

PROTAC^{...} 650

PROTECTION STEEL PLATES

PROTAC 650 is a high-strength and high-hardness steel used as an add-on plate for critical armour applications. Steel plates have excellent workshop properties regarding cutting and welding. Due to the high tensile properties, the bendability of the plates is very limited. PROTAC 650 steel plates have a unique balance between high strength, elongation and impact toughness even at low operating temperatures. Armour components made of this steel meet the requirements according to STANAG 4569 AEP55, VPAM-PM 2007, and other ballistic standards. Vehicles and structures made of this steel offer a high level of protection against projectile penetration.

STANDARDS

- General technical delivery requirements in accordance with EN 10021.
- Tolerances on dimensions and shape according to EN 10029.
- Delivery requirements for surface condition according to EN 10163-2.
- Ultrasonic testing according to EN 10160.
- Tensile testing at room temperature according to EN ISO 6892-1.
- Impact testing according to EN ISO 148-1.
- Brinell hardness testing according to ISO 6506-1.
- Ballistic testing according to VPAM-PM 2007.
- Ballistic testing according to STANAG 4569 AEP55.
- Ballistic testing according to NIJ 0108.01.

MECHANICAL PROPERTIES

Delivery condition	Thickness [mm]	Surface hardness [HB]
QT (quenched + tempered)	6–25	640–680

* One measurement per plate.

Tensile properties					
Delivery condition	Thickness [mm]	Testing direction	R _{p0.2} [MPa] min.	R _m [MPa] min.	A _{5.65} [%] min.
QT (quenched + tempered)	6–25	transverse	1650	2000	5.0

* Measured on one plate per thickness per heat.

Impact toughness				
Delivery condition	Thickness [mm]	Testing direction	Temperature [°C]	KV ₂ [J]* min.
QT (quenched + tempered)	6–25	transverse	-20	10

*Measured on one plate per thickness per heat. Measured on standard specimen 10 x 10 x 55 mm. The specified minimum value is the average of 3 tests. One individual value may be below the minimum average value specified, provided that it is not less than 70 % of that value. For plate thickness below 12 mm, subsize specimens shall be used. The minimum values of subsize specimens shall be reduced in direct proportion to the cross-sectional area of the test piece.

DIMENSIONS

PROTAC 650	Hot rolled quarto plates – trimmed edges
Thickness [mm]	6–25
Width [mm]	1000–2500
Length [mm]	up to 12500

TOLERANCES ON DIMENSIONS

- Hot-rolled quarto plates: EN 10029

DELIVERY CONDITION

- Hot-rolled quarto plates in quenched and tempered condition.

SURFACE CONDITION

- Shot-blasted
- Shot-blasted and anti-corrosion painted*

* Thickness of the coating 20–60 µm, max. width of the anti-corrosion painted plates is 2000 mm.

CHEMICAL COMPOSITION

Heat analysis										
PROTAC 650	C	Si	Mn	P	S	Cr	Ni	Mo	B	CEV*
max. in %	0.48	1.0	0.8	0.01	0.003	1.3	1.3	0.5	0.004	0.88

$$*CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

GENERAL WORKSHOP RECOMMENDATIONS

PROTAC 650 armour steel is produced through carefully controlled alloy design, resulting in good welding characteristics. Due to the high mechanical properties, more care is required for saw cutting and milling. During processing in the workshops, the steel shall not be exposed to temperatures exceeding 150 °C, as this can result in a loss of mechanical properties, particularly its hardness. Due to its extremely high hardness the plates are not suitable for bending.

INSPECTION DOCUMENTS

The type of document shall be agreed upon at the time of enquiry and order. A test certificate according to EN 10204/3.1 is issued mandatorily.

The information and data in this product data sheet are intended for informative purpose only and may be revised at any time without notice. Presented typical properties of the materials are described only to help readers make their own evaluations and decisions. They are not guaranteed.