

Hardox 450

General Product Description

Hardox 450 is an abrasion resistant steel with a nominal hardness of 450 HBW. Typical applications are components and structures subjected to wear. For more information on applications see www.ssab.com

Available dimensions

Hardox 450 is available in thicknesses of 3 – 80 mm. Hardox 450 Tuf is available in thicknesses of 3 – 40 mm. Both grades are available in widths up to 3350 mm and lengths up to 14630 mm. For widths ≤1600 mm and thicknesses between 3 and 6 mm, preferred widths are 1500 or 1600 mm. More detailed information on dimensions is provided in the dimension program at www.ssab.com.

Mechanical Properties

Thickness mm	Hardness HBW min - max ¹⁾	Typical yield strength MPa, not guaranteed
3 - 40	425 - 475	1100 - 1300
(40) - 80	400 - 475	1050 - 1300

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 material thickness will not deviate more than ±15 mm from that of the test specimen.

The plates are through-hardened to a minimum of 90 % of the guaranteed minimum surface hardness.

Impact properties	Hardox 450	Hardox 450 Tuf
Minimum impact energy (J) for transverse tests Charpy V 10x10 mm test specimen ²⁾	–	27 J/-20°C

²⁾ For thicknesses between 6 - 11.9 mm, subsize Charpy V-specimens are used. The specified minimum value is then proportional to the cross-sectional area of the test specimen, compared to a fullsize specimen (10 x 10 mm). Impact testing according to ISO EN 148 per heat and thickness group. Average of three tests. Single value minimum 70% of specified average. Impact testing is performed from 6 mm.

Ultrasonic testing

Plates in thicknesses of 80 mm are delivered in Class E₂S₂ in accordance with EN 10 160, other thicknesses are delivered in Class E₁S₁.

Chemical Composition (heat analysis)

C ^{*)} Max %	Si ^{*)} Max %	Mn ^{*)} Max %	P Max %	S Max %	Cr ^{*)} Max %	Ni ^{*)} Max %	Mo ^{*)} Max %	B ^{*)} Max %
0.26	0.70	1.60	0.020	0.010	1.40	1.0	0.60	0.005

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

Maximum carbon equivalent CET (CEV)

Thickness mm	- (5)	5 - (10)	10 - (20)	20 - (40)	40 - 80
CET (CEV)	0.37 (0.48)	0.38 (0.49)	0.39 (0.52)	0.41 (0.60)	0.43 (0.74)

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

Tolerances

More detail are given in SSAB's brochure 41-General product information Weldox, Hardox, Armox and Toolox-UK or on www.ssab.com.

Thickness

Tolerances according to SSAB's thickness precision guarantee AccuRollTech.

- AccuRollTech meets the requirements of EN 10 029 Class A, but offers narrower tolerances.
- Width \approx 1600 mm and thicknesses 3 – 6 mm conform to EN 10 051, tighter tolerances available on request.

Length and width

According to SSAB's dimension program.

- Tolerances conforms to EN 10 029 or to SSAB's standard after agreement.
- Width \approx 1600 mm and thicknesses 3 – 6 mm conform to EN 10 051. Tighter tolerances available on request.

Shape

Tolerances according to EN 10 029

- Width \approx 1600 mm and thicknesses 3 – 6 mm according to EN 10 051.

Flatness

Tolerances according to SSAB's flatness tolerances which are narrower than EN 10 029 Class N (steel type L).

- Width \approx 1600 mm and thicknesses 3 – 6 mm conform with the requirements of EN 10 051 but offer narrower tolerances.

Surface Properties

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

Delivery Condition

The delivery condition is Quenched. The plates are delivered with sheared or thermally cut edges. Untrimmed edges after agreement.

Width \approx 1600 mm and thicknesses 3 - 6 mm delivered as cut-to-length in as rolled surface condition with mill edge as standard. Cut edge is an option.

Delivery requirements can be found in SSAB's brochure 41-General product information Weldox, Hardox, Armox and Toolox-UK or www.ssab.com.

Fabrication and Other Recommendations

Welding, bending and machining

Recommendations can be found in SSAB's brochures on www.hardox.com or consult Tech Support, help@ssab.com.

Hardox 450 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 and Information

For information, see SSAB's brochures on www.ssab.com or consult Tech Support, help@ssab.com.