



Plate components at SSAB Raahe

SSAB

Contents

Introduction	3
<hr/>	
Shop primed plates	4
<hr/>	
Product description	
Dimensions and tolerances	
Shop priming and shot blasting preceding it	
Recommended shop primers	
Use and storage	
Precision cut plates	5
<hr/>	
Product description	
Dimensional range	
Tolerances	
Shape cut plates	5
<hr/>	
Product description	
Beveled products	6
<hr/>	
Product description	
Dimensions and tolerances	
Bent plate products	8
<hr/>	
Product types, dimensional ranges and steel grades	
Tolerances	
Measuring practice	
Packing & Marking	9
<hr/>	
Marking	
Plates, shop-primed and plate components	
Packing	
Project Management Services	10
<hr/>	

Introduction

Plate components further processes hot-rolled steel plates to ready-to-assemble products.

SSAB Raahe's prefabrication offering includes shot blasting, shop priming, shape- and precision cutting, beveling and bending.

A wide range of subcontractors means that other processes and dimensions are available.

Prefabrication at SSAB Raahe takes place at the mill

site and is integrated into the steel mill. This brings us many benefits including, for example, tailor-made customized plate sizes, no need for extra transportation and we also have own harbor for direct deliveries around the world.

Plate components are used in bridges, buildings, ships, heat exchangers and various types of storage tanks, to name just a few examples.

Shop-primed plates

Shop priming gives steel temporary corrosion protection for the duration of transport, short-term storage and workshop processing. In engineering workshop operation, it improves the cleanliness of the working environment and occupational safety. Cutting and welding shop-primed plates is easy.

Product description

SSAB Europe's shop-primed plates are primed with zinc silicate shop primer or iron epoxy shop primer. By separate agreement, other shop primers are available, too. The plates are always shotblasted before shop priming. Generally, both sides of the plate are primed, but upon request it is possible to carry out the treatment on one side only. In addition to this, also precision cut plate products, cut shapes and bent plate products can be delivered shop primed. The minimum weight of a plate to be shop primed is 2000–5000 kg, depending on the plate thickness. Plate products over 7 mm thickness can be delivered shop blasted only on one side.

Dimensions and tolerances

Shop-primed plate products are manufactured from heavy plate in the dimensions stated in **Table 1**. Dimensions other than those shown in the table can be delivered upon special request. Upon request, plates can also be delivered with shot blasting treatment only.

Table 1. Shop-primed plates, general dimensions.

Dimension ranges	
Thickness	4–150 mm
Width	800–3 300 mm
Length	2 500–19 500 mm

Shop priming and shot blasting preceding it

Prior to shop priming, plates are pre-heated and shot-blasted with steel grit to the Sa 2 ½ preparation grade following standard ISO 8501-1. Plates are shot-blasted to a surface roughness that provides the best possible adhesion for a shop primer. Typically, the surface profile (Rz) is 30 to 70 µm. The actual priming takes place immediately after shot blasting.

Recommended shop primers

A shop primer is a thin primer coat, spread automatically upon the shot-blasted steel surface, to provide the steel with temporary protection against corrosion for the duration of transport, storage and workshop processing.

Based on their excellent anticorrosion properties, recommended shop primers are zinc silicate and iron oxide epoxy shop primers.

Typical properties of a zinc silicate shop primer include:

- The average value of the dry film target thickness is 16 µm ± 5 µm (measured on a smooth steel surface).*
- Excellent anti-corrosion properties.
- Plates that are treated with this shop primer are exceptionally good to weld and cut.

Typical properties of an iron oxide epoxy shop primer include:

- The average value of the dry film target thickness is 21 µm ± 5 µm (measured on a smooth steel surface).*
- Good anti-corrosion properties.
- Plates that are treated with this shop primer are good to weld and cut.

Upon request, plates and plate products can also be delivered treated with other than the above-mentioned shop primers.

** The dry film thickness of every single shop primer coating is measured from the surface of a smooth steel strip painted with the shop primer concerned – the steel strip is made of cold-rolled steel. This is how the accurate dry film target thickness of the shop primer is achieved.*

Use and storage

Shop-primed plate products must be stored in a dry environment protected from moisture. There must be no water remaining on top of the plate, or any humidity concentrate on the plate surface. The most recommendable and effective way to prevent moisture damage is to store the products indoors. The use of proper dunnage in storing is essential. It is recommended that plate products are stored in a slightly slanted position to prevent any standing water on the plates. It is also recommended to store shop-primed plates separately from other materials. If it is necessary to store shop-primed plates outdoors, moisture damage should be prevented by covering the plates, paving the storage area with gravel, etc. Prior to final surface treatment of the shop-primed plate products, the steel surfaces must be thoroughly cleaned. Shot blasting is recommended. Shop primer is not a true primer, i.e., ground coat, but expressly a temporary protection against corrosion for the duration of transport, storage and workshop processing. These instructions for the handling and storage of shot-blasted and shop-primed plate products apply to the buyer, user and the manufacturer alike.

