

General product information
WELDOX, HARDOX and ARMOX



WELDOX[®]
STRUCTURAL STEEL PLATE

HARDOX[®]
WEAR PLATE

ARMOX[®]
PROTECTION PLATE

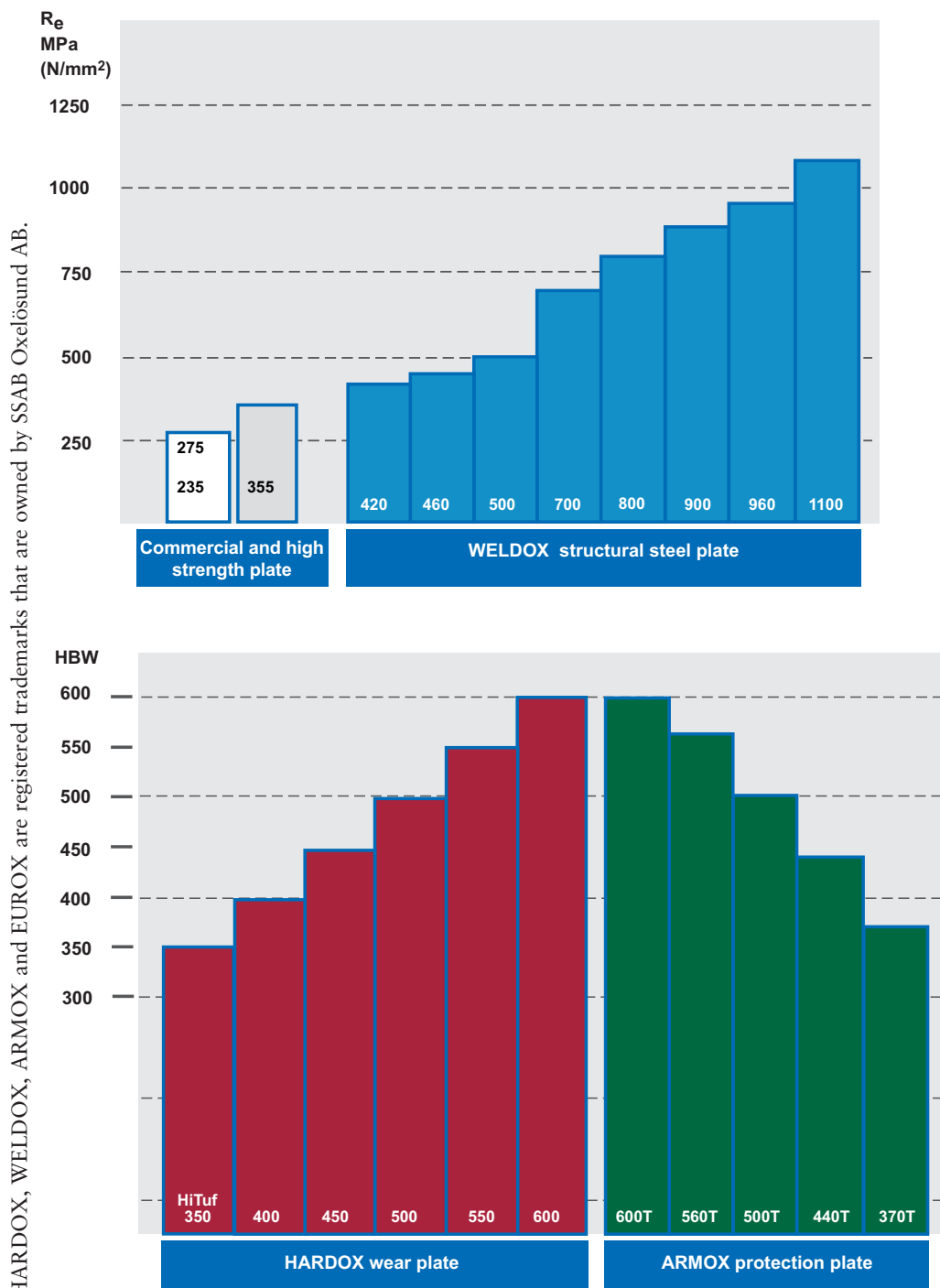
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Introduction

SSAB Oxelösund is a member of the SSAB Svenskt Stål AB Group and is Scandinavia's leading manufacturer of heavy plate. SSAB Oxelösund produces annually more than half a million tonnes of steel, out of which around 90% are exported. The company is a world leader in the specialist field of quenched and tempered steels, and produces product brand names such as WELDOX structural steel, HARDOX wear plate and ARMOX protection plate.

Product range



WELDOX, HARDOX and ARMOX dimensions available

Maximum length in m* for widths in mm.

