

N-A-XTRA<sup>®</sup> and XABO<sup>®</sup>  
high-strength steels  
For lighter living

ThyssenKrupp Steel Europe  
Thinking the future of steel



ThyssenKrupp

# Quenched and tempered N-A-XTRA® and XABO® steels – for lighter living

ThyssenKrupp  
high strength

N-A-XTRA®

ThyssenKrupp  
high strength

XABO®

The high-strength fine-grain structural steels N-A-XTRA® and XABO® from ThyssenKrupp Steel Europe are primarily used in highly stressed welded structures requiring low weight and maximum strength. Depending on the type of stress involved, substituting N-A-XTRA® 700 for the structural steel S355 allows a 50 % reduction in plate thickness, and using XABO® 960 an even greater reduction of around 70%. Lightweighting is particularly important in commercial vehicle and mobile crane construction, where dimensions, axle loads and total weight of the vehicle are restricted by legal regulations. The development of mobile cranes for loads of up to 1200 tons was only made possible by the advent of high-strength steels. Further advantages of high-strength steels are lower consumption of welding fillers and reduced welding costs.

These steels, known worldwide under the brand names N-A-XTRA® and XABO®, were produced for the first time more than 50 years ago in the Heavy Plate Unit of ThyssenKrupp Steel Europe. Advancements since then have been remarkable, and nowadays various grades are available with minimum yield strengths up to 1300 MPa in plate thicknesses from 3 to 100 mm. These steels have proven highly successful not only in the construction of commercial vehicles and mobile cranes but also when used for mining equipment and in the construction of pressure vessels and pipelines.

## Different quenched and tempered steels for different applications

The most common quenched and tempered structural steel is N-A-XTRA® 700, which meets customer requirements for high strength and easy processing. N-A-XTRA® 700 combines a high yield strength of at least 700 MPa with outstanding toughness even at temperatures down to -60 °C. Its lean chemical composition makes it ideal for cold forming and all common welding methods.

The XABO® 890 and 960 steels are used if higher yield strengths are required. These steels are best welded under shielding gas. XABO® 1300 provides maximum strength. This steel offers a minimum yield strength

of 1300 MPa combined with good toughness and weldability. Despite its outstanding strength, this steel can also be easily processed by cold forming.





# N-A-XTRA® and XABO® steels for different applications



## Mechanical properties

Steel grade	Thickness [mm]	Yield strength $R_e$ [MPa]	Tensile strength $R_m$ [MPa]	Elongation A [%]	Impact energy $A_V \geq 27$ J at	Bending radii <sup>3)</sup> r (t ≤ 6 mm)
N-A-XTRA® (M) 550	3 – 100 (120)	≥ 550 <sup>1)</sup>	640 – 820 <sup>1)</sup>	≥ 16	-60 °C (-40 °C)	≥ 2.0 t
N-A-XTRA® (M) 620	3 – 100 (120)	≥ 620 <sup>1)</sup>	700 – 890 <sup>1)</sup>	≥ 15	-60 °C (-40 °C)	≥ 2.5 t
N-A-XTRA® (M) 700	3 – 100 (120)	≥ 700 <sup>1)</sup>	770 – 940 <sup>1)</sup>	≥ 14	-60 °C (-40 °C)	≥ 2.5 t
XABO® 890	3 – 100	≥ 890 <sup>1)</sup>	940 – 1100 <sup>2)</sup>	≥ 12	-40 °C	≥ 3.5 t
XABO® 960	3 – 100	≥ 960 <sup>1)</sup>	980 – 1150 <sup>2)</sup>	≥ 12	-40 °C	≥ 3.5 t
XABO® 1100	4 – 40	≥ 1100	1200 – 1500	≥ 8	-40 °C	≥ 3.5 t
XABO® 1300	4 – 10 <sup>4)</sup>	≥ 1300	1400 – 1700	≥ 8	-40 °C	≥ 4.5 t

<sup>1)</sup> for thickness ≤ 65 mm

<sup>2)</sup> for thickness ≤ 50 mm

<sup>3)</sup> bending line parallel to rolling direction

<sup>4)</sup> thicker plates are available on inquiry



## Balanced alloying concepts for simple processing and high strength

The special chemical composition and the quenching and tempering heat treatment of N-A-XTRA® and XABO® steels give them excellent toughness properties for reliable performance even at extremely low temperatures. The N-A-XTRA® 700 grade in particular displays outstanding toughness and can therefore be welded with higher heat input and longer cooling times  $t_{8/5}$ . A further characteristic feature of N-A-XTRA® steels is their low carbon equivalent. Due to the reduced plate thickness, substituting

N-A-XTRA® 700 for S355 allows costs for preheating prior to welding to be reduced. Depending on welding method, plate thicknesses up to 20 mm (or combined thicknesses up to 40 mm) can be welded without preheating. Furthermore, N-A-XTRA® 700 displays good cold forming properties allowing tight bending radii. Plates up to 6 mm thick can be bent with radii as low as  $r/t \geq 2.5$  (from 6 mm to 16 mm thick plates with  $r/t \geq 3$ ).

