We know how to protect...

Prezentace

Hlavní body :

-Historie ochranných prostředků jednotlivce od středověku po současnost

-Balistické materiály, co dělá balistický materiál tak odolným, typy materiálů srovnání

-Současné trendy v balistické ochraně co se používá v ČR a ve světě, typy vest a dalších ochranných prvků, kompozitní materiály pancíře,

-Mezinárodní normy a jejich užití, srovnání Česko a zahraničí

-Budoucnost a předpoklad dalšího vývoje balistických ochran, např. nový typ balistické přilby vývoj, Dragon skin atd.

-Závěr-diskuze, ukázky již testovaných materiálů

- Praktická část, střelení do balistické vložky z Kevlaru, a střelení do vložky UHMWPE.

Naše společnost byla založena v roce 2010, ale pokračujeme a navazujeme na dlouholetou výrobu VÚP Brno

Vyrábíme balistické ochranné vesty, ochranné balistické doplňky, provádíme pancéřování vozidel, pro civilní účely jako je převoz peněz a cenin, pro VIP , pancéřování vojenské techniky a její případný upgrade, speciální aplikace,
výzkum a vývoj v této oblasti aplikací balistických materiálů

Výroba je umístěna v Brně, v areálu o celkové ploše 15000 metrů čtverečních, kterou budeme ještě navyšovat.

Naši hlavní klienti, jsou všichni ti co chtějí kvalitní a cenově dostupné výrobky, vyrobené v České republice

Řecké brnění
Cuircass

Použití 500 – 250BC

Bronz / Železo

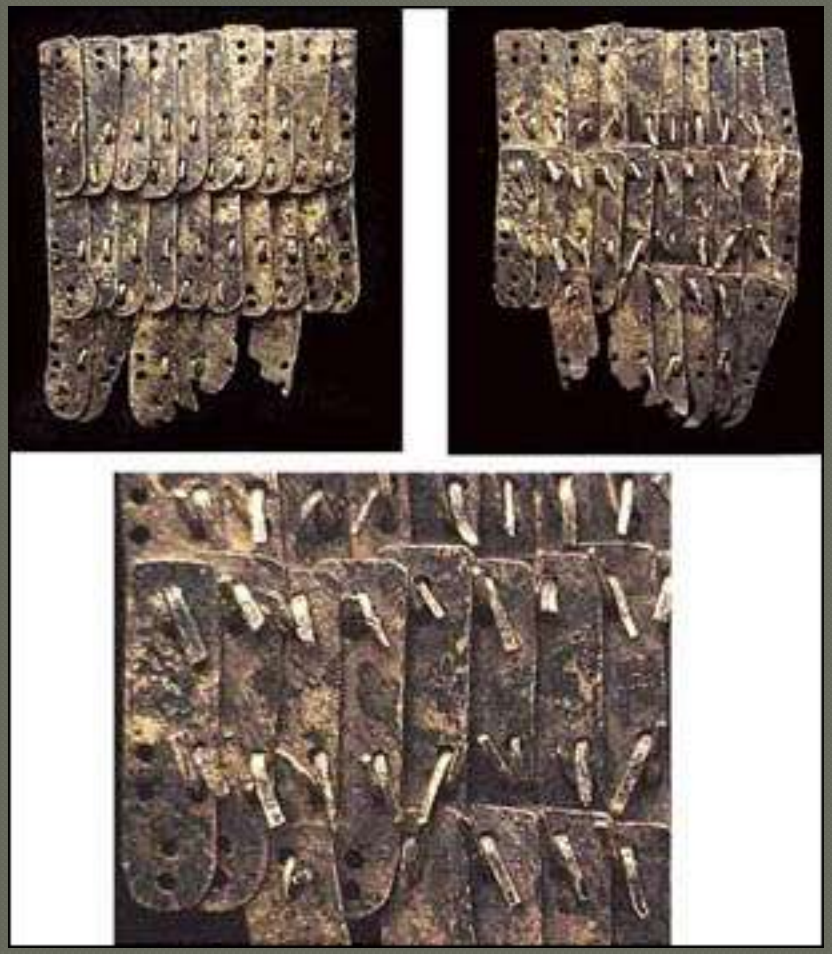
Váha (est. 5 – 8 kg)

Lorica Squamata
(Scale Armor)

Year 100–200AD

Bronze / Iron

Thickness
(.02 - .032'')

