

# The CBJ Technology



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CBJ Tech AB has developed the 6.5x25 CBJ Cartridge, which utilizes subcaliber technology (tungsten core projectile inside a plastic sabot that separates after the muzzle), to achieve an optimized and class leading performance regarding penetration capability and stopping power. The cartridge is optimized for use in pistols, PDW's, submachine guns and short carbines.

The subcaliber technology is scalable and is now being developed for the 7.62x51 Nato and the 300 Blackout. These rounds have superior armor piercing capability and accuracy, making them suitable for both sniping at long ranges and engaging hard targets like APC's or personnel with advanced body armor.



The subcaliber technology is not new. Similar products, like the SLAP, are already on the market. The problem with these is that they cannot be fed through an automatic cycling weapon without feeding problems, due to the exposed tip of the core projectile.

CBJ Tech AB's solution is far superior to the existing products both regarding functionality and performance. The core projectile is completely encapsulated by the sabot, which has an outer geometry similar to FMJ projectiles. This ensures that the feeding works properly in automatic cycling weapons, and provides better support for the core projectile during the acceleration through the barrel. The metal gas check ensures that rotation is transferred to the core projectile through a pattern at the rear end of the core projectile without rotational slip. This gives the ammunition superior accuracy, even at high or especially at low temperatures.



# Key characteristics for the CBJ Subcaliber Technology:

High muzzle velocity;  $V_0$  of 730-1015m/s depending on barrel length

- Extreme penetrating performance against hard targets, like armor
- High hit probability due to low recoil and good ballistic performance – short time of flight and flat trajectory
- High wounding effect due to high impact velocity
- High system flexibility – possibility to combine with non subcaliber ammunition, like subsonic or frangible



## Ballistic Data

Cartridge	7.62x51 Nato CBJ		.300 Blackout CBJ		6.5x25 CBJ Ball	
Projectile weight, g	6		6		2	
Sabot weight, g	1		1		0,5	
Barrel length, mm	450	610	254	406	120	300
$V_0$ , m/s	950	1015	675	725	730	900
$E_0$ , J	2168	3091	1406	1622	533	810
$V_{50}$ , m/s	822	984	654	703	678	841
$E_{50}$ , J	2025	2907	1321	1526	460	707
$V_{300}$ , m/s	687	837	556	601	457	578
$E_{300}$ , J	1418	2100	953	1114	209	334

There are several cartridges on the market that would really benefit from utilizing the subcaliber technology.

Below are some examples that are optimized for the AR15 platform.



The current standard ammunition for this system is 5.56x45 NATO. The obvious solution would be to utilize subcaliber technology on this cartridge. However, due to the geometry and characteristics of this cartridge this is very hard to achieve and the result would be pointless due to a very small and light core projectile.

## Performance of the 7.62x51 CBJ

The charts below compare a typical standard 7.62x51 Ball round, the US M80, with the performance of the M993 AP, 7.62x51 SLAP and the CBJ projectile when shot from a 24" (610mm) barrel, which is typical for a sniper rifle or a machine gun.

**The calculations are based on the following:**

$V_0$  has been verified during several tests.

The **Ballistic Coefficient (BC)** is calculated with regards to the projectiles characteristics, like caliber, nose length, nose radius, nose shape, boat tail, density and overall length. For simplicity and comparison purposes, the G7 drag function is used in all cases.

The data used in the calculations is as follows:

