

# MARS 190

## a quenched and high tempered armor steel

MARS 190 has undergone examination for use in vehicle structures such as main battle tanks and armored personnel carriers, as well as for stationary protection applications like buildings, sentry boxes, and observation posts. Additionally, it has been studied for its effectiveness against various types of targets. The adaptability of MARS 190 is noteworthy, as it seamlessly combines ease of workability even in thicker dimensions with favorable ballistic properties against a wide range of ammunitions.

Standards	
France	NF A 36-800-CLA
Germany	TL 2350 – 0000 Hardness G, H, K, L
UK	Stan 95-24 Class 1 and 2, Stan 95-13
US	MIL DTL 12560 CL 1.2.3

Chemical analysis - Weight %								
C	S	P	Si	Mn	Ni	Cr	Mo	V
≤ .30	≤ .005	≤ .012	≤ .4	≤ 1.20	≤ 1.8	≤ 1.5	≤ .6	≤ .10

Mechanical properties				
Plate thickness (t)		hardness range (HB)	KCV -40 ° Transverse to rolling direction	
mm	Inch		J	ft.lbs
≤ 12	≤ 0.47	352 - 388	≥ 20	≥ 15
12 < t ≤ 35	0.47 < t ≤ 1.38	331 - 375	≥ 24	≥ 18
35 < t ≤ 60	1.38 < t ≤ 2.36	302 - 341	≥ 32	≥ 24
60 < t ≤ 85	2.36 < t ≤ 3.30	262 - 331	≥ 36	≥ 26
85 < t ≤ 120	3.30 < t ≤ 4. 72	248 - 285	≥ 56	≥ 41
120 < t ≤ 150	4. 72 < t ≤ 6	241 - 277	≥ 64	≥ 47

#### Heat treatment

MARS 190 is a quenched and high tempered armour steel ( $\geq 500$  °C / 930 ° F)

#### Cutting

Standard thermal cutting techniques (oxygas, plasma, laser) can be used without any special precautions (pre or post-heating) for thicknesses up to 75 mm (3")

#### Forming

MARS 190 can be cold bent – The rough cut edges have to be ground prior to cold forming

Hot forming can be performed according to process or ; nevertheless, consult us before because temperatures vary according to thickness.

1. Heating at 900/950 °C (1650/1740 ° F), mandatory to make a new quality treatment including quenching + tempering.
2. Heating at 450/550 °C (840/1020 ° F) – air cooling after forming.