

Hardox 400

General Product Description

Hardox 400 is an abrasion resistant steel with a nominal hardness of 400 HBW. Typical applications are components and structures subject to wear. For more information on applications see www.ssab.com.

Available dimensions

Hardox 400 is available in thicknesses of 3 – 130 mm. Hardox 400 is available in widths up to 3350 mm and lengths up to 14630 mm. For widths ≤ 1600 mm and thicknesses between 3 - 8 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 |
|--------------|--------------------------------------|----------------------------|
| 3 - 130 | 370 - 430 | 1000 |

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 | Longitudinal test, typical |
|---------------------------------|----------------------------|
| Charpy V 10x10 mm test specimen | 45 J/-40 °C |

Ultrasonic testing

Plates in thicknesses of 80 -130 mm are delivered in Class E₂S₂ in accordance with EN 10160.

Chemical Composition (heat analysis)

| C ^{*)} Max % | Si ^{*)} Max % | Mn ^{*)} Max % | P Max % | S Max % | Cr ^{*)} Max % | Ni ^{*)} Max % | Mo ^{*)} Max % | B ^{*)} Max % |
|-----------------------|------------------------|------------------------|---------|---------|------------------------|------------------------|------------------------|-----------------------|
| 0.32 | 0.70 | 1.60 | 0.025 | 0.010 | 1.40 | 1.50 | 0.60 | 0.004 |

The steel is grain refined. ^{*)} Intentional alloying elements.

Maximum carbon equivalent CET (CEV)

| Thickness mm | - (8) | 8 - 20 | (20) - 32 | (32) - 45 | (45) - 51 | (51) - 80 | (80) - 130 |
|--------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|
| CET (CEV) | 0.26 (0.41) | 0.31 (0.46) | 0.32 (0.52) | 0.33(0.60) | 0.40 (0.59) | 0.43 (0.67) | 0.50 (0.76) |

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

Tolerances

More details are given in SSAB's brochure 41-General product information Weldox, 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 10029 Class A, but offers narrower tolerances.
- Width \leq 1600 mm and thicknesses 3 - 8 mm conform to EN 10051. Tighter tolerances available on request.

Length and Width

According to SSAB's dimension program.

- Tolerances according to SSAB's mill edge standards or tolerances that conform to EN 10029.
- Width \leq 1600 mm and thicknesses between 3 - 8 mm conform to EN 10051. Tighter tolerances available on request.

Shape

Tolerances according to EN 10029.

- Width \leq 1600 mm and thicknesses 3 - 8 mm according to EN 10051.

Flatness

Tolerances according to SSAB's flatness tolerances which are more restrictive than EN 10029 Class N (steel type L).

- Width \leq 1600 mm and thicknesses 3 - 8 mm conform with the requirements of EN 10051 but offer narrower tolerances.

Surface Properties

According to EN 10163-2, 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 are available by agreement.

Width \leq 1600 mm and thicknesses 3 - 8 mm delivered as cut-to-length with an rolled surface and mill edges as standard.

Cut edges are 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 Weldox, Hardox, ArmoX and Toolox-UK or at 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, 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 .

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, help@ssab.com.