

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	<b>ASSA ABLOY Perimeter Security Group/ Ameristar Fence Products</b>
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150080-IBA1-EN
Issue date	10.04.2015
Valid to	09.04.2020

**Fencing – Montage II Fence Panel**



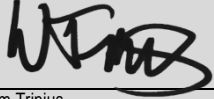
**ASSA ABLOY Perimeter Security Group/  
Ameristar Fence Products**



[www.bau-umwelt.com](http://www.bau-umwelt.com) / <https://epd-online.com>



**1. General Information**

<p><b>Ameristar Perimeter Security</b></p> <hr/> <p><b>Programme holder</b>                  IBU - Institut Bauen und Umwelt e.V.                  Panoramastr. 1                  10178 Berlin                  Germany</p> <hr/> <p><b>Declaration number</b>                  EPD-ASA-20150080-IBA1-EN</p> <hr/> <p><b>This Declaration is based on the Product Category Rules:</b>                  IBU: PCR for Structural steels, 07.2014                  (PCR tested and approved by the independent expert committee (SVR))</p> <hr/> <p><b>Issue date</b>                  10.04.2015</p> <hr/> <p><b>Valid to</b>                  09.04.2020</p> <hr/> <p></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer                  (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr.-Ing. Burkhard Lehmann                  (Managing Director IBU)</p>	<p><b>Montage II Fence Panel</b></p> <hr/> <p><b>Owner of the Declaration</b>                  ASSA ABLOY Perimeter Security Group                  Ameristar Fence Products                  1555 N. Mingo Road                  Tulsa, OK 74116                  USA</p> <hr/> <p><b>Declared product / Declared unit</b>                  This declaration represents one Montage II fence panel painted.</p> <hr/> <p><b>Scope:</b>                  This declaration and its LCA study are relevant to Montage II fence panels manufactured from 12 and 14 gauge cold rolled and galvanized steel at a single manufacturing ASSA ABLOY Perimeter Solutions site - Ameristar Perimeter Security, Tulsa, OK, USA. All Montage II fence component assembly and manufacturing processes are performed at our manufacturing factory - Ameristar Perimeter Security, Tulsa, OK, USA. The Montage II panels are marketed under the following ASSA ABLOY Door Group brands: Ameristar Perimeter Security, Tulsa, OK, USA.</p> <hr/> <p><b>Verification</b></p> <table border="1"> <tr> <td colspan="2">The CEN Standard 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></p> <hr/> <p>Dr. Wolfram Trinius                  (Independent verifier appointed by SVR)</p>	The CEN Standard 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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Independent verification of the declaration and data according to ISO 14025							
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**2. Product**

**2.1 Product description**

Product name: Montage II

Product characteristics: Built for strength yet a penchant for beauty, Montage II is an industrial weight steel fence that delivers on both levels. Superior welding techniques create a profile that lends itself to landscaping design while maintaining a level of perimeter security that is unmatched.

**2.2 Application**

The Montage II is intended for outdoor use. Common applications are: state facilities, government facilities, airports, water treatment & storage, public housing authorities, parks & recreation, stadiums & event centers, schools & universities, and hospitals.

**2.3 Technical Data**

Montage II fence panels conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of .90 oz/sq.ft. (276 g/sq.m), Coating Designation G-90.

**2.4 Placing on the market / Application rules**

Montage II fence panels meet or exceed the industry standards set forth by:

- ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

**2.5 Delivery status**

Finished Montage II panels are individually wrapped in plastic, placed horizontally on wooden pallet with cardboard interleaving, covered with plastic, and banded to pallet for shipment. Minimum of 1 and max 20 panels per pallet. Package Sizes: Package dimensions are 5'1" x 8'0" x 48".

**2.6 Base materials / Ancillary materials**

The composition of the fence panel is as following:

Component	Percentage in mass (%)
Steel	99.55
Plastics	0.45
<b>Total</b>	<b>100</b>

**2.7 Manufacture**

Fence panel production process utilizes cutting, forming, stamping, welding, grinding and an electrodeposition coating process. Material for pickets shall be 1" sq x 14 ga. tubing. The rails shall be steel channel, 1.75"x1.75"x.105". Picket holes in the rail shall be spaced 4.715" o.c. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar's proprietary fusion welding process, thus completing the rigid panel assembly. Paint: The manufactured panels shall be subjected to an in-line electrodeposition coating process consisting of a multi-stage pretreatment/wash followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058mm). Optional colors consist of black or bronze.

