Industeel

ArcelorMittal

S420QLO

A quenched and tempered high-strength structural steel for large offshore structures

A quenched and tempered high-strength structural steel for large offshore structures combining reliability, weldability, and XCarb® low-carbon production.

Industeel® S420QLO is **a high-strength quenched and tempered structural steel plate** developed for **offshore structures** operating under low temperatures and demanding load conditions such as those encountered in the North Sea.

Produced through **Electric Arc Furnace (EAF)** melting using **selected recycled scrap and 100 % renewable electricity,** Industeel® S420QLO belongs to the **XCarb® Recycled and Renewably Produced** range. This production route ensures **exceptional metallurgical cleanliness and a significantly reduced carbon footprint**, making it a robust and sustainable solution for modern offshore construction.

With **a nominal minimum yield strength of 370 MPa** and weldability **prequalified under EN 10225-1 Option 17**, Industeel® S420QLO offers **high fabrication safety, excellent toughness, and ease of welding**, even for heavy-thickness plates.

The steel is **quenched and tempered** after rolling to guarantee uniform mechanical properties and resistance to brittle fracture through the full section.

Properties

Standards and qualifications

- EN 10225-1:2019 – S420QLO (1.8666)
- EN 10225:2009 – S420G2 + QT
- Deliverable per **NORSOK M-120 Ed. 5** / **MDS-Y30 Rev. 5**

Prequalified options reviewed by DNV-GL and Lloyd's Register:

- Option 11 – Strain ageing resistance
- Option 12 – Through-thickness properties
- Option 17 – Weldability

Chemical composition

Ladle analysis – Expressed in weight percent (wt%)

C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al
≤0.14	≤0.55	1.00-1.65	≤0.020	≤0.010	≤0.25	≤0.70	≤0.25	≤0.30	≥0.015

Fine-grain practice with Nb, V and Ti micro-alloying secures toughness and dimensional stability.
Typical **CEV ≈ 0.42** / **Pcm ≈ 0.22** – ensuring excellent weldability for high-strength grade.

Mechanical properties

Thickness range (mm)	Yield Strength R_{eH} (MPa)	Tensile Strength R_m (MPa)	Rm Elongation (%)	AZ (%)	Impact KV (-40°)	Y/T ratio
80-150	≥380	480-640	≥19	≥35	≥60 J	≤0.93
150-200	≥370	480-640	≥19	≥35	≥60 J	≤0.93

These mechanical properties deliver **weight optimization** potential and **high structural efficiency** for heavy offshore modules and load-bearing joints.

Delivery and dimensions

- Thickness : 80 – 200 mm
- Max. width : 4350 mm
- Max. length : 19000 mm
- Max. unit weight : 60 t
- Heat treatment : quenching ≈ 900 °C / tempering ≈ 600 °C
- Surface : EN 10163-2 Class B Sub-class 3, ground
- Ultrasonic testing : EN 10160 S1/E2

Other delivery options available on request.

Processing and welding

Forming and Cutting

Machinability and formability similar to mild steels. The material's cleanliness and homogeneity guarantee predictable performance during fabrication.

Welding

Thanks to its balanced composition, Industeel® S420QLO offers excellent weldability, validated under EN 10225 Annex E-G (Option 18).

Recommended practice:

Preheat ≈ 125 °C
- Interpass ≤ 250 °C
- Heat input ≤ 3.5 kJ/mm
- PWHT ≈ 580 °C ± 10 °C (1 h / 25 mm).

Compatible with SAW, FCAW, MCAW, SMAW, GMAW, GTAW.

Applications

Industeel® S420QLO is suited for **highly loaded structural elements** in large offshore units — jackets, nodes, decks, riser supports, and subsea structures — where **higher strength enables weight reduction** without compromising safety or toughness.

Sustainability

XCarb® Recycled and Renewably Produced

Industeel® S420QLO is available under the **XCarb® Recycled and Renewably Produced** label, manufactured from **up to 98 % recycled steel and 100 % renewable electricity**(through Guarantees of Origin, GoOs).

Third-party reviewed according to **ISO 14040/14044 and Worldsteel LCI** methodology, the grade exhibits **a cradle-to-gate carbon footprint around 1.6 t CO_2 eq / t plate**, contributing to lower Scope 3 emissions in offshore projects.

XCarb®
Recycled and renewably produced

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