

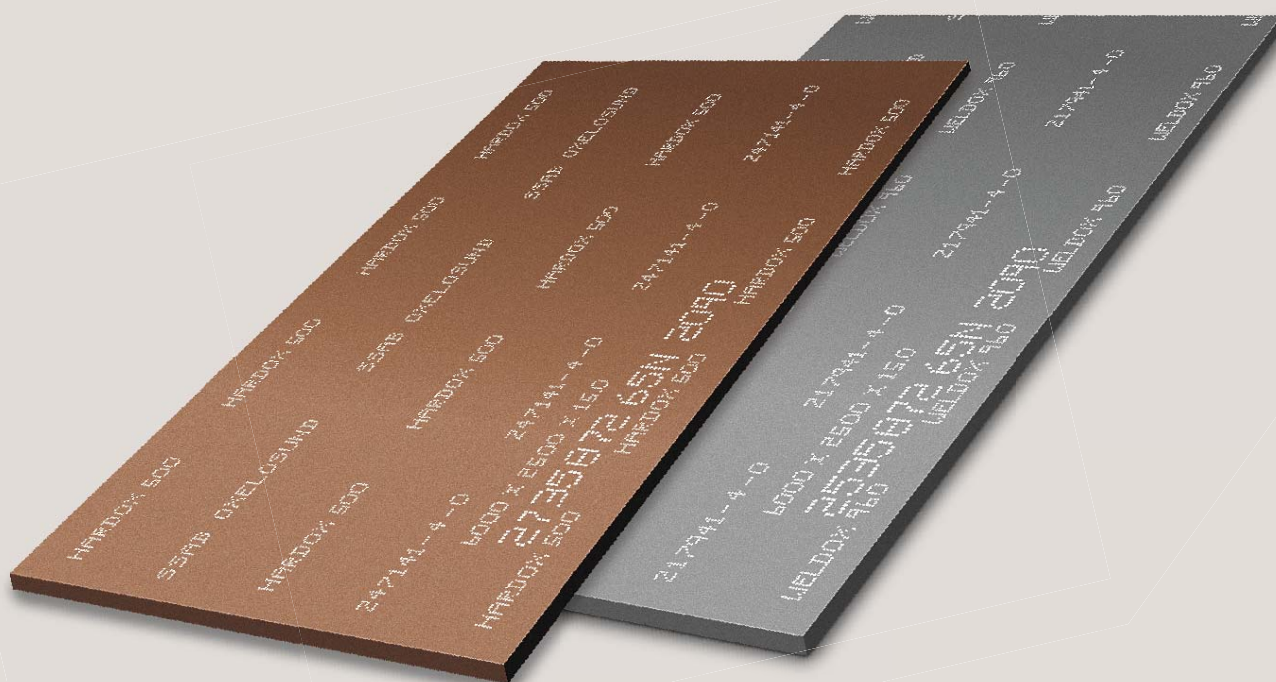
SSAB OX TechSupport

Information from
SSAB Oxelösund

#25

Shop Primers used by SSAB Oxelösund

SSAB Oxelösund can provide shop primer coated plates in a number of different types of primers to meet various requirements in terms of corrosion protection duration, welding and laser cutting performance.



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Anti-corrosion treated plates

Shop primers

Steel plate having unprotected surfaces will corrode, which could give rise to various problems. To protect the plate during storage, transportation and fabrication SSAB Oxelösund can provide the plate with an effective anti-corrosion treatment known as shop primer, prior to delivery. The shop primer can be coated with a final paint system, normally including further corrosion inhibiting primer coatings.

At SSAB Oxelösund, we mainly apply two types of primers, i.e. either the organic 2-component PVB-primer (poly vinyl butyral) or the inorganic zinc silicate primer. The zinc silicate primer can be applied either as low zinc silicate or as medium zinc silicate. The difference between the two is the zinc content and thus the duration of protection. Depending on primer type and thickness of the primer film applied, different corrosion protection duration can be obtained. Our alternatives provides corrosion protection for 3 or 6 months.

Shop Primers			
Type	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.

The plates we keep in stock are always painted with the low zinc silicate primer corresponding to a 6 month protection time.



The primer performance to resist corrosion is continuously tested at our test site, located on an island on the Swedish west coast.

Paint systems

Zinc silicate primers provide a good substrate for further painting and can be included in all paint systems, whereas PVB can not be used for zinc-based painting systems, in systems for cathodic protection, submerged areas or in tanks. Before selecting the final paint system we recommend consultation of the relevant paint supplier.

Hygiene

Tests at various institutions have shown that plate with a coat of shop primer can be cut and welded in normally ventilated workshop premises.

Extract from test report from Force Institute, Denmark
"Due to the relatively high hygienic limit value for zinc (4 mg/m³), the zinc content is of no significance to the resulting limit value of the welding fumes. In simple terms, it can be said that the low zinc silicate primer studied does not affect the harmful properties of the fumes compared to the fumes emitted when shot blasted plate is welded. However, the fume volume is higher when plate painted with shop primer is welded."

From other studies performed by the Force Institute it has been concluded that normal ventilation requirements are considered sufficient for welding of low zinc silicate primer coated plates, provided the applied coat thickness is maximum 18 µm.

According to the guidelines in TRGS 900(12/91), the maximum permissible zinc concentration at the work site is 5 ml / m³. (From "Untersuchungsbericht 9234065")

The zinc silicate primer coated steel plates supplied by SSAB Oxelösund are in conformance with the requirements of the End of life Vehicles Directive (2000/53/EC), as specified in commission Decision 2002/525/EC.



Use weld fume exhaust systems for improved working environment.

