

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804




Owner of the Declaration	ArcelorMittal Europe - Flat Products
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Cold Rolled Steel Coils
ArcelorMittal Europe

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General Information

<p>ArcelorMittal Europe</p> <hr/> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-ARC-20200027-CBD1-EN</p> <hr/> <p>This declaration is based on the product category rules: Structural steels, 07.2014 (PCR checked and approved by the SVR)</p> <hr/> <p>Issue date 10/07/2020</p> <hr/> <p>Valid to 09/07/2025</p> <hr/> <p></p> <hr/> <p>Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p>	<p>Cold Rolled Steel Coils</p> <hr/> <p>Owner of the declaration ArcelorMittal Europe – Flat Products 24-26 Boulevard d'Avranches L-1160 Luxembourg Luxembourg</p> <hr/> <p>Declared product / declared unit The declaration applies to 1 ton of cold rolled steel coil.</p> <hr/> <p>Scope: The Life Cycle Assessment is based on data collected from the ArcelorMittal plants producing Cold Rolled Coils, representing 95 % of the annual production from 2015.</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.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The standard <i>EN 15804</i> serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to <i>ISO 14025:2010</i></td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p></p> <hr/> <p>Mr Carl-Otto Neven (Independent verifier appointed by SVR)</p>	The standard <i>EN 15804</i> serves as the core PCR		Independent verification of the declaration and data according to <i>ISO 14025:2010</i>		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
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Product

Product description/Product definition

This Environmental Product Declaration refers to Cold Rolled Steel Coil, Slit Coil and Sheet including Indaten® weathering steel, consisting of carbon steel. The EPD results reflect the volume weighted average of these products.

Cold Rolled Coils are produced in ArcelorMittal cold rolling mill in which Hot Rolled Steel coils are continuously rolled between a series of stands of rotating cylinders, and then annealed, either on a continuous annealing line or on batch annealing facilities. Alloy composition and process parameters are set to guarantee the required grade. 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.

Mean thickness value is at 1.5 mm but the declaration covers the whole range from 0.4 mm up to 3 mm. Width range is from 30 mm up to 1880 mm.

For the use and application, the product has a performance taking into consideration *EN 10130:2006* - Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions or *EN 10268+A1:2013* - Cold rolled steel flat products with high yield strength for cold forming - Technical delivery

conditions. For the application and use the respective national provisions apply.

Indaten® cold rolled steel offers improved resistance to atmospheric corrosion. Despite not being covered by a specific European standard, it is a thin gauge version of the hot rolled steel defined in the *EN 10025-5:2019* - Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance for Indaten®.

It is a fine-grain, high-strength structural steel that has been optimised to give improved processing and in-service performance.

Application

Cold Rolled Coils can be used in various construction applications, such as:

- Construction: façade & cladding, roofing, sun screens & shades.
- Road equipment: safety barriers, protection equipment, sound insulation wall panels.
- Art sculpture & Other industrial applications: Containers & filters, etc.

Cold-rolled coils and Indaten® coils are delivered in wide coils, slit coils or sheets. It can be processed by all conventional processing operations used for cold rolled: cutting, slitting, bending, drawing, clinching, profiling, stamping, welding etc.

Indaten® Weathering steels offer improved resistance to corrosion thanks to the addition of copper during manufacture.

Additional alloying elements and specific thermal treatments during annealing can be used to increase the steel's tensile strength or make forming processes easier.

Technical Data

ArcelorMittal Europe Flat products is producing Cold Rolled Steel Coils in 6 mills. The EPD covers 95 % of the total production in 2015.

ArcelorMittal offers a full range of grades in compliance with the *EN 10130* to meet different applications.

ArcelorMittal has also created Indaten® weathering steel grade to meet different applications.

Constructional data

Name	Value	Unit
Density	7850	kg/m ³
Modulus of elasticity	210000	MPa
Coefficient of thermal expansion	12	10 ⁻⁶ K ⁻¹
Thermal conductivity	48	W/(mK)
Melting point	1650	°C
Minimum yield strength	180 - 850	MPa

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision from standards *EN 10130* or *EN 10268* (no CE-marking).

Voluntary data: ArcelorMittal product catalogue – document centre:
<https://industry.arcelormittal.com/productdocumentcentre>

Base materials/Ancillary materials

The chemical composition is in accordance with *EN 10130* or *EN 10268*. High strength low alloyed (HSLA) carbon steel has a carbon content lower than 0.2 %. Yield strengths from 180 MPa up to 850 MPa are available.

Steel is mainly iron and carbon, with small amounts of alloying elements. These elements modify the chemical and physical properties of steel such as

strength, durability and corrosion resistance. High strength low alloyed (HSLA) carbon steel has a carbon content lower than 0.2 %.

The metallurgical composition of weathering steels includes less than 0.2 % carbon. Alloying elements (mainly copper, chromium, nickel, phosphorus, silicon, and manganese) typically comprise less than 5 % of the steel.