Precision cut plates

Product description

Precision cut plates are manufactured with oxy-propane or plasma cutting. Precision cut plates are rectangular plates, cut in dimension with accurate tolerances. Dimensions and tolerances are presented in tables below.

Table 2. Precision cut plates, general dimensions.

Dimensional range	
Thickness	5–150 mm
Width	800–3 300 mm
Length	2 000–19 500 mm

Table 3. Tolerances.

Tolerances	
Width	± 1.5 mm
Length	± 2 mm or 0.02% when length over 10 000 mm
Width and length when thickness is over 80 mm	± 5 mm
Diagonal difference	max. 4 mm

Shape cut plates

Product description

Shape cut plates are manufactured with oxy-propane or plasma cut, see **Table 4**. Shape cut parts can be marked with aligning markings in accordance with the customer's requirements, for further assembly and installation of the products. In connection with oxy-propane cutting it is possible to use powder and gauge point marking, and with plasma cutting, powder or plasma marking.

Table 4. Shape cut plates, general dimensions.

	Plasma cutting	Oxy-propane cutting
Thickness	5–25 mm	10–150 mm
Width	max. 3 300 mm	max. 3 300 mm
Length	max. 22 200 mm	max. 22 200 mm
Tolerance	EN ISO 9013-542	EN ISO 9013-432

Beveled products

Product description

Precision plates with a beveled edge are manufactured from heavy plates and are delivered with welding bevels based on customer needs. Beveling can be made to shop

primed, bent and/or cut shape plates. Precision cutting and beveling are made by flame cutting, mechanical cutting or machining.

Table 5. Precision cut plate with beveled edge. Dimensions.

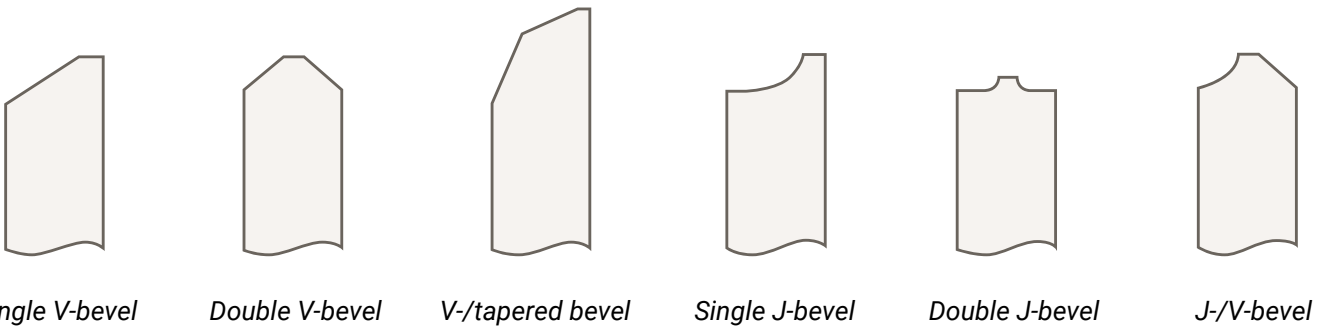
Bevel type	Type of joint preparation							Thickness mm (1)
	Flame cutting		Cevisa machining		Steiner machining			
	Bevel angle	Thickness mm	Bevel angle	Thickness mm	Bevel dimensions	r mm	c mm	
				Bevel angle				
I	0	5–150	-	-	0	-	-	8–55
V	15–45	16–100	15–70	5–100	15, 20, 22.5, 25, 30, 35, 40, 45	-	-	8–30
Y	15–45	16–100	15–70	5–100	15, 20, 22.5, 25, 30, 35, 40, 45	-	-	8–30*
X	15–45	16–100	15–70	5–100	15, 20, 22.5, 25, 30, 35, 40, 45	-	-	8–60*
J	-	-	-	-	10 20	8 5	2–10 2–10	8–45
Double J	-	-	-	-	10 20	8 5	2–10 2–10	8–70*
J / V	-	-	-	-	J: 10 J: 20 V: 15, 20, 22.5, 25	8 5 -	2–10 2–10 -	8–50*

r = Groove bottom radius of curvature.

c = Depth of root face (scaling by even millimetres).

