



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 8-16 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 Min - Max (HBW)	Yield Strength Min (min MPa)	Tensile Strength Min (MPa)	Elongation A ₅ Min (min %)
8- 16	400- 480	1000	1150	8

Impact Properties

Test temperature	Min. impact energy test Charpy-V 10x10 mm test specimens ¹⁾
-40 °C	20 J

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

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 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.

RAMOR 450

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	2	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

Heavy Plate Thickness (mm)	Tolerance (Min / Max)
8.0- 14.9	- 0.0 / + 1.0
15- 16	- 0.0 / + 1.1

Length and Width

According to SSAB's dimension program.

- Tolerances conform to EN 10029 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 450 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, techsupport@ssab.com.

Ramor 450 is not intended for further heat treatment. If Ramor 450 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.

RAMOR 450

Grinding, especially of primer coated plates, may produce dust with high particle concentration.



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