Cutting of shop primer coated plates

Thermal Cutting of anti-corrosion painted plate

Oxygen fuel cutting and plasma cutting can be carried out without problems, on plate painted with shop primer of zinc silicate type as well as PVB, using normal cutting parameter settings. The laser cutting performance is considered poor for plates coated with PVB and medium zinc silicate primer and as fair to good if low zinc silicate primers are used.

Simplify laser cutting of primer coated plates

There is presently no primer which will improve the laser cutting performance. However, by selecting the right type of primer and primer thickness the negative influence on laser cutting can be limited. So far the best laser cutting result is obtained if a low zinc silicate primer is used.

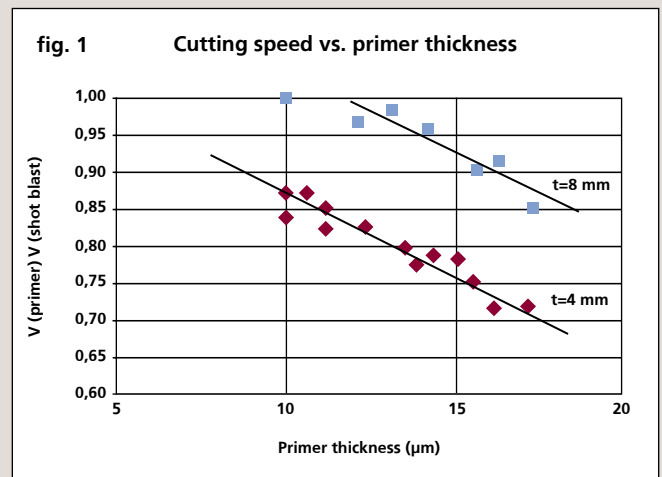
The normal procedure enabling laser cutting of low zinc silicate coated plates is to reduce the laser cutting speed specified for cutting of non primer coated plates. A further increase in cutting productivity can be obtained if the low zinc silicate primer is applied as an extra thin coating of uniform quality. Low zinc silicate primer coated plates can be ordered with a guaranteed corrosion protection time corresponding to either 3 or 6 months. The 6 month protection time corresponds to a primer thickness of approx. 15 μm and the 3 months protection to approx. 10 μm .

By choosing the 3 month protection time instead of the 6 month a productivity increase of about 10% can be gained when cutting 4 mm thick plates.

The ratio of laser cutting speed between a low zinc silicate coated and a shot blasted plate surface as function of coat thickness, is illustrated in figure 1.



Iron oxide – the pigment used for creating the shade of HARDOX.



To reach the same cut edge quality in an 4 mm plate coated with a 10 μm thick low zinc silicate primer as in a shot blast plate surface of the same thickness the cutting speed must be reduced by 15 %. In 8 mm thick plate the 10 μm primer coating will just have a minor influence on laser cutting speed.

Primer thickness

To get a relevant reading of the primer coat thickness, the thickness measurement must be carried out on a very smooth surface of low surface roughness, i.e cold rolled strip or glass, coated with a uniform primer layer. Due to the higher surface roughness of a steel plate the scatter in the readings will be too large to get a representative average value of the primer coat thickness. To control and direct the target primer thicknesses, corresponding to a 3 or 6 month protection time, quality checks are continuously performed and recorded on cold rolled strip samples in our paint shop production line. Due to the fact that a relevant reading of the primer thickness can not be made on a coated 4-high mill rolled plate, we guarantee the time of corrosion protection not a specific primer thickness.



To reach a uniform primer coat thickness it is essential to have an optimized spray gun geometry, minimizing overlap and variations in primer thickness.

Welding of shop primer coated plates

Simplify welding of primer coated plates

Welding of anti-corrosion painted plate may cause varying degrees of weld metal porosity. To meet the standard requirements, in terms of weld metal porosity, the primer does not need to be removed before welding. However, the pore volume can be minimized by selecting an appropriate primer type, primer thickness, welding method and suitable welding parameters.

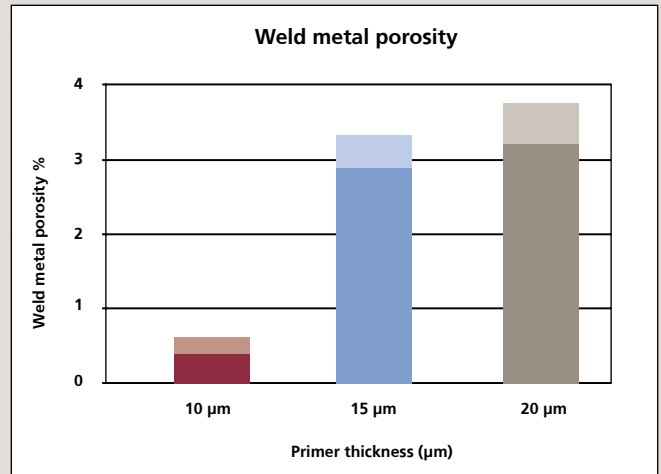
The best welding performance with respect to weld metal porosity, appearance of weld spatter and clogging of weld nozzle is obtained if welding is carried out on a low zinc silicate primer coated plate. Likewise in laser cutting the welding performance is improved if the primer thickness is reduced.

By choosing the alternative of a 3 month guaranteed protection time the weld metal porosity will even meet the hardest requirement, Class High B, in the European standard EN 25817/ ISO 5817.

Standards

The table below shows the maximum permissible porosity for meeting the provisions of various welding classes in practical welding (ISO 5817, EN 25817)

- Moderate D 4%
- Medium C 2%
- High B1%.



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