Width [mm]	1000	(1350)-	1500	(1600)-	(1700)-	(1800)-	(1900)-	(2000)-	(2100)-	(2200)-	(2300)-	(2400)-	(2500)-	(2600)-
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Thickness[mm]	1350	(1500)	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
3.0 ¹⁾ - 3.7														
3.8 - 4.7														
4.8 - 5.7														
5.8 - 6.7														
6.8 - 7.7														
7.8 - 8.7														
8.8 - 10.0														
10.1 - 24.0														
24.1 - 25.0														
25.1 - 26.0														
26.1 - 27.0	14	Maximum plate length 14.5 m												
27.1 - 28.0	13.4													
28.1 - 29.0	13													
29.1 - 30.0	12.5													
30.1 - 31.0	12.1													
31.1 - 32.0	11.8													
32.1 - 33.0	11.4													14.2
33.1 - 34.0	11.1													14.4
34.1 - 35.0	10.7													13.9
35.1 - 36.0	10.4													13.6
36.1 - 37.0	10.2													14.1
37.1 - 38.0	9.9													13.7
38.1 - 39.0	9.6													13.4
39.1 - 40.0	9.4													12.8
40.1 - 45.0	8.3													12.5
45.1 - 50.0	7.5													12
50.1 - 55.0	6.8													12.7
55.1 - 60.0	7.8													12.2
60.1 - 65.0	7.2													11.7
65.1 - 70.0	6.7													10.8
70.1 - 75.0	6.2													10.4
75.1 - 80.0	5.9													10.4
80.1 - 102.0		7.4	7.4	7.3	7	6.7	6.3	6	5.7	5.5	5.3	5		
102.1 - 115.0		6.5	6.5	6.5	6	5.8	5.5	5.2	5	4.8	4.6	4.4		
115.1 - 130.0		5.8	5.8	5.7	5.4	5.1	4.8	4.6	4.4	4.2	4	3.9		
130.1 - 150		5	5	5	4.7	4.4	4.2	4	3.8	3.6				

* Plates requiring test samples at both ends are 400 mm shorter than the lengths tabulated above.

¹⁾ Subject to special agreement.

Production flow

Our steels are produced in an integrated process extending from raw materials to finished plate. This enables us to keep the entire process under close control.

The processes are optimized to suit our most complicated spearhead products, which also benefits our commercial steel grades. A common feature that ensures good weldability is the accurate chemical composition, including very low carbon equivalent, closely controlled contents of alloying elements, and very low contents of residual elements. The latter is due to the ore-based metallurgy.

