

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	ArcelorMittal Europe – Flat Products
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ARC-20220319-CBA1-EN
Issue date	15/12/2022
Valid to	14/12/2027

XCarb® recycled and renewably produced organic coated  
steel coils Granite® and Estetic®  
ArcelorMittal

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



ECO PLATFORM

**EPD**  
VERIFIED

**XCarb®**

Recycled and renewably  
produced

## General Information

<p>ArcelorMittal</p> <hr/> <p><b>Programme holder</b>          IBU – Institut Bauen und Umwelt e.V.          Hegelplatz 1          10117 Berlin          Germany</p>	<p>XCarb® recycled and renewably produced organic coated steel coils</p> <hr/> <p><b>Owner of the declaration</b>          ArcelorMittal Europe – Flat Products          24-26 Boulevard d'Avranches          L-1160 Luxembourg          Luxembourg</p>						
<p><b>Declaration number</b>          EPD-ARC-20220319-CBA1-EN</p>	<p><b>Declared product / declared unit</b>          The declared unit is 1 metric ton of XCarb® recycled and renewably produced organic coated steel from the Granite® and Estetic® range.</p>						
<p><b>This declaration is based on the product category rules:</b>          Structural steels, 11.2017          (PCR checked and approved by the SVR)</p>	<p><b>Scope:</b>          This declaration applies to 1 metric ton of XCarb® recycled and renewably produced organic coated steel coil (Granite® and Estetic®).</p>						
<p><b>Issue date</b>          15/12/2022</p>	<p>The Life Cycle Assessment is based on the LCA model and data for ArcelorMittal XCarb® recycled and renewably produced hot rolled coils, coupled with downstream processes at ArcelorMittal plants, representing 95 % of the production XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®).</p>						
<p><b>Valid to</b>          14/12/2027</p>	<p>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+A2. In the following, the standard will be simplified as EN 15804.</p>						
<div>  </div> <div> <p>Dipl. Ing. Hans Peters          (chairman of Institut Bauen und Umwelt e.V.)</p> </div> <div>  </div> <div> <p>Dr. Alexander Röder          (Managing Director Institut Bauen und Umwelt e.V.)</p> </div>	<div> <p><b>Verification</b></p> </div> <div> <table border="1"> <tr> <td colspan="2">The standard EN 15804 serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to ISO 14025:2011</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> </div> <div>  </div> <div> <p>Matthias Klingler          (Independent verifier)</p> </div>	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
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						

## Product

### Product description/Product definition

This Environmental Product Declaration refers to XCarb® recycled and renewably produced organic coated steel coils from the Granite® and Estetic® range. The Granite® and Estetic® range combines metallic coated steel substrates with a protective organic coating system to create robust colour-coated products with high weathering resistance and therefore longer lifetime.