* The bevel depth on each side is ≤ 30 mm and plate thickness ≤ 70 mm.

The width range for plates for machining is 1 200–3 250 mm and the length range 4 200–16 000 mm.



Dimensions and tolerances

Tables 5 and 6 show the dimensions and tolerances of precision cut plates with a beveled edge.

Table 6. Tolerances.

Measure unit	Permissible deviation from the nominal dimension	
	Flame cutting, Cevisa machining	Steiner machining
Thickness	EN 10029 Class A or as agreed	EN 10029 Class A or as agreed
Width	± 1.5 mm (*)	± 1.0 mm
Length	± 2 mm (*)	± 1.5 mm
Length over 10m	± 0.02%	± 0.015%
Cross-measure difference	max. 4 mm	max. 3 mm
Bevel Angle	± 2.5°	± 1.5°
Depth of root face	± 1.5 mm	± 1.0 mm
Root face position	± 1.5 mm	± 1.0 mm
Edge straightness of the bevel	-	± 0.5 mm/16 m
Linearity of the bevelled edges	-	± 1.0 mm/16 m
Surface quality of the bevelled surface	Acc. to EN ISO 9013	Acc. to EN ISO 9013

* For plates > 80 mm thickness, the tolerance is ± 5 mm.

Bent plate products

Bent plate products are components that are ready to be delivered to the installation site, which is beneficial in terms of schedule as well as transport and storing costs. If needed, the products can also be ordered as shop-primed, cut to shape and beveled.

Product types, dimensional ranges and steel grades

The dimensional ranges of bent plate products are specified by the performance values of bending equipment. In this case the steel strength is the most influential. The steel grade range is according to SSAB Europe's heavy plate production program with its tolerances. Bending can be done at SSAB's own production or through SSAB's network of subcontractors.

In SSAB's own production, with a 3-roll bending machine, the following guidelines apply:

The thickness area for bending is between 5–50 mm, depending on the steel grade. The minimum bending radius is 450 mm and the maximum height of a bent piece is approximately 5.5 m. Width and length acc. to SSAB's heavy plate production program.

All other dimensions can be checked and offered by SSAB's network of subcontractors.

Tolerances

Tolerances according to Precision cut plates, Shape cut plates or Beveling tolerances, depending on the product and scope of work.

Measuring practice

The acceptance inspection for bent plates for proper dimensions and geometry is conducted at the works.

For bent plate products, the proper dimensions are verified in the following way and documented in the Dimension report.

- Full cylinders: Circumference and cross-measure are measured in flat state. Roundness is measured from both ends of the cylinder.
- Half cylinders: Circumference and cross-measure are measured in a flat state. Span is measured from both ends.

- Segmental plates: Width, length and cross-measure.
- Segmental plates cones: Width, length and cross-measure. The plate is bent to the nominal radius so that a maximum of 3 mm clearance is left between a 1.2 m long template and the surface of the bent plate, *Figure 1*. The Dimension Report will be delivered to the customer upon separate request.

Full cylinder and half cylinder tolerances:

Tolerance for roundness $D_{max} - D_{min}$:

- Max. 1% from the inner diameter (D).

The greatest allowable deviation from the circumference of the cylinder (length = $\pi \times D$; D = outer diameter):

- 3 mm with an outer diameter of $D < 1000$
- 0.30% with an outer diameter of $D \geq 1000$.
- No guarantee of roundness can be given to cylinders of less than 12 mm wall thickness, or segmental plates of less than 8 mm thickness. These restrictions are based on the disproportionate ratio of the plate's dead weight and material stiffness.

Cones: Must be agreed separately.

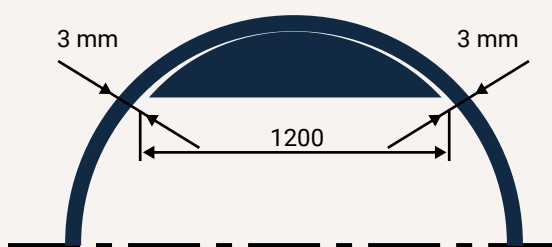
Full cylinder manufacture (tack welded)

Subject to separate agreement, cylinders can be tack welded after bending. Final welding is not performed. The work is conducted following the Welding Procedure Specification (WPS).