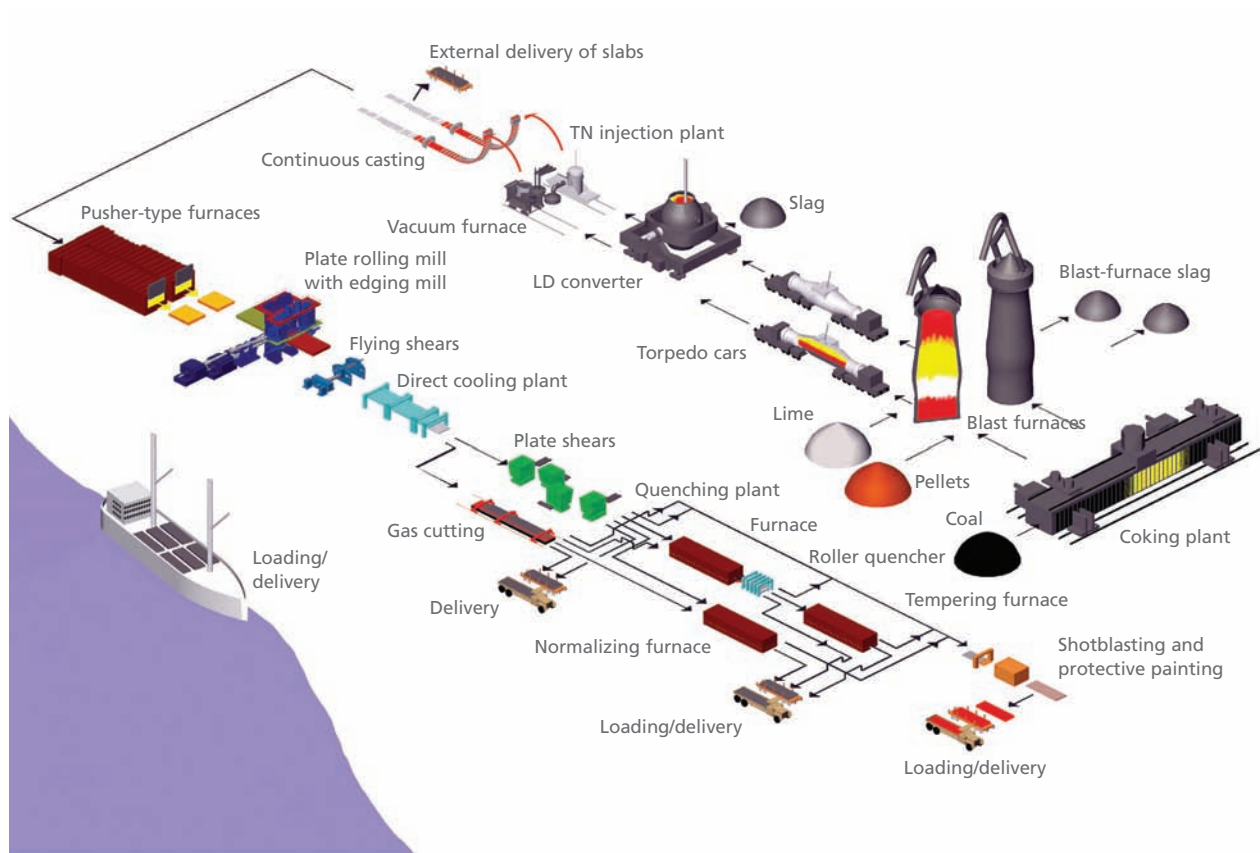
The process

The principal raw materials are ore in the form of pellets and coke from our own coking plant. The raw materials are converted into raw iron in the blast

furnace. The raw iron is transported in 'torpedo cars' to our own steel shop, where the LD converter refines the raw iron into steel by oxygen blowing, which lowers the carbon content of the iron. It is the carbon content that is the main distinguishing feature between raw iron and steel.

The steel is then processed to achieve exactly the right composition and temperature. The steel is cast into slabs in the continuous casting plant.

The slabs are then transported to the rolling mill, where they are rolled into plate. To achieve the required properties, the plates may then be heat treated including quenching. Various post-treatment processes are then carried out, such as levelling, shotblasting, anti-corrosion painting, cutting to length and width, and marking. The plate is then ready for delivery to the customer.



WELDOX structural steel

SSAB Oxelösund produces structural steels that conform to most international and national standards. Our extra-high strength structural steels are marketed under the WELDOX brand name.

WELDOX has been developed to provide excellent weldability, combined with high strength and toughness. The ore-based metallurgy and advanced processing in the steel shop ensures very low contents of residual elements in the steel. WELDOX structural steels have excellent bendability and machinability properties. Due to the high strength of the steel, the end products can be strong but lightweight, which allows for substantial reductions in the cost of materials, welding and transport. Good flatness and fine surface quality are also distinguishing features of WELDOX plate.

WELDOX structural steel plate is produced in thicknesses ranging from 4 to 130 mm, and with guaranteed yield strengths between 420 MPa and up to 1100 MPa. The flexible production system enables us to deliver plate with tailored properties to suit the customer's requirements. We can supply plate in thermomechanically rolled or quenched and tempered condition. In addition, most WELDOX steels can be supplied with guaranteed impact toughness at temperatures down to -60°C .

WELDOX structural steels conform to EN 10025-4 (earlier EN 10 113-3) and EN 10025-6 (earlier EN 10 137-2). However, there is no standardized equivalent for WELDOX 800 and WELDOX 1100. Certain deviations regarding the delivery condition apply to WELDOX 460 and WELDOX 500.

Further information concerning the properties of the plate and the options in the standard that are employed are given in the relevant data sheets.

Z-plate

All structural steels with yield strengths of up to 500 MPa can be supplied with guaranteed properties in the through thickness direction, often called Z-plate. For higher strengths, Z-plate is available only subject to special agreement. Unless otherwise agreed, the maximum plate thickness is 75 mm.



Oxelösund steels and standardized structural steels in equivalent steel groups

SSAB Oxelösund	Yield strength class [MPa] ²⁾	Toughness class Charpy-V, [°C]	EN 10025 - 4 issue 2004 (EN 10 113 - 3 101993)	EN 10025 - 6 issue 2004 (EN 10 137 - 2 1995)	ASTM Toughness class as per ASTM A6
WELDOX 420 D ¹⁾ WELDOX 420 E ¹⁾	420	-20 -50	S 420 M S 420 ML		A 678 B A 572 - 60
WELDOX 460 D ¹⁾ WELDOX 460 E ¹⁾	460	-20 -40 -50 -60	S 460 M S 460 ML	S 460 Q S 460 QL S 460 QL1	A 852
WELDOX 500 D WELDOX 500 E	500	-20 -40 -60		S 500 Q S 500 QL S 500 QL1	A 678 C A 678 D
WELDOX 700 D WELDOX 700 E WELDOX 700 F	700	-20 -40 -60		S 690 Q S 690 QL S 690 QL1	A 514
WELDOX 900 D WELDOX 900 E WELDOX 900 F	900	-20 -40 -60		S 890 Q S 890 QL S 890 QL1	
WELDOX 960 D WELDOX 960 E	960	-20 -40		S 960 Q S 960 QL	
WELDOX 1100 E WELDOX 1100 F	1100	-40 -60			

¹⁾ The steels are supplied in certain thicknesses in delivery condition Q, but otherwise conform to the provisions of EN 10025-4.

