

ThyssenKrupp Steel Europe

Wear-resistant special structural steel	Steel grade		Material No.	Material Specification
	TKSE-Short name	EN-Short name		
	XAR[®] 300	20MnCr6-5	1.8704	

Heavy plate

Scope

This Material Specification applies to normalised or normalised rolled plates in thicknesses up to 50 mm (1.969 in.) made of the wear-resistant special structural steel XAR[®] 300.

Application

The steel may be used at the discretion of the purchaser for wear-exposed structures, e.g. excavating, mining and earth-moving machinery, truck dump bodies, conveying, crushing and pulverizing equipment, scrap presses and other machinery.

The processing and application techniques as a whole are of fundamental importance for the successful use of the products fabricated of this steel. The processor/fabricator must assure himself, that his design and work methods are appropriate for the material, are state-of-the-art and are suitable for the envisaged purpose.

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

Chemical composition (heat analysis, mass. -%)

C	Si	Mn	P	S	Cr	Mo	B
≤ 0.22	≤ 0.65	≤ 1.50	≤ 0.025	≤ 0.025	≤ 1.20	≤ 0.30	≤ 0.005

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

Delivery condition: N (normalised)

Hardness at room temperature in the delivery condition:

Plate thickness ≤ 20 mm (≤ 0.787 in.): Hardness ≥ 270 HBW

Plate thickness > 20 mm (> 0.787 in.): Hardness ≥ 240 HBW

The Brinell hardness shall be determined in accordance with ISO 6506.

Number of tests

Unless otherwise agreed upon in the order, the Brinell hardness shall be determined from each heat. The hardness shall be measured roughly 1 mm (0.039 in.) below the surface.

General processing information

Prior to any processing, it is advisable to make use of the information available from the steel producer in order to draw on that experience for the processing. The following information can deal with only a few essential points. The recommendations given in STAHL-EISEN-Werkstoffblatt 088 (Weldable fine-grained structural steels, guidelines for processing, in particular for welding) correspondingly apply to this steel as well.

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

It is left to the discretion of the processor/fabricator to decide which of the familiar precautions must be adopted to avoid cracking during thermal cutting and welding under the prevailing construction and fabrication conditions.

Cold forming

The products made of this steel are suitable for cold bending provided, that consideration is given to the high hardness. The formability of steel decreases with increasing hardness. This has to be kept in mind when forming. The forming must take place at a slow and steady rate, the cut edges must be deburred and the plates heated, if necessary, prior to the forming.

Hot forming

Hot forming is possible at temperatures between 850°C and 1000 °C (1562 °F and 1832 °F). The outstanding delivery service properties even after hot forming and cooling in air do not disappear in this case. The recommendations given in STAHL-EISEN-Werkstoffblatt 088 (Weldable fine-grained structural steels, guidelines for processing, in particular for welding) correspondingly apply to this steel as well.

Machinability

In spite of its high wear resistance, the steel exhibits good machinability if sufficiently heavy machine-tools and sharp carbide-tipped tools are used. The feed rate and cutting speed have to be adjusted to the high hardness of the material.

Heat treatment

Plates made of XAR[®] 300 receive the required properties as a result of normalizing at 880 °C - 960 °C (1616 °F - 1760 °F) or normalized rolling. At lower thicknesses of the material and in special cases a delayed cooling down or tempering can be necessary.

Thermal cutting

Preferably the flame-cutting process is used. For small product thicknesses, however, the plasma cutting process is used in the interest of minimum distortion.

Preheating is not normally necessary when flame-cutting thicknesses up to around 20 mm (0.787 in.). However, if the workpiece temperature is below + 5 °C (+ 41 °F), or the cut edges are to be cold-formed in the course of further processing, preheating to about 100 °C to 150 °C (212 °F to 302 °F) should be considered in the interest of cold cracking resistance.

Welding

If due consideration is given to the general rules for welding, this steel is weldable both manually and automatically. To prevent cold cracking in the welded joints only welding consumables giving welds of very low hydrogen content should be used.

Preheating is not generally necessary for welding with austenitic filler metals.

The preheat temperature level for welding depends on the plate thickness and the residual stress state of the structure. The working temperature should not go beyond 250 °C (482 °F).

The wear resistance of components made of XAR[®] 300 may be increased with the aid of wear resistant layers deposited by means of welding or metal spraying.

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 can be agreed upon at the time of ordering.

For surface quality requirements EN 10163 is applicable.

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

Publisher`s addresses

EN-, ISO Standards

Beuth Verlag GmbH, Postfach, D-10772 Berlin

STAHL-EISEN-Werkstoffblätter

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ThyssenKrupp Steel brochures

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“Wear-Resistant Steel plate
Processing Recommendations”

“XAR[®] steels - ThyssenKrupp Stahl`s
solution to your wear problems”