

Quenched and tempered special structural steel Heavy plate	Steel grade		Material No.	Material Specification
	TKSE-short name	EN-short name		
	XABO[®] 1300	S1300QL	1.8794	

Scope

This Material Specification applies to heavy plates in thicknesses from 4 up to 15 mm (0.157 up to 0.591 in.) made of the high-strength special structural steel XABO[®] 1300. Higher thicknesses may be agreed on the basis of special agreement.

Application

The steel may be used at the discretion of the processor for highly stressed welded constructions of several kinds, such as transport vehicles, mobile cranes, hoistings and mining equipment.

The entire processing technique is of fundamental importance for the good performance of the products made of these steels. The processor must assure himself, that his methods of calculation, designing and working conform with the material to be used, meet the latest requirements of technical progress, and are suited to the proposed application. Due consideration must be given to relevant construction specifications.

The selection of the material is left up to the purchaser.

Chemical composition (heat analysis, %)

C	Si	Mn	P	S	Cr	Mo	Ni	V
≤ 0.25	≤ 0.5	≤ 1.4	≤ 0.015	≤ 0.005	≤ 0.8	≤ 0.7	≤ 2.0	≤ 0.08

The steel has a fine-grained microstructure. Nitrogen is absorbed to form nitrides.

Delivery condition: quenched, or quenched and tempered (see paragraph "Heat treatment")

Typical mechanical properties in the delivery condition:

Tensile test at room temperature (Transverse specimens acc. DIN EN ISO 6892-1/Method B).

Minimum yield strength R_{eH} ^{*)} MPa ¹⁾	Tensile strength R_m MPa ¹⁾	Minimum elongation at fracture A %
1300	1400 - 1700	8

^{*)} if continuous yielding occurs, the yield strength is determined as $R_{p0,2}$

¹⁾ 1 MPa = 1 N/mm²

Impact energy in the delivery condition (Charpy-V-test acc. DIN EN ISO 148-1).

Specimen direction	Impact energy KV in J at a test temperature of - 40 °C (-40 °F)
longitudinal	30
transverse	27

The values stated for the impact energy are minimum values obtained as the average of 3 specimens, with no single value being less than 70 % of the values stated in the table. For thicknesses < 10 mm (< 0.394 in.) the impact energy value is reduced proportionally to the specimen width.

In case of product thicknesses < 6 mm (< 0.236 in.), impact tests may be carried out on the basis of special agreement.

Amount of testing

Unless otherwise agreed upon in the order, the tests listed below performed during inspection:

- | | |
|--|---|
| 1 tensile test | 1 sample from the end of each rolled plate |
| 1 notched bar impact test
(3 specimens) | 1 set of specimens from the end of each rolled plate
at a specimen direction, to be agreed. If the specimen
direction is not specified at the time of order, impact
testing will be carried out on transverse specimens. |

General processing information

For those who process these steels for the first time, it is recommended to consult the steel supplier to take advantage of the experiences gathered so far.

The general information stated below can only cover a few of the important points.

The information, outlined in STAHL-EISEN-Werkstoffblatt 088 (weldable fine grain structural steels, processing directives especially for welding) applies equally for XABO[®] 1300.

Recommendations for welding are also given in EN 1011 part 1 and part 2 - Welding, Recommendation for welding of metallic materials -.

It has to be pointed out, that temperatures above 200 °C (392 °F) are to be avoided during processing of the steel, because otherwise the excellent properties of this product might get lost.

Cold forming

Commonly the steel is processed by cold forming. Nevertheless subsequent heat treatment (stress relieving treatment), in order to reduce the effects of cold forming and to improve the toughness, which has been impaired due to the cold forming process, is only possible up to a maximum temperature of 200 °C (392 °F) .

Hot forming

Hot forming is basically possible. Such an operation, however, will neutralize the original heat treatment condition of the steel. Therefore, it is necessary to perform a subsequent heat treatment after hot forming, according to the respective delivery condition.

Heat treatment

In general, the steel obtain the required mechanical properties by austenitization, followed by conventional quenching, or quenching and tempering. According to EN 10025-6, direct quenching after hot-rolling, followed by tempering, is considered equivalent to conventional quenching and tempering. The heat treatment is governed by the chemical composition and the thickness of the material. Information on this can be obtained from the manufacturer.

Thermal cutting

Provided, that appropriate operation methods are used, flame- and melt cutting is possible without any difficulty. The processing conditions correspond to other unalloyed steels. The surface condition of the products has a substantial influence on the applicable cutting parameters and the attainable quality of the cut face. If higher qualities of the cut face are required, it is recommended to clean the upper and the lower surface of the workpiece in the zone of the trimmed edge. In this case rust, scale and other kinds of pollution must be removed.

For workpiece temperatures below 5 °C (41 °F) and also if the flame cut edges are to undergo cold forming in the course of further processing, it is advisable to preheat the material to about 150 °C (302 °F) before flame cutting..

Welding

If due consideration is given to the general rules for welding, these steels are weldable both manually and automatically. The manual arc welding and the gas shielded arc welding procedures are preferably used. Depending on plate thickness, hydrogen content of the weld metal and heat input the welding may be carried out under preheating. The recommendations of the STAHL-EISEN-Werkstoffblatt 088 are to be followed. The interpass temperature should not exceed 200 °C (392 °F).

It has to be pointed out, that the available welding consumables can't give the guarantee, to achieve the same mechanical properties in the weld, as given in the base material. To prevent cold cracking in the welded joints, only welding consumables giving welds of very low hydrogen content should be used. A too high cooling rate in the weld region should also be avoided. Detailed information is given in our recommendations for welding and our processing brochures.

To ensure, that the steel properties are not impaired to an inadmissible extent by thermal cycles during welding, an upper limit for the heat input has to be fixed. The heat input for welding is governed by the welding process, the plate thickness, the preheating temperature, the form of the welding seam and the requirements imposed on the construction.

General information

Unless otherwise agreed upon in the order, the delivery will be governed by the conditions outlined in EN 10021.

The admissible tolerances are based on EN 10051 for plates cut from hot strip and EN 10029 for four-high mill plates, unless other terms have been agreed upon.

The plates will be supplied with a maximum flatness tolerance according to EN 10029, table 4, steel type H. Smaller flatness tolerances may be agreed at the time of order.

For surface quality requirements EN 10163 is applicable.

As per prior agreement at the time of ordering, other testing conditions are also possible.

As per special agreement it is possible to supply plates descaled or descaled and primed.

Publisher`s addresses

EN-, ISO Standards

STAHL-EISEN-Werkstoffblätter

ThyssenKrupp Steel Europe brochures

„Processing of Quenched and Tempered
Special Structural Steels“

„Quenched and tempered N-A-XTRA[®] -
and XABO[®]-steels – for lighter living“

Beuth Verlag GmbH, Postfach, D-10772 Berlin

Verlag Stahleisen GmbH, Postfach 10 51 64, D-40042 Düsseldorf

ThyssenKrupp Steel Europe AG, D-47161 Duisburg