6.5x25 CBJ

And other cartridges against CRISAT panel

CBJ Tech – Test protocol

Date: 2020-04-08	**Location**: Kungsbacka, Bunker (indoor test facility)	**Weather conditions**: Indoor, 21 deg C
Weapon systems tested: Glock 17 gen 3 in 6.5x25 CBJ - HK MP7 in 4.6x30 - FN P90 in 5.7x28.		
Ammunition tested: 6.5x25 CBJ APDS, 4.6x30 NM257 (Nammo) and 5.7x28 SS190.		
Targets tested: CRISAT Panel, defined as a 1.6 mm titanium (UK IMI Ti 318) plate supplemented by 20 layers of Kevlar (UK/SC/4468) as defined in STANAG 4512.		
People present: Mikael Johansson, Bertil Johansson		
Additional information: The tests for the 6.5x25 CBJ and the 4.6x30 were done on 2019-10-20. The tests for the 5.7x28 were done later but under the exact same circumstances.		

Background, Purpose and Goal

Collaborative Research Into Small Arms Technology (CRISAT) is the name of a series of studies conducted by the North Atlantic Treaty Organisation (NATO), identifying and defining threats with regard to the standardisation in the manufacturing of military equipment. The CRISAT target is defined as a 1.6 mm titanium (UK IMI Ti 318) plate supplemented by 20 layers of Kevlar (UK/SC/4468) as defined in STANAG 4512. This target is intended to replicate the personal protection used by former Warsaw Pact countries, and it is still used as a reference. The CRISAT target will stop the commonly used 9×19mm Parabellum full metal jacket cartridge, but it is pierced by the newer 5.7×28mm and 4.6×30mm personal defense weapon cartridges.

The purpose and goal of this test is to evaluate how much energy each of the tested projectiles retain after penetrating this panel and draw conclusions about their penetration capability.

The goal is to determine if the penetration depth of the 6.5x25 CBJ APDS, the 6.5x25 CBJ HET and the 6.5x25 CBJ Sinter lies within the desired 300-450mm in bare gelatin.

Test Setup

The CRISAT panel was fixed vertically with clamps, that allowed the Kevlar to flex somewhat, in order to maintain realistic conditions regarding the stress on the Kevlar fibers during penetration. The distance to the target was 5m. Velocities were measured at the same distance without panel, and then the chronograph was positioned directly after the panel for the penetration test.

The 6.5x25 CBJ APDS cartridge has a core projectile (monolithic tungsten) with a discarding sabot. The core projectile weighs 2g and has a diameter of 4mm. The 4.6x30 NM257 cartridge has a copper plated steel projectile that weighs 2g and has a diameter of 4.65mm. The 5.7x28 SS190 has a full metal jacket projectile containing a steel penetrator and aluminum alloy and has a diameter of 5.7mm.