All Montage II fence component assembly and manufacturing processes are performed at our manufacturing factory - Ameristar Perimeter Security, Tulsa, OK, USA.

**2.8 Environment and health during manufacturing**

ASSA ABLOY Perimeter Solutions Group and Ameristar are committed to protecting human health and the environment; meeting or exceeding Federal, State, and local laws, regulations, codes, and guidelines; and employing sustainable pollution prevention practices. Painting and Welding areas of Manufacturing plant has extraction ventilation system to remove dust, volatile organic compound (VOC) and air borne materials. Sound abatement is implemented where possible and Personal Protective Equipment is provided. Waste water is pre-treated prior to dispensing into city water system.

- Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and Environment Management program effectiveness is evaluated.
- Code of Conduct covers human rights, labor practices and decent work. Management of ASSA ABLOY is aware of their environmental roles and responsibilities, providing appropriate training,

supporting accountability and recognizing outstanding performance.

**2.9 Product processing/Installation**

Fence panels are typically installed into commercial applications per local, state and federal building codes, standards and requirements. Personal Protective Equipment should be provided at construction site.

**2.10 Packaging**

Montage II panels are interleaved with protective cardboard and banded with polyethylene to retain protective packaging. Panels are stacked horizontally on wooden pallet and banded to pallet for shipment (minimum of 1 to max 20 panels per pallet) Packaging material should be removed from product and collected separately for recycling.

Material	Value (%)
Cardboard/paper	0.04
Plastics	0.03
Wood	78.22
Steel	21.71
<b>Total</b>	<b>100.0</b>

**2.11 Condition of use**

The contractor in accordance with the construction plans shall lay out all new installation. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36". When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Typical maintenance is to service the painted surface by re-coating the doors as necessary (location and environment will vary the time). This is usually after about 20 years in the field (but can be longer depending on exposure and environment). Repairs or replacement are not usually necessary. No cleaning efforts need to be taken into consideration.

**2.12 Environment and health during use**

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

**2.13 Reference service life**

Properly installed and maintained industrial ornamental steel fence panels often last 30 years or longer. The location and environment to which it is exposed, will determine the fence panel's assembly life expectancy.

**2.14 Extraordinary effects**

**Fire**

Not applicable

**Water**

No substances are used which have a negative impact on ecological water quality on contact by the fence panel with water.

**Mechanical destruction**

No danger to the environment can be anticipated during mechanical destruction.

**2.15 Re-use phase**

The product is possible to reuse during the reference service life and be moved from one similar location to another. The majority, by weight, of fence panel components is steel which can be recycled. In collaboration with the Steel Recycling Institute, customers can utilize a locator tool, allowing them to find a recycling center near them. The locator tool is hosted on the Steel Recycling Institute’s website ([www.recycle-steel.org](http://www.recycle-steel.org)); it simply asks the user for location information, and provides the nearest recycling location. The tool is free to use and allows the consumer to travel just a short distance and properly dispose their materials. This free program

provides recycling and/or disposal of door and frame products that have reached the end of their life cycle and are beyond the product’s warranty period.

**2.16 Disposal**

No disposal is foreseen for the Montage II Fence Panel nor for the corresponding packaging.

**2.17 Further information**

For additional information on our products please visit our web sites:

ASSA ABLOY [www.assaabloy.com](http://www.assaabloy.com), or Ameristar Fence Products [www.ameristarfence.com](http://www.ameristarfence.com)

**3. LCA: Calculation rules**

**3.1 Declared Unit**

The declaration refers to the functional unit of 1 piece of Montage II fence panel. Conversion to 1 t is displayed in the table below as specified in Part B requirements on the EPD for Structural steels. Conversion to 1 t is calculated based on the weight of 1 piece product.

