



Chemical composition content % maximum (ladle analysis)

Steel grade	Thickness	C	Si	Mn	P	S	Cr	Ni	Mo	B
Miilux Protection 400	5-30 mm	0,20	0,70	1,70	0,030	0,015	1,50	0,40	0,50	0,004
Miilux Protection 450	5-40 mm	0,26	0,70	1,70	0,030	0,015	1,50	0,70	0,50	0,004
Miilux Protection 500	2,5-40 mm	0,30	0,70	1,70	0,030	0,015	1,50	0,80	0,50	0,004
Miilux Protection 600	5-20 mm	0,44	0,80	0,60	0,015	0,003	0,80	3,5	0,50	0,004

Typical mechanical properties

Steel grade	Thickness	Yield strength Rp _{0.2} N/mm ²	Tensile strength Rm N/mm ²	Elongation A ₅ %	Impact Charpy-V -40 °C	Hardness Range HBW	CEV
Miilux Protection 400	5-30 mm	1000	1250	10-12	40	370-450	0,45
Miilux Protection 450	5-40 mm	1200	1450	8-12	30	425-485	0,55
Miilux Protection 500	2,5-40 mm	1250	1600	8-10	25	470-540	0,60
Miilux Protection 600	5-20 mm	1400	2000	6-8	20	570-650	0,75

**Miilux® Protection
400 | 450 | 500 | 600**

**Ballistic steel plates and components
for human protection**

Delivery condition

- Quenched

Tolerances

- Dimensions according to EN 10029 or EN 10051
- Thickness according to EN 10029 class C and flatness according to EN 10029 class N, steel type H

Surface condition

- According to EN 10163-2 class B subclass 3

General technical delivery condition

- According to EN 10021. Unless otherwise agreed. Inspection documents EN 10204-2.2. Issued in English.

**Dimensional tolerances
according to EN 10029**

Plate thickness in mm	Tolerances in mm
3-4	-0,0 +0,35
5-6	-0,0 +0,70
7-9	-0,0 +0,90
10-13	-0,0 +1,00
>13	-0,0 +1,10

Other thickness tolerances by special agreement.



ALL INFORMATION AS TO THE PROPERTIES AND UTILISATION OF MATERIALS AND PRODUCTS MENTIONED IN THIS BROCHURE ARE FOR THE PURPOSE OF DESCRIPTION ONLY.

Technical specification of Miilux® Protection

Class acc. to	Thickness of the test (nominal)	Steel grade	Type of weapon	Calibre	Type of bullet	Weight of the bullet	Shooting distance	Speed of the bullet V 2,5 (m/s)
EN1522 FB3	2,5 mm	500	Revolver	357 Mag.	Fulljacket, coned bulled, soft core	10,2 g	5 m	430 ± 10 m/s
EN1522 FB4	3,0 mm	500	Revolver	44 Rem. Mag.	Fulljacket, flat nose, soft core	15,6 g	5 m	440 ± 10 m/s
EN1522 FB4+	4,2 mm	500	Rifle	7,62 x 39 mm	AK-47 M43	8,0 g	10 m	720 ± 10 m/s
EN1522 FB5	6,0 mm	500	Rifle	5,56 x 45 mm	SS109 (M855)	4,0 g	10 m	950 ± 10 m/s
EN1522 FB6	6,0 mm	500	Rifle	7,62 x 51 mm	M80 Nato Ball	9,5 g	10 m	830 ± 10 m/s
EN1522 FB7	14,0 mm	500	Rifle	7,62 x 51 mm	P80 Nato AP	9,5 g	10 m	820 ± 10 m/s
Stanag 4569 Level 1	6,0 mm	500	Rifle	7,62 x 51 mm	M80 Nato Ball	9,5 g	30 m	833 ± 20 m/s
	6,0 mm	500		5,56 x 45 mm	SS109 (M855)	4,0 g	30 m	900 ± 20 m/s
	9,0 mm	500		5,56 x 45 mm	M193	3,5 g	30 m	937 ± 20 m/s
Stanag 4569 Level 1	6,0 mm	600	Rifle	7,62 x 51 mm	M80 Nato Ball	9,5 g	30 m	833 ± 20 m/s
	6,0 mm	600		5,56 x 45 mm	SS109 (M855)	4,0 g	30 m	900 ± 20 m/s
	6,0 mm	600		5,56 x 45 mm	M193	3,5 g	30 m	937 ± 20 m/s
Stanag 4569 Level 2	12,0 mm	500	Rifle	7,62 x 39 mm	API BZ	7,7 g	30 m	695 ± 20 m/s
	8,0 mm	600						
Stanag 4569 Level 3	24,0 mm	500	Rifle	7,62 x 51 mm	AP (WC core)	8,4 g	30 m	930 ± 20 m/s
	16,0 mm	500		7,62 x 54R mm	B32 API	10,3 g	30 m	854 ± 20 m/s
	12,0 mm	600		7,62 x 51 mm	AP (WC core)	8,4 g	30 m	930 ± 20 m/s
VPAM PM7	5,0 mm	600	Rifle	5,56 x 45 mm	SS109 (M855)	4,0 g	10 m	950 ± 10 m/s
				7,62 x 51 mm	M80 Nato Ball	9,5 g	10 m	830 ± 10 m/s
VPAM PM9	10,0 mm	600	Rifle	7,62 x 51 mm	AP (WC core)	9,7 g	10 m	820 ± 10 m/s

Workshop recommendations

Machining

Miilux Protection steels can be machined. The machining process should be carried out on numerically controlled CNC machine tools, which are equipped with appropriate replaceable heads tools or tools made with a cemented carbide technology.

Welding

Miilux Protection 400 can be welded well. Miilux Protection 450, 500 and 600 are more limited with heat input and maximum welding energy. With Miilux Protection 400 preheating is needed when combined plate thickness is more than 40 mm and with Miilux Protection 450, 500 and 600 when combined plate thickness is more than 20 mm.

Cold forming

Cold forming directive limits

Steel grade	Plate thickness (mm)	Free bending < 90° rounding radius of press/plate thickness R/t		Free bending -Free hole width/plate thickness W/t		Bottoming < 90° - Free hole width/ plate thickness W/t
		Bending line to rolling direction		Bending line to rolling direction		
		Transverse	Longitudinal	Transverse	Longitudinal	
Miilux Protection 400	5-20	3,0	4,0	9,0	11,0	~ 15,0
Miilux Protection 450	5-20	4,0	5,0	11,0	13,0	~ 15,0
Miilux Protection 500	5-20	6,0	8,0	15,0	19,0	-
Miilux Protection 600	5-10	~10,0	~12,0	~23,0	~27,0	-

Bending should be done with one press | Slow pressing speed is recommended | Lower tool should be roller-type (see drawings)