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Results

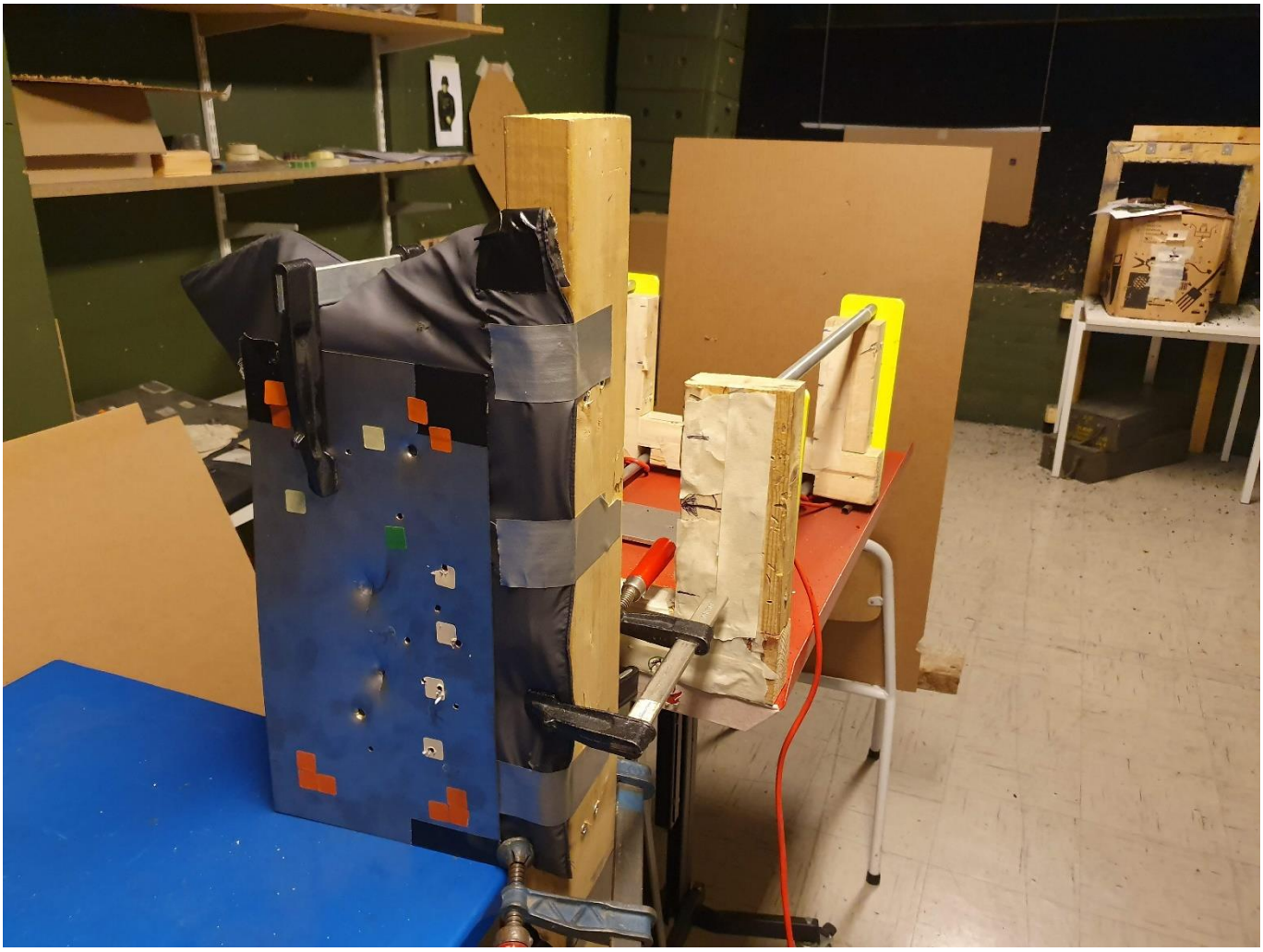
Test 1

Chronograph test at 5m distance from the muzzle. 5 rounds were fired with each weapon and an average projectile velocity was calculated:

1. Glock 17 gen 3, 6.5x25 CBJ APDS: 706.3m/s average velocity.
2. HK MP7, 4.6x30 NM257 (Nammo): 669.2 m/s average velocity.
3. FN P90, 5.7x28 SS190: 693.0 m/s average velocity.

Test 2

Penetration test at 5m distance from the muzzle.



Test 2

Several attempts had to be made with each weapon to get any measured data. The projectiles changed trajectory somewhat after penetrating the CRISAT panel, resulting in failure to get a measurement from the second gate. After a cardboard sheet was added, the position of the chronograph could be changed to compensate for the changed trajectory. The titanium plate was moved in relation to the Kevlar between the shots, to avoid hitting an area of the Kevlar that has been affected by previous hits.

Measured velocities after CRISAT panel:

1. Glock 17 gen 3, 6.5x25 CBJ APDS: 692.9m/s
2. HK MP7, 4.6x30 NM257 (Nammo): 578.9 m/s
3. FN P90, 5.7x28 SS190: 547.3 m/s

This data combined with the data from test 1 gives the following result:

	6.5x25 CBJ APDS	**4.6x30 NM257**	**5.7x28 SS190**
Velocity at 5m distance [m/s]	706.3	669.2	693.0
Velocity after CRISAT panel [m/s]	692.9	578.9	547.3
Velocity lost after penetration of CRISAT panel [m/s]	13.4	90.3	145.7
Energy at 5m distance [J]	498.9	447.8	480.2
Energy after CRISAT panel [J]	480.1	335.1	299.5
Energy lost during penetration of CRISAT panel [J]	18.8	112.7	180.7

Summary

The 6.5x25 CBJ APDS has a tungsten core projectile that has the same weight, 2g, as the 4.6x30 and the 5.7x28 projectiles, but it has a density that is more than twice that of the 4.6x30 steel projectile, and even more compared to the copper/steel/aluminum alloy projectile of the 5.7x28. This combined with the smaller caliber, 4mm compared to 4.65mm and 5.7mm respectively, and a higher target hitting velocity gives the 6.5x25 CBJ APDS superior armor piercing capability compared to the 4.6x30 and the 5.7x28 in all scenarios.

Important to notice is that the 6.5x25 CBJ APDS was fired from a pistol with a barrel length of 114mm, compared to the 4.6x30, which was fired from a PDW (HK MP7) with a barrel length of 180mm, and the 5.7x28, which was fired from a PDW (FN P90) with a barrel length of 263mm.

The CRISAT panel can easily withstand 9x19mm hits. Some more powerful types of 9x19mm can crack the titanium plate, but the projectiles will not be able to penetrate the Kevlar. Some trauma effect behind the panel can occur.