



## HARDOX 400 SHEET



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### General Product Description

The all-around steel that resists wear and abrasion.

Hardox 400 is an abrasion-resistant steel with a nominal hardness of 400 HBW. Hardox 400 is an all-around wear resistant steel. Thanks to its high toughness, good bendability and weldability, this steel can be used in structures with moderate wear.

### Dimension Range

Hardox 400 Sheet is available in thicknesses between 2- 8 mm. Hardox 400 Sheet is available in widths up to 1750 mm and lengths up to 16000 mm. More detailed information on dimensions is provided in the dimension program.

### Mechanical Properties

Thickness (mm)	Hardness <sup>1)</sup> (HBW)	Typical yield strength (MPa), not guaranteed
2.00- 8.00	370- 430	1100

<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.

### Impact Properties

Grade	Longitudinal test, typical impact energy, Charpy V 10 x10 mm test specimen <sup>1)</sup>
Hardox 400 Sheet	45 J /-40 °C <sup>2)</sup>

<sup>1)</sup> 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.

<sup>2)</sup> Single value minimum 70% of specified average. Impact testing is performed on thicknesses ≥ 6 mm.

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## 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 %)
0.32	0.70	1.60	0.025	0.010	1.40	1.50	0.60	0.004

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

## Carbon Equivalent CET(CEV)

Thickness (mm)	2.00 - 8.00 mm
Max CET(CEV)	0.39 (0.52)
Typ CET(CEV)	0.30 (0.48)

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

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

## Tolerances

### Thickness

Tolerances according to Hardox Thickness Guarantees. Hardox® Guarantees meets the requirements of ½ EN 10 051 for cut to length sheet.

### Length and Width

According to SSAB's dimension program. Tolerances conform to EN 10 051. Tighter tolerances available on request.

### Shape

Tolerances according to EN 10 051.

### Flatness

For cut to length sheet the tolerances are according to Hardox Flatness Guarantees Class B, that offers narrower tolerances compared to EN 10 051.

### Surface Properties

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

### Bending

Tolerances for Hardox cut to length sheet are according to Hardox Bending Guarantees Class A. Extra Close can be supplied after special agreement.

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## Delivery Conditions

The delivery condition is Q or QT (Quenched or Quenched and Tempered). Cut to length sheet are delivered with an as-rolled surface and mill edges as standard delivery condition. Delivery requirements can be found in SSAB's brochure 41-General Product Information Strenx, Hardox, Armox and Toolox-UK 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, [help@ssab.com](mailto:help@ssab.com).

Hardox 400 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. Hardox sheets can be welded and thermal cut in room temperature without pre-heating, all common welding processes can be used.

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.



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