

# General Product Information Strenx, Hardox, Armox and Toolox



**SSAB**



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# Tolerances and surface requirements for plate

SSAB was first in the world to introduce a comprehensive precision guarantee on the thickness of heavy plate – AccuRollTech™. This high precision is made possible by the four-high rolling mill, which is designed for very high precision products.

Unless otherwise specified in the material standard or otherwise agreed, plate is delivered with surface condition in accordance with EN 10 163-2, Class A, Sub-class 1, with flatness tolerances that conforms to provision of EN 10 029, Class N, with length and width tolerances to EN 10 029, and with thickness tolerances to AccuRollTech™ that conforms to the provisions of EN 10 029.

Extracts from EN 10 029 adapted to the SSAB dimensional range, thickness and flatness tolerances in accordance with AccuRollTech™.

## Thickness tolerances

The thickness tolerances to AccuRollTech™ are closer than those specified in EN 10 029, except for thicknesses  $\geq 80$  mm, for which the tolerance range is the same. In AccuRollTech™, SSAB guarantee on maximum thickness variation within one plate. The tolerances are applicable to plate in asrolled or heat treated condition. Unless otherwise agreed, tolerance class A for AccuRollTech™.

AccuRolltech™

Nominal thickness (mm)	Tolerance Class A (mm)		Max thickness variation within one plate (mm)
	Min	Max	
- 4.9	- 0.3	+ 0.4	0.5
5.0 - 7.9	- 0.3	+ 0.5	0.6
8.0 - 14.9	- 0.4	+ 0.6	0.7
15.0 - 24.9	- 0.5	+ 0.7	0.8
25.0 - 39.9	- 0.7	+ 0.8	1.0
40.0 - 79.9	- 0.9	+ 1.5	1.1
80.0 -	- 1.0	+ 2.2	1.2

Tolerance class B, C or some other requirement within the AccuRolltech tolerance range for each thickness interval can be supplied.

Class B: Constant minimum tolerance of – 0.3 mm.  
Class C: Constant minimum tolerance of 0 mm.

Subject to special agreement, plate with Extra - Close

AccuRollTech™ Extra close

Nominal thickness (mm)	Tolerance Class A (mm)		Max thickness variation within one plate (mm)
	Min	Max	
- 8.0	- 0.2	+ 0.3	0.4
8.1 - 16.0	- 0.2	+ 0.4	0.5
16.1 - 20.0	- 0.3	+ 0.5	0.7
20.1 - 25.0	- 0.3	+ 0.8	0.8

Other tolerance classes within the Extra close tolerance range for each thickness interval can be supplied. If tolerances to AccuRollTech™ Extra Close are specified, only surface requirements in accordance with EN 10 163-2 Class B, Subclass 3 are applied.

## Length and width tolerances

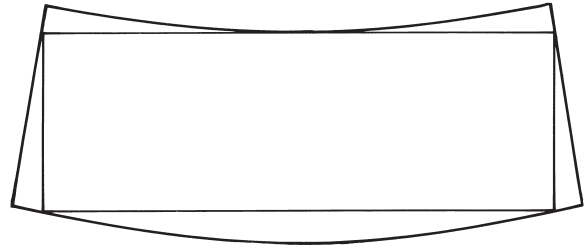
For plate with thickness up to and including 20 mm, plasma cutting enables us to offer closer tolerances on length and width than those tabulated down below.

Nominal length (mm)	Length tolerances (mm)	
	Min	Max
- 4000	0	+ 20
4000 - 5999	0	+ 30
6000 - 7999	0	+ 40
8000 - 9999	0	+ 50
10000 - 14999	0	+ 75
15000 - 18000	0	+ 100

Nominal thickness (mm)	Width tolerances (mm)	
	Min	Max
- 39	0	+ 20
40 - 149	0	+ 25
150	0	+ 30

## Edge camber and out-of-squareness

It must be possible to inscribe a rectangle with the dimensions of the plate ordered within the plate supplied. See down below.



## Flatness measurement

In addition to hot levelling, our equipment also allows for cold levelling of the plate.

To determine the flatness deviation, the plate is measured automatically by laser. The measurement conforms with manual procedure according to EN 10 029.