A further important requirement for the use of XABO® is that the high toughness requirements of the parent metal are also met in the heat affected zone of the weld and the weld metal. When using the metal active gas method to weld XABO® 890 and 960, matching welding fillers are available. For XABO® 1100 and XABO® 1300 the welds are usually located in lower stressed parts of the structure, as the strength of the weld metal using common welding filler metals does not match the strength of the parent metal.

Up to 6 mm thick XABO® plates can be bent with a minimum radius  $r/t \geq 3.5$  (from 6 mm to 10 mm thick plates with  $r/t \geq 4$ ).

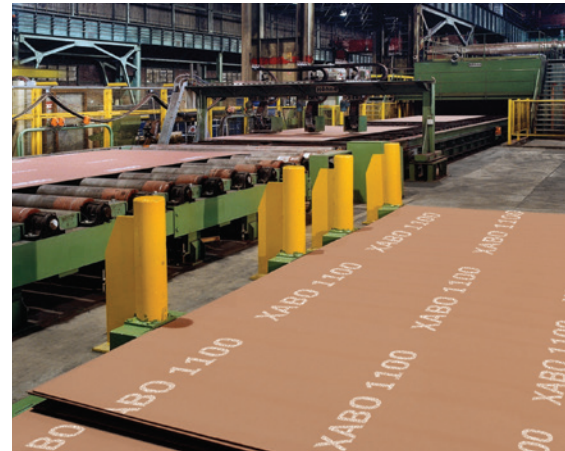
In addition to static loading, steel structures can also be exposed to dynamic loads. XABO® 1100 displays the same good fatigue properties as the proven XABO® 960 grade. However, it must be considered that the fatigue strength of weld joints is virtually the same on both normal and high-strength steels. Post-weld treatment, e.g. shot peening or PIT dressing, is needed to take advantage of the high fatigue strength of the parent metal.

### Hot strip plates for weight optimized constructions

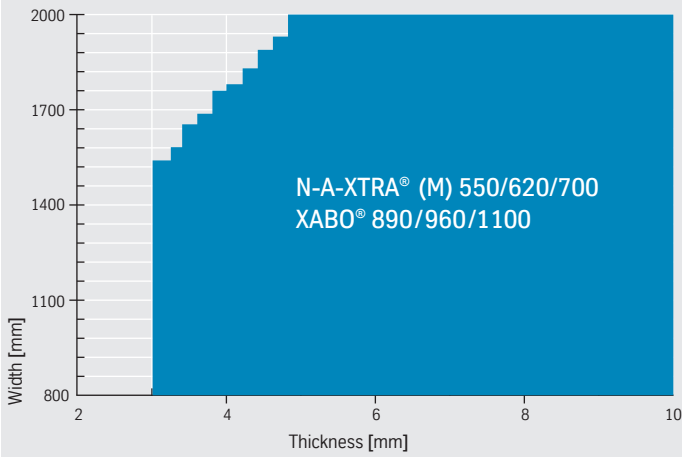
Weight plays an important role in many structures. Therefore, restricted thickness tolerances are often required. ThyssenKrupp Steel Europe can produce N-A-XTRA® and XABO® steels via two different routes. Hot strip mill production offers the advantage of very close thickness tolerances of  $\pm 0.2$  mm which are lower than the usual thickness tolerances of four-high-mill plates and also lower than the tolerances usually required by customers. In addition to weight saving potential, the extremely uniform plate thickness of plates cut from hot strip also offers advantages with regard to cold forming.

