General Product Information
Strenx, Hardox, Armox and Toolox

Content

SSAB Plate steels and standardized high preformance steels in equivalent steel groups

SSAB produces high prefomance steels that confirms to most international and national standards. Our high prefomance steels are marketed under the Strenx™ brand.

Strenx - preformance steel

SSAB Plate	Yield Strength class MPa[1)]	Toughness class Charpy-V, ^{0}C	EN 10 025-6	ASTM Toughness class per ASTM A6
Strenx 100	700	-40		A 514 S
Strenx 700 E Strenx 700 F	700	-40 -60	S 690 QL S 690 QL1	
Strenx 900 D Strenx 900 E Strenx 900 F	900	-20 -40 -60	S 890 Q S 890 QL S 890 QL1	
Strenx 960 D Strenx 960 E	960	-20 -40	S 960 Q S 960 QL	
Strenx 1100 E Strenx 1100 F	1100	-40 -60		
Strenx 1300 E Strenx 1300 F	1300	-40 -60		

[1)] 1 MPa = 1 N/mm^2

Quality management system

Unless otherwise agreed, delivery and inspection are subject to the technical provisions of EN 10 021.

Quality management system in accordance with EN ISO 9001:2008

The quality management system at SSAB is based on EN ISO 9001:2008 and is described in our "Operational Manual for Quality and Environment". The system is certified by an accredited inspection body, and it is also certified in accordance with AQAP 2110:3.


DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Initial certification date: 17 June, 1991

Valid: 01 February, 2015 - 31 January, 2018

This is to certify that the management system of

SSAB EMEA AB
SSAB Special Steels
Industriområde A, 613 80, OXELÖSUND, Sweden

has been found to conform to the management system standards:

ISO 9001:2008/ AQAP 2110, Edition 3 - November 2009

This certificate is valid for the following Scope:

Design and manufacture of steel slabs and plates

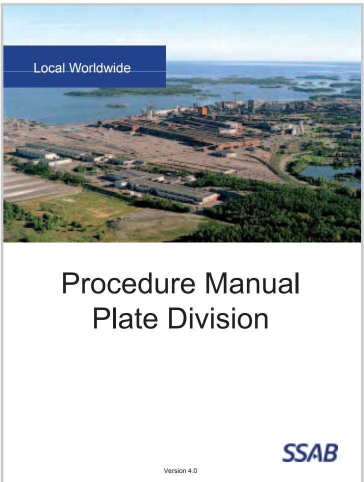
Place and date: Solna, 20 January, 2015

For the issuing office: DNV GL – Business Assurance, 171 06, Sweden

Doris Forsberg

SWEDAC ACKREDITERING 1053 ISO/IEC 17021

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.




DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Initial certification date: 17 May, 2004

Valid: 01 February, 2015 - 31 January, 2018

This is to certify that the management system of

SSAB EMEA AB
SSAB Special Steels
Industriområde A, 613 80, OXELÖSUND, Sweden

has been found to conform to the Environmental management system standard:

ISO 14001:2004

This certificate is valid for the following Scope:

Design and manufacture of steel slabs and plates

Place and date: Solna, 20 January, 2015

For the issuing office: DNV GL – Business Assurance, Box 6046/Hemvärnsgatan 9, Solna, 171 06, Sweden

Doris Forsberg, Management Representative

SWEDAC ACKREDITERING 1053 ISO/IEC 17021

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance Sweden AB, Box 6046, 171 06 Solna, Sweden. TEL:+46 8 587 940 00. http://assurance.dnvgl.com

CE marking

We conform to the requirements for CE marking according to the provisions of the EU Construction Products Regulation (89/106/EEC).

The approval, which has been issued by TÜV-NORD, applies to products made to EN 10025-1 and -6, and also covers Strenx 700, Strenx 900 and Strenx 960.

Tolerances and surface condition

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 new 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 provisionsof EN 10 029.

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

Length and width tolerances

Nominal length (mm)	Length Tolerances (mm)	
	Min	Max
-(4 000)	0	+ 20
4 000 - 5 999	0	+ 30
6 000 - 7 999	0	+ 40
8 000 - 9 999	0	+ 50
10 000 - 14 999	0	+ 75
15 000 - 18 000	0	+ 100

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

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

Thickness tolerances

The thickness tolerances to AccuRollTech™ are closer than those specified in EN 10 029, except for thicknesses ≥80 mm, for which the tolerance range is the same.

In AccuRollTech™ , the requirement on maximum thickness variation within one plate is stricter than in EN 10 029. 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 above 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 tolerances can be supplied.

