HARDOX®
WEAR PLATE

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 subject to wear. For more information on applications see www.ssab.com.

Available dimensions

Hardox 450 and Hardox 450 Tuf are available in thicknesses of 3-130 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, the preferred widths are 1500 or 1600 mm. For thickness over 80 mm the preferred width is 1650 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 - 80	425 – 475	1100 - 1300
(80) - 100	410 - 475	1050 - 1300
(100) - 130	390 - 475	1000 - 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.

Plates up to 80 mm are through-hardened to a minimum of 90 % of the guaranteed minimum surface hardness.

Impact properties	Hardox 450	Hardox 450 Tuf Transverse test, guaranteed	Longitudinal test, typical
Impact energy (J) Charpy V 10x10 mm test specimen [2)]	–	27 J/-20°C	50J/-40 °C

[2)] For thicknesses between 6 - 11.9 mm, sub-size Charpy V-specimens are used. The specified minimum value 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 per heat and thickness group. Average of three tests. Single value minimum 70% of specified average. Impact testing is performed on thicknesses ≥ 6 mm.

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	0.025	0.010	1.40	1.50	0.60	0.005

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

Carbon equivalent CET (CEV)

Thickness mm	- (5)	5 - (10)	10 - (20)	20 - (40)	40 - 80	(80) - 130
CET (CEV) Max	0.37 (0.48)	0.38 (0.49)	0.39 (0.52)	0.41 (0.60)	0.43 (0.74)	0.41 (0.67)
CET (CEV) Typical	0.29 (0.39)	0.33 (0.45)	0.36 (0.48)	0.38(0.56)	0.38 (0.61)	0.39 (0.64)

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

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Tolerances

More details are given in SSAB's brochure 41-General product information Strenx, Hardox, Armox and Toolox-UK or at 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 ≤ 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 conform to EN 10 029 or to SSAB's standard after agreement.
- Width ≤ 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 ≤ 1600 mm and thicknesses 3 – 6 mm according to EN 10 051.

Flatness
Tolerances according to SSAB's flatness tolerances which are more restrictive than EN 10 029 Class N (steel type L).
- Width ≤ 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 Q or QT (Quenched or Quenched and Tempered). The plates are delivered with sheared or thermally cut edges. Untrimmed mill edges available by agreement. Width ≤ 1600 mm and thicknesses 3 - 6 mm delivered as cut-to-length with a rolled surface and mill edges as standard. Cut edge is an option.Thicknesses over 80 mm are delivered with mill edge as standard.

Delivery requirements can be found in SSAB's brochure 41-General product information Strenx, 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 at www.hardox.com or consult Tech Support, techsupport@ssab.com.

Hardox 450 and Hardox 450 Tuf are not intended for further heat treatment. Mechanical properties are achieved 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 at www.ssab.com or consult Tech Support, techsupport@ssab.com.

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