

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	24.07.2027

XCarb® Recycled and Renewably Produced Hot Rolled Coils
ArcelorMittal Europe

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ECO PLATFORM

EPD
VERIFIED

XCarb®

Recycled and renewably
produced

General Information

ArcelorMittal Europe

Programme holder

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

Declaration number

EPD-ARC-20220173-CBC1-EN

This declaration is based on the product category rules:

Structural steels, 11.2017
(PCR checked and approved by the SVR)

Issue date

25.07.2022

Valid to

24.07.2027



Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)



Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

XCarb® Recycled and Renewably Produced Hot Rolled Coil

Owner of the declaration

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

Declared product / declared unit

The declared unit is 1 ton of hot rolled steel coil.

Scope:

This declaration applies to 1 metric tonne of XCarb® Recycled and Renewably Produced Hot Rolled Coils produced at ArcelorMittal Sestao.

The Life Cycle Assessment is based on data collected in 2021 for deliveries based on Guarantee of Origins renewable electricity supply.

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.

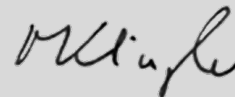
The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR

Independent verification of the declaration and data according to *ISO 14025:2011*

internally externally



Matthias Klingler
(Independent verifier)

Product

Product description/Product definition

This Environmental Product Declaration refers to XCarb® Recycled and Renewably Produced Hot Rolled Coils used for any commercial and structural applications, including Armstrong® high strength steel range. XCarb® Recycled and Renewably Produced Hot Rolled Coils refer to Black or Pickled & Oiled coils. The EPD results reflect the volume-weighted share of these coils (60 % Black, 40 % Pickled & Oiled).

XCarb® Recycled and Renewably Produced Hot Rolled Coils are produced at ArcelorMittal Sestao in Spain; their production is based on Electric Arc Furnace and Compact Strip Production processes with renewable electricity supply with Guarantee of Origins.

Products are continuously rolled at high temperatures going through a series of stands of rotating cylinders. Steel alloy composition and process parameters are set to guarantee the required grade. The coils are then delivered, Black or Pickled & Oiled, to processors and

manufacturers for shaping into finished products.

The mean thickness value is at 5 mm but the declaration refers to hot rolled steel coils between 985 and 1550 mm wide and 1 to 12.74 mm thick.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The product has a declaration of performance taking into consideration *EN 10025-1 - Hot rolled products of structural steels - Part 1: General technical delivery conditions*. For the application and use, the respective national provisions apply.

Other European standards concerning Hot Rolled Coils could also be used by manufacturers for various pieces or components:

- *EN 10149-2 - Hot rolled flat products made of high yield strength steels for cold-forming.*

- General technical delivery conditions can be considered as specified in *EN 1993-1-3* - Eurocode 3 - Design of steel structures - Part 1-3: General rules - Supplementary rules for cold-formed members and sheeting.
- Drawing steels according to *EN 10111* and other special grades according to *EN ISO 683*.

These products, not covered by *EN 10025*, are not under *CPR* and do not require CE marking to be placed on the market.

Characteristics are also specified in the American standard *ASTM G101-04:2015* (American Society for Testing and Materials) for hot-rolled material.

Application

XCarb® Recycled and Renewably Produced Hot Rolled Coils can be used in various applications, such as:

- Construction: structural or non-structural welded sections, façade & cladding, roofing, sunscreens & shades;
- Road equipment: safety barriers, protection equipment, sound insulation wall panels;
- Art sculpture & Other industrial applications such as containers, filters, etc.

They are delivered as wide coils that can be processed in slit coils or cut-to-length sheets. They can be further processed by all conventional manufacturing operations used for hot rolled steel: mechanical and thermal cutting, bending, drawing, roll-forming, stamping, welding, etc.

Technical Data

XCarb® Recycled and Renewably Produced Hot Rolled Coils cover a full range of products in compliance with the *EN 10025*, *EN 10149*, *EN 10111* and *EN ISO 683* to meet various requirements.

Constructional data

Name	Value	Unit
Density	7850	kg/m ³
Modulus of elasticity	210000	N/mm ²
Thermal conductivity	48	W/(mK)
Melting point	1650	°C
Yield strength (min-max)	170-700	MPa

Performance data of the product are in accordance with the declaration of performance with respect to its essential characteristics according to *EN 10025-1* - Hot rolled products of structural steels - Part 1: General technical delivery conditions.

Base materials/Ancillary materials

The basic materials for the manufacture of ArcelorMittal's steel coil are non-alloyed and fine grain steel. Different steel grades and qualities are possible, according to standards previously mentioned.

The base material for XCarb® Recycled and Renewably Produced Hot Rolled Coils is iron. Variations in carbon content and alloying elements modify the chemical and physical properties of steel such as strength, durability and corrosion resistance. Such material additions make up a small percentage by mass of the final product.

This product contains substances listed in the *candidate list* (date: 02.06.2022) exceeding 0.1 percentage by mass: no.

Reference service life

A reference service life for XCarb® Recycled and Renewably Produced Hot Rolled Coils is not declared.

Hot rolled coils 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 XCarb® Recycled and Renewably Produced Hot Rolled steel coil, black or pickled & oiled, packed and ready to be transported from ArcelorMittal to its clients as specified in *Part B* requirements on the EPD.

Declared unit

Name	Value	Unit
Declared unit	1	t
Density	7850	kg/m ³

System boundary

Type of the EPD: cradle-to-gate - with options.
Module A1-A3, Module C3, Module C4 and Module D were considered.

