6.5x25 CBJ

6.5x25 CBJ and reference ammunition against body armor NIJ 3a and NIJ 3 and ballistic gelatin

CBJ Tech – Test protocol

Date: 2022-10-07	**Location**: Kungsbacka, Bunker (indoor test facility)	**Weather conditions**: Indoor, 21 deg C
Weapon systems tested: Glock 17, HK MP5, AKM and AK5		
Ammunition tested: 6.5x25 CBJ APDS, 6.5x25 CBJ HET, 9x19mm Nato FMJ, 7.62x39 FMJ, 5.56x45 Nato FMJ		
Targets tested: Body armor panels NIJ level 3a and NIJ level 3, ballistic gelatin.		
People present: Mikael Johansson		
Additional information:		

Background, Purpose and Goal

This round of tests were done to evaluate the penetration performance of the 6.5x25 CBJ against NIJ Level 3a and NIJ Level 3 body armor panels, compared to reference ammunition in the form of 9x19mm Nato FMJ, 7.62x39 FMJ and 5.56x45 Nato FMJ.

The purpose of this test is to evaluate both the penetration performance as well as wounding effect behind the armor panels, by using ballistic gelatin. The evaluation is done according to the Wound Profile Method, developed by M. L. Fackler and J. A. Malinowski.

The goal is to prove that 6.5x25 CBJ ammunition has a better armor piercing and wound capability compared to the reference cartridges.

CBJ Tech – Test protocol

Test 1: Glock 17 + 6.5x25 CBJ HET against NIJ Level 3a + gelatin

A pair of 10% ballistic gelatin blocks were placed at 10m distance from to shooting position. An NIJ level 3a body armor panel was placed directly in front of, and in contact with the gelatin blocks.

Image 1: Test 1 setup

A Glock 17 with a 6.5x25 CBJ barrel fitted was loaded with one 6.5x25 CBJ HET (solid 2.5g brass projectile), and the target was shot with the white dot as an aiming point.

Test 1 Result

The NIJ Level 3a body armor panel was penetrated and the projectile managed to penetrate the ballistic gelatin to a depth of 50cm.