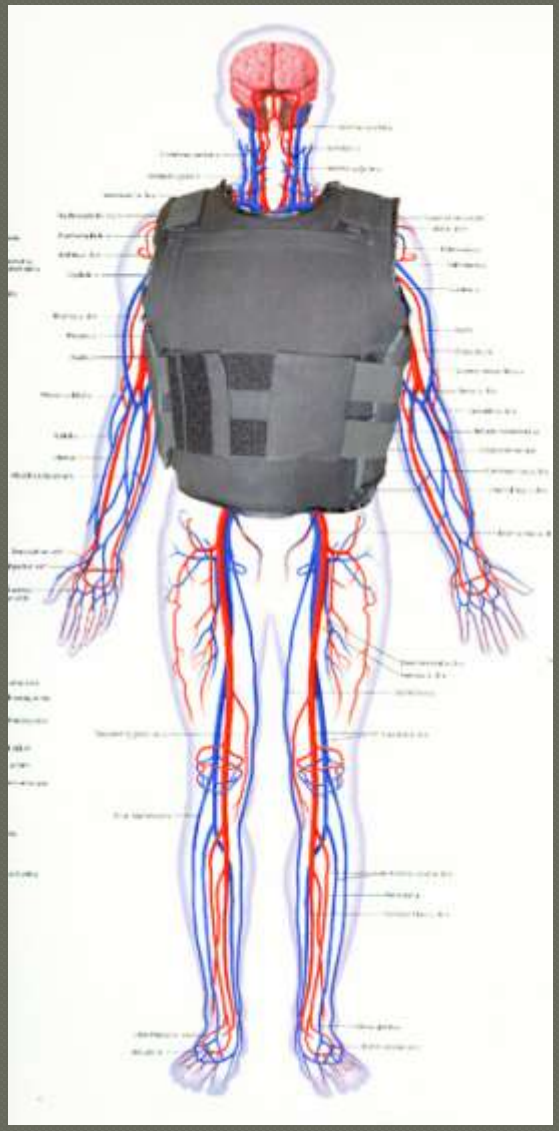


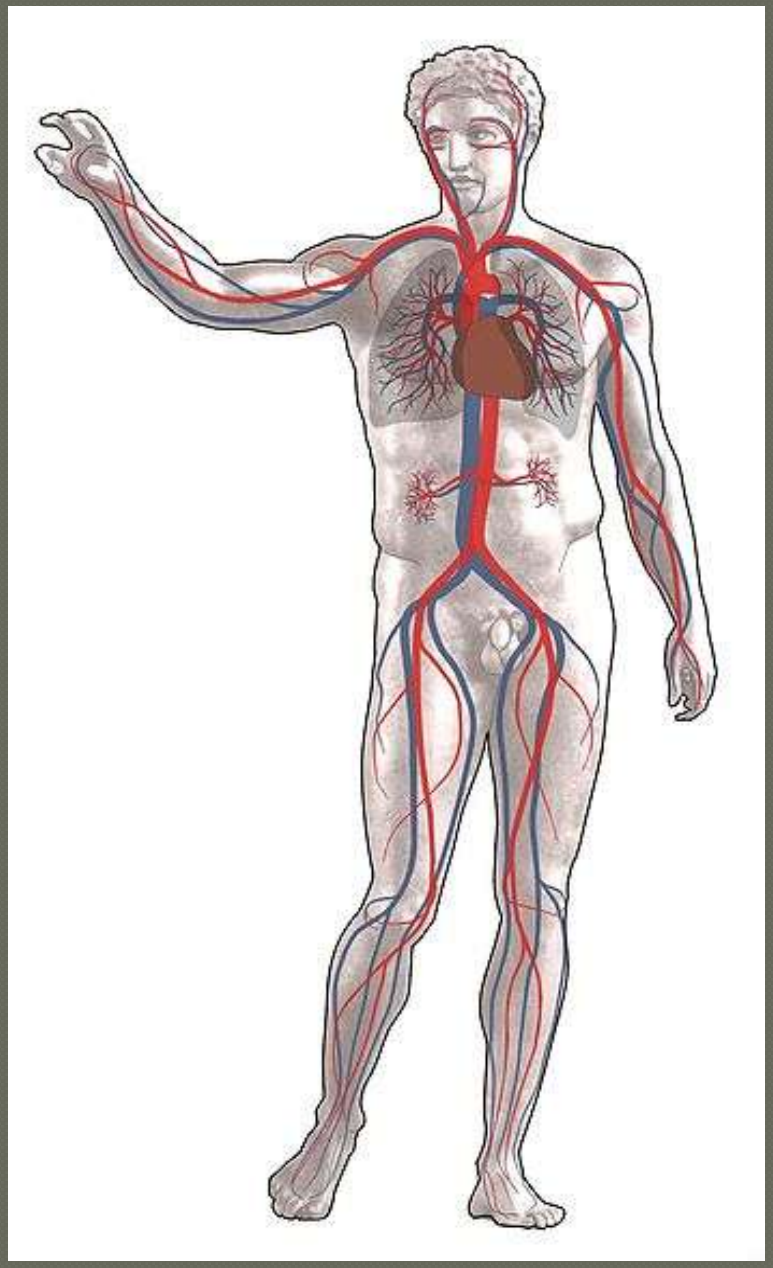
Kroužkové brnění

Velmi dlouho používané

Železný drát 6-8mm

Krevní řečiště, nebezpečná místa pro zásah





Německé železné brnění

AD 1500-1600

železo

Flexibilní

Těžké a v tehdejší době velmi Nákladné

DRAGON SKIN brnění

Aramidový a keramický kompozit

Částečně flexibilní

Vysoký stupeň ochrany

Velmi těžké

Náročná výroba

Vysoká pořizovací cena

Vyztužená vesta

AD 1920-1930

Bavlna

Použití americké gangy

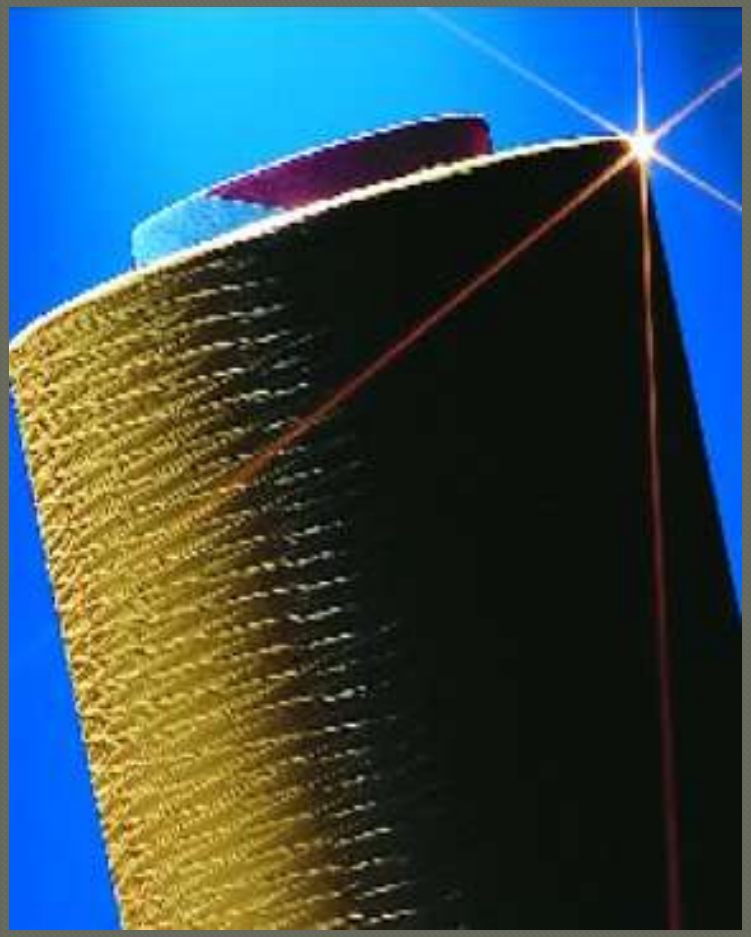
Ochrana ne příliš spolehlivá od rychlosti 1000 ft/sec

Německá jednotka GSG 9


BUNDESGRENZSCHUTZ
GSG 9

Twaron (Tejin) & Kevlar (DuPont)

- Para-Aramid Synthetic Fiber
- 5 times the strength of steel
- Inherent flame retardant
- Excellent flexibility
- Good bullet v0 and v50 performance
- Excellent fragmentation performance



Dyneema (DSM) & Spectra Shield (Honeywell)

- Ultra High Molecular Weight Polyethylene (UHMWPE)
- 15 times the strength of steel
- Exhibits high resistance to chemicals, water, and ultraviolet light
- Neutrally buoyant
- Excellent bullet v0 and v50 performance

Gold Shield (Honeywell)

- Para-Aramid Synthetic Fiber
- 5 times the strength of steel
- Excellent flexibility
- Excellent bullet v0 and v50 performance

4 fiber and resin plies, consolidated with thermo-plastic film to protect the composite package.