Weathering steels are known as corrosion resistant steels. Like standard carbon steels, weathering steels oxidise when exposed to the atmosphere. Due to their specific chemistry, the corrosion rate of weathering steels is generally much lower than that of standard carbon steel. To obtain the weathering features, those steel grades are including some alloys like Cu, Cr, Ni, P & Mo in quantities defined by the standards. The possible chemical composition is defined in European standard. Weathering steels can be classified into two categories: those with limited phosphorous content (typically less than 0.035 %); and those with a higher phosphorous content. Weathering steels with a phosphorous content of between 0.06 and 0.15 % are identified by the letter P at the end of the product name.

High levels of phosphorous improves the corrosion resistance of weathering steels. Phosphorous is not used in heavy plate for structural uses as it can form iron phosphide (FeP₃) during welding. This can hamper weldability and cause the weld zone to become brittle. For this reason, phosphorous weathering steels are usually only available in thicknesses lower than 12 mm.

This product contains substances listed in the candidate list (date: 26.2.2020) exceeding 0.1 percentage by mass: no

Reference service life

A reference service life for cold rolled steel coil is not declared. Cold rolled coil products are construction products with many different application purposes. The lifetime therefore will be limited by the application as well as the service life of the work.

First structural steel projects using weathering steel were completed 50 years ago in Europe and have demonstrated a very low maintenance level and no need for painting.

At the end of life, weathering steel products could be recovered, recycled and sent to the steel mill.

LCA: Calculation rules

Declared Unit

This Environmental Product Declaration refers to Cold Rolled Steel Coil, Slit Coil and Sheet including Indaten® weathering steel, consisting of carbon steel, as specified in Part B requirements on the EPD for Structural Steels.

Declared unit

Name	Value	Unit
Declared unit	1000	kg
Conversion factor to 1 kg	0.001	-
Density	7850	kg/m ³

System boundary

Type of the EPD: cradle-to-gate - with options. Module A1-A3, Module C3 and module D were considered.

Modules A1-A3 of the Cold Rolled Steel Coil, Slit Coil and Sheet including Indaten® weathering steel production include the following:

- The provision of resources, additives, and energy
- Transport of resources and additives to the production site
- 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 it is shredded and sorted, thus becomes input to the product system in the inventory.

Module C3 takes into account the sorting and shredding of after-use steel that is recycled, as well as the non-recovered scrap due to sorting efficiency which is landfilled. A conservative value of 2 % landfill is considered.

Module D refers to the End-of-Life of the steel coil, 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.

Gabi version 9.2 was used with Gabi Database SP35 version 8.7 to calculate this EPD.

LCA: Scenarios and additional technical information

Current practice for the average Cold Rolled Steel Coil consist of 98 % recycling and 2 % landfill according to the /European Commission Technical Steel Research/.

End of life (C3)

Name	Value	Unit
Landfilling	2	%

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; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 ton of cold rolled steel coil

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO ₂ -Eq.]	2.38E+3	2.00E+0	-1.65E+3
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.82E-9	6.89E-12	3.24E-10
Acidification potential of land and water	[kg SO ₂ -Eq.]	4.12E+0	6.78E-3	-3.98E+0
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	4.18E-1	7.99E-4	-3.41E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	7.04E-1	4.75E-4	-5.12E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.02E-4	9.53E-7	1.70E-4
Abiotic depletion potential for fossil resources	[MJ]	2.06E+4	2.25E+1	-1.31E+4

RESULTS OF THE LCA - RESOURCE USE: 1 ton of cold rolled steel coil

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	6.16E+2	1.12E+1	1.20E+3
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.16E+2	1.12E+1	1.20E+3
Non-renewable primary energy as energy carrier	[MJ]	2.06E+4	3.43E+1	-1.23E+4
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.06E+4	3.43E+1	-1.23E+4
Use of secondary material	[kg]	1.13E+2	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	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
Use of net fresh water	[m ³]	4.59E+0	1.53E-2	5.79E-1

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 ton of cold rolled steel coil

Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	1.37E-5	2.18E-7	-8.67E-6
Non-hazardous waste disposed	[kg]	4.21E+0	2.01E+1	-2.63E+1
Radioactive waste disposed	[kg]	-2.71E-3	4.70E-3	2.94E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	9.80E+2	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0

References

EN 10025

EN 10025-5:2019 - Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance

EN 10130

EN 10130:2006 - Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions

EN 10268

EN 10268+A1:2013 - Cold rolled steel flat products with high yield strength for cold forming - Technical delivery conditions

PCR Part B

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

Institut Bauen und Umwelt

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

ISO 14025

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

EN 15804

EN 15804+A1:2013 - Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

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 Software

GaBi ts. Software and Databases
5 Environmental Product Declaration ArcelorMittal - Organic coated steel coils Granite® and Estetic® for Life Cycle Engineering. LBP, University of Stuttgart und PE International, 2017.

GaBi ts Documentation

Documentation of the GaBi datasets for Life Cycle Engineering. LBP, University of Stuttgart and PE International, 2017.
<http://documentation.gabi-software.com>

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/regulations/reach/legislation>

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