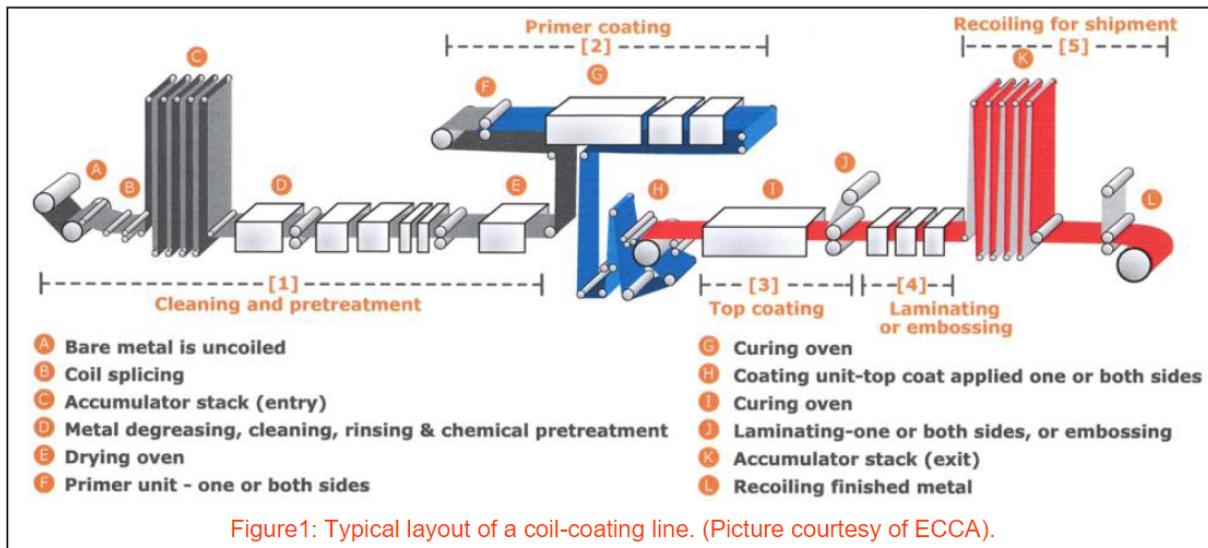
Granite® & Estetic® prepainted steels are delivered in compliance with standard EN 10169.

These two families of prepainted products are available in a wide range of steel grades aimed for architectural buildings for outdoor use (roofing,

cladding) and indoor use (home appliances, general industry and building components) processed by drawing, roll forming, bending, flanging, or spinning.

Granite® & Estetic® prepainted steels are made of a Zinc or Optigal® (respectively Z & ZM according to EN 10346 standard) metallic coated steel with coating weights ranging from 60 to 350 g/m², combined with an additional organic coating with thicknesses as follows:

- Top side 25 µm to 75 µm for Granite® and 15 µm to 55 µm for Estetic®
- Back side 5 µm to 75 µm for Granite® and 5µm to 25 µm for Estetic®



For the use and application of the product, the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

### Application

Organic-coated steel is used in all sectors of industry. In building and construction, it is used as profiles for cladding, roofing, tiles, gutters etc.

ArcelorMittal's coloured organic coated steel coils comprise hot dip galvanized coils as a substrate over which organic coatings are applied. The coils are then delivered to manufacturers for shaping into end products to be included in building works, generally to precise dimensions, thereby avoiding losses on the construction site.

### Technical Data

The thickness of coatings (i.e. metallic layer and organic coating) varies according to the intended end use of the products. Granite® is suitable for outdoor applications whereas Estetic® is preferred for indoor applications. Granite® and Estetic® products can be processed by bending, profiling, cold roll forming and deep drawing without damaging the top surface. They can be joined using techniques such as clinching, riveting and adhesive bonding. These products are in compliance with EN 10169 standard.

Detailed steel and coating properties and chemical compositions for the different products in the Granite® and Estetic® range are available at:

- <https://industry.arcelormittal.com/catalogue/F30/EN>,
- <https://industry.arcelormittal.com/catalogue/F40/EN> and
- <https://industry.arcelormittal.com/catalogue/F20/EN>.

### Constructional data

The following table refers to steel properties without the coating. Properties with coating differ according to

thickness. If necessary, specific characteristics can be obtained at  
<https://industry.arcelormittal.com/catalogue/F10/EN>.

Name	Value	Unit
Density	7850	kg/m <sup>3</sup>
Modulus of elasticity	210000	N/mm <sup>2</sup>
Coefficient of thermal expansion	12	10 <sup>-6</sup> K <sup>-1</sup>
Thermal conductivity	48	W/(mK)
Melting point	1536	°C

Performance data of the product with respect to its characteristics are in accordance with the relevant technical provision (no CE-marking).

### Base materials/Ancillary materials

The base material of organic-coated steel coils is iron. Alloying elements are added in the form of ferroalloys or metals. The metallic coating includes either zinc (Z) or an alloy made of zinc, aluminium, and magnesium (ZM) as defined in EN 10346 standard. The organic coatings are made from polyester, polyurethane or polyvinylidene fluoride (PVDF) resins.