²⁾ 1 MPa = 1 N/mm²



HARDOX wear plate

HARDOX wear plate meets strict demands on strength, consistent quality, flatness and surface condition. The unique combination of consistently high hardness, high strength and excellent impact toughness makes HARDOX wear plate a very appropriate material for a wide range of applications.

The product has been on the market since the 1970's and is continually being developed to meet customer requirements. It is now produced in thicknesses from 3 to 130 mm and hardnesses up to 600 HBW. We can now produce extra-thin and wide plate.

The high hardness and wear resistance of HARDOX plate greatly extend the useful life of the end product. Due to its high strength, the products made can be simpler and lighter, but can carry higher payloads. Moreover, HARDOX plate has a good resistance against impact also at low temperatures. Its good weldability and machinability properties simplify production and repair work. Higher payloads, lower maintenance costs, good availability and a longer service life combine to provide better overall economy.

HARDOX HiTuf is a wear resistance plate with extremely high toughness to provide an excellent crack tolerance. HARDOX HiTuf has a hardness of 350 HBW and is intended for heavy section structural wear parts where extra high demands are applied on the combination of wear and crack resistance.

HARDOX 400 has a typical hardness of 400 HBW. Excellent weldability, impact strength and bendability are distinctive features of HARDOX 400.

HARDOX 450 is a wear-resistant plate with a typical hardness of 450 HBW. The characteristic feature of the steel grade is the unique combination of toughness and hardness and also the fact that, in spite of its hardness, it is as fabrication-friendly as HARDOX 400.

HARDOX 500 is a wear plate that can withstand hard wear and has a typical hardness of 500 HBW. It is well suited for applications in which it is exposed to heavy wear by hard minerals and other abrasive materials.

HARDOX 550 is a wear plate with a hardness of 550 HBW and toughness equal to HARDOX 500. It is intended specially for heavy wear applications and targeted toward users and producers of wear parts using 12% manganese steel castings or 500 Brinell wear plates.

The additional 50 Brinell you gain in hardness, when upgrading from 500 HBW steels, will increase wear life but not at the expense of crack integrity.

HARDOX 600 is the world's hardest wear plate with a hardness of 600 HBW. It is intended specifically for extreme wear conditions and is mainly intended to replace cast steels, chromium-alloyed white cast iron, and hard facing. In spite of its extremely high hardness, it can be machined, welded and cut. For its hardness, the steel also has uniquely high impact strength.

Further information on the properties of HARDOX plate is available from the appropriate data sheet.



ARMOX protection plate

ARMOX protection plate was previously used mainly in military applications, but its use is now expanding to civilian products.

ARMOX 370T (280 – 330 HBW or 380 – 430 HBW) and ARMOX 440T (420 – 480 HBW) are products that combine good ballistic properties with excellent toughness. They are suitable as protection plate for applications involving the risk of explosion, such as various types of vehicles and storage premises.

ARMOX 500T has excellent ballistic properties combined with high hardness (480 – 540 HBW) and strength. In spite of this, the steel is easy to machine and work. Typical applications include armouring of bank counters, security vehicles, VIP vehicles, burglarproof storage premises, and so on.

ARMOX 560T (530 – 590 HBW) and ARMOX 600T (570 – 640 HBW) are our latest products intended for applications in which an even higher standard of protection is required. Typical applications include armouring of VIP vehicles and security doors.

Further information on the properties of the plate is available from the relevant data sheets.