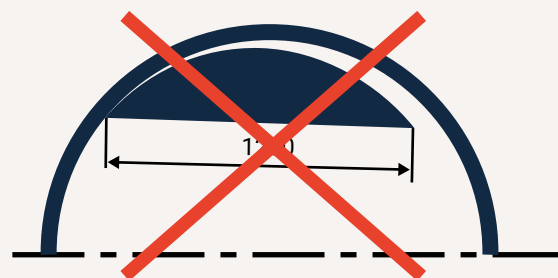
Matters to be considered:

- Working allowances for pre-bending needed at the plate ends. The handling allowance requirement is two times 150 to 500 mm depending on plate thickness and steel grade. If the handling allowance is not taken into consideration, a straight length that measures about four times the plate thickness is left at the ends of the bent plate.
- Prior to bending, plates over 40 mm thick are shot-blasted to Sa 2 ½ following ISO 8501-1.

Figure 1. Diagram showing the way roundness is measured using a template.



Correct measurement method.



Incorrect measurement method.

Packing & Marking

Marking

The purpose of marking is to enable unambiguous and permanent identification of the product. According to the EN 10021 standard (General technical delivery conditions for steel products), the manufacturer must identify their products either in accordance with the product standard or as required in the customer's order. The EN 10204 standard on inspection documents requires constant and clear traceability between the product and the inspection document. The product standard or customers' requirements may pose additional requirements for the product markings. For example, the EN 10028-1 standard on steels for pressure purposes requires that the steel grade, manufacturer, charge number, slab number, test batch number and the manufacturer's inspection stamp is always marked on the product.

Plates, shop-primed and plate components

Marks and marking methods

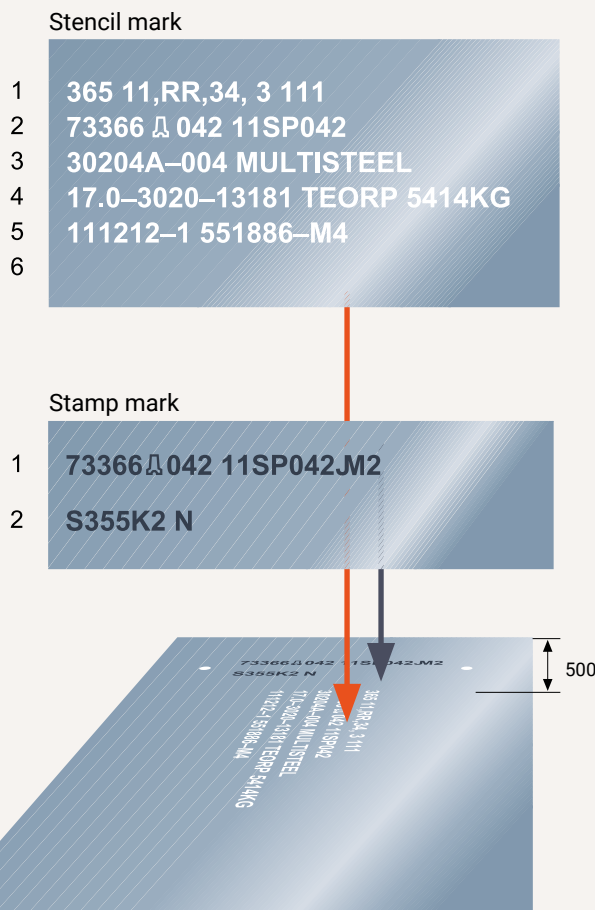
The marking methods to be applied for plates and shop-primed plates are stencilling and stamping. In both of these, the marking is automated and the marks are similar in content. The most recommendable method, providing the best durability, is stamping.

Stencilling

Stencilled marks on a shop-primed plates are applied in the rolling direction, either in the area used customarily by SSAB or in an area specified by the customer in the order. If necessary, marks on plates of six (6) metres or more in length are stencilled on two locations in the same plate. **Figure 2** shows a stencilled mark on a plate.

Stencilling of prefabricated parts complies with the practices applied for plate. In addition, the size and type of finishing of the plate component have an effect on the stencilling. The marks are applied manually. The rolling direction of the original plate does not influence the markings on a plate component.

Figure 2. Stencil and stamp marks on plates.



1. Internal marks of the works.
2. Charge number (73366), the manufacturer's mark of SSAB Raahe Works, number of the rolled plate (042), number of the delivered plate cut from a rolled plate (11), designation of the test batch (SP) and number of the tested plate (042).
3. Number of the order confirmation, position number and steel grade.
4. The thickness, width and length (mm) and theoretical weight (kg) of the plate.
5. The classification society's mark if required and/or markings required by the customer.
6. Markings required by the customer.