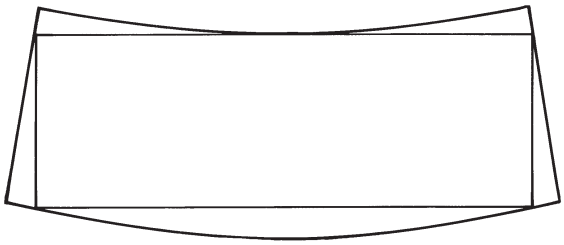
AccuRollTech™ Extra Close

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 above 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.

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.

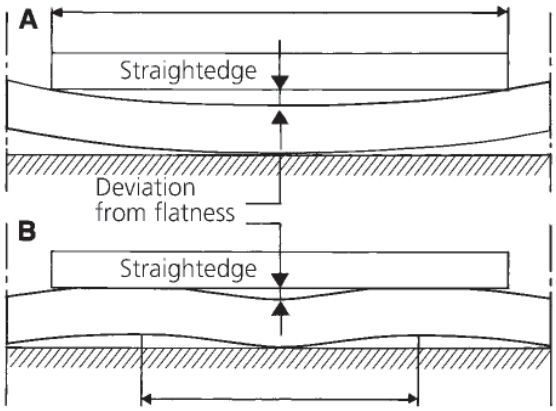


Flatness measurement

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 measurment 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 thickplate. Further information is available from SSAB.

** Subject to special agreement.

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

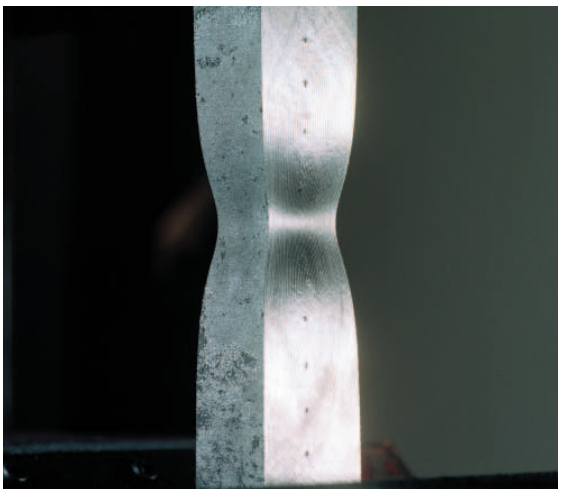
Tensile testing in accordance with ISO 6892-1
Impact testing in accordance with ISO 148-1
Hardness testing in accordance with EN ISO 6506-1, 6508-1 Tensile testing in the thickness direction in accordance with EN 10 164

Ultrasonic testing

Ultrasonic testing is used for indicating cracks, inclusions, porosity and similar discontinuities.

Unless otherwise agreed, plate is delivered in class E_1, S_1 for thickness up to and included 100 mm in accordance with EN 10 160:1999.

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 E_0, S_0, testing for test certificate is carried out only after special agreement.



Surface testing [1)]

As per EN 10 160	Distance between parallel scanninglines (mm)	Min. defect area to register (mm^2)	Max. permissible defect area (mm^2)	Max. number of local defects ($defects/m^2$)
-	100	1000	10000	1
S_0	100	1000	5000	20
S_1	100	100	1000	15
S_2	50	50	100	10
S_3	50	20	50	10

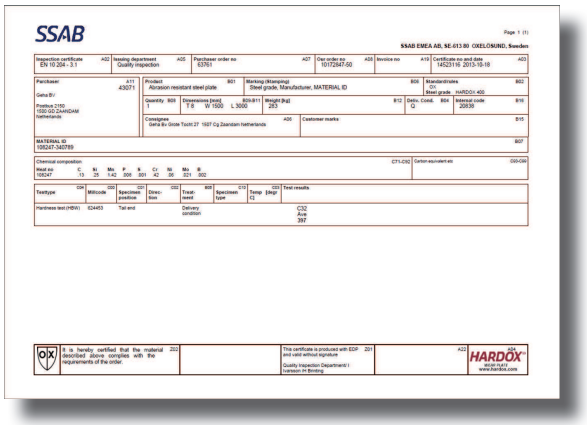
As per EN 10 160	Edge zone width[2)] (mm)	Min. defect length to register (mm)	Max. permissible defect length (mm)	Max. permissible defect area (mm^2)	Max. number of defects per m length
E_0	50 -100	50	100	2000	6
E_1	50 -100	25	50	1000	5
E_2	50 -100	20	40	500	4
E_3	50 - 100	15	30	100	3
E_4	50 - 100	10	20	50	2

[1)] Testing can be ordered and carried out either as total testing, e.g. E_1, S_1 or E_2, S_2, or as edge or surface testing individually, e.g. E_1, S_1.

