

XC06 XCarb®

High-purity ultra low-carbon magnet steel

High-purity ultra low-carbon magnet steel – combining magnetic performance, reproducibility, and XCarb® low-carbon manufacturing.

XC06 is a **commercially pure iron** specifically designed for **magnet applications** that demand extreme homogeneity and stability – such as **MRI scanners, particle accelerators, synchrotrons, and spectrometers**.

Produced via **Electric Arc Furnace (EAF)** melting of **selected recycled scrap** and powered by **100 % renewable electricity**, XC06 is part of the **XCarb® Recycled and Renewably Produced** range.

This advanced production route guarantees **exceptional purity, extremely low residual elements, and a significantly reduced carbon footprint**, combining **magnetic precision with environmental responsibility**.

Thanks to **its ultra low carbon content and vacuum-degassed metallurgy**, XC06 offers high saturation polarisation, high permeability, and **low coercive field strength**, ensuring a **stable magnetic response** over time and across large dimensions.

Available in **solid plates up to 825 mm thick**, XC06 provides engineers with a material of unrivalled consistency for massive magnetic assemblies and critical research equipment.

Properties

Classification and standards

- **AISI 1006**
- **EN 10027 – C06**
- Equivalent to high-purity soft iron

Chemical composition

Ladle analysis – Expressed in weight percent (wt%)

| | Fe | C | Mn | Si | Ni | Cr | Mo | Cu | S | P |
|-------------------|----------|------|------|------|------|------|------|------|-------|-------|
| Specification max | balanced | 0.06 | 0.40 | 0.20 | - | 0.10 | - | 0.10 | 0.015 | 0.015 |
| Typical | >99.2 | 0.04 | 0.33 | 0.18 | 0.05 | 0.08 | 0.02 | 0.04 | 0.005 | 0.006 |

Controlled refining and degassing operations keep impurities at a few hundred ppm, preventing magnetic aging and ensuring reproducibility across batches.

Magnetic and physical properties

XC06 is a **soft ferromagnetic steel** combining high induction and low coercivity, verified according to IEC/EN 60404-2 and IEC/EN 60404-4.

| Measured values of magnetic polarisation J(T) | | | | | | | | |
|---|------|------|------|------|------|------|------|-------|
| J1 | J5 | J10 | J20 | J50 | J100 | J200 | J500 | J1000 |
| 0.32 | 1.29 | 1.49 | 1.60 | 1.73 | 1.84 | 1.98 | 2.11 | 2.13 |

| Measured values of magnetic induction B(T) | | | | | | | | |
|--|------|------|------|------|------|------|------|-------|
| B1 | B5 | B10 | B20 | B50 | B100 | B200 | B500 | B1000 |
| 0.32 | 1.29 | 1.49 | 1.61 | 1.73 | 1.85 | 2.00 | 2.17 | 2.25 |

Typical physical values :

- Saturation polarisation Jsat : 2.15T
- Coercitive force Hc : ≤100 A/m (after excitation at 25 KA/m)
- Relative permeability (1000 A/m) : ~ 1180
- Electrical resistivity : 16 µΩ/cm
- Thermal conductivity : 50 W/mK

These characteristics guarantee precise control of magnetic flux and repeatable performance across all plate thicknesses.

Product range and delivery conditions

Available forms

- Hot-rolled plates ("as-rolled")
- Forged and rolled blocks ("as-forged")
- Cut-to-size flame-cut pieces according to drawings

Multiple parts can be extracted from the same mother plate to preserve magnetic symmetry between paired components.

Maximum dimensions

- Thickness : up to 825 mm (32 ½ in)
- Width and length : on request

Applications

- Magnetic cores and yokes for high-field systems
- MRI and medical imaging magnets
- Particle accelerators and synchrotrons
- Spectrometers and research equipment

XC06 ensures **magnetic uniformity, purity, and reproducibility** required by high-precision scientific and industrial applications.

Sustainability

XCarb® Recycled and Renewably Produced

XC06 is manufactured with **≈ 99 % recycled steel and 100 % renewable electricity** which use is ensured through **Guarantees of Origin (GoOs)**.

Each delivery is accompanied by a **XCarb® certificate** guaranteeing a cradle-to-gate carbon footprint of 1.198 t CO₂ eq per t of plate.

This value is calculated through a methodology reviewed by a third party and in compliance with **ISO 14040 / 14044 and Worldsteel LCI methodology**.

By selecting **XC06 XCarb®**, designers combine **magnetic performance, dimensional stability, and decarbonized manufacturing**, supporting sustainable innovation in advanced technologies.



Industeel France
Châteauneuf Plant
118, route des Etaings
F – 42800 Rive-de-Gier
industeel.arcelormittal.com

Your contact

Valéry NGOMO
Tel. +33 6 10 49 59 48

valery.ngomo@arcelormittal.com

Technical data and information are to the best of our knowledge at the time of editing. However, they may be subject to some slight variations due to our ongoing research programme on steels. Therefore, we suggest that information be verified at time of enquiry or order. Furthermore, in service, real conditions are specific for each application. The data presented here are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company. Further information may be obtained from the address opposite.