Hardox® 500 Tuf

General Product Description

Introducing the new generation Hardox® wear plate.

Hardox® 500 Tuf wear plate is the latest upgrade in the Hardox® range. It delivers high strength, extreme hardness and guaranteed toughness in one and the same wear plate. Hardox® 500 Tuf combines the best properties from Hardox® 450 and Hardox® 500. The result is a wear plate with no real competition on the market.

Dimension Range

Hardox® 500 Tuf is available as sheet in thicknesses of 3.0 - 6.5 mm, and as plate in thicknesses of 4.0 – 38.1 mm. More detailed information on dimensions is provided in the dimension program.

Mechanical Properties

Product	Thickness (mm)	Hardness [1] (HBW)	Typical yield strength (MPa), not guaranteed
Hardox® 500 Tuf sheet	3.0 - 6.5	475 - 505	1370
Hardox® 500 Tuf plate	4.0 - 38.1	475 - 505	1370

[1] Brinell hardness, HBW, according to EN ISO 6506-1, on a milled surface 0.5 – 3 mm below surface. At least one test specimen per heat and 40 tons. The nominal thickness of supplied plates will not deviate more than +/- 15 mm from the thickness of the test specimen used for hardness testing. For sheet the Brinell hardness test is according to EN ISO 6506-1 on each heat treatment individual/coil. Hardness is measured on a milled surface 0.3 - 2 mm below surface.

Hardox® wear plate is through-hardened. Minimum core hardness is 90 % of the guaranteed minimum hardness.

Impact Properties

Thickness (mm)	Longitudinal test, typical impact energy, Charpy V 10x10 mm test specimen [1]	Transverse test, guaranteed impact energy, Charpy V 10x10 mm test specimen [1]
3.0 - 8.0	50 J / -40 °C [2]	27 J / -40 °C
8.1 - 38.1	50 J / -40 °C [2]	27 J / -20 °C

[1] Impact testing is performed on thicknesses ≥ 6 mm for plate and ≥ 3 mm for sheet. For thicknesses between 3 and 11.9 mm, sub-size Charpy V-specimens are used. The specified minimum value is proportional to the cross-sectional area of the test specimen, compared to a full-size specimen (10 x 10 mm). Impact testing according to ISO EN 148 per heat and thickness group. Average of three tests.

[2] Typical value for 20 mm.

Chemical Composition (heat analysis)

C *) (max %)	Si *) (max %)	Mn*) (max %)	P (max %)	S (max %)	Cr*) (max %)	Ni*) (max %)	Mo*) (max %)	B*) (max %)
0.30	0.70	1.60	0.020	0.010	1.50	1.50	0.60	0.005

The steel is grain refined. *) Intentional alloying elements.

Carbon Equivalent CET(CEV)

Product type	Sheet	Plate	Plate	Plate
Thickness (mm)	3.0 - 6.5	4.0 - 16.0	16.1 - 25.4	25.5 - 38.1
Max CET(CEV)	0.38 (0.54)	0.38 (0.54)	0.39 (0.55)	0.44 (0.63)
Typ CET(CEV)	0.35 (0.52)	0.36 (0.52)	0.37 (0.53)	0.40 (0.59)

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40} \qquad CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

Tolerances

More details are given in SSAB's brochure Hardox® Guarantees or at www.ssab.com.

Thickness

Tolerances according to Hardox® Thickness Guarantee.
Hardox® Guarantees meet the requirements of EN 10029 Class A for plate, but offer more narrow tolerances. For sheets the guarantees meets the requirements of 1/2 EN 10051.

Length and Width

According to SSAB's dimension program. For plate, the tolerances are according to SSAB´s mill edge standard or tolerances that conform to EN 10029. For sheet the tolerances conform to EN 10051, tighter tolerances available on request.

Shape

Tolerances according to EN 10029 for plate and according to EN 10051 for sheet.

Flatness

For plate the tolerances are according to Hardox® flatness guarantees Class C, which are more restrictive than EN 10029. For sheet the tolerances are according to Hardox® flatness guarantees Class A, that offer narrower tolerances compared to EN 10051.

Surface Properties

According to EN 10163-2 Class A, Subclass 1.

Delivery Conditions

The delivery condition is Q or QT (Quenched or Quenched and Tempered). The sheets are delivered with an as-rolled surface and mill edge as standard, and the plates are delivered with sheared or thermally cut edges.

Delivery requirements can be found in SSAB's brochure Hardox® Guarantees or www.ssab.com.

Fabrication and Other Recommendations

Welding, bending and machining

Recommendations can be found in SSABs brochures at www.hardox.com or consult Tech Support.

Bendability for plates are according to Hardox® Bending Guarantees Class E. For sheets the bendability are according to Hardox bending guarantees Class A.

Hardox® wear plate is not intended for further heat treatment. It has obtained its mechanical properties by quenching and when necessary by means of subsequent tempering. The properties of the delivery condition cannot be retained after exposure to temperatures in excess of 250ºC .

Appropriate health and safety precautions must be taken when welding, cutting, grinding or otherwise working on this product. Grinding, especially of primer coated plates, may produce dust with a high particle concentration.

Contact Information

www.ssab.com/contact