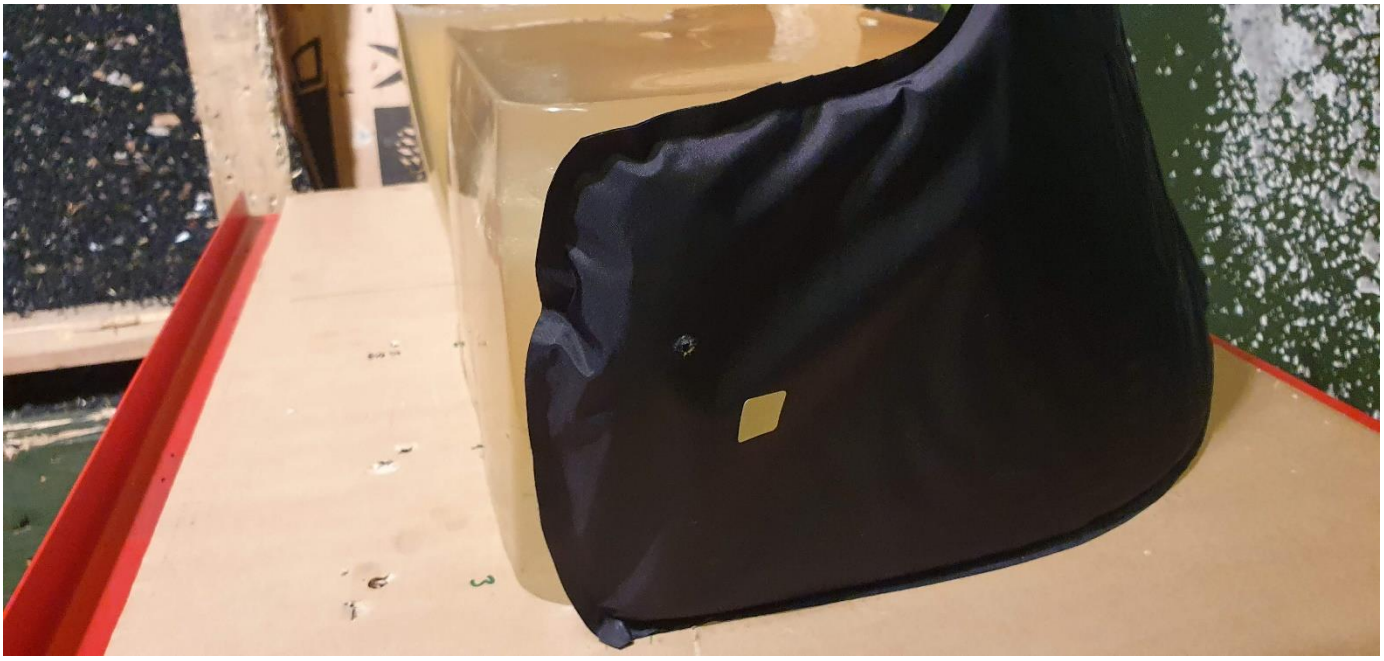


Image 2: Test 1 - Point of impact

Image 3: Test 1 - Cavity

Image 4: Test 1 - Cavity angled

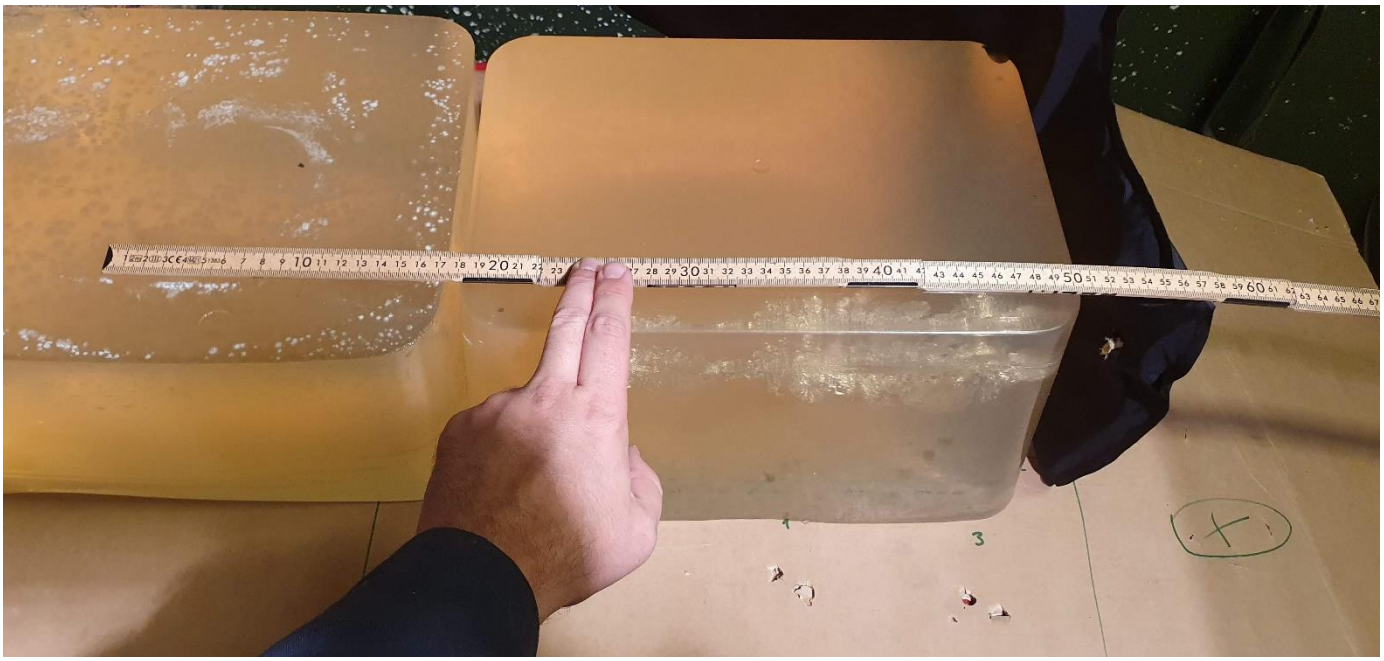
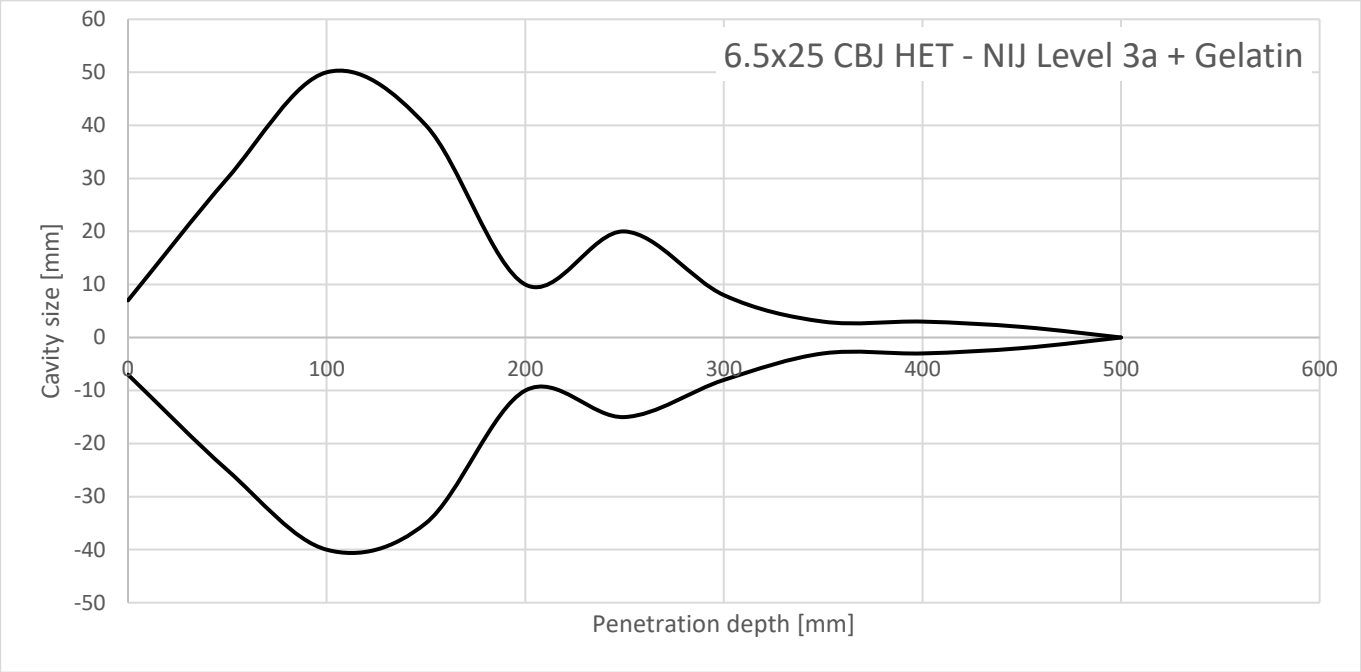


Image 5: Test 1 - Penetration depth

CBJ Tech – Test protocol

Test 1: Wound Cavity



Short Summary

The NIJ Level 3a body armor panel was penetrated with the Glock 17 and 6.5x25 CBJ HET. The majority of the energy was delivered to the gelatin during the first 200mm, indicating a good capability to incapacitate the target.

Test 2: Glock 17 + 9x19mm FMJ against NIJ Level 3a + gelatin