Technical specification of ARMOX 500T protection plate

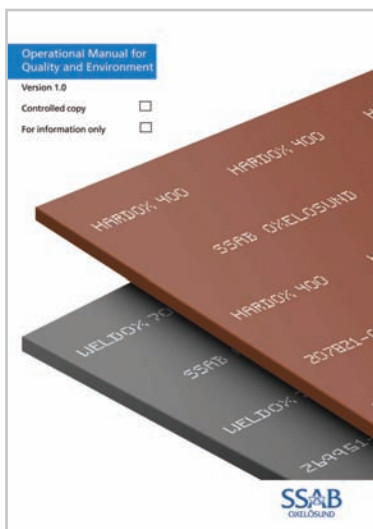
Hardness		480 - 540 HBW							
Protection class	Weapon ammunition	Weight [g]	Muzzle velocity [m/s]	Distance [m]	Recommended plate thickness [mm]				
FB 3	.357 Magnum FJ/CB/SC	10.2	430	5	3.0				
FB 4	.357 Magnum FJ/CB/SC	10.2	430	5	3.0				
	.44 Magnum FJ/FN/SC	15.6	440	5	3.0				
FB 5	M16 A2	4.0	950	10	6.0				
	5.56 x 45 FJ/PB/SCP1 (SS109)								
FB 6	M16 A2, FN FAL	4.0	950	10	6.0				
	5.56 x 45 FJ/PB/SCP1 (SS109)								
	7.62 x 51 FJ/PB/SC (NATO Ball)					9.5	830	10	6.0
FB 7	FN FAL	9.8	820	10	14.5				
	7.62 x 51 FJ/PB HC1 (NATO AP)								
Unclassified	AK 47, G3, M16A2	8.0	720	10	4.0				
	7.62 x 39 Ball Type (M43)								
	7.62 x 51 FJ/PB/SC (NATO Ball)					9.5	800	10	5.5
	5.56 x 45 Ball SS92/M193					3.56	970	10	10.0
	7.62 x 39 API					7.65	740	10	13.0

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

The quality management system at SSAB Oxelösund is based on EN ISO 9001 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 110:2.



Swedish Certification Authority for Steel in Building Structures (SBS)

SSAB Oxelösund is approved by SBS, and production of structural plate is thus subjected to SBS inspection.

Ü-Zeichen

We conform to the provisions of Ü-Zeichen in accordance with the requirements of Deutsches Institut für Bautechnik (German institute for building technique) and are certified by TÜV (Technischer Überwachungs-Verein) and LMPA (Landesmaterialprüfamt).

Other approvals

We have received authorization from certain classification societies for carrying out testing and inspection without the physical presence of an independent surveyor in the production of both ship plate and industrial plate. An authorized representative of an inspection body need only to confirm the certificate.

Examples of classification societies and approvals for both ship plate and industrial plate:

- DNV, Det Norske Veritas – MSA, Manufacturing Survey Arrangement
- GL, Germanischer Lloyd
- LR, Lloyd’s Register – Materials Scheme.

Unless otherwise agreed, we manufacture plate in accordance with these approvals.



Distribution of inspection documents

SSAB Oxelösund has developed a new 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.

Inspection documents

Unless otherwise agreed, inspection documents are issued in English in accordance with EN 10 204 and contain information in accordance with the requirements of the material standard, which generally includes:

- Manufacturer's name
- Clear reference to the purchase agreement and delivery batch
- Material designation in accordance with the purchase agreement
- Name 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.

Inspection certificate 3.1

Inspection documents based on testing of the products delivered or on products in the test unit of which the delivery batch comprises a part.



The following types are available:
Inspection certificate 3.1.A

Issued and validated by an inspector appointed in accordance with official regulations, in accordance with these and corresponding technical rules.

Inspection certificate 3.1.B

Issued by the inspection department which is independent of the production department and validated by a representative who is authorized by the company and who is independent of the production department.

Inspection certificate 3.1.C

Issued and validated by an authorized representative of the purchaser in accordance with the purchase agreement.

Inspection report 3.2

If the inspection certificate be (see above) as agreed in the purchase agreement is to be validated by both the authorized representative of the manufacturer's inspection department and the authorized representative of the purchaser, the certificate is known as an inspection report "3.2".

* The certificate designations conform to EN 10 204:1991 with addendum A1:1995. At the time of going to print, the standard is being revised and the new issue is expected to be confirmed during 2005. The revision will result in a reduction in the number of certificate types. 3.1B will then be designated 3.1, and 3.1A, 3.1C, and 3.2 will be merged into 3.2.

Tolerances and surface condition

SSAB Oxelösund 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 tolerance to 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 Oxelösund dimensional range and thickness tolerances in accordance with AccuRollTech™ are given below.

Length and width tolerances

Nominal length [mm]	Tolerances [mm]	
	Max.	Min.
– (4000)	+20	0
4000 – (6000)	+30	0
6000 – (8000)	+40	0
8000 – (10000)	+50	0
10000 – (15000)	+75	0
15000 – 18000	+100	0

Nominal width [mm]	Tolerance [mm]	
	Max.	Min.
1000 – (2000)	+20	0
2000 – (3000)	+25	0
3000 – 3400	+30	0

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 as-rolled 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	–0.35	+0.35	0.5
5.0 – 7.9	–0.40	+0.40	0.6
8.0 – 14.9	–0.50	+0.50	0.7
15.0 – 24.9	–0.60	+0.60	0.8
25.0 – 39.9	–0.70	+0.80	1.0
40.0 – 79.9	–0.90	+1.50	1.1
80.0 – 155.0	–1.00	+2.20	1.2

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

Class B: Constant minimum tolerance of -0.3 mm

Class C: Constant minimum tolerance of 0 mm

Class D: Symmetrical max. and min. tolerances

Subject to special agreement, plate with Extra-Close tolerances can be supplied.