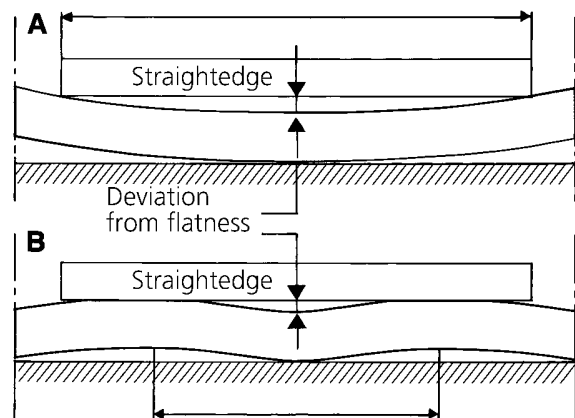
The plate is measured at least 25 mm from the long side of the plate and at least 200 mm from its short side. The vertical height is rounded off to the nearest mm.

The maximum permissible vertical heights for each tolerance class, thickness and measurement length are specified in the table below. Tolerance class S is applied only subject to special agreement.

Nominal thickness (mm)	Normal tolerance, Class N		Special tolerance, class S	
	Measurement length (mm)			
	1000	2000	1000	2000
3.0* - 4.9	9	14	**	**
5.0 - 7.9	8	12	4	8
8.0 - 14.9	7	11	3	6
15.0 - 24.9	7	10	3	6
25.0 - 39.9	6	9	3	6
40.0 - 155.0	5	8	3	6

\* Restricted flatness tolerances apply to 3 - 4 mm thick plate. Further information is available from SSAB.

\*\* Subject to special agreement.



# Tolerances and surface requirements for Cut to length sheet

Unless otherwise specified in the material standard or otherwise agreed, plate is delivered with surface condition in accordance with EN 10 163-2, Class A, Sub-class 1, with flatness tolerances that conforms to provision of EN 10 051, with length and width tolerances to EN 10 051, and with thickness tolerances that conforms to EN 10 051.

## Thickness tolerances

The thickness tolerances offered for cut-to-length sheet products are closer than those specified in EN 10 051, The tolerances are applicable in asrolled with mill edge as standard. Unless otherwise agreed, tolerance class A. The thickness shall be measured at any point situated at least 40 mm from the edges for products with mill edges and at least 25 mm from the edges for products with trimmed/slit edges.

Nominal Thickness (mm)	Nominal Width (mm)		
	≤ 1200	1200 ≤ 1500	1500 ≤ 1800
t ≤ 2.00	± 0.24	± 0.27	± 0.29
2.00 < t ≤ 2.50	± 0.25	± 0.29	± 0.32
2.50 < t ≤ 3.00	± 0.28	± 0.31	± 0.34
3.00 < t ≤ 4.00	± 0.31	± 0.34	± 0.36
4.00 < t ≤ 5.00	± 0.34	± 0.36	± 0.39
5.00 < t ≤ 6.00	± 0.36	± 0.39	± 0.41
6.00 < t ≤ 8.00	± 0.41	± 0.42	± 0.43
8.00 < t ≤ 10.0	± 0.45	± 0.46	± 0.48
10.00 < t ≤ 12.50	± 0.49	± 0.50	± 0.52
12.50 < t ≤ 15.00	± 0.52	± 0.53	± 0.56
15.00 < t ≤ 25.00	± 0.56	± 0.59	± 0.63

## Length and width tolerances

The length of the cut-to-length sheet is the length of the shorter of both longitudinal edges. The width shall be measured at right angles to the longitudinal axis of the product.

Nominal length (mm)	Tolerances (mm)	
	Lower	Upper
< 2000	0	+10
2000 ≤ l < 8000	0	+ 0.005 x l
l ≥ 8000	0	+ 40

Nominal width (mm)	Tolerances (mm)			
	Mill edges		Trimmed edges <sup>1)</sup>	
	Lower	Upper	Lower	Upper
w ≤ 1200	0	+10	0	+3
1200 < w ≤ 1850	0	+20	0	+5
w > 1850	0	+25	0	+6

<sup>1)</sup> Tolerances for trimmed edges apply to products with nominal thickness t ≤ 10 mm.

## Flatness measurement

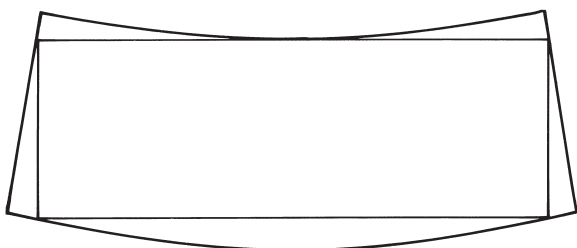
In addition to hot levelling, our equipment also allows for cold levelling of the cut-to-length sheet.