XCarb® recycled and renewably produced organic coated steel coils (Granite® and Estetic®) originate from a production process flow which only uses XCarb® recycled and renewably produced hot rolled coil as pre-material. This pre-material will only be transported by sea or train to the ArcelorMittal finishing mills outside Spain.

ArcelorMittal's organic coated steel is produced in full compliance with the European REACH Regulation (Registration, Evaluation, Authorization and Restriction of Chemicals). In particular, all coatings and surface treatments used for Granite® and Estetic® are free of hexavalent chromium compounds, which are substances of very high concern (SVHC) included in REACH Annexe XIV, and hazardous heavy metals (Pb, Hg and Cd).

This product contains substances listed in the candidate list (date 02.06.2022) above 0.1 mass percent: No.

### Reference service life

A reference service life for XCarb® recycled and renewably produced organic coated steel from the Granite® and Estetic® range is not declared.

Hot dip galvanized organic coated steels are used in

construction with many different application purposes. The lifetime therefore will be limited by the application and corresponding service. At the end of life, they will be recovered and recycled into a new steel product.

## LCA: Calculation rules

### Declared Unit

The declaration refers to the functional unit of 1 metric ton of double-sided XCarb® recycled and renewably produced organic coated steel from the Granite® and Estetic® range, packed and ready to be transported from ArcelorMittal to its clients as specified in Part B requirements of the EPD.

The results are calculated based on a 0.47 mm steel thickness with 225 g/m<sup>2</sup> metallic coating and 40 µm organic coating thickness (total on both sides). Prior to the coating steps, the steel substrate has been cold rolled from an XCarb® recycled and renewably produced hot rolled coil.

### Declared unit

Name	Value	Unit
Declared unit	1	t
Thickness (of steel)	0.47	mm

For conversion to square meters, 1 metric ton of the declared unit is equivalent to 251.5 m<sup>2</sup>.

The product described refers to the average annual production at ArcelorMittal in Europe for the reference year of 2021. For Global Warming Potential (Total) the results are within a 10 % variation.

### System boundary

Type of EPD: cradle to gate with modules C1–C4 and module D (A1-A3, C and D)

**Modules A1-A3** of the steel and coating production include:

- The provision of resources, additives, and energy
- Transport of resources and additives to the production site
- Transport of intermediate products within ArcelorMittal sites
- Production processes on site including energy, production of additives, disposal of

production residues, and consideration of related emissions.

- Recycling of production/manufacturing scrap. Steel scrap is assumed to reach the end-of-waste status once is shredded and sorted, thus becoming input to the product system in the inventory.

**Module C1** assumes a generic multi-story building demolition scenario.

**Module C2** includes impacts of assumed distances of 100 km from the demolition site of a scrap processing plant and 200 km from this plant to the disposal. In both cases, empty returns of transport were assumed.

**Module C3** takes into account the sorting and shredding of after-use steel to allow its orientation towards the recycling solutions. This process will also produce losses due to efficiency that will be oriented towards landfill sites. A conservative value of 2 % landfill is then considered in C4.

**Module C4** takes into account the waste disposal including physical pre-treatment and management of the disposal site. Steel is an inert material which does not require any specific treatment on the disposal site.

**Module D** refers to the end of life of structural steel, including reuse and recycling.

### 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.

For life cycle modelling of the considered products, *GaBi ts software* version 10.6.1.35 was used with *GaBi* database 2022.1. This database contains consistent and documented datasets available in *Gabi Documentation*

## LCA: Scenarios and additional technical information

### Characteristic product properties

#### Information on biogenic carbon

The declared product does not contain any biogenic carbon.

Product packaging is adapted to the way the product will be transported, its intended use, its thickness and width, and the customer's request.

For modelling, a conservative scenario was employed,

considering the following amounts of packaging materials.