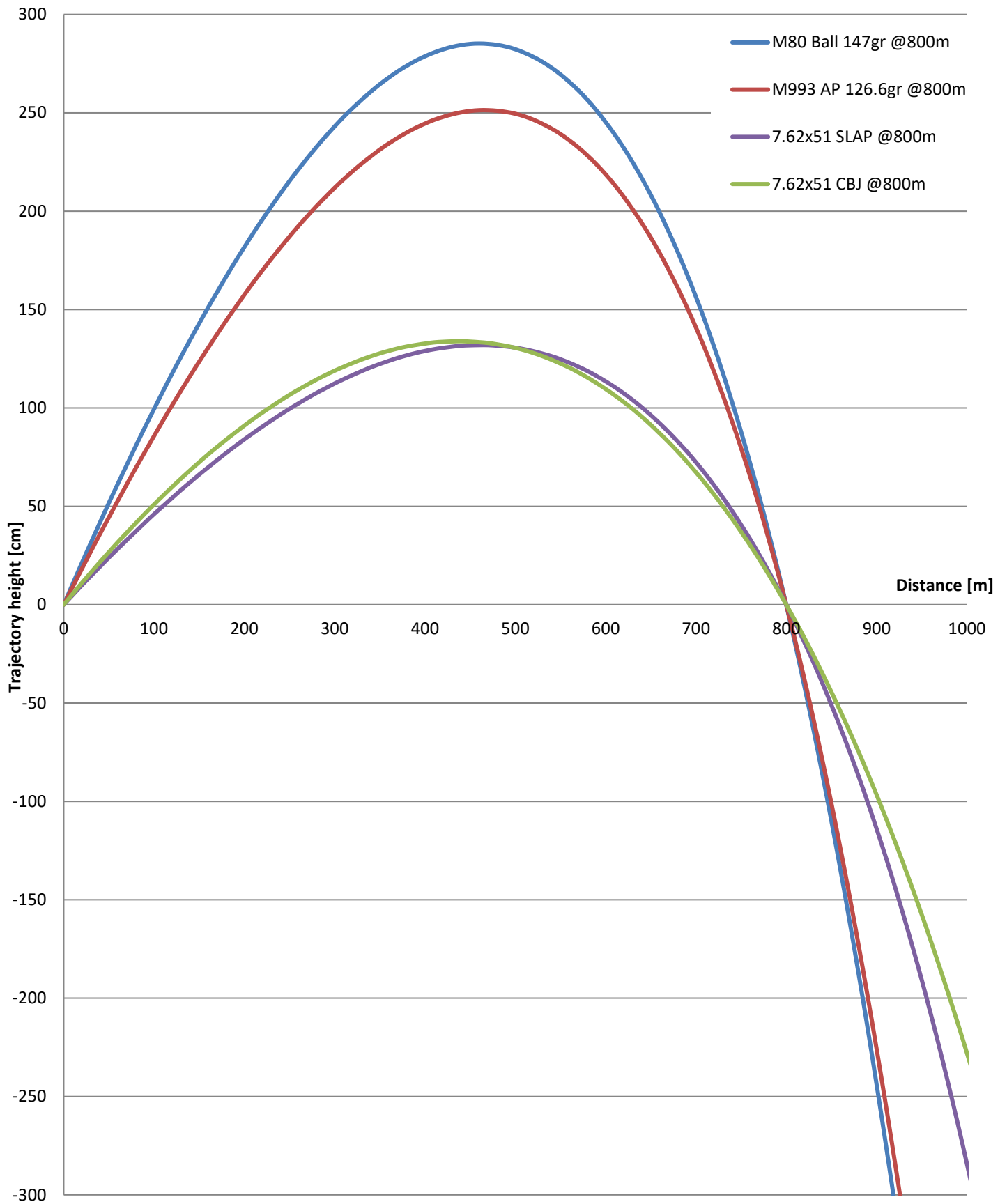
<b>7.62x51 M80</b>	<b>7.62x51 M993</b>	<b>7.62x51 SLAP</b>	<b>7.62x51 CBJ</b>
BC (G7): 0.20	BC (G7): 0.176	BC (G7): 0.165	BC (G7): 0.274
M: 147gr (9.5g)	M: 126.6gr (8.2g)	M : 60gr (3.9g)	M: 93gr (6g)
V0: 833m/s	V0: 930m/s	V0: 1220m/s	V0: 1015m/s



## Trajectories

Zero: 800m

Barrel length: 24" (610mm)