Kevlar Correctional (DuPont)

- Para-Aramid Synthetic Fiber
- Fibers are superfine
- Fibers tightly woven together to prevent separation of material
- Light weight and flexible material provides increased comfort

How Armor Works

Armor is designed to absorb and distribute energy of the projectile as quickly as possible
The more a projectile deforms or "mushrooms" when impacting the vest, the more fibers it will engage
By engaging more fibers, the energy is able to distribute quickly over a larger surface area
There will be a reduction in trauma if the projectile is stopped earlier in the vest
Greater trauma will occur if the bullet breeches more layers in the vest

Industry Terminology

Carrier: primary purpose is to retain the ballistic panel and provide a means of supporting and securing the armor (ballistic panel)
Backface Signature (BFS): The greatest extent of indentation in the backing material caused by a non-perforating impact on the armor
Backing Material: A block of non-hardening, oil-based modeling clay (roman plasitina #1) placed in contact with the back of the armor panel during ballistic testing
Ballistic Limit (V-50): For a given bullet type, the velocity at which the bullet is expected to perforate the armor 50 % of the time
Strike Face: The surface of an armor panel designated by the manufacturer as the surface that should face the incoming ballistic threat
Aerial Density (PSF): The weight of a ballistic panel measured in a 12" x 12" section
Thinness: The measurement of the thickest portion of the ballistic panel
NIJ Model Number: A reference number provided by the manufacture at the time of testing for NIJ

Body Armor Testing 1923

National Institute of Justice

Commonly referred to as NIJ
In 1972 NIJ developed the ballistic-resistance body armor performance standard, a voluntary compliance testing program for armor
1972 – NIJ 0101.01 Standard
1975 – NIJ 0101.02 Standard
1985 – NIJ 0101.03 Standard
2000 – NIJ 0101.04 Standard
2008 – NIJ 0101.06 Standard

NIJ 0101.04 vs. 0101.06

	NIJ 0101.04 (IR 2005)	NIJ 0101.06	CHANGES
SOFT ARMOR	6 Complete Vests	28 Complete Vests (14 per threat)	22 more vest submitted
	One Size (male / female / front opening)	Must submit largest and smallest panel company intends to manufacture	Different size test samples
	4 - v0's per threat (wet-spray cond.) / 2 - v50's per small threat	12 - v0's per threat (8-submerged 4-tumbled) / 12 - v50's per threat (10-submerged 2-tumbled)	Number of tests per threat (plus conditioning)
	6 minute water spray	30 minute water submersion	Wet Conditioning
	None	10 day tumble (72000 rotations) at 149°F and 80% RH	Environmental Conditioning
	6 shots per v0 / 3" from edge / 2 BFS measurements	6 shots per v0 / 3" heavy cal, 2" small cal. from edge / 3 BFS measurements *(All BFS measurements of shots 1-3 for a given threat and size must be less than or equal to 44mm. If a shot exceeds 44mm, then there must be a 95% confidence that 80% of all BFS measurements will be less than or equal to 44mm. No single measurement can exceed 50mm.*	Shot placement and number of BFS measurements
	Caliber 1 Velocity / Caliber 2 Velocity Rem. 9mm 1120fps / Rem. 40cal 1055fps Rem. 9mm 1205fps / Rem. 357mag 1430fps Rem. 9mm 1430 / Rem. 44mag 1430fps	Caliber 1 Velocity / Caliber 2 Velocity Rem. 9mm 1225fps / Rem. 40cal 1155fps Rem. 9mm 1305fps / Rem. 357mag 1430fps SPEER. 357sig 1470 / SPEER 44mag 1430fps	Different bullets and velocities shown in red
	Complete cert cost per model - $5K	Complete cert cost per model - $50K*	Significant increase in cert cost
HARD ARMOR	4 plates (III) / 9 plates (IV)	9 plates (III) / Up to 37 plates (IV)	Number of plates required
	2 v0's-1 v50 (III) / 2 v0's-1 v50 (IV)	4 v0's-24 shot v50 (III) / 24 v0 shots-12 shot v50 (IV)	Number of shots / BFS
	6 minute water spray	10 day & 24hr Environmental Conditioning / Test Durability	More severe conditioning and durability test
	Complete cert cost (III - $3K) / (IV - $5K)	Complete cert cost (III - $9K) / (IV - $22K)*	Significant increase in cert cost

