

Steel solutions
provider
to the global
wind energy
industry



ArcelorMittal



What is your turbine's carbon footprint?

XCarb® initiative towards net zero steel

ArcelorMittal is committed to making steel integral to a sustainable, net zero economy. We have already taken some significant steps, having developed the industry's broadest and most flexible suite of low carbon-emissions steelmaking technologies and integrating them into two pathways, Smart Carbon and Innovative-DRI, both of which hold the potential to deliver carbon-neutral steelmaking.

In 2021, ArcelorMittal launched XCarb®, a brand designed to bring together all of ArcelorMittal's reduced, low and zero-carbon emissions products and steelmaking activities into a single effort focused on achieving demonstrable progress towards net zero steel.

XCarb® serves as evidence of our determination and accelerating commitment to achieve net zero by 2050. We will continue to drive innovation to meet our decarbonisation goals and are committed to leading the industry transition towards net zero steel. We have the scale, resources, technology prowess and ambition required to make a significant impact.

Alongside the XCarb® brand, we have launched three XCarb® initiatives: the XCarb® innovation fund, XCarb® steel certificates, and XCarb® recycled and renewably produced for products made via the Electric Arc Furnace route using scrap steel and 100% renewable electricity, giving our finished steel products an extremely low CO₂ footprint.

Our industry-first XCarb® steel certificates are designed for our steel products made from iron ore in a blast furnace. They allow customers to report an equivalent reduction in their Scope 3 emissions, in accordance with the Greenhouse Gas Protocol.

The initiatives that are part of XCarb® aim to reduce the carbon footprint of ArcelorMittal and of our customers. To know which XCarb® product line applies to your project, please contact our sales team.

XCarb®

Towards net zero steel



Where are your components produced?

ArcelorMittal: a worldwide presence

ArcelorMittal produces an extensive portfolio of steels which are used in the major components of a wind farm.

Our worldwide industrial operations are strategically located with easy access to sea routes. They are backed by an international sales and distribution network which is an asset for all parts of the wind energy supply chain.

Production assets for wind energy solutions in Europe, NAFTA, China, India, Brazil and South Africa. Sales and technical support in 60 countries worldwide.

What are your wind farms made of?

Creating wind power solutions for the future

At ArcelorMittal we know a lot about steel. Our Global R&D department counts 1,650 world-class researchers located in 10 countries. Their experience and knowledge of steel enables ArcelorMittal to support our customers who are developing new solutions to meet the challenges they face.

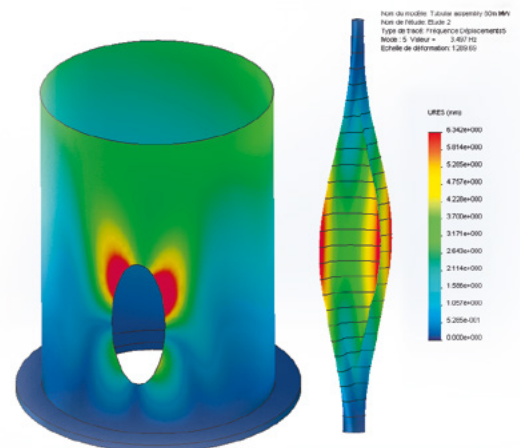
We provide our customers with a multidisciplinary and specialised range of expertise for wind turbine towers and foundations, backed up by an integrated knowledge of materials, design and fabrication processes.

ArcelorMittal's full engineering approach begins with characterisation of materials and continues through to component testing.



Welding laboratory:
Multi-wire Submerged Arc Welding (SAW)

In-house equipment is available to test new techniques such as improved welding methods. With our modelling and simulation tools, ArcelorMittal can offer solutions for your design and engineering challenges while ensuring your turbines achieve maximum efficiency. Our active collaboration with certification institutes helps to ensure the relevance of our research.



Finite elements method

Reliable steels for every part of the wind turbine

Offshore foundations and substations

Our high-quality quarto plates are fully qualified to withstand the most demanding environment. They are used to produce the jackets and pin piles that keep offshore towers stable on the sea floor and in the manufacture of electrical substations which stabilise the power generated offshore so that it can be transported to the onshore grid. ArcelorMittal's heavy plates are available in a large range of qualities and dimensions, which can also meet the requirements of pioneering projects in the floating offshore wind segment. Duplex stainless steel plates can also be used to house the substations for offshore wind farms.

Offshore wind farm construction requires wind turbine installation vessels (WTIVs), based on traditional jack-up designs. ArcelorMittal is a key supplier of extra-heavy quarto plates for the new generation of XXL WTIVs required for the installation of new wind farms with turbines above 10 MW.

Onshore foundations

ArcelorMittal SBQ (Special Bar Quality) steels for anchoring ensure durable and long-lasting foundations for the wind tower structure.

Tower

Around 85% of all wind turbine towers are built with quarto plate, also known as heavy plate. ArcelorMittal has an extensive experience in the supply of plates for the fabrication of offshore/onshore towers as one of the European leaders in this market since 2005, having supplied quarto plates for more than 10,000 towers. ArcelorMittal also supplies hot rolled coils of higher strength steels such as Armstrong®. These steels are suitable for taller structures and shell towers.

ArcelorMittal's offer includes the widest range of merchant bars on the market for the secondary steel of the tower.

Offshore wind towers include large diameter connector rings made from ring-rolled forgings. These are fabricated from large diameter ingots supplied by ArcelorMittal through the electric arc furnace (EAF) route for a lower carbon footprint.