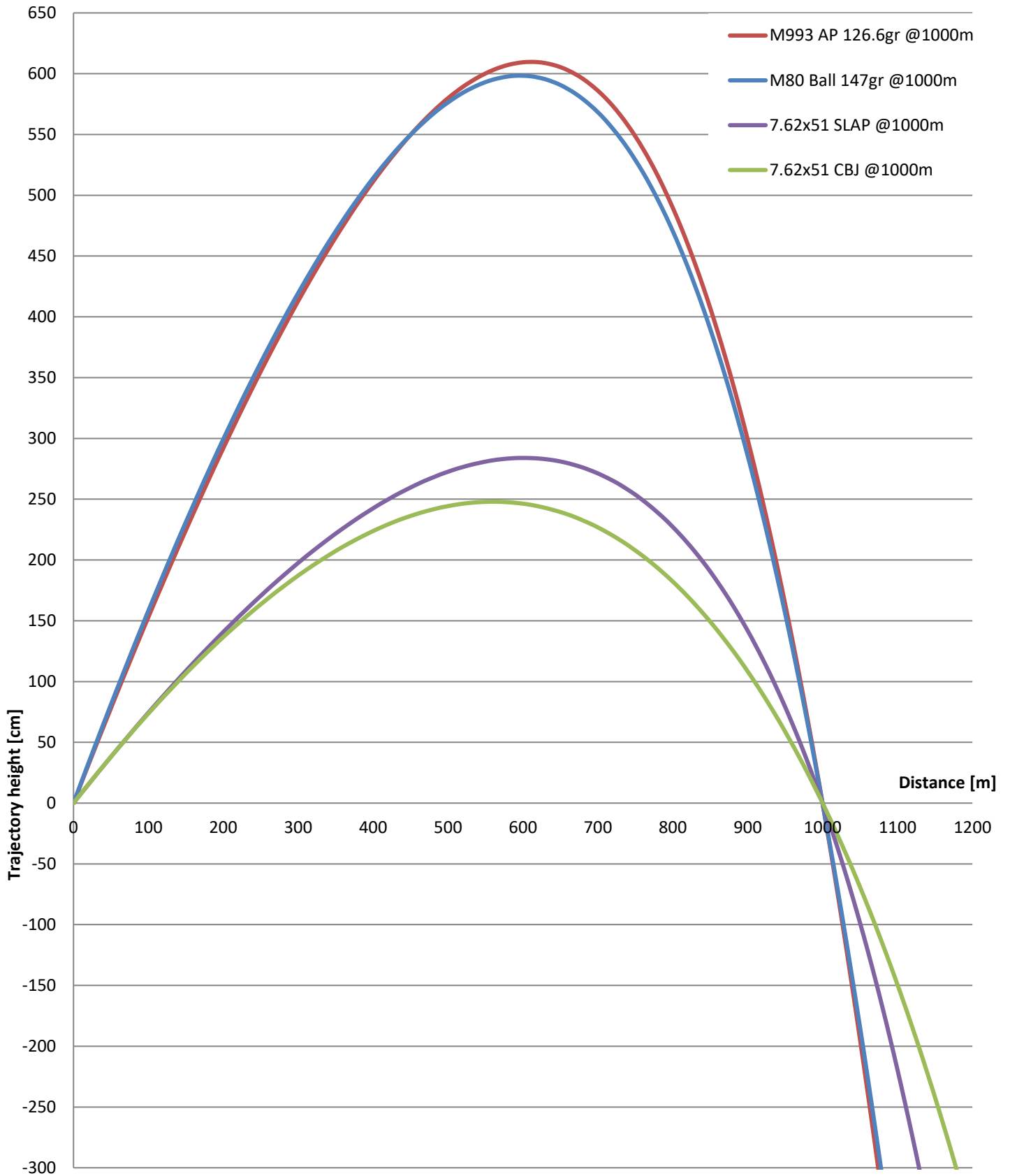
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# Trajectories