A pair of 10% ballistic gelatin blocks were placed at 10m distance from to shooting position. An NIJ level 3a body armor panel was placed directly in front of, and in contact with the gelatin blocks.

Image 6: Test 2 setup

A Glock 17 was loaded with one 9x19mm FMJ cartridge, and the target was shot with the white dot as an aiming point. The red circle indicates the hit from Test 1. The area of the body armor panel near the white dot is not affected by the hit from Test 1.

Test 2 Result

The body armor panel was hit, indicated by the red circle, but was not penetrated and the projectile was stopped and contained within the fibers of the panel.

Image 7: Test 2 impact front

Image 8: Test 2 impact back

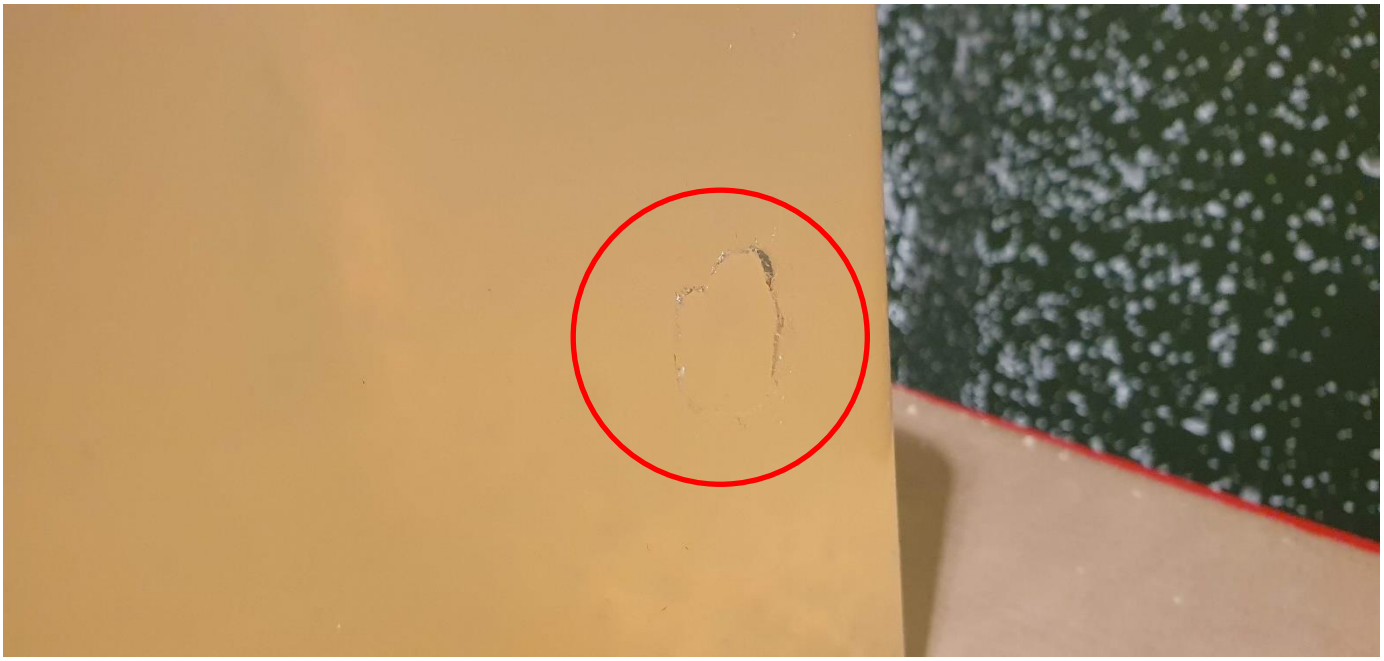


Image 9: Test 2 impact on gelatin.