To determine the flatness deviation, the sheet is measured automatically by laser. The measurement conforms with manual procedure according to EN 10 051. Requirements concerning flatness shall be agreed at the time of enquiry and order.

Nominal thickness t	Nominal width w	Tolerances on flatness	Special tolerances on flatness
t ≤ 2.00	w ≤ 1200	18	9
	1200 < w ≤ 1500	20	10
	w > 1500	25	13
2.00 < t ≤ 25	W ≤ 1200	15	8
	1200 < w ≤ 1500	18	9
	w > 1500	23	12

## Edge camber and out-of-squareness

It must be possible to inscribe a rectangle with the dimensions of the sheet ordered within the sheet supplied. See down below.



## Hardox and Strenx Guarantees

Hardox and Strenx product are produced according to their Guarantees. See respective brochure on [www.ssab.com](http://www.ssab.com)

## Tolerances and surface requirements Tubes and sections

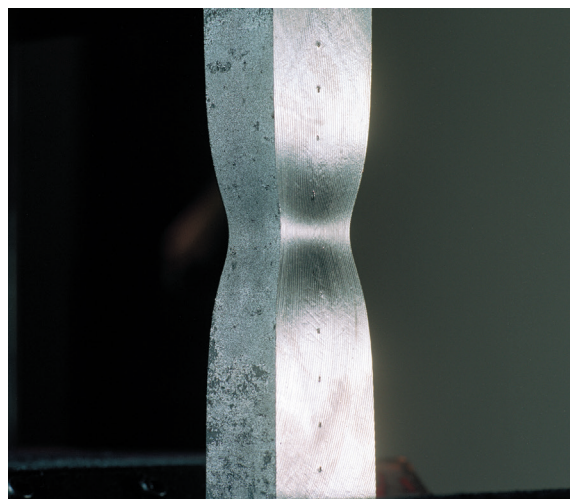
SSAB is a proude producer of high quality tubes and section in most of our product families, But for tubes and sections the tolerances and surface requirement is detailed described in their datasheets under tolerances. For more information on this requiremenst please contact the Brand manager, your local sales representant or Tech support, [techsupport@ssab.com](mailto:techsupport@ssab.com).

# Testing

Unless otherwise agreed, inspection and testing are carried out and the results are reported as specified in the relevant material standard or in our data sheets. When placing the order, always specify whether the material is to be subjected to special inspection, the scope of such inspection, and also the type of inspection document required.

## Mechanical testing

Tensile testing in accordance with ISO 6892-1  
 Impact testing in accordance with ISO 148-1  
 Hardness testing in accordance with EN ISO 6506-1, 6508-1 and 10 083. Tensile testing in the thickness direction in accordance with EN 10 164.



## Ultrasonic testing

Ultrasonic testing is performed on thicknesses  $\geq 6$  mm and are used for finding indicating cracks, inclusions, porosity and similar discontinuities. Unless otherwise agreed, plate is delivered in class E1, S1 for thickness up to and included 100 mm in accordance with the latest version of EN 10 160. Ultrasonic testing is carried out after agreement in accordance with EN 10 160, SEL 072, ASTM 435, ASTM 578 or other agreed standard. For plate thicknesses in excess of 100 mm and requirements stricter than those corresponding to E0, S0, testing for test certificate is carried out only after special agreement.

## Surface Testing <sup>1)</sup>

As per EN 10 160	Distance between parallel scanninglines (mm)	Min. defect area to register (mm <sup>2</sup> )	Max. permissible defect area (mm <sup>2</sup> )	Max. number of local defects (defects/m <sup>2</sup> )
-	100	1000	10000	1
S <sub>0</sub>	100	1000	5000	20
S <sub>1</sub>	100	100	1000	15
S <sub>2</sub>	50	50	100	10
S <sub>3</sub>	50	20	50	10

As per EN 10 160	Edge zone width <sup>2)</sup> (mm)	Min. defect length to register (mm)	Max. permissible defect length (mm)	Max. permissible defect area (mm <sup>2</sup> )	Max. number of defects per m length
E <sub>0</sub>	50 - 100	50	100	100	6
E <sub>1</sub>	50 - 100	25	50	50	5
E <sub>2</sub>	50 - 100	20	40	40	4
E <sub>3</sub>	50 - 100	15	30	30	3
E <sub>4</sub>	50 - 100	10	20	20	2

<sup>1)</sup> Testing can be ordered and carried out either as total testing e.g E<sub>1</sub>, S<sub>1</sub> or E<sub>2</sub>, S<sub>2</sub> or as edge or surface testing individually e.g E<sub>1</sub>, S<sub>1</sub>.