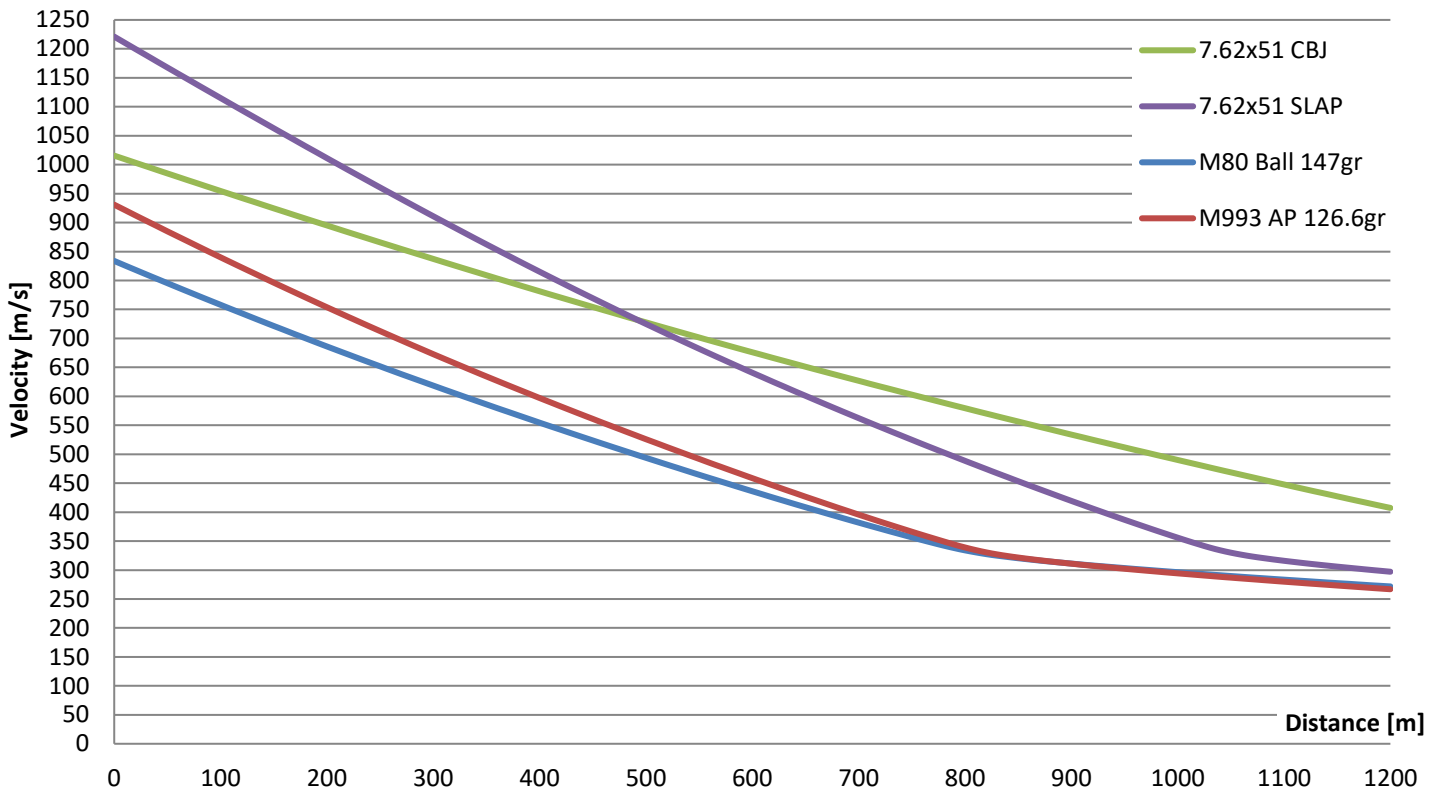
Zero: 1000m

Barrel length: 24" (610mm)



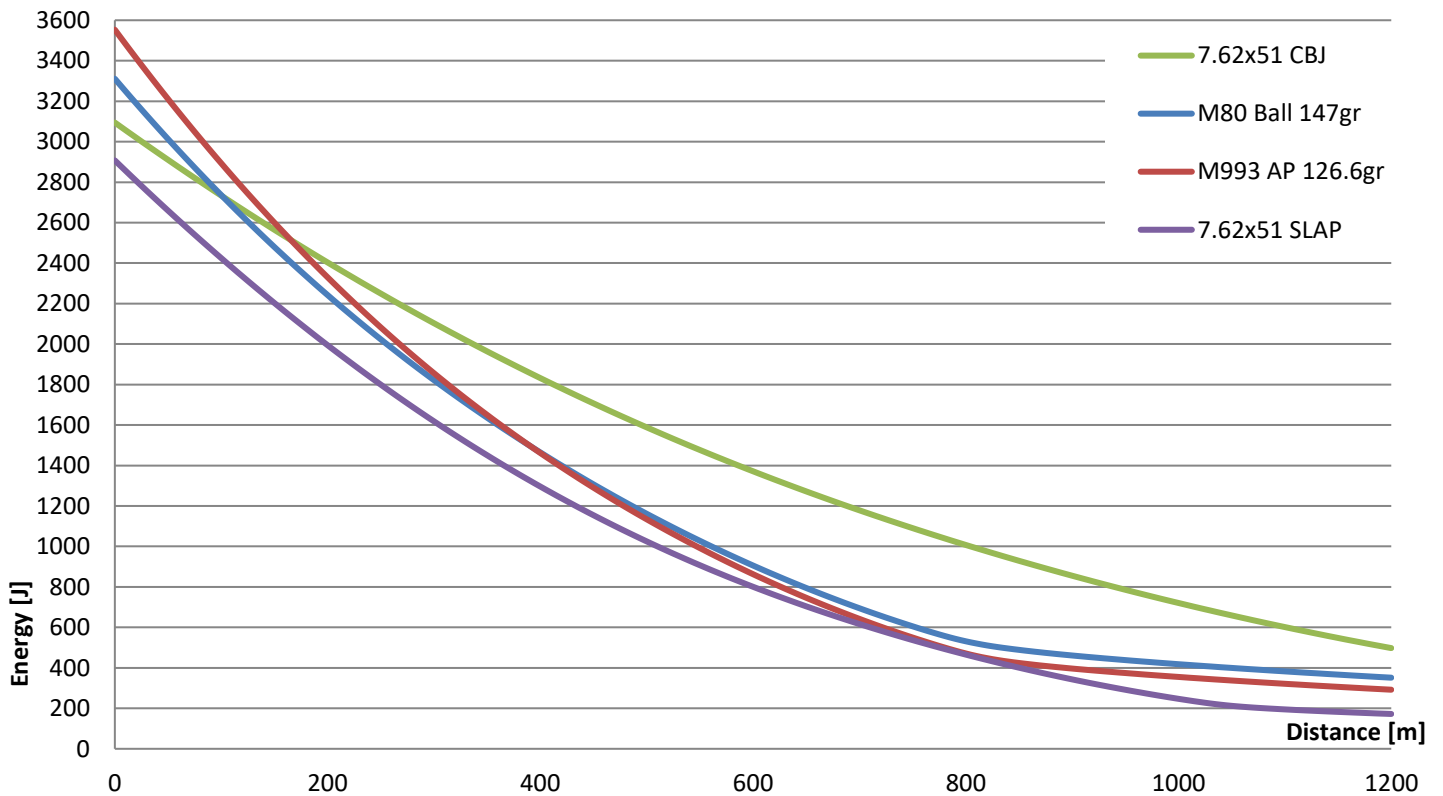
## Velocities

Barrel length: 24" (610mm)



## Energies

Barrel length: 24" (610mm)