Short Summary

The NIJ Level 3a body armor panel was not penetrated with the Glock 17 and 9x19mm FMJ. The trauma effect of the hit is visible as a shallow mark on the gelatin, but can not be measured using this test method.

Test 3: HK MP5 + 6.5x25 CBJ APDS against NIJ Level 3 + gelatin

A pair of 10% ballistic gelatin blocks were placed at 10m distance from to shooting position. An NIJ level 3 body armor panel was placed directly in front of, and in contact with the gelatin blocks.

Image 10: Test 3 setup

An HK MP5 in caliber 6.5x25 CBJ was loaded with one 6.5x25 CBJ APDS cartridge, and the target was shot with the green dot as an aiming point.

Image 11: Test 3 setup close up

Test 3 Result

The body armor panel was hit, indicated by the red circle. The NIJ Level 3 body armor panel was penetrated, and the projectile managed to penetrate the ballistic gelatin to a depth of 62 cm.

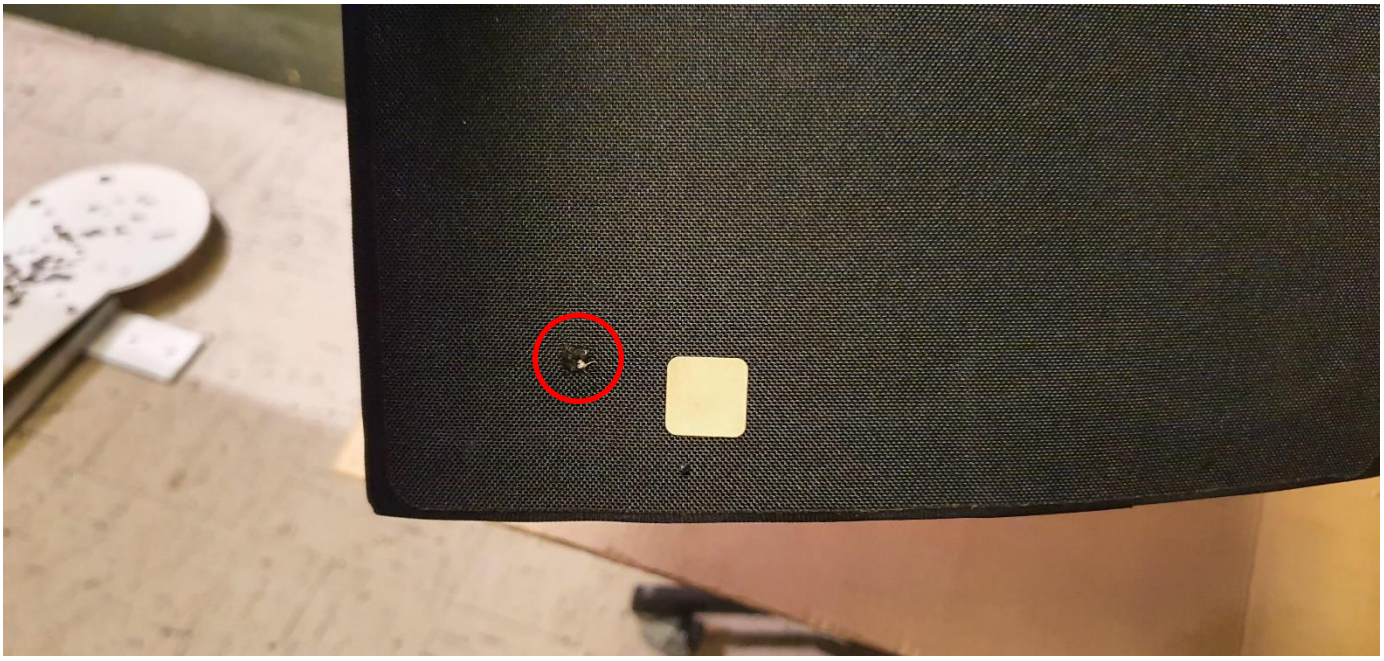


Image 12: Test 3 – Impact point NIJ Level 3 body armor panel front

Image 13: Test 3 - Impact point NIJ Level 3 body armor panel back, indicated by the green circle

Image 14: Test 3 - Ballistic gelatin from the side.
The blue circle indicates a projectile from a previous test, and shall be ignored for this test

