

## 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 plate in thicknesses of 4.0 – 25.4 mm and as sheet in thicknesses of 3.0 - 6.0 mm. More detailed information on dimensions is provided in the dimension program.

### Mechanical Properties

Grade	Thickness (mm)	Hardness <sup>1)</sup> (HBW)	Typical yield strength (MPa), not guaranteed
Hardox® 500 Tuf sheet	3.0 - 6.0	475 - 505	1250 - 1400
Hardox® 500 Tuf plate	4.0 - 25.4	475 - 505	1250 - 1400

<sup>1)</sup> 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.

Hardox® 500 Tuf is through-hardened. Minimum core hardness is 90 % of the guaranteed minimum surface hardness.

### Impact Properties

Grade	Transverse test, guaranteed impact energy, Charpy V 10x10 mm test specimen <sup>1)</sup>
Hardox® 500 Tuf plate	27 J/ -20 °C
Hardox® 500 Tuf sheet	27 J/ -40 °C

<sup>1)</sup> Impact testing is performed on thicknesses ≥ 6 mm for plate and on thicknesses ≥ 3 mm for sheet. For thicknesses between 3 and 11.9 mm, sub-size Charpy V-specimens are used. The specified toughness is then 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. Average of three tests.

### Chemical Composition (heat analysis)

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

The steel is grain refined. <sup>\*)</sup> Intentional alloying elements.

### Carbon Equivalent CET(CEV)

Thickness	sheet 3.0 - 6.0	plate 4.0 - 16.0	plate 16.1 - 25.4
Max CET(CEV)	0.38 (0.54)	0.38 (0.54)	0.39 (0.55)
Typ CET(CEV)	0.30 (0.40)	0.36 (0.52)	0.37 (0.53)

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40}$$

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

## Tolerances

More details are given in SSAB's brochure Hardox® Guarantees or at [www.ssab.com](http://www.ssab.com).

## Thickness

Tolerances according to Hardox® Thickness Guarantee. Hardox® guarantees meets the requirements of EN 10 029 Class A for plate. For sheets the guarantees meets the requirements of 1/2 EN 10 051.

## Length and Width

According to SSAB's dimension program. Tolerances according to SSAB's mill edge standards or tolerances that conform to EN 10 029 for plate. For sheet the tolerances conform to EN 10 051, tighter tolerances available on request.

## Shape

Tolerances according to EN 10 029 and EN 10 051.

## Flatness

For plate the tolerances are according to Hardox® flatness guarantees Class D, which are more restrictive than EN 10 029. For sheet the tolerances are according to Hardox® flatness guarantees Class A, that offer narrower tolerances compared to EN 10 051.

## Surface Properties

According to EN 10 163-2, Class A Subclass 1.

## Bending

The bendability for plate are according to Hardox® bending guarantee Class F. For sheet the bendability are according to Hardox® bending guarantee Class B.

## 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 at [www.ssab.com](http://www.ssab.com).

## Fabrication and Other Recommendations

### Welding, bending and machining.

Recommendations can be found in SSAB's brochures at [www.hardox.com](http://www.hardox.com) or consult Tech Support, [techsupport@ssab.com](mailto:techsupport@ssab.com).

Hardox® 500 Tuf 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 250°C .

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](http://www.ssab.com/contact)