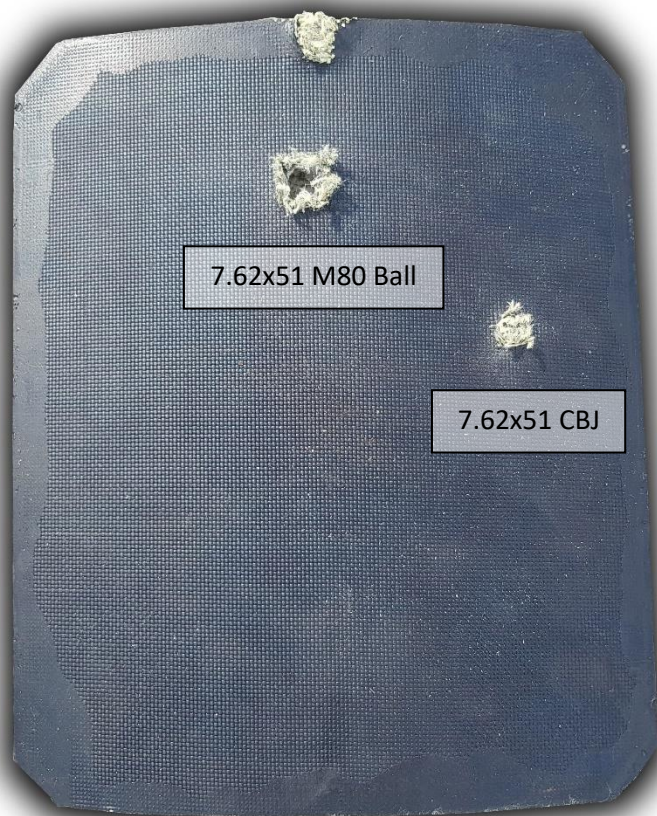


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## Penetration performance of the 7.62x51 CBJ



The 7.62x51 CBJ is still under development and the performance is continuously being evaluated. Apart from the ballistic performance a lot of focus is on the penetration performance against different kinds of barriers between the shooter and the intended target.



A barrier that is being more and more common is body armor. At this point the potential of the 7.62x51 CBJ has not been fully evaluated yet, but the picture above shows a body armor panel with the classification NIJ level IV. The panel was penetrated with the 7.62x51 CBJ at 10m range. As a reference, it was also shot with a 7.62x51 M80 Ball cartridge at the same distance, without penetration of the panel.



The 18mm armor plate (HB300) shown in the picture to the left shows another performance test of the 7.62x51 CBJ. It was shot at 10m range with the 7.62x51 CBJ (right hit) and left hit is from an M80 ball at the same range.



# Performance of the .300 Blackout CBJ

The charts on the following pages compare a typical .300 Blackout round, with a 125gr FMJ projectile, with the .300 Blackout CBJ. Both projectiles have been shot from a 16" (406mm) barrel, which is typical for a full length assault rifle for this cartridge.

## The calculations are based on the following:

V<sub>0</sub> has been verified during several tests. The primary test weapon used is an unmodified AR15 in caliber .300 Blackout with 16 inch barrel, as shown in the picture:



The weapon cycles without problems with standard setting on the gas block. The recoil is identical to factory loaded .300 Blackout ammunition with 110 grain (7.1g) FMJ projectiles, which is soft and manageable, even during full auto firing.

The **Ballistic Coefficient (BC)** is calculated by using existing formulas that calculates BC with regards to the projectiles characteristics, like caliber, nose length, nose radius, nose shape, boat tail, density and overall length. For simplicity and comparison purposes, the G7 drag function is used in all cases.