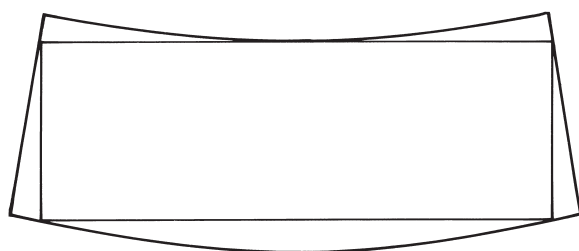
AccuRollTech™ Extra Close

Nominal thickness [mm]	Tolerance class D [mm]		Max. thickness variation within one plate [mm]
	Min.	Max.	
– 4.9	–0.20	+0.20	0.4
5.0 – 8.0	–0.25	+0.25	0.4
8.1 – 16.0	–0.30	+0.30	0.5
16.1 – 20.0	–0.40	+0.40	0.7
20.1 – 25.0	–0.55	+0.55	1.0

Other tolerance classes within the above tolerance range for each thickness interval can be ordered. If tolerances to AccuRollTech™ Extra Close are specified, only surface requirements in accordance with EN 10 163-2 Class A, 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.

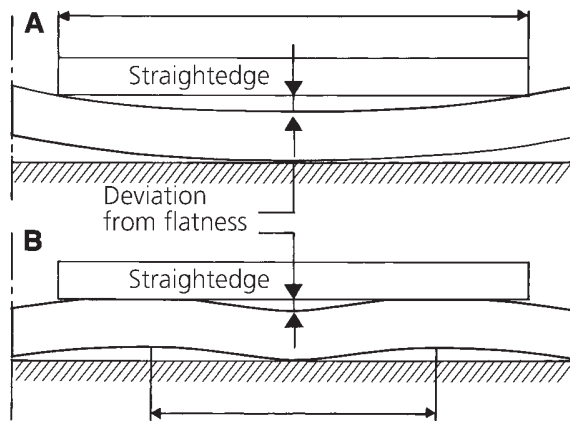


Flatness tolerances

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

To determine the flatness deviation, the plate is placed on a flat surface. A straightedge is placed on the plate, and the maximum distance from the plate (vertical height as shown in Figures A and B) is measured.

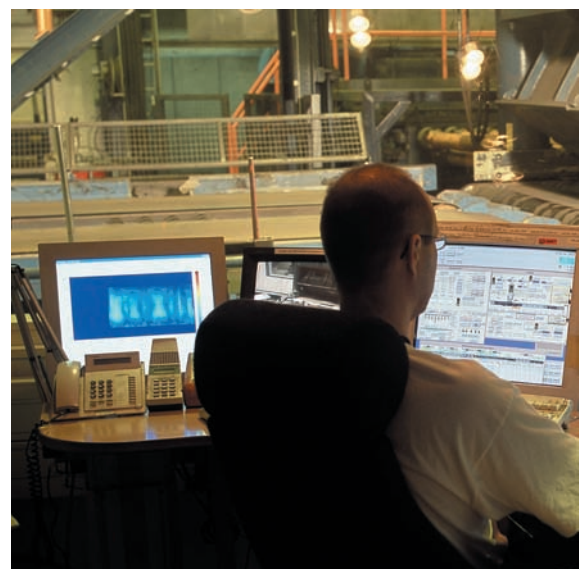
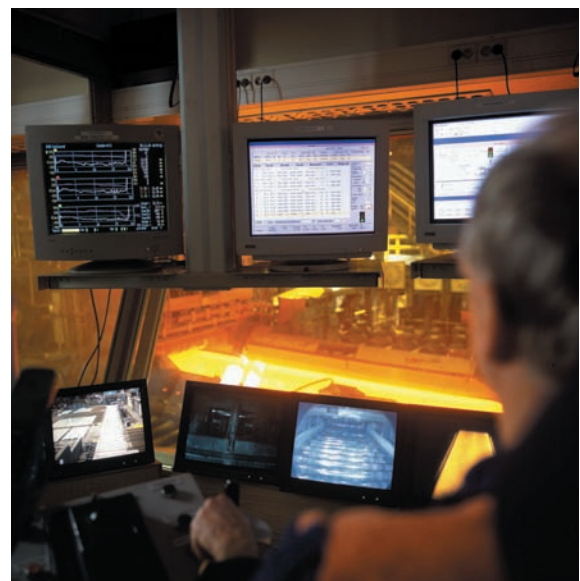
The straight-edge shall rest on the plate at two points at least 25 mm from the long side of the plate and at least 200 mm from its short side (100 mm for plate to tolerance class S). The vertical height is rounded off to the nearest whole mm.