Modules A1-A3 of the XCarb® Recycled and Renewably Produced Hot Rolled coil production include:

- The provision of resources, additives, and energy
- Transport of resources and additives to the production site
- Production processes on site include 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 becoming input to the product system in the inventory.



Module C3 takes into account the sorting and shredding of after-use steel, as well as the non-recovered scrap due to sorting efficiency which is landfilled. A conservative value of 2% landfill is considered (**Module C4**).

Module D refers to the end-of-life of the XCarb® Recycled and Renewably Produced Hot Rolled 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.

For life cycle modelling of the considered products, *GaBi ts software* version 10.6.1.35 was used with *GaBi database 2022.2*. This database contains consistent and documented datasets available in *Gabi Documentation*

Materials and chemicals used were modelled using the allocation rule most suitable for the respective product. For further information on a specific product check *Gabi Documentation* and *Worldsteel Association Methodology Report*.

LCA: Scenarios and additional technical information

Current practice for the average XCarb® Recycled and Renewably Produced Hot Rolled coil consists of 98 % recycling and 2 % landfill according to the *European Commission Technical Steel Research*.

End of life (C1-C4)

Name	Value	Unit
Recycling	980	kg
Landfilling	20	kg

Sorting and shredding of after-use steel, as well as non-recovered scrap.

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

Name	Value	Unit
Recycling	980	kg



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	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 ton XCarb® Recycled and Renewably Produced Hot Rolled Coil

Parameter	Unit	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ -Eq.]	5.32E+2	1.50E+0	2.83E-1	-1.70E+1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.00E-7	2.35E-11	8.25E-13	5.65E-11
Acidification potential of land and water	[kg SO ₂ -Eq.]	1.02E+0	2.95E-3	1.69E-3	-3.91E-2
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	9.14E-2	4.28E-4	1.88E-4	-3.24E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.07E-1	2.49E-4	1.33E-4	-5.11E-3
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.63E-3	4.10E-7	3.09E-8	3.96E-7
Abiotic depletion potential for fossil resources	[MJ]	5.30E+3	1.67E+1	3.78E+0	-1.33E+2

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 ton XCarb® Recycled and Renewably Produced Hot Rolled Coil

Parameter	Unit	A1-A3	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	1.89E+4	1.39E+1	5.87E-1	1.88E+1
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	1.89E+4	1.39E+1	5.87E-1	1.88E+1
Non-renewable primary energy as energy carrier	[MJ]	5.39E+3	2.68E+1	3.91E+0	-1.30E+2
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	5.39E+3	2.68E+1	3.91E+0	-1.30E+2
Use of secondary material	[kg]	9.71E+2	0.00E+0	0.00E+0	8.80E+0
Use of renewable secondary fuels	[MJ]	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
Use of net fresh water	[m ³]	2.87E+0	1.32E-2	9.93E-4	-1.13E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 ton XCarb® Recycled and Renewably Produced Hot Rolled Coil

Parameter	Unit	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	2.40E-6	2.23E-9	2.01E-10	6.45E-9
Non-hazardous waste disposed	[kg]	1.21E+1	1.90E-2	2.00E+1	-2.46E-1
Radioactive waste disposed	[kg]	4.32E-3	3.95E-3	4.35E-5	2.16E-3
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	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
Exported electrical energy	[MJ]	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

Note: 971.2 kg of scrap are used in the manufacturing of 1 metric ton of XCarb® Recycled and Renewably Produced Hot Rolled Coils. After use, 980 kg steel is recycled, and 20 kg is landfilled. The potential environmental impact calculated for module D depends on the net amount of scrap left in the system, which is 980-971.2 = 8.8 kg. This means that the system has a net output of 8.8 kg of scrap, which is shown in module D as an environmental credit or burden depending on the impact category.

References

EN 1993-1-3

EN 1993-1-3:2006 - Eurocode 3 - Design of steel structures - Part 1-3: General rules - Supplementary rules for cold-formed members and sheeting.

EN 10025-1

EN 10025-1:2004 - Hot rolled products of structural

steels - Part 1: General technical delivery conditions.

EN 10025-2

EN 10025-2:2019 - Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels.

EN 10025-3

EN 10025-3:2019 - Hot rolled products of structural steels - Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels.

EN 10025-4

EN 10025-4:2019 - Hot rolled products of structural steels - Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels.

EN 10025-5

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

EN 10111

EN 10011:2008 - Continuously hot rolled low carbon steel sheet and strip for cold forming.

EN 10149-1

EN 10149-1:2013 - Hot rolled flat products made of high yield strength steels for cold forming - Part 1: General technical delivery conditions.

EN 10149-2

EN 10149-2:2013 - Hot rolled flat products made of high yield strength steels for cold forming - Part 2: Technical delivery conditions for thermomechanically rolled steels.

EN 10149-3

EN 10149-3:2013 - Hot rolled flat products made of high yield strength steels for cold forming - Part 3: Technical delivery conditions for normalized or normalized rolled steels.

EN 15804

EN 15804:2012+A1:2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN ISO 683

EN ISO 683-1:2012 - Heat-treatable steels, alloy steels and free-cutting steels.

ASTM G101-04(2015)

Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels, ASTM International, West Conshohocken, PA, 2015

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

PCR Part A

PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, version 2.1. Institut Bauen und Umwelt e.V., 2021.
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

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>

Regulation (EU) No. 305/2011 (CPR)

Regulation of the European Parliament and of the Council (EU) No 305/2011 of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106 / EEC, Official Journal EU No L 88, 4.4.2011

Worldsteel Association Methodology Report

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**

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