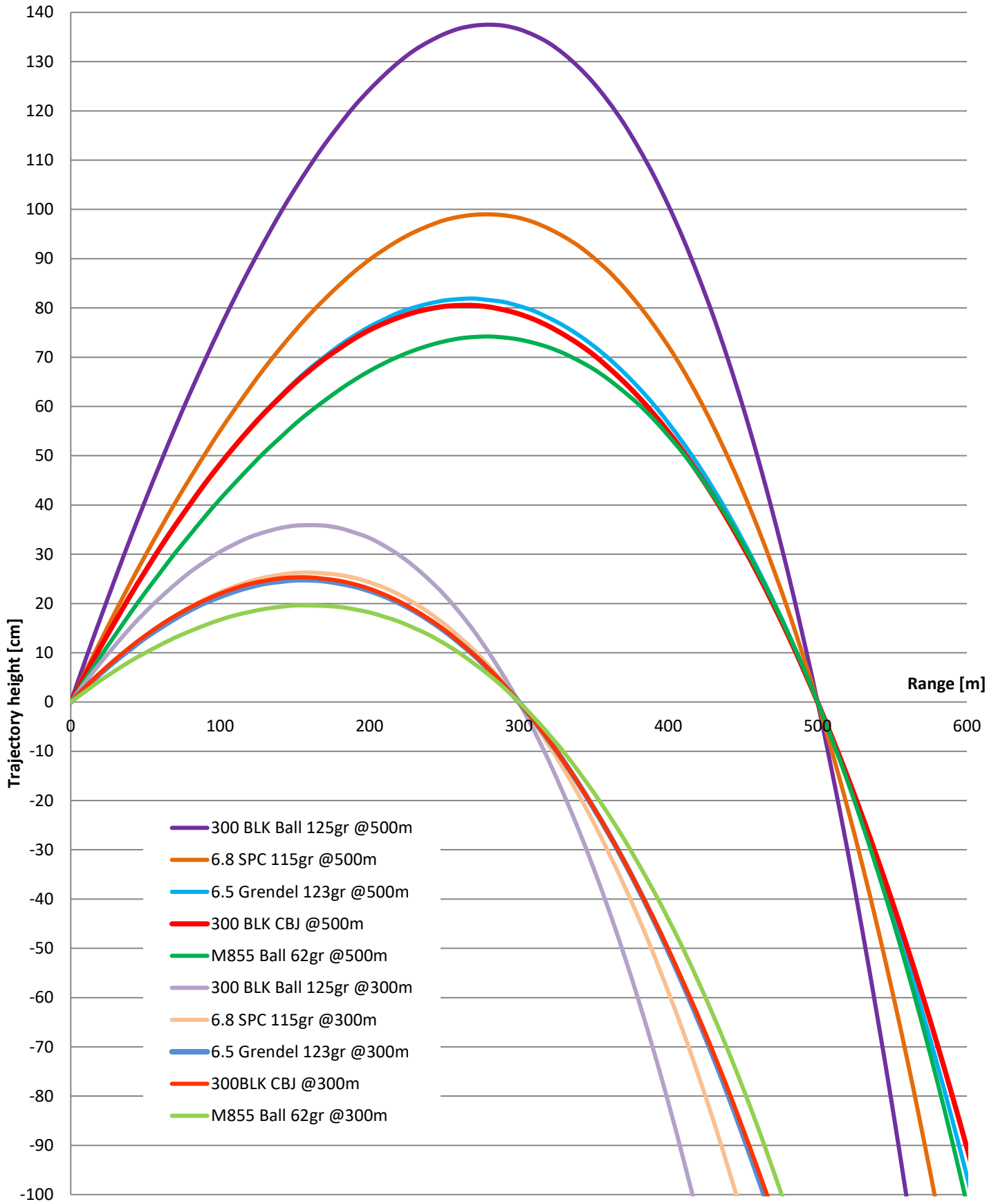
The data used in the calculations is as follows:

5.56x45 M855	6.5 Grendel FMJ	6.8 SPC FMJ	.300 Blackout FMJ	.300 Blackout CBJ
BC (G7): 0.151	BC (G7): 0.263	BC (G7): 0.163	BC (G7): 0.151	BC (G7): 0.32
M: 62gr (4g)	M: 123gr (8g)	M: 115gr (7.5g)	M: 125gr (8.1g)	M : 93gr (6g)
V <sub>0</sub> : 910 m/s	V <sub>0</sub> : 750 m/s	V <sub>0</sub> : 785 m/s	V <sub>0</sub> : 675 m/s	V <sub>0</sub> : 725m/s



## Trajectories

Barrel length: 16" (406mm)

