Industeel

ArcelorMittal

S355NLO/S355G10+N XCarb®

A high-performance normalized steel for offshore structures

A high-performance normalized steel for offshore structures combining strength, weldability, and low carbon footprint.

Industeel® S355NLO is a **normalized structural steel plate** designed for **large offshore structures** operating in low-temperature and high-stress environments such as the North Sea.

Produced via **Electric Arc Furnace (EAF)** using **selected recycled scrap and 100% renewable electricity**, Industeel® S355NLO is part of the **XCarb® Recycled and Renewably Produced** range. This production route combines **high metallurgical purity with a drastically reduced carbon footprint**, aligning offshore performance requirements with sustainability objectives.

With a nominal minimum yield strength of 300 MPa (for thickness > 150 mm) and **a prequalified weldability file approved by DNV-GL and Lloyd's Register** (Option 17 of EN 10225), the grade offers o**utstanding fabrication reliability and ease of certification.**

Its fine microstructure, very low levels of sulphur and phosphorus, and controlled alloying guarantee **excellent impact toughness and CTOD properties** even in thick sections. The plates are **normalized after rolling** to ensure uniformity and through-thickness consistency, providing engineers with confidence for demanding offshore applications.

Properties

Standards and qualifications

- EN 10225-1:2019 – S355NLO (1.8808)
- EN 10225:2009 – S355G10 + N
- Also deliverable per **NORSOK M-120 Ed. 5** / **MDS-Y20 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 (Annex B–D tests)

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	≤0.08	≤0.30	≥0.015

Micro-alloying with Nb, V, Ti refines the grain structure and ensures stable mechanical and toughness performance. Typical **CEV ≈ 0.43** / **Pcm ≈ 0.22**, giving balanced weldability and strength.

Mechanical properties

Thickness range (mm)	Yield Strength R_{eH} (MPa)	Tensile Strength R_m (MPa)	Rm Elongation (%)	AZ (%)	Impact KV (-40°)	CTOD (-10°C)
80-150	325	460-620	≥22	≥35	≥50 J	≥0.25 mm (AW)
150-250	≥300	450-600	≥22	≥35	≥50 J	≥0.20 mm (PWHT)

These properties ensure high reliability **for fatigue-sensitive joints and dynamic load conditions** typical of offshore structures.

Delivery and dimensions

- Thickness : 80 – 255 mm
- Max. width : 4350 mm
- Max. length : 19000 mm
- Max. unit weight : 60 t
- Heat treatment : normalized ≈ 900 °C
- Surface : EN 10163-2 Class B Sub-class 3, ground
- Internal soundness : UT EN 10160 S1/E2

Other delivery options available on request.

Processing and fabrication

Forming / Cutting / Machining

Standard parameters for mild steels are applicable. The steel's fine grain and cleanliness simplify forming and machining with minimal tool wear.

Welding

Outstanding weldability, validated through EN 10225 Option 17 tests:
– No cracking in Controlled Thermal Severity tests (CTS)
– Hardness below 325 HV in Bead-on-Plate tests
– CTOD performance meeting NORSOK MDS-Y20 at –10 °C

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® S355NLO is intended for critical structural parts in offshore platforms and subsea components:
– jackets, nodes, riser supports, pile sleeves, deck reinforcements.

Its combination of strength, through-thickness ductility, and verified weldability ensures reliability and long-term integrity under severe service conditions.

Sustainability

XCarb® Recycled and Renewably Produced

Industeel® S355NLO is supplied as **XCarb® Recycled and Renewably Produced**, manufactured from **up to 98 % recycled steel and 100 % renewable electricity (through Guarantees of Origin , GoOs).**

This route drastically lowers **the carbon footprint to 1.6 t CO_2 eq/t of plate**, cradle-to-gate, third-party reviewed (ISO 14040/14044 and Worldsteel LCI methodology).

Choosing XCarb® S355NLO means meeting **offshore performance standards** while supporting **carbon-neutral project objectives** in the energy transition.

XCarb®
Recycled and renewably produced

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