Image 15: Test 3 – Ballistic gelatin from above

Image 16: Test 3 – Ballistic gelatin front

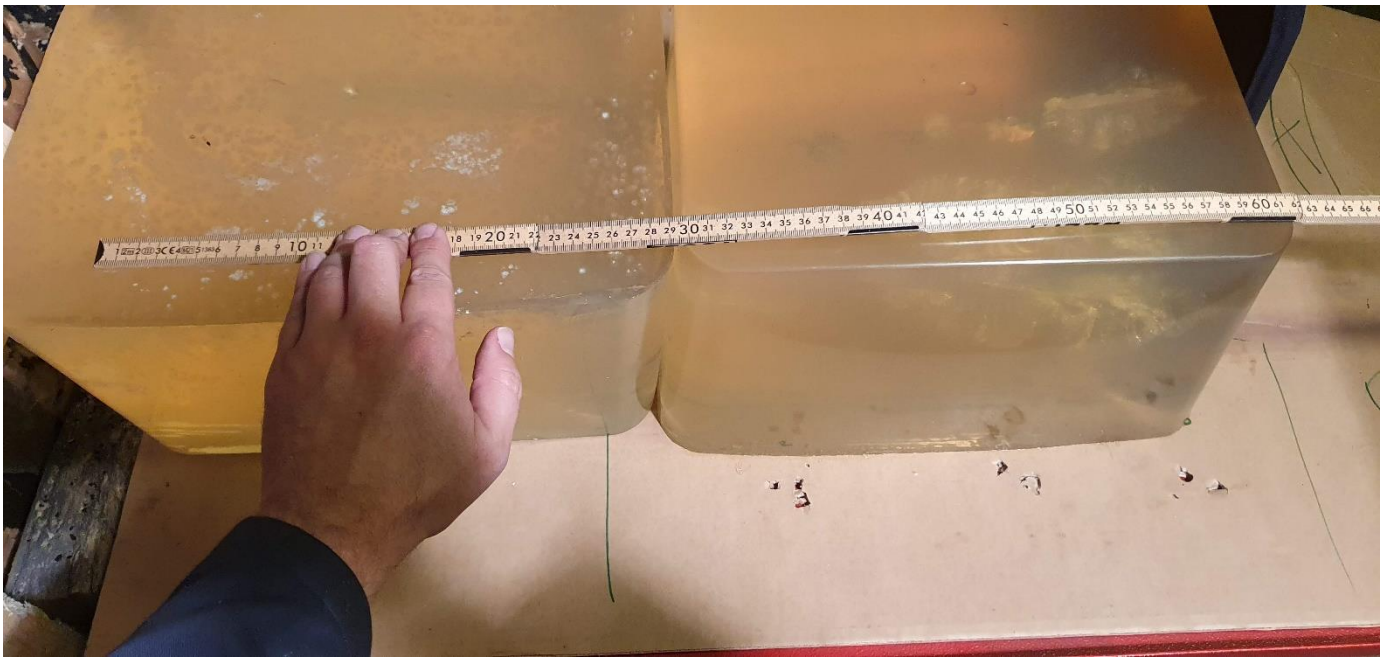
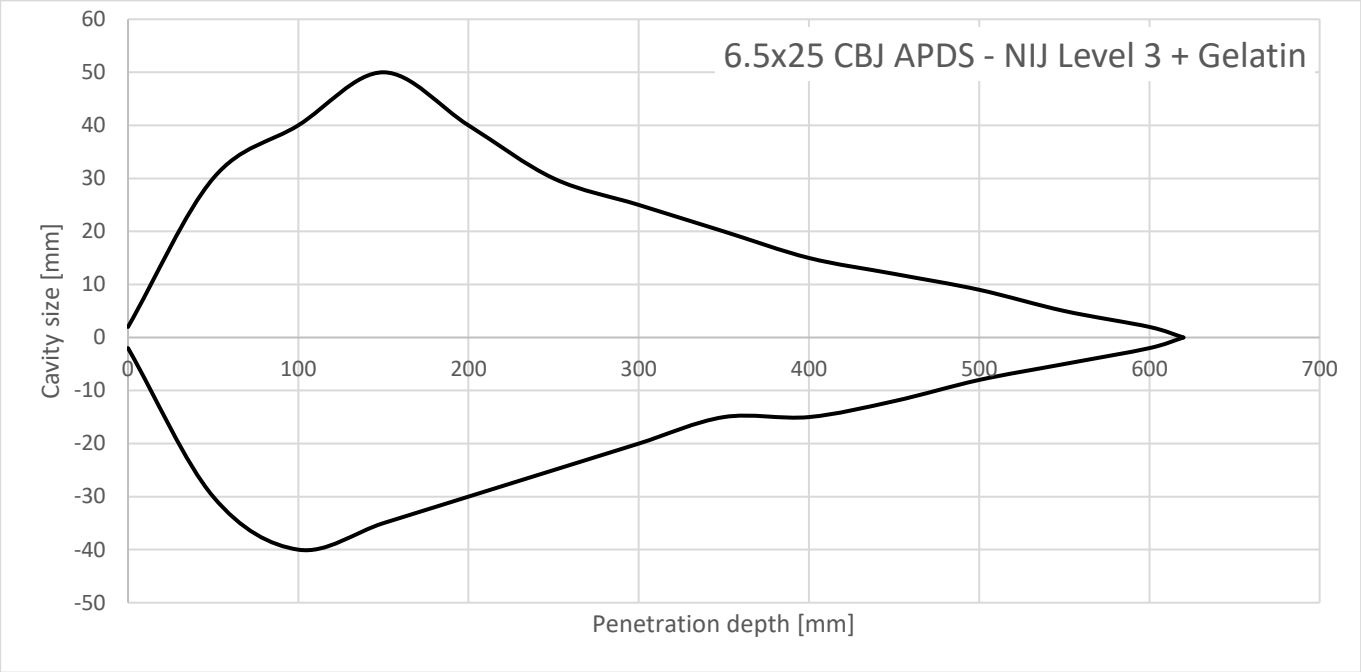


Image 17: Test 3 – Ballistic gelatin penetration depth – 62cm

Test 3: Wound Cavity



Short Summary

The NIJ level 3 body armor panel was penetrated with the HK MP5 and 6.5x25 CBJ APDS. The similarity of the size and distribution of the wound profile, compared to other tests where ballistic gelatin has been shot without a body armor panel in front, indicates that most of the energy of the projectile is retained while penetrating the NIJ level 3 body armor panel. This in turn indicates a very high probability to incapacitate the target.

Test 4: AKM + 7.62x39 FMJ against NIJ Level 3 + gelatin

A pair of 10% ballistic gelatin blocks were placed at 10m distance from to shooting position. An NIJ level 3 body armor panel was placed directly in front of, and in contact with the gelatin blocks.

Image 18: Test 4 setup front

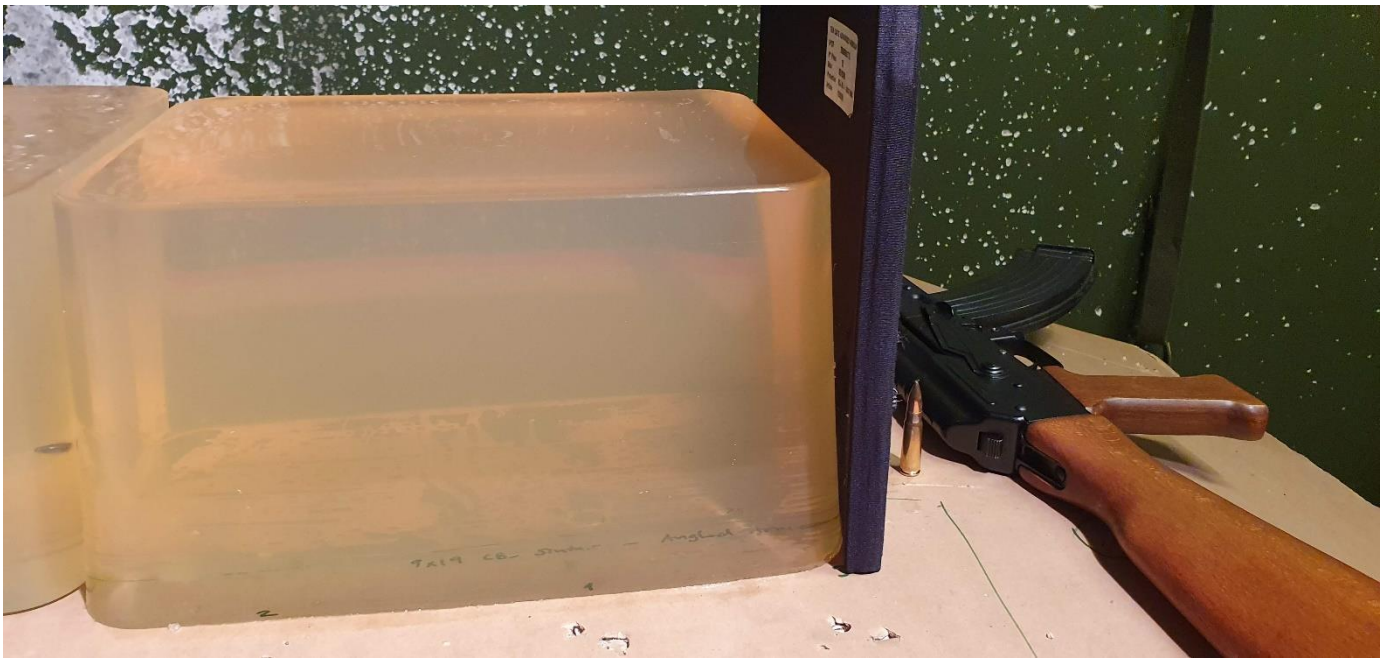


Image 18: Test 4 setup side

An AKM in caliber 7.62x39 was loaded with one 7.62x39 FMJ cartridge, and the target was shot with the white dot as an aiming point. Previous hits are indicated with blue circles and the area near the white dot is not affected by these.