**Declared unit**

Name	Value	Unit
Declared unit for fence panel	1	piece
Mass (Total System, excluding packaging)	67.1	kg/ 1 piece fence panel
Conversion to 1 t	14.9	pieces
Dimension	2.44 x 1.83	m
Surface weight	15.03	kg/m <sup>2</sup>
Conversion factor to 1 kg	0.0149	-

For materials and pre-products the actual means of transport and distances, provided by the suppliers, were considered.

**EoL:**

In the End-of-Life phase a recycling scenario with 100% collection rate was assumed.

**3.2 System boundary**

Type of the EPD: cradle to gate - with Options  
The following life cycle phases were considered:

**Production stage:**

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

**A4-A5 Construction stage:**

- A4 - Transport from the gate to the site
- A5 – Packaging waste processing

**C1-C4 End-of-life stage:**

- C2 – Transport to waste processing,
- C3 – Waste processing for recycling and
- C4 – Disposal (landfill, waste for incineration).

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

**Module D:**

- Declaration of all benefits or recycling potential from EOL and A5.

**3.3 Estimates and assumptions**

Transport:

**3.4 Cut-off criteria**

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available).

In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts. Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

**3.5 Background data**

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by PE INTERNATIONAL AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online

GaBi-documentation /GaBi 6 2013D/.

To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation, and auxiliary materials.

**3.6 Data quality**

The requirements for data quality and background data correspond to the specifications of the /IBU PCR PART A/.

PE INTERNATIONAL performed a variety of tests and checks during the entire project to ensure high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used.

The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs.

All relevant background datasets are taken from the GaBi 6 software database. The last revision of the

used background data has taken place not longer than 10 years ago.

**3.7 Period under review**

The period under review is 2013/14 (12 month average).

**3.8 Allocation**

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the combusted material. In this EPD the following specific life cycle inventories for the WIP are considered:

- Waste incineration of plastic
- Waste incineration of paper

• Waste incineration of wood

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the GaBi dataset documentation.

**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 or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

**Installation into the building (A5)**

Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	0.03	kg
Output substances following waste treatment on site (Plastics packaging)	0.02	kg
Output substances following waste treatment on site (Wood packaging)	55.07	kg
Output substances following waste treatment on site (Steel packaging)	15.29	kg

**Reference service life**

Name	Value	Unit
Reference service life	30	a

**End of life (C1-C4)**

Name	Value	Unit
Collected separately steel	66.80	kg
Collected separately plastics	0.30	kg
Recycling steel	66.80	kg
Thermal treatment plastics	0.30	kg

**Reuse, recovery and/or recycling potentials (D), relevant scenario information**

Name	Value	Unit
Collected separately waste type Fencing – Montage II (including packaging)	137.51	kg
Recycling Steel	48.58	%
Thermal Treatment Plastic parts	0.22	%
Reuse packaging (paper, plastic, wood, steel) (from A5)	51.20	%

## 5. LCA: Results

Results shown below were calculated using CML Methodology.

### 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 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	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of Montage II Fence Panel

Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
Global warming potential	[kg CO <sub>2</sub> -Eq.]	9.67E+01	3.27E+00	6.33E+01	3.27E+00	0.00E+00	2.15E-01	-1.39E+02
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.30E-09	1.57E-11	5.43E-10	1.57E-11	0.00E+00	6.48E-13	-9.15E-09
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	7.00E-01	1.50E-02	-8.81E-02	1.50E-02	0.00E+00	5.48E-05	-4.76E-01
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> -Eq.]	6.45E-02	3.42E-03	-6.45E-03	3.42E-03	0.00E+00	4.15E-06	-3.86E-02
Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.04E-01	-4.83E-03	-1.41E-02	-4.83E-03	0.00E+00	2.66E-06	-6.61E-02
Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.45E-05	1.23E-07	6.72E-07	1.23E-07	0.00E+00	1.42E-08	-4.79E-06
Abiotic depletion potential for fossil resources	[MJ]	2.14E+03	4.51E+01	-2.25E+02	4.51E+01	0.00E+00	9.10E-02	-1.49E+03