Stenciling is applied on the plate in the rolling direction. The height of letters in stenciling is 80 mm.

1. Charge number (73366), the manufacturer's mark of SSAB Raahe Works, number of the rolled plate (042), number of the delivered plate cut from a rolled plate (11), designation of the test batch (SP), number of the tested plate (042) and the manufacturer's inspection stamp.
2. Steel grade designation.

Shipbuilding steels are also seen with the classification society's stamp mark. Ultrasonic inspection is verified by a stamp mark. The stamp mark is applied on the plate transverse to the rolling direction. The height of letters in stamping is 6–9 mm.

Stamp markings and stamp field

Plates and shop-primed plates have one or more stamp fields, always with the same content. Stamp marks are applied transverse to the rolling direction at the agreed point. The type of inspection document defines how much information is to be stamped. The start and end of a stamp is marked with white paint dots for easier recognition.

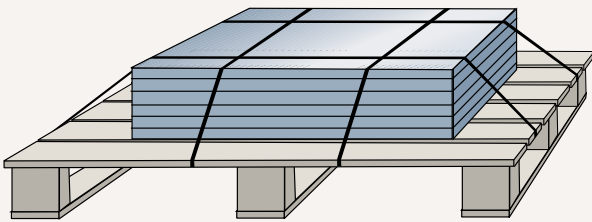
Packing

A high-quality, durable packing is an important aspect of SSAB's products. The packing and protection of steel products are generally specified in the order. As the manufacturer, we reserve the right to specify the most practical packing, protecting, labeling and transport methods for certain product groups.

Plates

We deliver plates as individual plates stacked on top of each other.

Figure 3. Small plate components packed on a forklift pallet.



Small plate components

Small plate components are packed on a pallet suitable for forklifts, *Figure 3*.

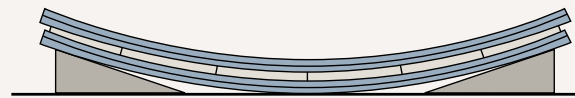
Bent plate products

Plates bent to shape are loaded on a transport rack with triangular supports under the plates, *Figure 4*. Lifting points are marked on the plate on top of a bundle. N.B: Transport racks are not lifting gear – it must be the product that is lifted, not the rack.

Conditions related to the protection, transport and moving of products are specified in accordance with the delivery conditions agreed in the order.

Subject to separate agreement, also steel cradles for bended plates are available. The steel cradle itself is not allowed to be used as a lifting accessory, since it has not been manufactured in accordance with the regulations and legislation relating to lifting accessories.

Figure 4. Bent tank plates packed on a transport rack.



Project Management Services

Benefits for the customer:

Transparency: By implementing better control and proactive communication during production, transparency is significantly improved. This allows customers to have a clear understanding of the project's status on a weekly basis.

Customer Information: Regular updates are provided to keep customers well-informed about the progress of their projects. This continuous flow of information helps in building trust and ensures that customers are always aware of the current state of their orders.

Issue Identification: Promptly addressing any issues that arise during the production process leads to cost efficiency and the production of higher quality products. The early identification and resolution of problems prevent them from escalating into larger, more costly issues.

Project Monitoring: Weekly progress reports and effective management of changes help in reducing uncertainty. This consistent monitoring ensures that the project stays on track and any deviations are quickly corrected.

On-Time Deliveries: Ensuring on-time deliveries is crucial for customer planning. By sticking into delivery schedules, SSAB helps customers plan their operations more effectively, reducing downtime and increasing productivity.

Cost Efficiency: Avoiding delays and rework reduces overall production costs. Efficient project management practices help in minimizing waste and optimizing resource utilization, leading to significant cost savings.

Customer Satisfaction: Better customer experience is achieved through effective project management. Satisfied customers are more likely to return for future business, fostering long-term relationships and contributing to the company's success.

SSAB is a Nordic and US-based steel company that builds a stronger, lighter and more sustainable world through value added steel products and services. Working with our partners, SSAB has developed SSAB Fossil-free™ steel and plans to reinvent the value chain from the mine to the end customer, largely eliminating carbon dioxide emissions from our own operations. SSAB Zero™, a largely carbon emission-free steel based on recycled steel, further strengthens SSAB's leadership position and our comprehensive, sustainable offering independent of the raw material. SSAB has employees in over 50 countries and production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki. Join us on our journey!

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