Test 4 Result

The body armor panel was hit, indicated by the red circle, but was not penetrated and the projectile was stopped and contained within the panel. The blue circles indicates older hits from previous tests.

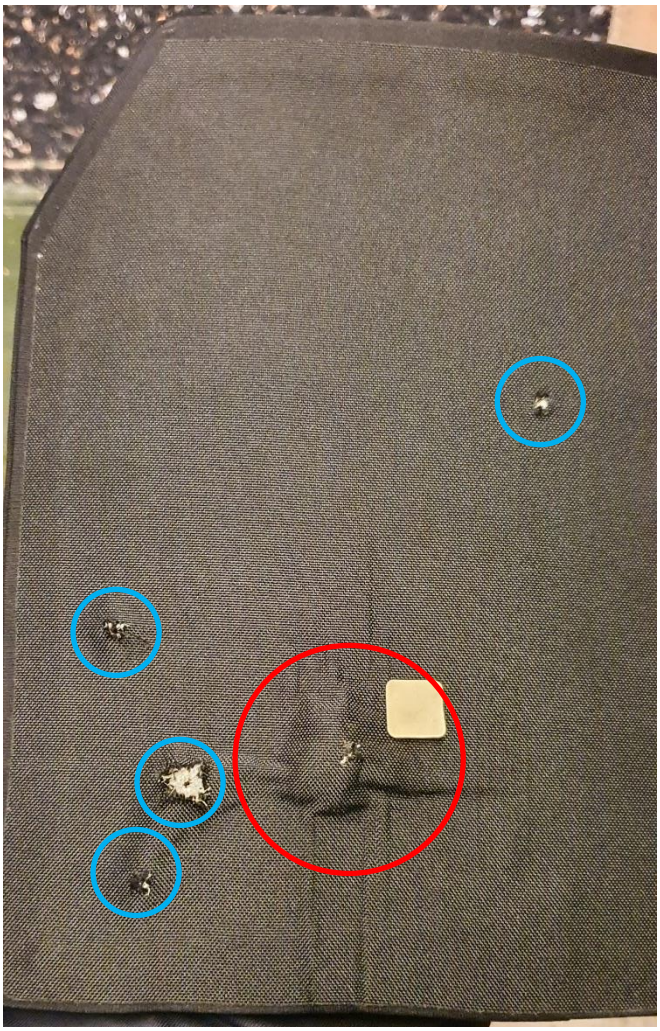


Image 19: Test 4 – NIJ level 3 impact front

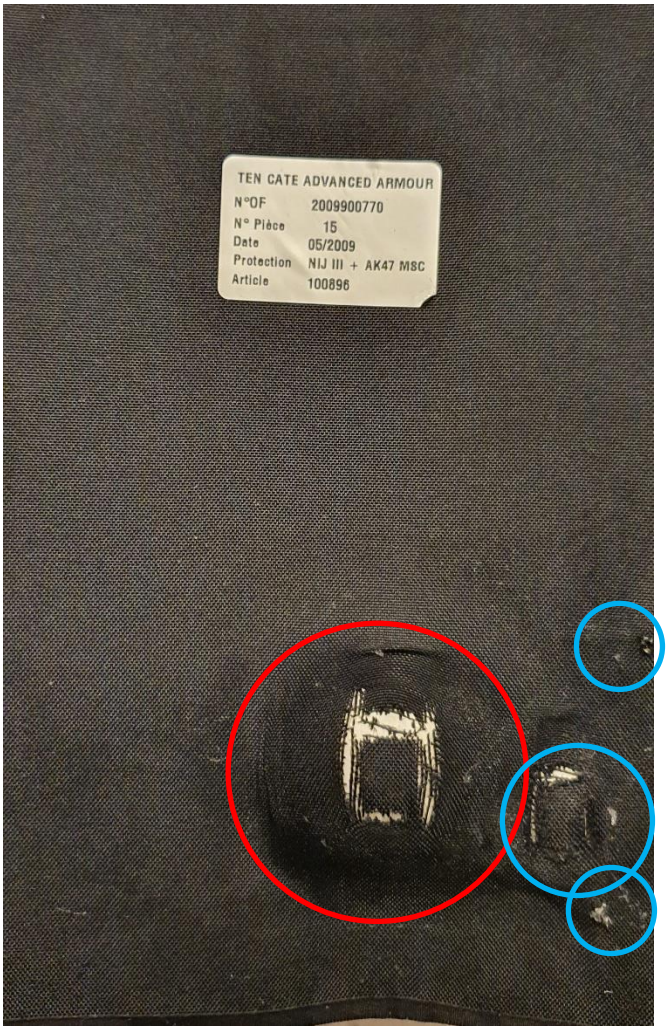


Image 20: Test 4 – NIJ level 3 impact backside

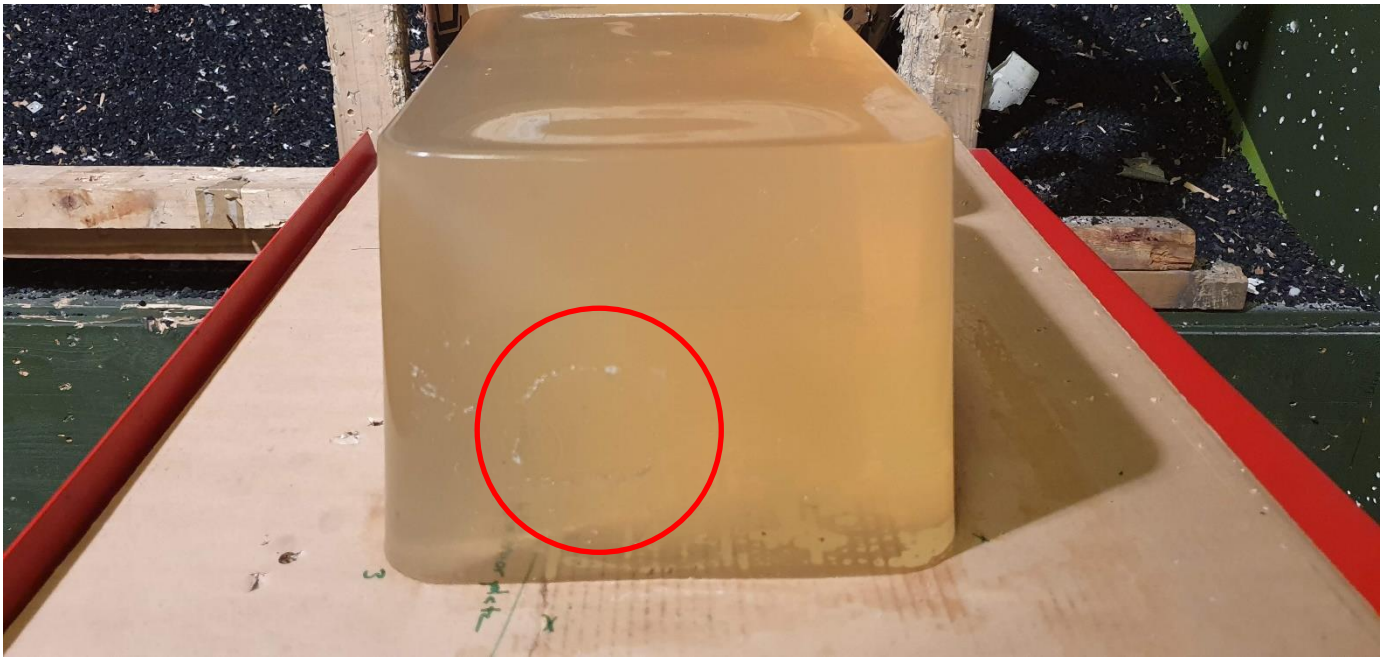


Image 21: Test 4 – Impact point at ballistic gelatin

Short Summary

The NIJ Level 3 body armor panel was not penetrated with the AKM and 7.62x39 FMJ. The trauma effect of the hit is visible as a shallow mark on the gelatin, but can not be measured using this test method.

Test 5: AK5 + 5.56x45 FMJ against NIJ Level 3 + gelatin

A pair of 10% ballistic gelatin blocks were placed at 10m distance from to shooting position. An NIJ level 3 body armor panel was placed directly in front of, and in contact with the gelatin blocks.

Image 22: Test 4 setup front

Image 22: Test 4 setup side

An AK5 in caliber 5.56x45 was loaded with one 5.56x45 FMJ cartridge, and the target was shot with the white dot as an aiming point. Previous hits are indicated with blue circles and the area near the white dot is not affected by these.

Test 5 Result

The body armor panel was hit, indicated by the red circle, and was penetrated, but the projectile broke up into several pieces before hitting the ballistic gelatin. It was able to penetrate the gelatin to a depth of 21 cm. The blue circles indicates older hits from previous tests.