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	4	8
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 Oxelösund.



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

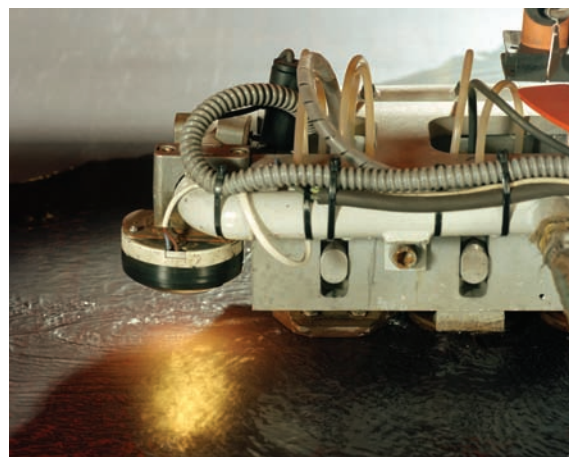
Tensile testing in accordance with EN 10 002-1
 Impact testing in accordance with EN 10 045-1
 Hardness testing in accordance with EN ISO 6506-1, 6508-1
 Tensile testing in the thickness direction in accordance with EN 10 164



Ultrasonic testing

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

Unless otherwise agreed, plate is delivered in class E₁, S₁ in accordance with EN 10 160:1999. Ultrasonic testing is carried out for a test certificate if ordered an order in accordance with EN 10 160, SEL 072, SIS 219115, 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 ¹⁾

As per EN 10 160	Distance between parallel scanning-lines [mm]	Min. defect area to register [mm ²]	Max. permissible defect area [mm ²]	Max. number of local defects [defects/m ²]	Corresponding Stahl-Eisen-Lieferbedingungen
–	100	1000	10000	1	SEL 072 class 5
S ₀	100	1000	5000	20	–
S ₁	100	100	1000	15	SEL 072 class 3
S ₂	50	50	100	10	SEL 072 class 2
S ₃	50	20	50	10	SEL 072 class 1

Edge zone testing ¹⁾

As per EN 10 160	Edge zone width ²⁾ [mm]	Min. defect lengths to register [mm]	Max. permissible defect length [mm]	Max. permissible defect area [mm ²]	Max. number of defects per m length	Corresponding Stahl-Eisen-Lieferbedingungen
E ₀	50 – 100	50	100	2000	6	–
E ₁	50 – 100	25	50	1000	5	SEL 072 class 3
E ₂	50 – 100	20	40	500	4	SEL 072 class 2
E ₃	50 – 100	15	30	100	3	SEL 072 class 1
E ₄	50 – 100	10	20	50	2	–

¹⁾ Testing can be ordered and carried out either as total testing, e.g. E₁, S₁ or E₂, S₂, or as edge or surface testing individually, e.g. E₁, S₁.

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

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 jet¹⁾.

The plate identity is specified by two digit groups

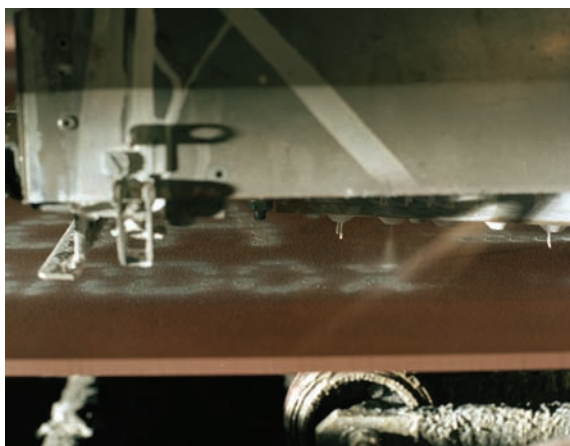
5 or 6 digits, representing the heat number, + 6 digits that represent the plate serial number. These two groups of digits give every plate a unique identity.

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 jet¹⁾.



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.

¹⁾Ink jet marking is in the course of development.

Brand marking

In order to eliminate the risk of material mix-ups 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 OXELÖSUND 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 Oxelösund 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 this:

- * Provides a good substrate for the next coat of paint
- * Need not be removed before normal welding

In order to provide visual distinction, our steel grades are painted in different colours:

* HARDOX – red

* WELDOX - grey

* ARMOX - green

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

As a general rule, a low-zinc silicate primer is usable in all normal paint systems.

Shopprimers

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

Other primer types are available subject to special agreement.

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 Oxelösund 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.
- If transport by road is included in the method of delivery, the pallet load is divided into stacks not exceeding 6 tonnes, or not exceeding 7 tonnes if the truck leaves from Oxelösund.
- 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.

