

Ramor® 450

General Product Description

Combines ballistic properties with impact toughness.

Ramor® 450 is a medium-hard protection plate combining ballistic properties with impact toughness, at 8.0 - 16.0 mm (0.315-0.630") thick and 400-480 HBW. Ramor® 450 is not intended for further heat treatment.

Dimension Range

Ramor 450 is available as plate in thickness between 8.0 - 16.0 mm.

Mechanical Properties

	Thickness (mm)	Hardness (HBW)	Yield strength R _{p0.2} (min MPa)	Tensile strength R _m (min MPa)	Elongation A ₅ (min %)
Ramor® 450	8.00 - 16.00	400 - 480	1000	1150	8

Mechanical Testing

Brinell hardness test according to EN ISO 6506-1 on each heat treatment individual/coil.

Hardness is measured on a milled surface 0.3 - 2.0 mm below plate surface.

Charpy impact test according to EN ISO 148, 1 test/20 ton.

Tensile test according to EN ISO 6892 on each plate and thickness <19.9 mm.

Impact Properties

Thickness (mm)	Min impact energy for transversal testing, Charpy V 10x10 mm test specimen ¹⁾
8.00 - 16.00	20 J / -40 °C

¹⁾ Impact testing transverse to rolling direction, average value of three tests. Single value min. 70% of specified average.

Chemical Composition (ladle analysis)

C (max %)	Si (max %)	Mn (max %)	P (max %)	S (max %)	Cr (max %)	Ni (max %)	Mo (max %)	B (max %)
0.25	0.70	1.50	0.015	0.010	1.00	2.0	0.70	0.005

The steel is grain refined. Phosphorous and sulphur are not intentionally alloying elements.

Tolerances

More details are given on www.ssab.com.

Thickness

Product Type	Thickness (mm)	Tolerance (mm)
Plate	8.00 - 14.9	- 0.0 / + 1.0
Plate	15.0 - 16.0	- 0.0 / + 1.1

Length and Width

According to SSAB's dimension program.

- Tolerances conform to EN 10 029 or to SSAB's standard after agreement.
- Dimensional tolerances for plate with mill edge according to special agreement.

Shape

Tolerances according to EN 10029.

Flatness

Tolerances according to SSAB's flatness tolerances which are more restrictive than EN 10029 Class N (steel type L).

Surface Properties

According to EN 10163-2 Class B Subclass 3.

Delivery Conditions

Ramor is delivered in quenched condition.

Fabrication and Other Recommendations

Welding, bending and machining

For information concerning welding and fabrication, see SSAB's brochures on www.ssab.com or consult Tech Support.

Ramor® is not intended for further heat treatment. If Ramor® is heated above 180 °C after delivery from SSAB no guarantees for the properties are given.

Appropriate health and safety precautions must be taken when cutting, welding, grinding or otherwise working on the product. Grinding, especially of primer coated plates, may produce dust with high particle concentration.

Contact Information

www.ssab.com/contact