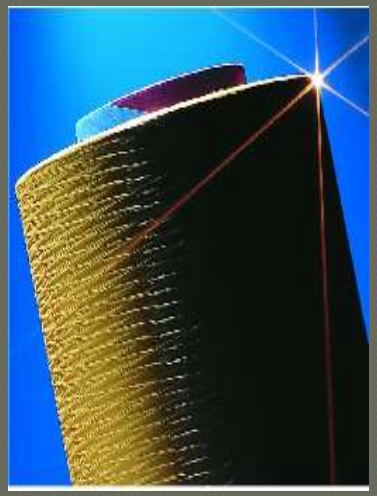
*Costs are estimates based of preliminary pricing

CSN 39 5360 Standard: Resistance Tests of protective gear

Ballistic resistance class	Caliber	Projectile	Velocity v_2.5 [m]	Weight g[m.s^{-1}]
1	22LR	Pb/O	300 10	2,6
2 2CZ	9 mm Luger 7,62x25	CP/Pbj./0 CP/Pbj./0	410 10 470 10	8 5,5
3 3CZ	357 Magnum 9 mm Luger	CP/Pbj./KK CP/Fej./0	430 10 440 10	10,2 6,45
4 4CZ	44 Magnum 7,62x25	CP/Pbj./KK CP/Fej./0	440 10 550 10	15,6 5,50
5 5CZ	223 Rem. 7,62x39	CP/Pbj. CP/Fej.	920 10 710 10	4 8
6 6CZ	7,62x51 223 Rem.	CP/Pbj. CP/Fej.	830 10 820 10	9,5 3,95
7 7CZ	7,62x51 7,62x54 R	CP/Fej. CP/Fej.	820 10 860 10	9,8 9,75

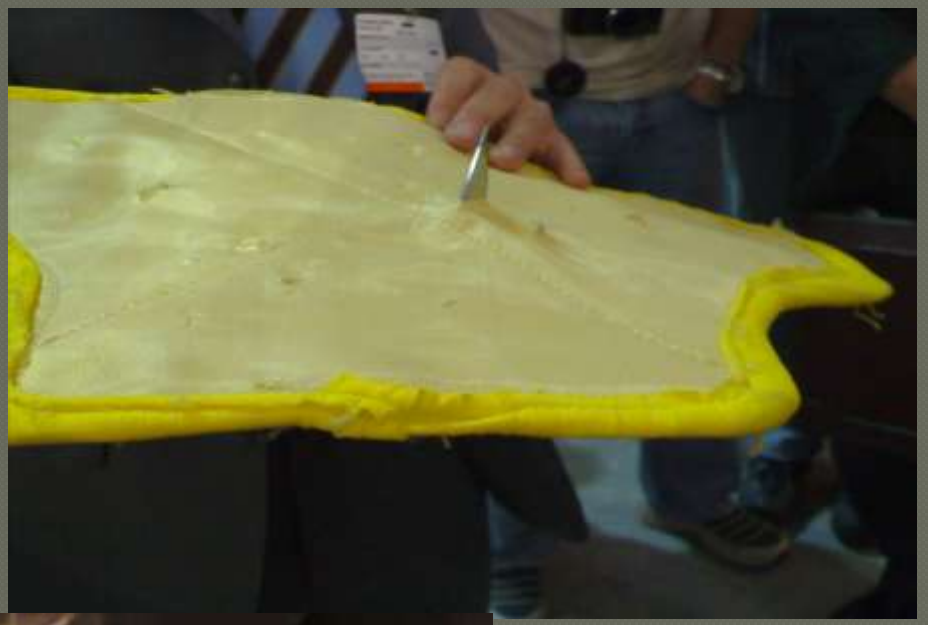
Legend: CP - full jacketed, Fej. - steel core,
Pbj. - lead core, 0 - ogival, KK - truncated cone

