037878	3,2332E-07	-0,030444	0,04956	4,307E-07	-0,040592	4,99E-02	4,307E-07	-0,040592
CRU	[kg]	0			0			0			0			0			0			0			0		
MFR	[kg]	0	0	1,534	0	0	2,1358	0	0	2,1358	0	0	2,1358	0	0	2,7494	0	0	2,7494	0	0	3,6698	0	0	3,6698
MER	[kg]	0			0			0			0			0			0			0			0		
EEE	[MJ]	0			0			0			0			0			0			0			0		
EET	[MJ]	0			0			0			0			0			0			0			0		

Table 1 LCIA results for 1 m² of ELVAL ENF^{TM} sinusoidal corrugated coil coated sheet (Table 5.8 in the LCA report)

List of abbreviations: GWP: Global warming potential; ODP: Ozone layer depletion potential; AP: Acidification potential of land and water; EP: Eutrophication potential; POCP: Photochemical oxidation potential; ADPE: Abiotic depletion potential (elements); ADPF: Abiotic depletion potential (fossil fuels); 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 materials; RSF: Use of renewable secondary fuels; NRSF: Use of non- renewable secondary fuels; FW: Use of net 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.

6. LCA interpretation

- Production of the aluminium sheet

The majority of the environmental impacts come from the aluminium sheet manufacturing. Within the manufacturing processes, the primary aluminium production is dominant, especially the alumina production and the electrolysis. This is particularly the case in these EPDs since it is assumed that the sheet is composed of 100% primary aluminium produced in Europe. The rolling process which converts ingot, i.e. slab, into sheet is much less significant. The LCA modelling and the impact of the primary aluminium production is detailed in the EAA environmental report /EAA EPR/. The recycled ingot production which presents a much lower impact than the primary ingot production is only used in Module D.

- Coil coating process

The coil coating process contributes in general between 2% and 15% to the various indicators. The contribution of the coil coating is obviously more significant for the thin aluminium sheet (i.e. 1mm) than for the thick Al sheet (i.e. 2 mm). For the PVDF coating, two indicators are significantly affected by the coating process which contributes to 47% of the ODP indicator for the 1 mm Al sheet due to fluoride emissions during the binder production as well as 23% of the ADP indicator due to the titanium and fluoride consumption. The coating process is also responsible for 100% of the hazardous waste disposed.

- End of life stage (C4) and Module D

The contribution of Module C4 (disposal) is very limited compared to module A1-A3 and module D. No specific comments are then relevant for this module.

Since no recycling was considered at production level, all the recycling benefits are considered in module D. Calculation rules for module D are explained in the annex C of the EAA PCR document / EAA PCR/. A recycling rate of 92% is used and justified. This provides a significant benefits considering that recycling saves up to 95% of the impact of the primary production. This demonstrates the importance to consider module D into the assessment.

7. References

CEN/TR 15941	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; CEN/TR 15941:2010
EAA DELFT	COLLECTION OF ALUMINIUM FROM BUILDINGS IN EUROPE - A Study by Delft University of Technology – 2004, available at http://www.european-aluminium.eu/publications-building/
EAA EPR	Environmental Profile Report for the European Aluminium Industry - April 2013- Data for the year 2010, available at http://www.european-aluminium.eu/environmental-profile-report/
EAA PCR	Product Category Rules (PCR) for Aluminium Building Products – version of 30 Jan 2013, available at http://www.european-aluminium.eu/updated-epd-programme-2/
EN 13501-1	Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
EN 13523-1	Coil coated metals - Test methods - Part 1: Film thickness
EN 13523-2	Coil coated metals - Test methods - Part 2: Gloss
EN 1396	Aluminium and aluminium alloys. Coil coated sheet and strip for general applications. Specifications
EN 13964+A1	Suspended ceilings – Requirements and test methods
EN 14782	Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements
EN 14783	Fully-supported metal sheet and strip for roofing, external cladding and internal lining – Product specification and requirements
EN 15804	EN 15804:2012-04: Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products
EN 485-2	Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties
EN 507	Roofing products from metal sheet - Specification for fully-supported roofing products of aluminium sheet
EN 508-2	Roofing products from metal sheet– Specification for self-supporting products of steel, aluminium or stainless steel sheet – Part 2: Aluminium
EN 573-3	Aluminium and aluminium alloys – Chemical composition and form of wrought products – Part 3: Chemical composition and form of products
EN ISO 14025	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
EN ISO 14040	Environmental management - Life cycle assessment - Principles and framework
EN ISO 14044	Environmental management - Life cycle assessment - Requirements and guidelines
GABI 6	GaBi 6.3 dataset documentation for the software-system and databases, LBP, University of Stuttgart and PE INTERNATIONAL AG, Leinfelden-Echterdingen, 2013 (http://documentation.gabi-software.com/)
RECYCLING IN EN15804	TACKLING RECYCLING ASPECTS IN EN15804 – paper presented at the « LCA & Construction » conference in Nantes 10-12 July 2012
EAA IR COIL COATING	EAA Internal environmental report on coil coating process – January 2014 (confidential, only provided to the EPD verifier)
EAA IR COMPOSITING	EAA Internal environmental report on compositing process – January 2014 (confidential, only provided to the EPD verifier)
DURABILITY	Aluminium and Durability - Towards Sustainable Cities, edited by Michael Stacey, Published by Cwningen Press, November 2014 ISBN 978-0-9930162-0-2 (available at http://www.world-aluminium.org/publications/)