Quarto plate specifications

Quarto plate used in wind turbines must meet the provisions of the EN 10025 standard for structural steel grades. ArcelorMittal's quarto plate steels are available in the following grades and dimensions:

Grades	S235, S275, S355, and from S420 up to S460 (including J, J2, JR, M, ML, N, and NL specifications)
Thickness	Up to 150 mm
Width	Up to 3,300 mm
Length	Up to 25,000 mm

ArcelorMittal can deliver your quarto plate shot-blasted and primed, cut and bevelled if required.

Hot rolled bars and wire rods

Available for fasteners and foundations applications, our high strength steel hot rolled bars and wire rods also allow weight reduction.

Hot rolled coil specifications: Armstrong®

ArcelorMittal's high strength Armstrong® steels can be supplied in the following grades and dimensions:

Grades	S460MC to S500MC
Thickness	Up to 15 mm

Specification for rolled sections and merchant bars

- Standard steel grades EN10025 from S235 up to S500, and CVN to -50°C, also in offshore qualities EN10225 and ASTM, HISTAR, Z-grades, W-grades / Arcorox and 16Mo3 and many more.
- Standard rolled sections EN10365 and additional sections to the standard. Channels and ASTM A6 shapes.
- Standard merchant bars and heavy angles up equal leg angles of 300 mm and 35 mm thickness

ArcelorMittal offers a wide range of quality steels for foundations, towers, ropes, nacelle structures, connections, bolts, fasteners, gearing, bearings, and generators.



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Nacelle

ArcelorMittal offers a large variety of specific beams suitable for the main frame of the nacelle. Quarto plates can also be used to manufacture this structure.

Gear rings within the nacelle are made from low alloy forged rings, for which ArcelorMittal provides special ingots through the EAF route for a lower carbon footprint.

Generator

ArcelorMittal supplies a full range of electrical steels for both medium- and high-power generators. These steels possess the required magnetic properties to maximise the amount of energy each turbine can produce. In addition to the electrical grades which meet the EN 10106 standard, ArcelorMittal also offers electrical steels with higher permeability or lower losses than the norm, together with different varnish types. Several thicknesses are available to meet the requirements of each specific design.

Electrical steel specifications

ArcelorMittal provides a full range of non-oriented fully processed electrical steels for use in wind generators. Our offer includes the M400-50A grade, which is a standard today. Lower loss electrical steels equivalent to M270-50A to M230-50A and M330P50 for high-speed machines (gear drive) are available in thicknesses from 0.35 to 1 mm.

Specific highly permeable grades such as M470P-65A are specially designed for low-speed machines (direct drive).

Gearbox, yaw and pitch

Bearings and gears are key components of a wind turbine. ArcelorMittal's steels ensure high performance and long life.

Seamless rolled ring steels can be provided in large diameters to meet the requirements of different turbine designs.

Seamless rolled ring steels

Steel ingots for ring gears	34CrNiMo6, 18CrNiMo7-6, 14CrMoV6-9, 31CrMoV9
Steels for orientation systems (pitch and yaw bearings)	42CrMo4
Steels for coupling systems	42CrMo4

ArcelorMittal's offer is completed by our SBQ range (in round or square bars) which is available in sizes up to 200 mm. As an example, our SBQs can be used to manufacture the bolts connecting the blades to the rotor.

Mooring wires

ArcelorMittal provides sheathed spiral strand wires for long term mooring applications, such as for floating wind turbines. ArcelorMittal provides a complete mooring turn-key package with mooring wires, sockets and offshore transportation reels all certified by a third party. Spiral strand wires offer excellent fatigue and elongation properties and the system, as it is made of steel, can be recycled after lifetime.

Sheet piles for strategic offshore infrastructure

Steel sheet piles provide smart, resilient and sustainable solutions for waterfront structures supporting offshore wind projects. They enable quay wall expansions, offshore energy islands, cable landfall points and land reclamation works. The EcoSheetPile™ Plus range, made from 100% recycled steel and 100% renewable electricity, helps reduce the overall project carbon footprint.



Who can support you on the road to success?

ArcelorMittal offers our wind turbine customers a:

- Global presence to support your projects
- Wide range of steels for all components of a wind tower
- Comprehensive research and development approach to help you develop new solutions.

We're here to help you

ArcelorMittal Europe – Flat Products

Quarto plates, hot rolled coils and electrical steels

industry.arcelormittal.com/energy

flateurope.technical.assistance@arcelormittal.com

ArcelorMittal Europe – Long Products

Merchant bars, sections and SBQ steels

sections.arcelormittal.com

sections.sales@arcelormittal.com

barsandrods.arcelormittal.com

longeurope.barsandrods@arcelormittal.com

Sheet piles

sheetpiling.arcelormittal.com

sheetpiling@arcelormittal.com

ArcelorMittal Europe – Global Solutions

Mooring wires

projects.arcelormittal.com/energy/segments-applications/wire-ropes

morten.breddam@arcelormittal.com

Industeel

Extra-heavy quarto plates, special ingots for forged rings, duplex stainless steels

industeel.arcelormittal.com

contact.industeel@arcelormittal.com

ArcelorMittal Energy Projects

Structural steel for offshore wind applications

Tubulars, heavy plates and beams sections & angles

projects.arcelormittal.com/energy

energy.projects@arcelormittal.com

Credits

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