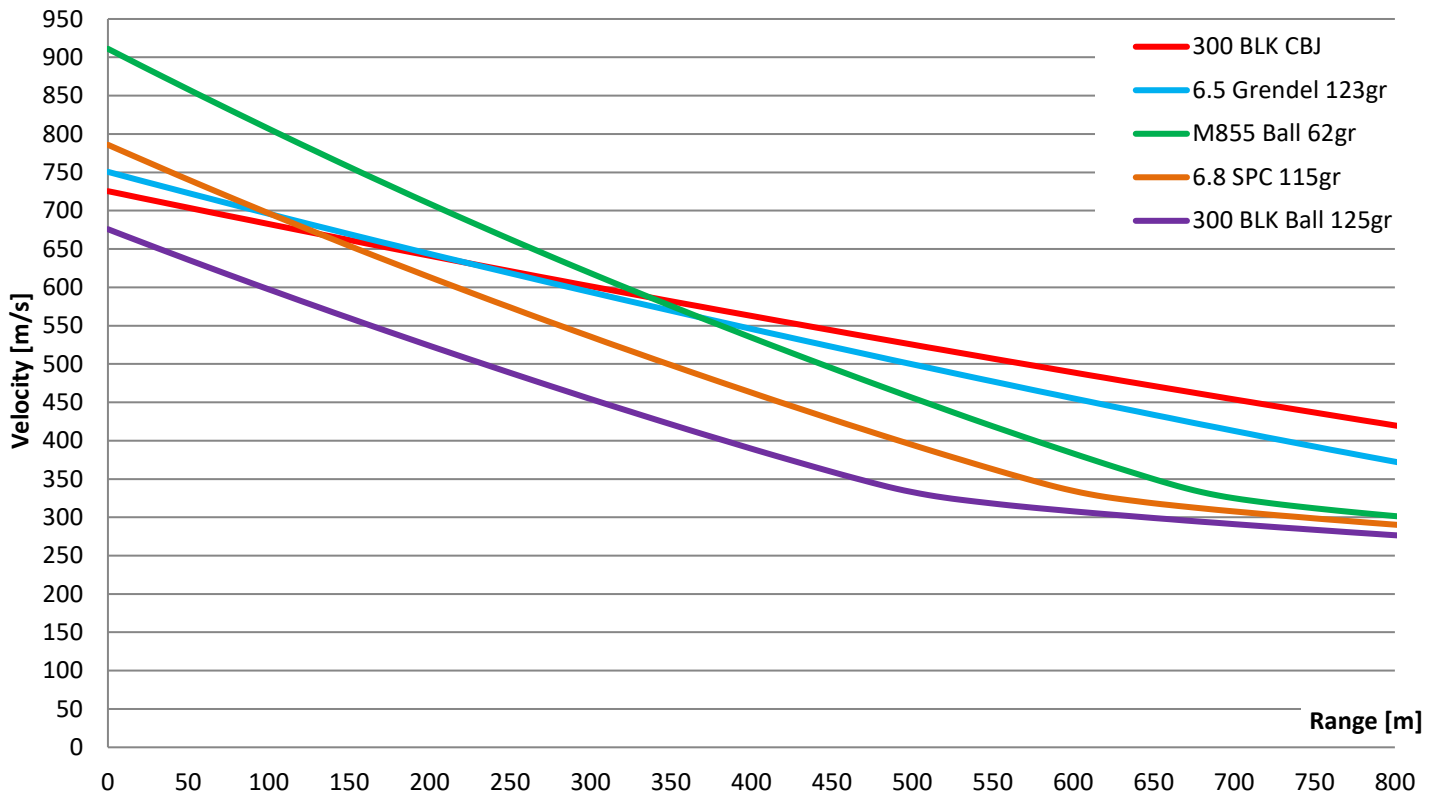


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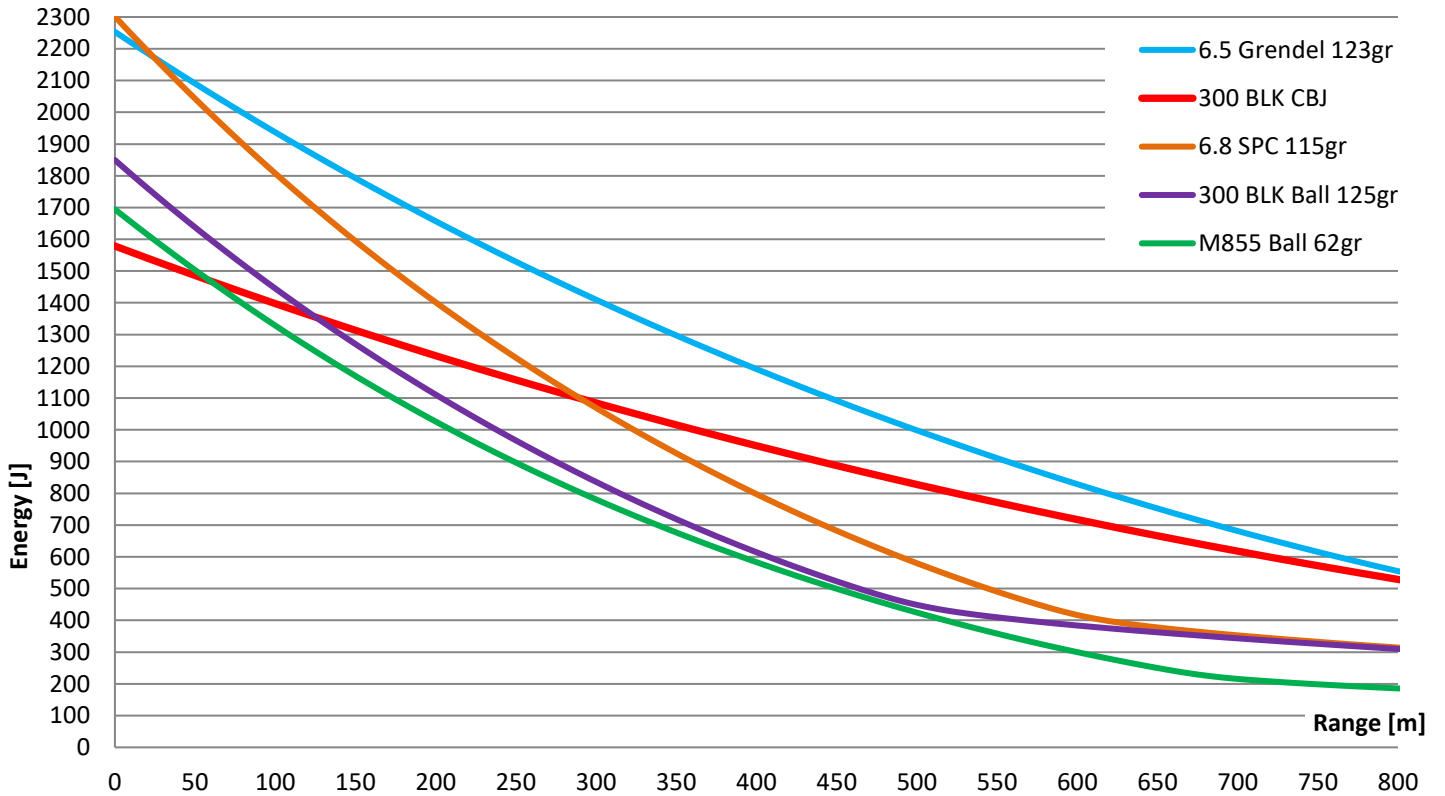
## Velocities