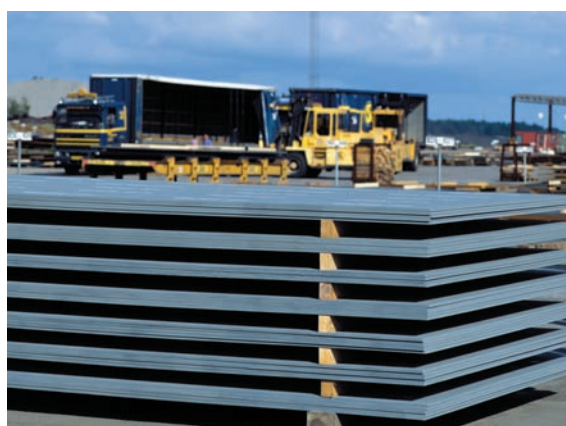
Options

- 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

- Up to 4 lines with 21 characters each on every plate*
- Only on the top plate on a pallet or stack.
- Edge label attached on the thickness surface of the short side as shown in the picture. Available in three variants with different information about the plate. Edge label possible above 8 mm thickness.

* Carried out free of charge, if required.



SSAB Oxelösund around the world

NORWAY Oslo Nesbru	DENMARK Brøndby Fredericia	FINLAND Helsinki	ESTONIA Saue	UNITED KINGDOM Birmingham	NETHERLANDS Beuningen
GERMANY Aiterhofen Berlin Dillingen Düsseldorf Duisburg Hamburg Krefeld Leipzig Neuffen	FRANCE Lyon Duran Paris Le Vieil Evreux	BELGIUM Antwerpen Hoeselt	AUSTRIA Ebreichsdorf Rosenbach	SWITZERLAND Zürich	PORTUGAL Lisbon
HUNGARY Sopron	ROMANIA Ploiesti	RUSSIA Moscow S:t Petersburg Novosibirsk	GREECE Thessaloniki	ITALY Parma	MOROCCO Casablanca
IRAN Teheran	AUSTRALIA Perth Brisbane	TURKEY Istanbul Ankara	CZECH REPUBLIC Ostrava	POLAND Warsawa Kómik	SLOVENIA Dobrava
CANADA Delta Quebec Toronto Grindrod	USA Atlanta Minneapolis/St.Paul Philadelphia Pittsburgh Tulsa Salt Lake City Texas	SOUTH AFRICA Johannesburg	SAUDI ARABIA Riyadh Jeddah	CHILE AND PERU Lima	ISRAEL Tel-Aviv
MEXICO Monterrey Mexico City	INDONESIA Jakarta Surabaya Kalimantan Sulawesi	CHINA Beijing Shanghai Guang Zhou Changsha Hong Kong	BRAZIL Sao Paolo	INDONESIA Jakarta Surabaya Kalimantan Sulawesi	ARGENTINA Buenos Aires
INDIA Madras	THAILAND Bangkok	PHILIPPINES Manila	SINGAPORE	LEBANON Beirut	TAIWAN Kaohsiung
PAKISTAN Islamabad	JAPAN Tokyo				



Information materials and technical support services

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 Oxelösund

- From ore to plate

Product information

- General product information commercial and high strength steel plate
- HARDOX Versatile wear plate
- WELDOX The Art of Engineering
- ARMOX Armour Plate for Civil Protection

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.

HARDOX/WELDOX Centre

At our HARDOX/WELDOX Centre, we arrange courses for our employees and customers on the subjects of how HARDOX and WELDOX plate 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.ssabox.com
- www.hardox.com
- www.weldox.com
- www.armoxplate.com
- www.accurolltech.com

Our home pages give further information on our products. The 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 Oxelösund is the world's biggest producer of quenched and tempered structural steels and wear plate.

Our products - HARDOX, WELDOX, ARMOX and TOOLOX - are available in more than 100 countries. The heavy plate produced in our rolling mill can be subjected to advanced quenching and post-treatment processes to provide it with unique properties.

We also produce commercial grade structural and pressure vessel plate. The steel slabs we produce are delivered to our own rolling mill and to the SSAB Tunnbrät strip mill in Borlänge, Sweden

Steel production at the then Oxelösund Ironworks began back in 1917. The plant was expanded at the end of the 1950's and the early 1960's into a fully integrated steelworks, with heavy plate as it's main product. The world's most modern rolling mill for heavy plate came on stream in 1998, and a new line for quenching and finishing of thin plate was commissioned in 2001.

SSAB Oxelösund is a member of the SSAB Swedish Steel Group.

The parent company was formed in 1978 and was introduced on the Stockholm Stock Exchange in 1989.



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