- Steel – 0.796 kg
- Plastic – 0.075 kg
- Timber – 1.5 kg
- Cardboard – 1.73 kg.

### Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic Carbon Content in product	0	kg C
Biogenic Carbon Content in accompanying packaging	1.46	kg C

Current practice for the average hot dip galvanized steel consist of 98 % recycling and 2 % landfill according to the *European Commission Technical Steel Research*.

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

Current practice for the average organic coated steel consists of 98 % recycling and 2 % landfill according to the *European Commission Technical Steel Research*.

Name	Value	Unit
Recycling	980	kg
Landfilling	20	kg

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

Name	Value	Unit
Recycling	98	%



## LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR 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	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 ton XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®)

Core Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global warming potential - total	[kg CO <sub>2</sub> -Eq.]	1.03E+3	4.35E+1	2.13E+1	1.53E+0	2.90E-1	-1.40E+2
Global warming potential - fossil fuels	[kg CO <sub>2</sub> -Eq.]	1.03E+3	4.32E+1	2.11E+1	1.52E+0	2.98E-1	-1.40E+2
Global warming potential - biogenic	[kg CO <sub>2</sub> -Eq.]	0.00E+0	1.83E-3	1.53E-2	5.40E-3	-8.84E-3	2.24E-1
GWP from land use and land use change	[kg CO <sub>2</sub> -Eq.]	2.93E-1	2.82E-1	1.45E-1	9.36E-4	5.51E-4	-3.75E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	8.59E-8	1.33E-11	2.12E-12	1.99E-11	7.01E-13	3.88E-10
Acidification potential, accumulated exceedance	[mol H <sup>+</sup> -Eq.]	3.07E+0	2.46E-1	1.27E-1	3.75E-3	2.12E-3	-3.84E-1
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	2.96E-3	1.52E-4	7.70E-5	4.31E-6	5.06E-7	-2.50E-5
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	7.06E-1	1.19E-1	6.20E-2	1.03E-3	5.41E-4	-8.01E-2
Eutrophication, accumulated exceedance	[mol N-Eq.]	7.56E+0	1.32E+0	6.87E-1	1.10E-2	5.94E-3	-8.67E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	2.29E+0	2.31E-1	1.20E-1	2.82E-3	1.64E-3	-2.67E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.16E-1	4.45E-6	2.17E-6	3.84E-7	3.06E-8	3.08E-6
Abiotic depletion potential for fossil resources	[MJ]	1.39E+4	5.82E+2	2.83E+2	2.68E+1	3.91E+0	-1.04E+3
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m <sup>3</sup> world-Eq deprived]	2.20E+2	6.26E-1	2.41E-1	3.11E-1	3.27E-2	2.93E+0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 ton XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	2.06E+4	4.44E+1	1.96E+1	1.38E+1	5.86E-1	1.52E+2
Renewable primary energy resources as material utilization	[MJ]	6.00E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.00E-1
Total use of renewable primary energy resources	[MJ]	2.07E+4	4.44E+1	1.96E+1	1.38E+1	5.86E-1	1.51E+2
Non-renewable primary energy as energy carrier	[MJ]	1.39E+4	5.85E+2	2.84E+2	2.68E+1	3.91E+0	-1.05E+3
Non-renewable primary energy as material utilization	[MJ]	4.00E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.00E+0
Total use of non-renewable primary energy resources	[MJ]	1.40E+4	5.85E+2	2.84E+2	2.68E+1	3.91E+0	-1.05E+3
Use of secondary material	[kg]	9.09E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.11E+1
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m <sup>3</sup> ]	5.44E+0	5.04E-2	2.27E-2	1.32E-2	9.93E-4	-9.10E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 ton XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	[kg]	3.75E-6	4.07E-9	1.50E-9	7.90E-8	0.00E+0	5.21E-8
Non-hazardous waste disposed	[kg]	2.25E+1	1.03E-1	4.63E-2	1.90E-2	2.00E+1	-1.99E+0
Radioactive waste disposed	[kg]	5.48E-1	2.86E-3	5.27E-4	3.95E-3	4.35E-5	1.74E-2
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	9.80E+2	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 ton XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND	ND