<sup>2)</sup> The width of the edge zone on edge scanning varies with the plate thickness.



# Distribution of inspection documents

SSAB has a certificate system that electronically produces, distributes and records all types of inspection documents. The documents are delivered in the form of PDF files or, in exceptional cases, by mail. Type 3.2 inspection reports are also delivered electronically. Subject to special agreement, the purchaser himself can download his documents. The certificate system offers excellent opportunities for simple and rational handling of inspection documents.

## Inspection documents

Unless otherwise agreed, certificates are issued in English in accordance with SS-EN 10 204:2004. The certificates include the particulars specified in the material standard, which usually includes:

- Name of manufacturer
- Clear reference to the purchase agreement and delivery batch
- Material designation in accordance with the purchase agreement.
- Description of article
- Nominal dimensions
- Quantity
- Results of inspection (although not type 2.1 certificate below)
- Date of issue

The image shows a sample SSAB inspection certificate form. It is a structured document with various fields for data entry. The header includes the SSAB logo and the text 'SSAB ENERGI AB, SE 812 89 GÖTEBORG, Sweden'. The form is divided into several sections: 'Inspection certificate' (with fields for order number, inspection type, and date), 'Product' (with fields for material grade, manufacturer, and material ID), 'Quantity' (with fields for quantity and unit), 'Description of article' (with fields for material designation and dimensions), 'Nominal dimensions' (with fields for length, width, and thickness), 'Quantity' (with fields for quantity and unit), and 'Results of inspection' (with fields for inspection type and date). The form also includes a section for 'Declaration of compliance with the order 2.1' and a signature line for the inspector. The bottom of the form features logos for SSAB and HARDOX.

Example of a Certificate

## Following types of inspection documents are applicable:

### Declaration of compliance with the order 2.1

The manufacturer certifies that the products supplied conform to the requirements of the order, without specifying test results. The certificate may consist of the dispatch specification.

### Test report 2.2

Document in which the manufacturer certifies that the products supplied are in compliance with the requirements of the order and in which he supplies test results based on non-specific inspection and testing.

## The following types are available:

### Inspection certificate 3.1.

The inspection certificate declares that the products delivered conform to the requirements of the purchase agreement. The results of testing are shown on the products that will be delivered or on inspection batches comprising part of the products delivered. The document is validated by an inspection representative who is authorized by the manufacturer and who is independent of the production department.

### Inspection certificate 3.2.

The inspection certificate declares that the products delivered conform to the requirements of the purchase agreement. The results of testing are shown on the products that will be delivered or on inspection batches comprising part of the products delivered. Document issued both by the inspection representative authorized by the manufacturer and either by an inspection representative authorized by the customer or by an inspector appointed in accordance with official regulations.

# Service and Support

SSAB has an extensive service and support offer.

We have a long tradition of helping customers to develop their steel products and processes with our unique knowledge. Unlike other steel mills SSAB offers two different services, Tech Support and Knowledge Service Center. We offer technical and innovation support as well as technical training, handbooks and tools.

SSAB offers advanced logistic solutions, including stock services world-wide, mill-direct deliveries, processing and logistics management solutions.

## Contact information

[techsupport@ssab.com](mailto:techsupport@ssab.com)

[contact@ssab.com](mailto:contact@ssab.com)

SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperation with its customers to create a stronger, lighter and more sustainable world.

SSAB has employees in over 50 countries. SSAB has production facilities in Sweden, Finland and the US. SSAB is listed on the NASDAQ OMX Nordic Exchange in Stockholm and has a secondary listing on the NASDAQ OMX in Helsinki.

For more information, contact us or visit [www.ssab.com](http://www.ssab.com)

SSAB  
SE-613 80 Oxelösund  
Sweden

Phone: +46 155-25 40 00  
Fax: +46 155-25 40 73  
E-mail: [contact@ssab.com](mailto:contact@ssab.com)

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