[2)] The width of the edge zone on edge scanning varies with the plate thickness

Distribution of inspection documents

SSAB has developed a certificate system that electronically produces, distributes and records all types of inspection documents. Each document covers one plate. 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 new certificate system offers excellent opportunities for simple and rational handling of inspection documents.


SSAB

SSAB EMEA AB, SE-613 80 OXELÖSUND, Sweden

HARDOX

Inspection documents

Unless otherwise agreed, certificates are issued in English in accordance with SS-EN 10204:2004.

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 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.

Marking

All plate is clearly marked on delivery. The OX mark, the steel grade and the plate identity are stamped, unless the relevant standard specifies no stamping or after special agreement. For plate thicknesses of 5 mm or below and if stamping is not carried out for any other reason, stamping is replaced by marking with white paint or with a dark ink jet[1)].

The plate identity is specified by two digit groups

5 or 6 digits, representing the heat number, + 6 digits that represent the plate serial number. These two groups of digits give every plate a unique identity.

Example of plate identity: 12345-123456 or 012345-123456.

If required or if so decided by us, the location of the stamped marking can be shown by two white-paint dots.

Stamping is always carried out at right angles to the direction of rolling. Marking with paint may be carried out in the direction of rolling. On plate that is not stamped, the direction of rolling is therefore shown by a painted arrow. A painted arrow can also be shown on stamped plates.

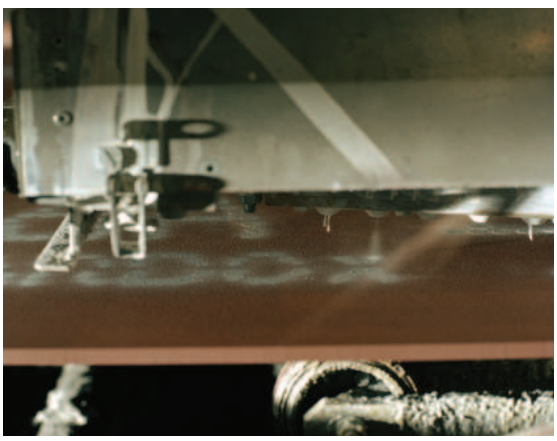
The customer's mark, plate dimensions of length, width and thickness, and the serial number of the plate, the batch number, and the in-house pile number are painted on the plate as required by means of white paint or with a dark ink jet.

Stamping and marking with paint are carried out by machine or manually. When done by machine, all marking with paint is carried out by dot-matrix printing, and stamping is carried out by means of rounded stamps.

Brand marking

In order to keep traceability of the material at the destination, our plate is marked as follows, unless otherwise agreed: Painted plate is normally marked in a number of rows over the whole of the plate surface. Unless otherwise agreed, a simplified steel grade designation and SSAB are painted. The plate identity number can also be marked in rows over the plate surface.

Note that the complete steel grade designation in accordance with the standard/data sheet or specification is stamped or is included in the paint marking.



Anti-corrosion painting

Unprotected steel plate will corrode. SSAB can therefore provide the plate with effective anti-corrosion treatment known as shop primer. This protects the plate while it is in transit.

Different primer types and different protective action times can be chosen. Our alternatives provide protection against corrosion for 3 or 6 months. If better welding or laser-cutting properties are required, a thinner coat and thus a shorter protection time can be specified.

The primer types we use have been tested by various institutes to ensure good working conditions for the end user. If good ventilation is provided, the hygienic limit values will not be exceeded in conjunction with welding, cutting or grinding.

Regardless of the anti-corrosion treatment specified, the appearance and cleanliness of the steel surface before treatment are decisive to the effectiveness of the anti-corrosion treatment. We shot-blast the plate which is then immediately anti-corrosion painted. The primers used are mainly of low-zinc silicate type.

The plate we keep in stock is painted with low-zinc silicate primer, since It does not need to be removed before normal welding.

In order to provide visual distinction, our steel grades are painted in different colors.

Hardox is primed with a red color and all other grades in grey if nothing else is agreed.

Before selecting the final paint system, we recommend that the relevant paint supplier should be consulted.