Note: 909 kg of scrap are used in the manufacturing of 1 metric ton of XCarb® recycled and renewably produced organic coated steel (Granite® and Estetic®). After use, 980 kg of steel are recycled, and 20 kg are landfilled. The potential environmental impact calculated for module D depends on the net amount of scrap left in the system, which is  $980 - 909 = 71$  kg. This means that the system has a net output of 71 kg of scrap, which is shown in module D as an environmental credit or burden depending on the impact category. The additional and optional impact categories in accordance with *EN 15804-A2* have not been declared, as this is not required in accordance with *PCR Part A*.

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, [GRL1] radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for nonfossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans not cancerogenic”, “potential soil quality index”.

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

## References

### EN10169

EN10169:2022 - Continuously organic coated (coil coated) steel flat products - Technical delivery conditions

### EN10346

EN10346:2015 - Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions

### EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

### ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

### European Commission Technical Steel Research

Sansom, M. and Meijer, J.: Life-cycle assessment (LCA) for steel construction, European Commission technical steel research, 2001-12.

### GaBi ts Documentation

GaBi ts dataset documentation for the GaBi datasets for Life Cycle Engineering. LBP, University of Stuttgart and PE International, 2011.  
<http://documentation.gabi-software.com/>.

### GaBi ts Software

GaBi ts Software and Databases for Life Cycle Engineering. LBP, University of Stuttgart and PE International, 2013.

### IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.  
[www.ibu-epd.com](http://www.ibu-epd.com)

### PCR Part A

PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, Institut Bauen und Umwelt e.V., 2021.  
[www.bauumwelt.com](http://www.bauumwelt.com)

### PCR Part B

PCR - Part B: Requirements of the EPD for Structural steels, Institut Bauen und Umwelt e.V., 2017.  
[www.bauumwelt.com](http://www.bauumwelt.com)

### Candidate list - REACH

Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).  
<https://echa.europa.eu/candidate-list-table>

### Worldsteel 2011

Life cycle assessment (LCA) methodology report for steel products.  
© World Steel Association 2017.  
<https://worldsteel.org/wp-content/uploads/Life-cycle-inventory-methodology-report.pdf>

**Publisher**

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

Tel +49 (0)30 3087748- 0  
Fax +49 (0)30 3087748- 29  
Mail [info@ibu-epd.com](mailto:info@ibu-epd.com)  
Web [www.ibu-epd.com](http://www.ibu-epd.com)

**Programme holder**

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

Tel +49 (0)30 - 3087748- 0  
Fax +49 (0)30 - 3087748 - 29  
Mail [info@ibu-epd.com](mailto:info@ibu-epd.com)  
Web [www.ibu-epd.com](http://www.ibu-epd.com)

**Author of the Life Cycle  
Assessment**

ArcelorMittal Europe – Flat  
Products  
Boulevard d'Avranches 24-26  
1160 Luxembourg  
Luxembourg

Tel +352 4792-1  
Fax -  
Mail [flateurope.technical.assistance@arcelormittal.com](mailto:flateurope.technical.assistance@arcelormittal.com)  
Web [flateurope.arcelormittal.com/](http://flateurope.arcelormittal.com/)

**Owner of the Declaration**

ArcelorMittal Europe – Flat  
Products  
Boulevard d'Avranches 24-26  
1160 Luxembourg  
Luxembourg

Tel +352 4792-1  
Fax -  
Mail [flateurope.technical.assistance@arcelormittal.com](mailto:flateurope.technical.assistance@arcelormittal.com)  
Web [flateurope.arcelormittal.com/](http://flateurope.arcelormittal.com/)