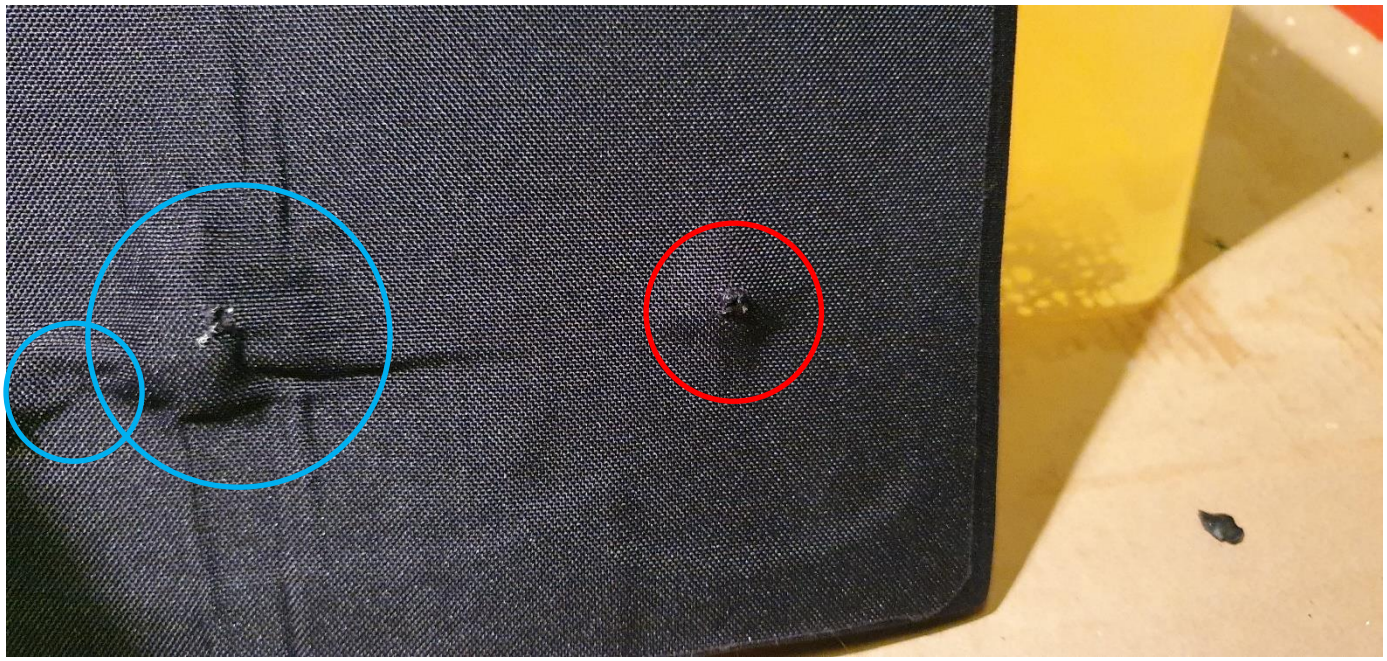


Image 23: Test 5 – NIJ level 3 impact front

Image 24: Test 5 – NIJ level 3 impact back

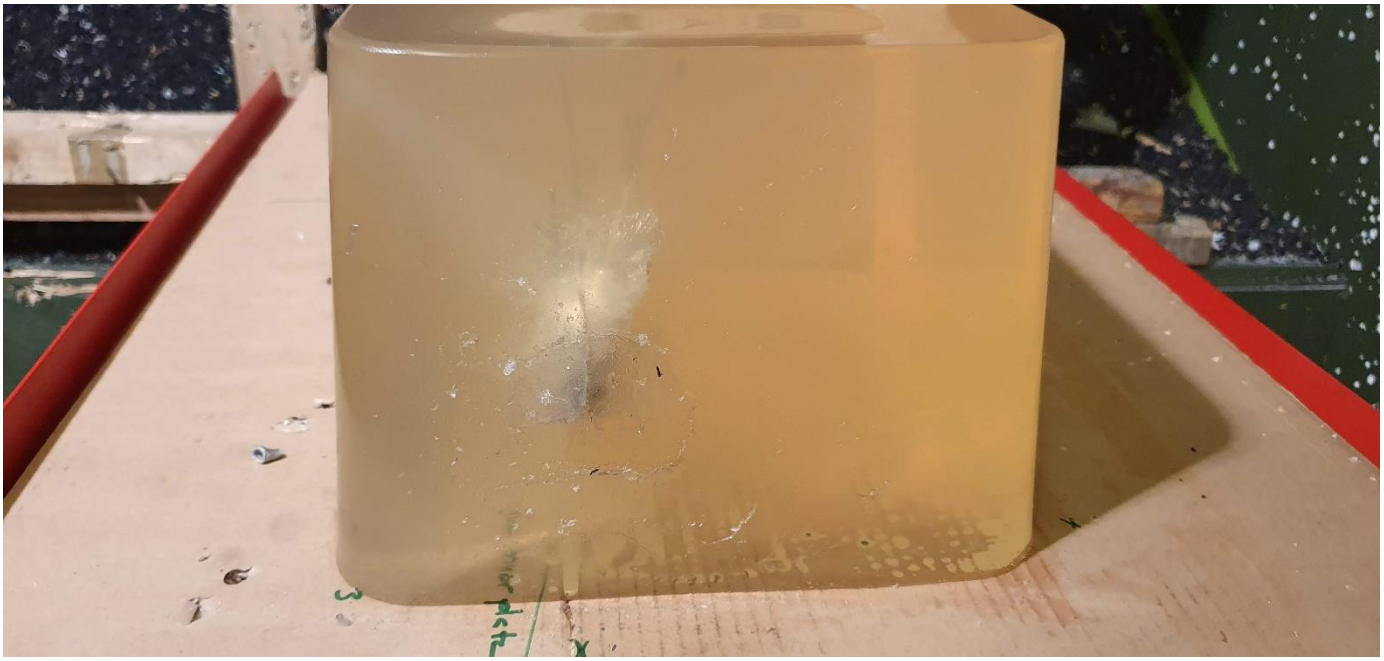


Image 25: Test 5 – Ballistic gelatin impact front

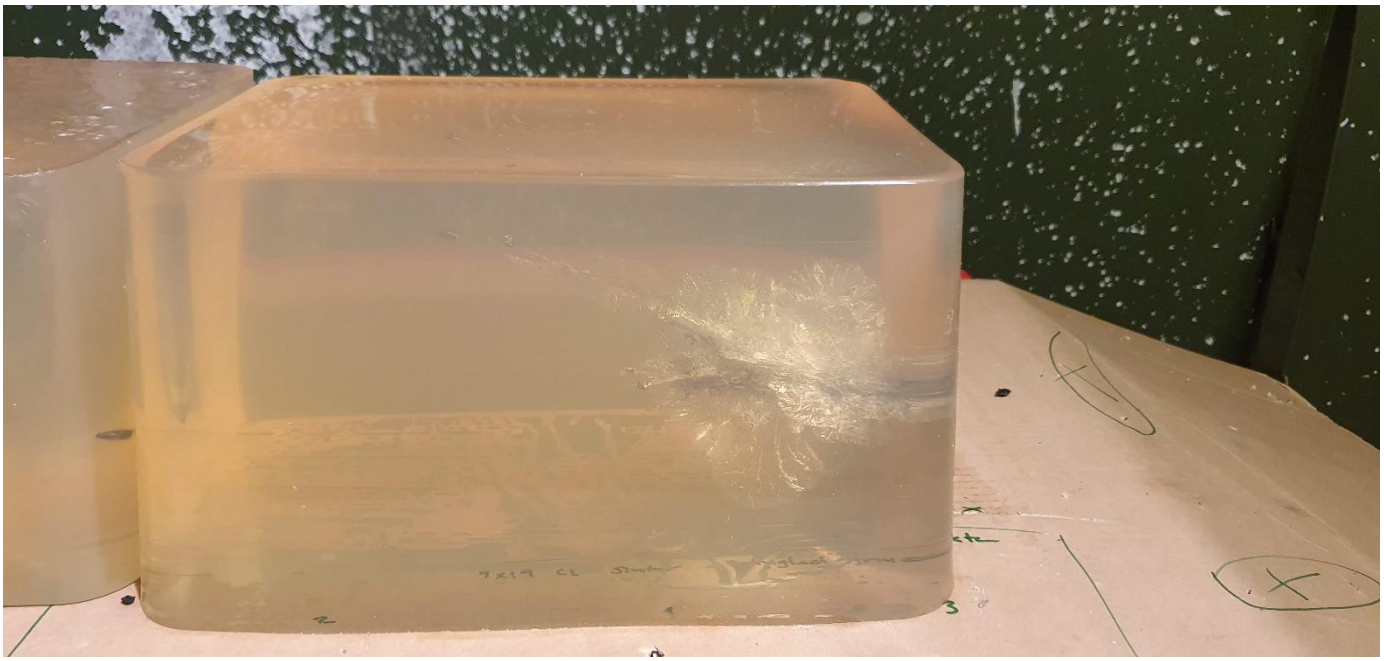


Image 26: Test 5 – Ballistic gelatin impact side

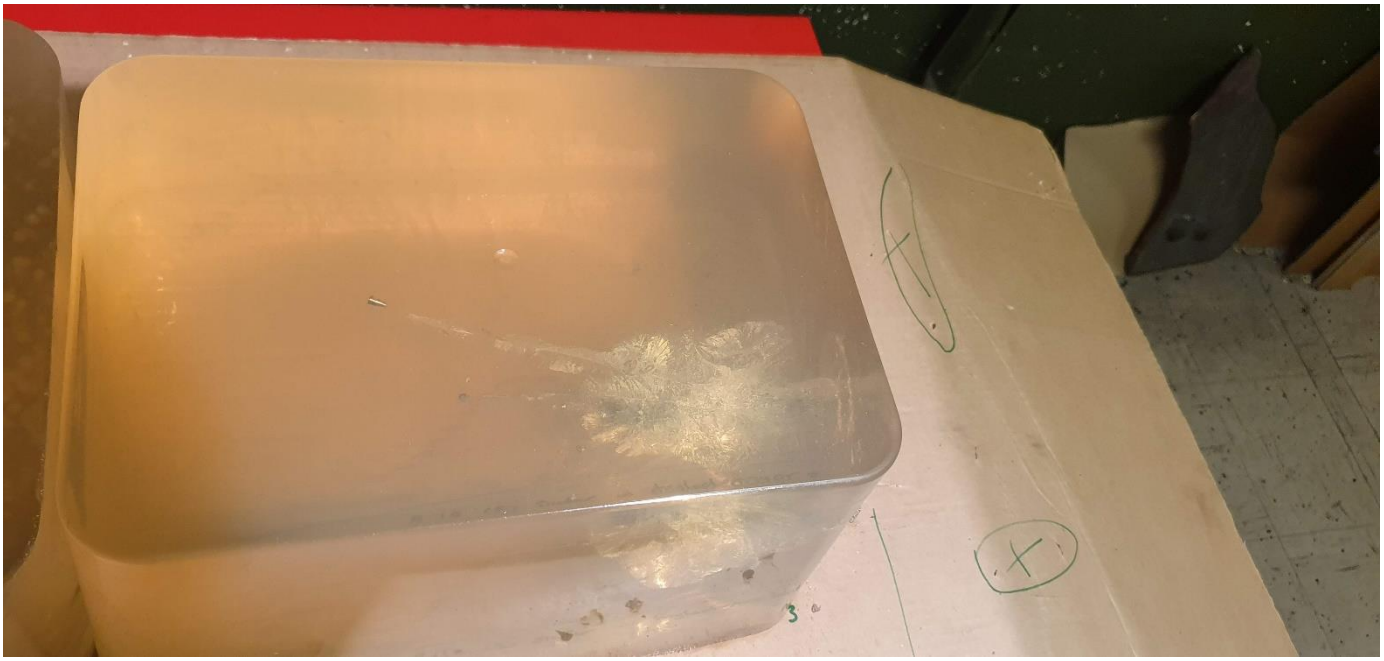


Image 27: Test 5 – Ballistic gelatin impact top

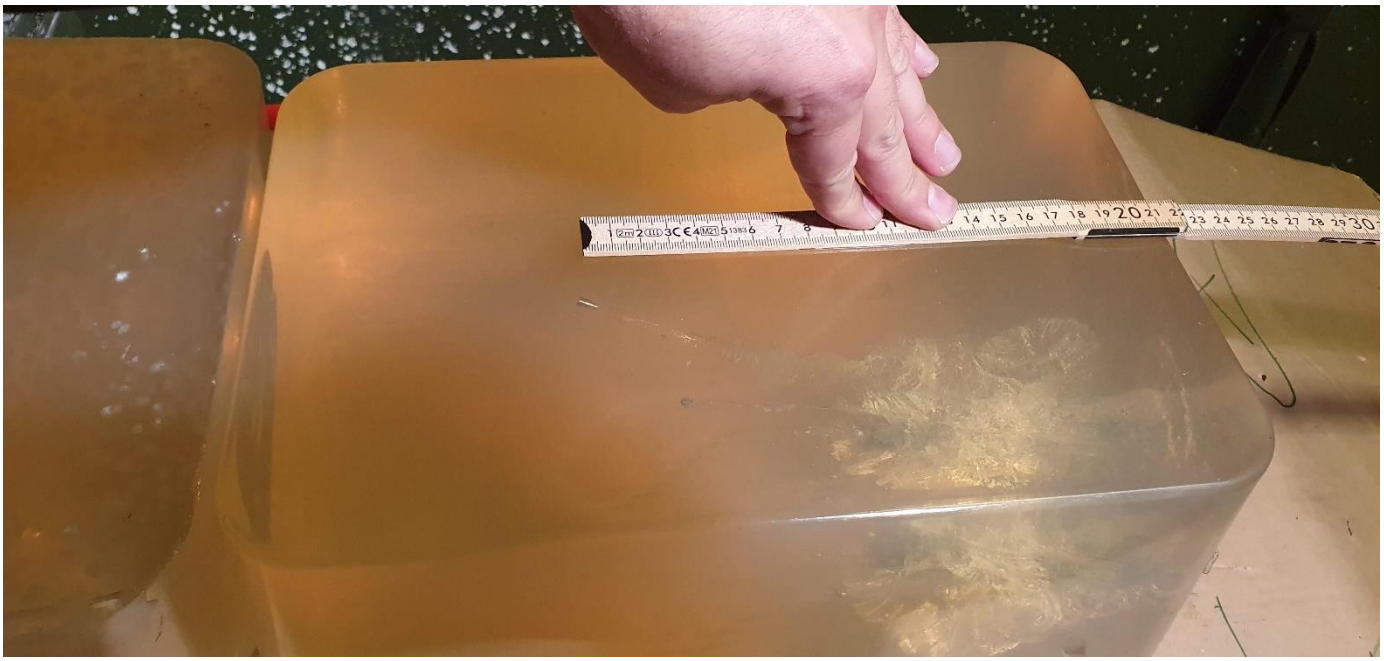
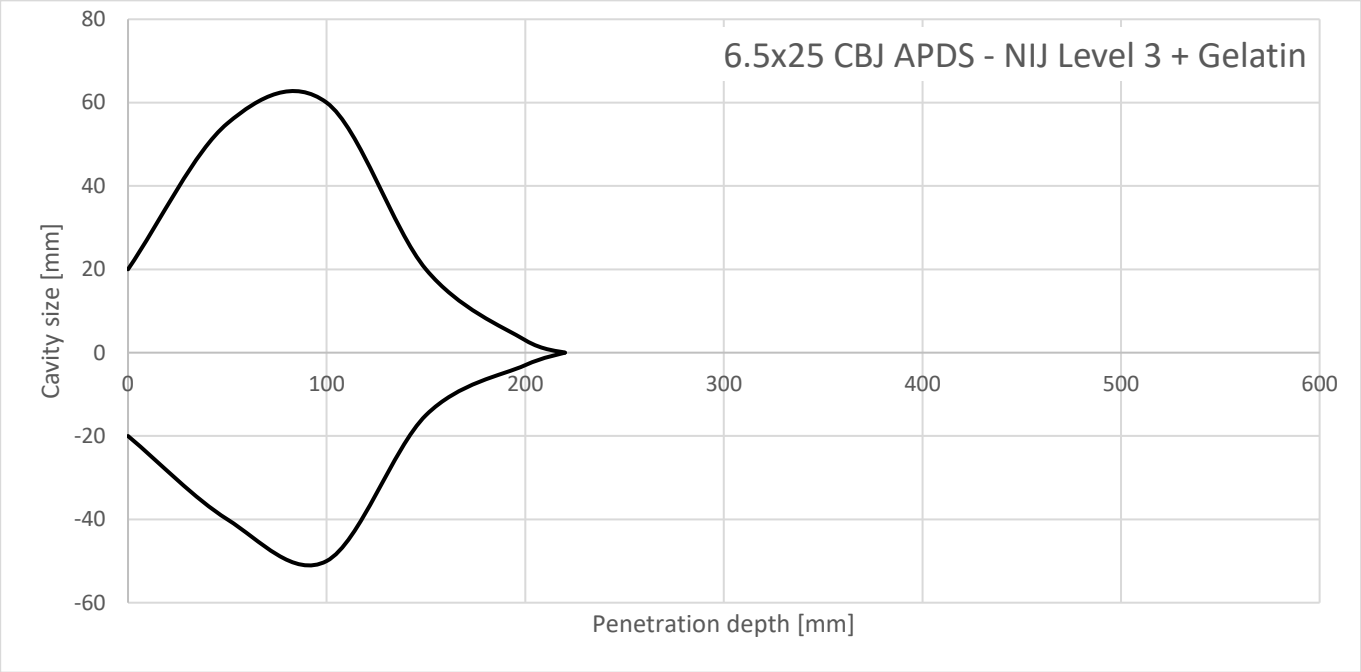


Image 28: Test 5 – Ballistic gelatin penetration depth

Test 5: Wound Cavity



Short Summary

The NIJ level 3 body armor panel was penetrated with the AK5 and 5.56x45 FMJ. However, the projectile did break up, creating a relatively short penetration of the ballistic gelatin. The fragment that caused the deepest penetration, 21cm, was the small steel penetrator from the tip of the projectile. The rest of the fragments penetrated around 13cm.

Summary

Compared to cartridges of the same class, *i.e.* pistol cartridges like the 9x19mm, the 6.5x25 CBJ has a superior armor piercing capability. Even the lesser penetrating 6.5x25 CBJ HET outperformed the 9x19mm FMJ in NIJ level 3a armor.

The 6.5x25 CBJ APDS shot from a submachine gun outperformed assault rifles in caliber 7.62x39 and 5.56x45 in terms of penetration of the NIJ level 3 body armor panel and delivering energy to the gelatin behind it. The 7.62x39 FMJ failed to penetrate the body armor panel altogether, and the 5.56x45 FMJ did penetrate it, but since the projectile broke up it had a very shallow penetration of the gelatin, compared to the 6.5x25 CBJ APDS.

Also, the volume of the temporary cavity was much larger with the 6.5x25 CBJ APDS, indicating that it has a greater potential for incapacitation, when fired from a submachine gun or a pistol, compared to a full size assault rifle, like the 5.56x45mm AK5 with 450mm (18”) barrel length.