Shopprimers

Typ	Colour	Protection time	Remarks
Low zinc	red, grey	3 months	Improved cutting properties and weldability
Low zinc	red, grey	6 months	
Ceramic	red, grey	6 months	High temperatures

Other primer types are available subject to special agreement. Degree of blasting SA 2.5 as per ISO 8501-1:1998.

Dimensions of shot blast/painted plate

Thickness: 3 – 102 mm

Length: 2000 – 14500 mm

Width: 1000 – 3350 mm

Logistics

In our delivery standard, we want to present the rules that guide the work of pallet make-up and what options are available.

The aim of the standard is to build the pallets in such a way that handling damage will be avoided to the greatest extent possible, and that we can create cost-effective and manageable volumes.

In deliveries in which SSAB is responsible for loading, the goods are always secured in accordance with the laws and regulations in force at that time. In order to regulate who will be paying for freight and insurance, we apply the following delivery conditions: DDP as per Incoterms 2000. FCA, CIF, CIF landed, and FOB.

Concepts

Pallet	A form of packaging. The pallets are separated with timber spacers measuring 63 x 90 mm or 90 x 90 mm.
Stack	Part-load on a pallet. Separated from other stacks by timber spacers measuring 32 x 32 mm.
Pallet label	Secured to the top plate on a pallet, with information on the pallet number in legible text, bar code, painted colour code, quantity, weight, and the identity of the top plate.
Colour	Painted colour coding on the short and/or coding long side of the plate for delivery by sea.
Short plate	Plate <6100 mm long.

General pallet rules

- The maximum pallet weight is 12 tonnes.
- Short and long plates are never loaded on the same pallet.
- Thick and thin plates are never loaded on the same pallet.
- Painted and unpainted plates are never loaded on the same pallet.
- The widest plate is always at the bottom on the pallet.
- Graduated width loading (widest plate on the pallet, gradually diminishing to the narrowest at the top) is employed for plate thicknesses <30.1 mm.
- Random length loading (plates of different lengths are loaded in random order) is employed.
- Some thin plate may be strapped.
- Magnetic pallet label as shown in the picture.

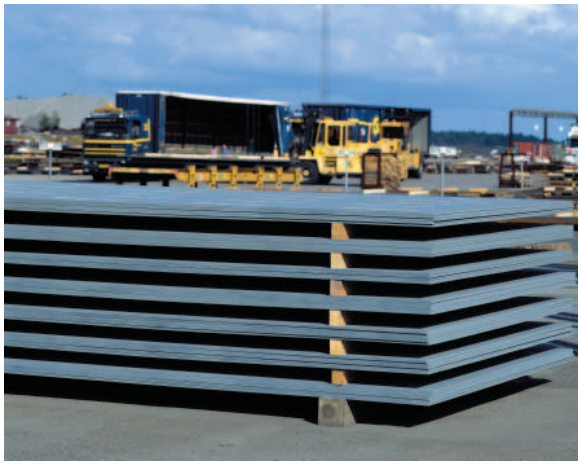
Options

- Strapping with steel straps round both the pallet and the stack. 6099 mm maximum plate length.
- Stack weights as agreed.
- Pallet weights as agreed.
- Special colour coding.
- Delivery codes outside the standard.
- Other requirements on dimensional separation.

Optional marking

- On the top plate on a pallet or stack. Up to 3 lines with 21 characters (manuell marking)* stack, up to 3 lines.
- Edge label attached on the thickness surface of the short side. Available in three variants with different information about the plate. Edge label possible above 8 mm thickness.

* Carried out free of charge, if required.



Information and technical support

Our steel development work is accompanied by extensive testing. The results of these tests and other experience are documented in our brochures and other information materials.

About SSAB

• From iron ore to steel plate

Product information

Visit www.ssab.com

Workshop recommendations

• Welding

• Machining

• Bending/shearing

• Cutting

Technical support service

Our application engineers have accumulated a vast stock of expertise and experience of design and manufacture of products for which heavy plate is used.

We shall be pleased to provide you with additional information concerning our products.

SSAB Academy

At our SSAB Academy, we arrange courses for our employees and customers on the subjects of how our products should be used in design and production.

Lectures are interspersed with practical exercises in which the trainees themselves can gain knowledge of how easy the plate is to use.

Home pages

www.ssab.com

Our home pages give further information on our products. The English version of data sheets and brochures published on the Internet are always the latest updated versions. In addition, there is a list of the dates of issue of all brochures and data sheets.

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

0411-General product information Strenx, Hardox, Armox and Toolox - UK. 2015-04-17
The UK English version of this document shall prevail in case of discrepancy. Download the latest version of this document on internet: www.ssab.com.

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