

Mars® steels for military applications

Threat		Mars® 380	Mars® 440	Mars® 500	Mars® 550	Mars® 600	Mars® 650	Multi-layer system examples (from strike face to back face)												
Recommended minimum thickness for protection (mm)														Multi-layer system					AD**	
Stanag Level*	i	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Grade / thickness	AG*** (mm)	Grade / thickness	AG*** (mm)	Grade / thickness	AD** (kg/sqm)	
1	0°	7,62 x 51 Nato ball	10,5	82	8,3	65	6,3	49	8,7	68	5,0	39	5,5	43	Mars®650 - 5,2mm	0	Glass fibers - 6mm	-	-	54
		5,56 x 45 Nato SS109			10	78	9,3	73			6,8	49								
		5,56 x 45 M193																		
2	0°	7,62 x 39 API BZ	13,5	106	-	-	12,5	98	10	78	8,5	67	7,5	59	Mars®600 - 4,5mm	30	Mars®500 - 6,5mm	-	-	86
					30°	7	55	-	-	6	47	-	-	6	47	-	-	Mars®650 - 5,4mm	0	Aramid fibers - 9mm
3	0°	7,62 x 54R API B32	18	141	-	-	16	126	-	-	14	110	13	102	Mars®600 - 5mm	15	Mars®600 - 6,5mm	-	-	90
		7,62 x 51 AP WC			23	181	20,7	162	20,5	161	-	-	-	-	-	-	Mars®600 - 5mm	10	Mars®380 - 8mm	-
	Mars®600 - 9mm		15	Mars®380 - 13,5mm													-	-	177	
	Mars®650P - 6mm R6T10		30	Mars®650P - 8mm R8T12													15	Mars®500 - 12,5mm	167	
	Mars®600 - 7mm		10	Mars®650P - 6mm R6T10													10	Mars®600 - 8,5mm	153	
	60°	8,5	67	-	-	8	63	-	-	-	-	-	-	Mars®650P - 6mm R6T10	30	Mars®650P - 8mm R8T12	35	Mars®600 - 8,5mm	136	
4	0°	14,5 x 114 API B32	37	290	-	-	-	-	-	-	-	-	-	-	Mars®600 - 14mm	0	Mars®380 - 13,5mm	-	-	216
					Mars®600 - 8,5mm	20	Mars®600 - 8,5mm	20	Mars®500 - 8mm	196										
	30°		23	181	-	-	-	-	-	-	-	-	-	-	Mars®600 - 8,5mm	30	Mars®380 - 15mm	-	-	184
															Mars®500 - 6mm	30	Mars®380 - 13,5mm	-	-	153
5	60°	25 x 137 APDS-T	34	267	-	-	-	-	-	-	-	-	-	Mars®650P - 12mm R12T18	100	Mars®650P - 6mm R6T10	100	Mars®380 - 15mm	206	
	-	25 x 137 APFSDS-T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

*Stanag 4569/ AEP 55 vol1 Ed C.
 **AD : Areal Density
 ***AG : Air Gapw

Mars® 650P = Perforated Mars® 650

All tests are carried out at Stanag recommendations speeds.

All information in this document is for information purpose only. Final configuration must be tested on vehicle.

Looking for a specific multi-layer configuration of for protection against a threat that is not included in this table?
 Please contact us for recommendation
 Industeel reserves the right to change its product range at any time without prior notice.

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Steels for civil applications

Threat				Safe 500	Mars® 550	Mars® 600	Mars® 650				
				Recommended minimum thickness for protection (mm)							
Standard & protection level	Munition	V proof* (m/s)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	Th	AD** (kg/sqm)	
EN 1522	FB4	.44 Magnum FJ/FN/SC	440 ± 10	3,2*	25	-	-	-	-	-	
	FB4+	7,62 x 39 FJ/PB/SC M43	720 ± 10	4,2	33	-	-	-	-	-	
	FB5	5,56 x 45 SS109	950 ± 10	-	-	-	-	5	39	-	
	FB6	7,62 x 51 Ball	830 ± 10	6,5	51	5,9	46	5	39	-	-
		5,56 x 45 SS109	950 ± 10								
	FB6 with Skin Effect ¹⁾	5,56 x 45 SS109	950 ± 10	8	63	-	-	-	-	-	-
FB7	7,62 x 51 AP (P80)	820 ± 10	-	-	12,8	100	10,5	82	9,5	75	
NIJ J0108.01	Level II	.357 Magnum JSP	426 ± 15	-	-	-	-	-	-	-	
	Level IIIA	.44 Magnum SWC	426 ± 15	2,5*	-	-	-	-	-	-	
	Level III	7,62 x 51 M80	838 ± 15	6,5	-	-	5	39	-	-	
	Level IV	.30-06 (7,62 x 63) AP M2	868 ± 15	-	-	-	-	11,5	90	11	86
VPAM	PM6	7,62 x 39 FJ/PB/SC M43	720 ± 10	-	-	-	-	3,9	31	-	-
	PM6 + multi hit ²⁾	7,62 x 39 FJ/PB/SC M43	720 ± 10	4,2	33	3,9	31	-	-	-	-
		PM7	5,56 x 45 SS109	950 ± 10	-	-	-	-	5,0	39	-
7,62 x 51 Ball	830 ± 10										
VPAM	PM7 + multi hit ²⁾	7,62 x 51 FMJ Nato Ball	830 ± 10	6,5	51	-	-	-	-	-	-
VPAM	PM7 + multi hit ²⁾ with Skin Effect ¹⁾	7,62 x 51 FMJ Nato Ball	830 ± 10	8	63	-	-	-	-	-	-
	PM8	7,62 x 39 API BZ	740 ± 10	-	-	-	-	8,5	67	7,5	59
	PM9	7,62 x 51 AP (P80)	820 ± 10	-	-	-	-	10,5	82	9,5	75
	PM10	7,62 x 54R API B32	860 ± 10	-	-	-	-	14	110	13	102

*For EN 1522 and VPAM PM 2006, velocity is recorded at maximum 2,5m from target strike face. For NIJ 0108.01, velocity is recorded at 2,5m from target strike face for levels II and IIIA and 12,5m for levels III and IV.

** AD : Areal Density

¹⁾ Skin Effect : the armor steel is tested with a 1mm mild-steel plate placed, in front of it, at a stand-off distance of 10mm

²⁾ Multi hit test condition : equilateral triangle with sides 4 ± 1 time projectile caliber

All angles of incidence are 0°.

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