### RESULTS OF THE LCA - RESOURCE USE: 1 piece of Montage II Fence Panel

Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	1.07E+03	-	-	-	-	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
Total use of renewable primary energy resources	[MJ]	1.07E+03	1.78E+00	6.86E+00	1.78E+00	0.00E+00	6.67E-03	-2.79E+01
Non renewable primary energy as energy carrier	[MJ]	2.20E+03	-	-	-	-	-	-
Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
Total use of non renewable primary energy resources	[MJ]	2.20E+03	4.53E+01	-2.06E+02	4.53E+01	0.00E+00	1.01E-01	-1.52E+03
Use of secondary material	[kg]	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	[m <sup>3</sup> ]	9.17E-01	1.25E-03	2.18E-01	1.25E-03	0.00E+00	5.26E-04	-1.70E-01

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

#### 1 piece of Montage II Fence Panel

Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
Hazardous waste disposed	[kg]	2.31E-02	1.03E-04	1.97E-02	1.03E-04	0.00E+00	7.07E-06	3.46E-02
Non hazardous waste disposed	[kg]	3.29E+00	5.69E-03	9.00E-01	5.69E-03	0.00E+00	2.00E-02	-1.58E+00
Radioactive waste disposed	[kg]	2.46E-02	5.93E-05	7.68E-03	5.93E-05	0.00E+00	4.03E-06	-1.28E-02
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+02	0.00E+00	-
Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.04E+02	0.00E+00	0.00E+00	4.12E-01	-
Exported thermal energy	[MJ]	0.00E+00	0.00E+00	2.93E+02	0.00E+00	0.00E+00	1.13E+00	-

## 6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

Production phase (module A1-A3) contributes between 58 and 100% to total impact assessment. This stage is dominated by upstream emissions associated with steel production processes.

The environmental impacts for the transport (A2) have a negligible impact within this stage.

In module D the benefits (negative values) and loads beyond the system boundary are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution) within A5.

## 7. Requisite evidence

Not applicable in this EPD.

## 8. References

### Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin (pub.):  
Generation of Environmental Product Declarations  
(EPDs);

### General principles

for the EPD range of Institut Bauen und Umwelt e.V.  
(IBU), 2011-09  
www.bau-umwelt.de

### IBU PCR 2011, Part A

Institut Bauen und Umwelt e.V., Königswinter (pub.):  
Product Category Rules for Construction Products  
from the range of Environmental Product Declarations  
of Institut Bauen und Umwelt (IBU), Part A: Calculation  
Rules for the Life Cycle Assessment and  
Requirements on the Background Report. September  
2012  
www.bau-umwelt.de

### IBU PCR Part B

IBU PCR Part B: PCR Guidance-Texts for Building-  
Related Products and Services. From the range of  
Environmental Product Declarations of Institute  
Construction and Environment e.V. (IBU). Part B:  
Requirements on the EPD for Structural steels.  
www.bau-umwelt.com

### ISO 14025

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

### EN 15804

EN 15804:2012+A1:2014: Sustainability of  
construction works - Environmental product  
declarations - Core rules for the product category of  
construction products

### EN 60335

EN 60335-1: 2012: Household and similar electrical  
appliances -Safety -Part 1: General requirements

### EN 61000

EN 61000-6-2: 2005: Electromagnetic compatibility  
(EMC) - Part 6-2: Generic standards - Immunity for  
industrial environments

### EN 61000-6-3: 2001

EN 61000-6-3: 2001: Quality management systems -  
Requirements (ISO 9001:2008)

### EN 60335

EN 60335-2-103: 2003 Household and similar  
electrical appliances Safety Part 2-103: Particular  
requirements for drives for gates, doors and windows

### EN ISO 13849

EN ISO 13849-1:2008: Safety of machinery — Safety-  
related parts of control systems — Part 1: General  
principles for design.

### EN 16005

EN 16005:2012: Power operated pedestrian door sets  
- Safety in use -  
Requirements and test methods.

### DIN 18650

DIN 18650-1: 2005: Building hardware - Powered  
pedestrian doors - Part 1: Product requirements and  
test methods.

### DIN 18650-2: 2005

DIN 18650-2: 2005: Building hardware - Powered  
pedestrian doors - Part 2: Safety at powered  
pedestrian doors.

### EN ISO 10077

EN ISO 10077-1:2006: Thermal performance of  
windows, doors and  
shutters – Calculation of thermal transmittance –  
Part 1: General.

### EN ISO 10077-2:2012

EN ISO 10077-2:2012: Thermal performance of  
windows doors and  
shutters – Calculation of thermal transmittance –  
Part 2: Numerical method for frame.