Barrel length: 16" (406mm)



## Energies

Barrel length: 16" (406mm)





## Penetration performance of the .300 Blackout CBJ

The penetrating performance has been tested against several types of armor and other types of barriers. The picture below shows an armor plate with a thickness of 12.7mm and a hardness of 300 HB.

This plate was shot with the .300 Blackout CBJ at 10m range giving the core projectile a hitting velocity of 720m/s. The hit to the right shows the full penetration of the projectile. The left hit is from a .300 Blackout FMJ 125gr at the same range with a hitting velocity of 670m/s, showing no penetration.



Several tests have also been done against thinner armor plates, like the one below which has been used in previous testing with the 6.5x25 CBJ Ball.

This armor plate is 7mm thick and has a hardness of 450 HB.

The .300 Blackout CBJ is able to penetrate this plate at 500m range, with a hitting velocity of 526 m/s.

The same range and hitting velocity is listed for the 7.62x51 M993 AP round as maximum range for penetration of this armor plate.

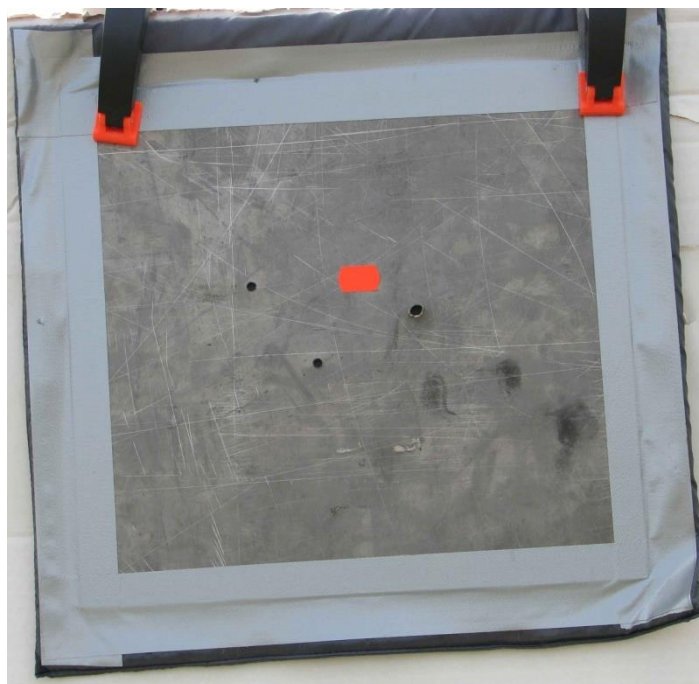


## **.300 Blackout CBJ against CRISAT panels**

The .300 Blackout CBJ has also been tested against NATO CRISAT Panels (NIJ Level 3a) consisting of a 1.6mm grade 5 titanium plate in front of 24 layers of Kevlar.

This panel stops all 9mm FMJ projectiles, even at point blank range.

The .300 Blackout CBJ has velocity and energy enough to penetrate this panel at a range beyond 1200m, which in practical terms means that it will be penetrated at any range where it can be hit.



## **.300 Blackout CBJ against ballistic gelatin**

Several tests have been done against blocks of ballistic gelatin. The picture below shows a typical cavity from a .300 Blackout CBJ projectile.

Firing direction →



### **Projectile**

Diameter: Ø5mm

Weight: 6g

BC G7: 0,33

Vt (hitting velocity): 720 m/s

### **Target**

10% Ballistic gelatin block (+4° Celsius)

Height: 200mm

Width: 250mm

Length (firing direction): 340mm

### **Cavity**

Full penetration of the block >340mm

Temporary cavity >170mm

Permanent cavity 24mm





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Technical specifications and numerical data are given as an indication only  
and are of no contractual nature.