### Modern shot blasting and priming line offers high surface quality

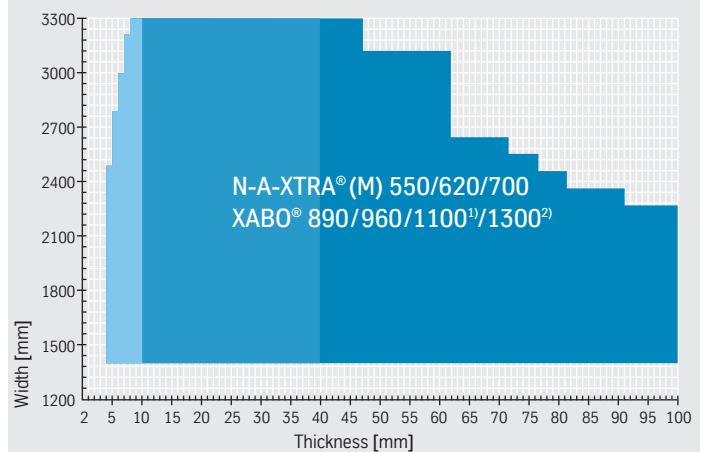
Plates are delivered shot blasted and primed to meet the highest surface quality requirements. Shot blasting and priming is carried out on a modern line at ThyssenKrupp Steel Europe. A low-zinc silicate primer is usually applied with an even coat 15 – 20  $\mu\text{m}$  thick. Investigations have shown that plates with this primer can be cut by laser without any problems. The inorganic content means that the primer can be welded over, making removal of the primer before welding generally unnecessary.



Available sizes for cut-to-length plate



Available sizes for four-high mill plate



<sup>1)</sup> for XABO® 1100: thickness up to 40 mm

<sup>2)</sup> for XABO® 1300: thickness up to 10 mm

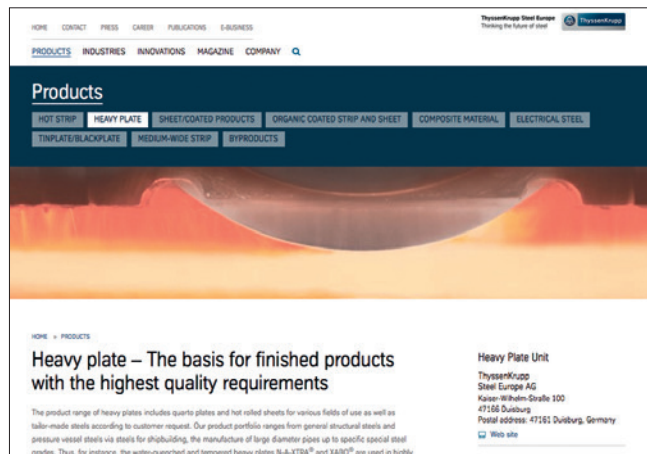
## ThyssenKrupp Steel Europe – more than just a plate supplier

ThyssenKrupp Steel Europe is more than a reliable plate supplier. The expansion of the worldwide distribution network is aimed not just to guarantee the availability and just-in-time delivery of N-A-XTRA® and XABO® steels to customers. The close cooperation with first-class steel service centers also makes it possible to offer components which are pre-fabricated by means of cutting, cold forming or welding. In this way ThyssenKrupp Steel Europe meets the steadily growing demands of its customers for quality, service and delivery performance.

## The online world of ThyssenKrupp Steel Europe's special structural steels

Optimized processing and application of N-A-XTRA® and XABO® steels require a close cooperation between supplier and customer. A comprehensive technical customer service has therefore been established to provide support in terms of all material processing and design questions.

Visit our website at [www.thyssenkrupp-steel-europe.com/plate](http://www.thyssenkrupp-steel-europe.com/plate) for further infor-



mation about our special structural steels, including data sheets and processing recommendations. In addition, you can find your personal sales or technical customer service contact. ProWeld, a computer software developed by ThyssenKrupp Steel Europe for calculating welding parameters, can also be ordered via our internet homepage.

### General note

All statements as to the properties or utilization of the materials and products mentioned in this brochure are for the purpose of description only. Guarantees in respect of the existence of certain properties or utilization of the material mentioned are only valid if agreed upon in writing.

Subject to technical changes without notice. Reprints, even extracts, only with permission of ThyssenKrupp Steel Europe AG, Heavy Plate Unit.

Images made available with the kind support of the following companies: Fahrzeugwerk Bernard Krone GmbH, Gronemeyer & Banck GmbH & Co. KG, Liebherr-Werk Ehingen GmbH, Liebherr-Werk Nenzing GmbH and Putzmeister Concrete Pumps GmbH (amongst others).

Please contact:

┌

└

The latest information can be found on the internet  
[www.thyssenkrupp-steel-europe.com/plate](http://www.thyssenkrupp-steel-europe.com/plate)

**ThyssenKrupp Steel Europe AG**

Kaiser-Wilhelm-Strasse 100 · 47166 Duisburg · Germany

Postal address: 47161 Duisburg · Germany

Telephone +49 (0)203 52-0 · Fax +49 (0)203 52-25102

[www.thyssenkrupp-steel-europe.com](http://www.thyssenkrupp-steel-europe.com) · [info.steel-europe@thyssenkrupp.com](mailto:info.steel-europe@thyssenkrupp.com)