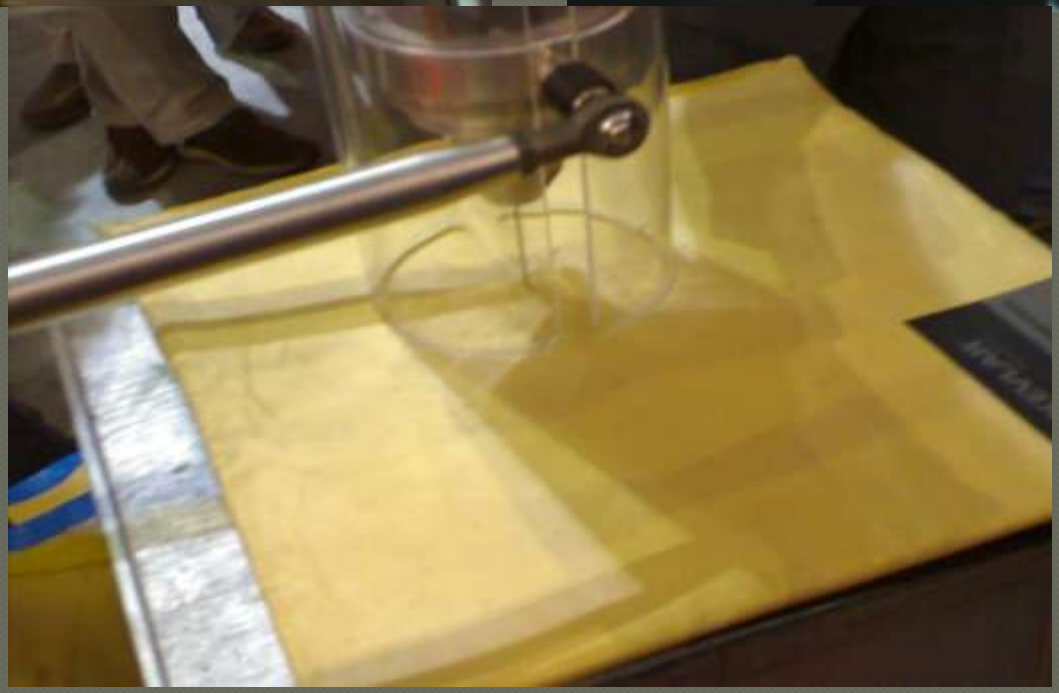
Materials used in construction are Twaron and Dyneema
Currently available in threat level IIA, II, and IIIA
Male and Female designs
Special Threat Testing: Winchester 9mm 127 gr SXT +P+, Speer .357 Sig 125 gr GDHP, FN 5.7 x 28 (SS195)
United States Military Fragmentation Testing: 2 gr, 4 gr, 16 gr, 17 gr, and 64 gr projectiles



IIA odolnost příklad konstrukce a složení

MANUFACTURER	OMEGA DEFEND – life
SERIES	DT
NIJ MODEL #	DX-IIA
NIJ THREAT LEVEL	IIA
NIJ CERTIFICATION SIZES	C1 – C5
BALLISTIC MATERIAL	Twaron / Dyneema
WEIGHT	.69 psf
THINNESS	.17 in (4.32mm)
DRY v50 – 9mm 124gr FMJ	1603 ft/s (489m/s)
DRY v05 – 9mm 124gr FMJ	1531 ft/s (467m/s)
COND. v50 – 9mm 124gr FMJ	1604 ft/s (489m/s)
DRY v50 – 40S&W 180gr FMJ	1535 ft/s (468m/s)
DRY v05 – 40S&W 180gr FMJ	1449 ft/s (468m/s)
COND. v50 – 40S&W 180gr FMJ	1538 ft/s (469m/s)
WET P-BFS Avg. – 9mm 124gr FMJ	30.7 mm
WET P-BFS Avg. – 40S&W 180gr FMJ	34.5 mm






475
7,62x51 NATO (830 m/s)


Chemical Energy mun...on
Shaped Charge RPG7
(7000 to 14000 m/s)
Kinetic Energy munition
30mm APFSDS
Armour-Piercing Fin-Stabilised
Discarding-Sabot
(1400 m/s)
30cm
475

Vesta pro skryté nošení

Vesta pro zjevné nošení armádní požití systém MOLLE

SAPI panel IV.