

Optim™ 700 MC

High Strength Structural Steel

Optim™ 700 MC's extra high strength steel grade offers excellent bendability, weldability and cutting properties. Lightened structures mean increased payloads for machines and equipment, reduced fuel consumption, environmentally sound construction and sustainable development. Surface quality and dimensional and geometrical accuracy are guaranteed.

Optim 700 MC is a thermomechanically rolled (M), cold formable (C) steel which exceeds EN standards requirements (EN 10149-2).

Applications:

Frame structures for mobile vehicles, superstructures of commercial vehicles, frames and booms for forestry vehicles, crane arms and other lifting equipment, load handling equipment and masts.

Tolerances

Tolerances on dimensions and shapes:

- The dimension and shape tolerances conform with, and in part exceed, EN 10051 requirements.
- Guaranteed flatness for cut lengths is 3mm/m.
- Optim 700 MC cut lengths are delivered with the Dead Flat guarantee.

Materials Testing

Materials testing and sampling are carried out in compliance with EN 10149-1

Mechanical Properties

Plate Thickness mm	Yield Strength ReH or Rp0,2 MPa Minimum	Tensile Strength Rm MPa	Elongation % Minimum A80 ¹⁾ A5	Impact Strength Longitudinal min. t°C Charpy V J
3.0mm – 10.0mm	700 ²⁾	750 – 930	-- 15	-20 ³⁾ 40 ³⁾

Yield and tensile strength are tested longitudinal to the rolling direction, and guaranteed both in the longitudinal and transverse directions. Elongation is tested longitudinal to the rolling direction.

Impact strength is tested by the Charpy V impact test in accordance with Standard EN 10045-1. The requirement value 40 J means tests carried out with 10 x 10 longitudinal standard test pieces. When testing thicknesses less than 10mm, the width of the test pieces corresponds with the strip thickness and the requirement values decrease in direct relation to the surface area of the test piece.

No impact tests are carried out for thicknesses less than 6mm.

¹⁾ Elongation A80 is used for thickness below 3mm.

²⁾ For thickness (8) – 10mm the minimum yield strength can be 20 Mpa lower.

³⁾ If agreed upon separately, Optim 700 MC can also be delivered with guaranteed impact strength Charpy V ≥29 J at the temperature of -40°C.

Chemical Composition Content % (ladle analysis)

C max.	Si max.	Mn max.	P max.	S max.	Al max.	CEV %
0.10	0.20	2.10	0.020	0.010	0.015	0.37 ave. 0.41 max.

In addition, niobium (Nb), vanadium (V), molybdenum (Mo), titanium (Ti), or boron (B) may be used as alloying elements either singly or in combination.

$$CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$$

Processing

Welding

The weldability is excellent and all the common welding processes can be used. Preheating is not necessary under normal conditions. A narrow heat affected zone (HAZ) with a somewhat lower strength is formed immediately adjacent to the weld. The softening tendency can be limited by avoiding unnecessarily high heat input during welding. In applications where high strength is required, the welded joints should be placed in the less stressed locations. So, the effect of welds on the structure will be minimised. Matching welding materials are recommended when high strength of the weld is needed. Alternatively, undermatching consumables may be used if the weld is located in a less stressed part of the structure.

Cutting

Optim 700 MC steel can be cut easily using thermal methods such as flame, plasma, and laser cutting. Mechanical cutting can also be applied, but attention must be paid to the stiffness of the equipment, blade condition and clearance, and support the work piece.

Forming

Optim 700 MC steel is suitable for cold forming.

Minimum permissible bending radius, bending angle 90°

Minimum permissible inside bending radius mm

Thickness mm (2.5) - 3	(3) - 4	(4) - 5	(5) - 6	(6) - 7	(7) - 8	(8) - 10
3.5	5.0	6.0	8.0	12.0	14.0	16.0

No limitations on bending direction.

Successful forming requires the use of good workshop techniques, especially for highest steel strengths. Worn tools, insufficient lubrication, scratches on the steel surface and edge burrs all reduce the forming quality. Plates taken from cold storage must warm to room temperature (+20°C) before forming.

Heat Treatment

If relieving of residual stresses is required, Optim 700 MC steel may be annealed at temperatures of 530-580°C. Heating the steel to temperatures higher than 580°C reduces its strength.

Heat Treatment	Temperature °C	Treatment time & manner of cooling
Stress relieving	530 – 580 (target 560)	2 minutes/mm thickness, min. 30 minutes. Slow cooling in furnace.

Too high temperature and long treatment time may weaken mechanical properties.

Hot-Dip Galvanising

Optim 700 MC steel can be hot-galvanised. Control of the galvanising parameters produces a smooth and durable coating.

Further information on processing in thermal cutting and flame straightening datasheets.

Inspection Document

An inspection certificate 3.1 in compliance with EN 10204 is granted. The inspection document states the chemical composition of steel based on cast analysis and hardness in delivery condition.

Full specification and details are available on request.
The above information is provided for guidance purposes only.
For specific design requirements please contact our technical sales staff.