### EN ISO 9001:2008

EN ISO 9001:2008: Quality management systems -  
Requirements (ISO 9001:2008).

### ASTM A653/A653M

ASTM A653/A653M: Standard Specification for Steel  
Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy  
Coated (Galvannealed) by the Hot-Dip Process  
(American Society for Testing and Materials)

### ASTM B117

ASTM B117: Practice for Operating Salt-Spray (Fog)  
Apparatus (American Society for Testing and  
Materials)

### ASTM D523

ASTM D523: Test Method for Specular Gloss  
(American Society for Testing and Materials)

### ASTM D714

ASTM D714: Test Method for Evaluating Degree of  
Blistering in Paint (American Society for Testing and  
Materials)

### ASTM D822

ASTM D822: Practice for Conducting Tests on Paint  
and Related Coatings and Materials using Filtered  
Open-Flame Carbon-Arc Light and Water Exposure  
Apparatus (American Society for Testing and  
Materials)

### ASTM D1654

ASTM D1654: Test Method for Evaluation of Painted  
or Coated Specimens Subjected to Corrosive  
Environments (American Society for Testing and  
Materials)

**ASTM D2244**

ASTM D2244: Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates (American Society for Testing and Materials)

**ASTM D2794**

ASTM D2794: Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) (American Society for Testing and Materials)

**ASTM D3359**

ASTM D3359: Test Method for Measuring Adhesion by Tape Test (American Society for Testing and Materials)

**ASTM F2408**

ASTM F2408: Ornamental Fences Employing Galvanized Steel Tubular Pickets (American Society for Testing and Materials)



**9. Annex**

Results shown below were calculated using TRACI Methodology.

**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 from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement <sup>(1)</sup>	Refurbishment <sup>(1)</sup>	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	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of Montage II Fence Panel**

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
GWP	Global warming potential	[kg CO <sub>2</sub> -Eq.]	9.67E+01	3.27E+00	6.33E+01	3.27E+00	0.00E+00	2.15E-01	-1.39E+02
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.57E-09	1.67E-11	5.78E-10	1.67E-11	0.00E+00	6.89E-13	-9.73E-09
AP	Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	7.19E-01	1.96E-02	-8.77E-02	1.96E-02	0.00E+00	6.43E-05	-4.80E-01
EP	Eutrophication potential	[kg N-eq.]	3.80E-02	1.37E-03	-4.25E-03	1.37E-03	0.00E+00	1.83E-06	-2.28E-02
Smog	Ground-level smog formation potential	[kg O <sub>3</sub> -eq.]	1.09E+01	4.03E-01	-1.24E+00	4.03E-01	0.00E+00	5.05E-04	-6.88E+00
Resources	Resources	[MJ]	6.54E+01	6.49E+00	5.94E+00	6.49E+00	0.00E+00	9.37E-03	-5.34E+01

**RESULTS OF THE LCA - RESOURCE USE: 1 piece of Montage II Fence Panel**

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.07E+03	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.07E+03	1.78E+00	6.86E+00	1.78E+00	0.00E+00	6.67E-03	-2.79E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	2.20E+03	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	2.20E+03	4.53E+01	-2.06E+02	4.53E+01	0.00E+00	1.01E-01	-1.52E+03
SM	Use of secondary material	[kg]	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	[m <sup>3</sup> ]	9.17E-01	1.25E-03	2.18E-01	1.25E-03	0.00E+00	5.26E-04	-1.70E-01

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of Montage II Fence Panel**

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	2.31E-02	1.03E-04	1.97E-02	1.03E-04	0.00E+00	7.07E-06	3.46E-02
NHWD	Non hazardous waste disposed	[kg]	3.29E+00	5.69E-03	9.00E-01	5.69E-03	0.00E+00	2.00E-02	-1.58E+00
RWD	Radioactive waste disposed	[kg]	2.46E-02	5.93E-05	7.68E-03	5.93E-05	0.00E+00	4.03E-06	-1.28E-02
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+02	0.00E+00	-
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.04E+02	0.00E+00	0.00E+00	4.12E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	2.93E+02	0.00E+00	0.00E+00	1.13E+00	-



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