



CBJ Tech – Test protocol

**6.5x25 CBJ**

**Accuracy at 10m range**



# CBJ Tech – Test protocol

|                                                                                                           |                                                            |                                             |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------|
| <b>Date:</b> 2020-06-01                                                                                   | <b>Location:</b> Kungsbacka, Bunker (indoor test facility) | <b>Weather conditions:</b> Indoor, 21 deg C |
| <b>Weapon systems tested:</b> Glock 17 gen 3 in Ransom Rest and barrel in adapter for Universal Receiver. |                                                            |                                             |
| <b>Ammunition tested:</b> 6.5x25 CBJ APDS, 6.5x25 CBJ HET and 6.5x25 CBJ Sinter                           |                                                            |                                             |
| <b>Targets tested:</b> Paper target.                                                                      |                                                            |                                             |
| <b>People present:</b> Mikael Johansson                                                                   |                                                            |                                             |
| <b>Additional information:</b>                                                                            |                                                            |                                             |

## Background, Purpose and Goal

The accuracy of the 6.5x25 CBJ APDS cartridge is interesting to measure carefully. The subcaliber projectile, that separates from the sabot after the muzzle, has a higher risk of disturbances than a normal full caliber projectile because of the separation process. In this case, there is a specific interest to evaluate the combination of Glock 17 and 6.5x25 CBJ

The purpose of this test is to measure the accuracy of the combination of weapon and ammunition. In order to avoid inaccuracy caused by the weapon, like loose fit between barrel, slide or frame, the barrel was also taken out of the pistol and fitted in an adapter that fits into a Universal Receiver. As a reference, one series was also shot from a 120mm Universal Receiver barrel. As a comparison, two 5 shot series were added to the test, one with 6.5x25 CBJ HET and one with 6.5x25 CBJ Sinter. These two are full caliber versions of the 6.5x25 CBJ cartridge and the projectile does not have to separate from a sabot. Compared with these two series, the inaccuracy caused by the core projectile separating from the sabot can be indicated.

The goal is to achieve an accuracy that is acceptable in both configurations, both barrel in pistol and barrel in adapter, and to measure any differences in accuracy between these two, in order to determine how the accuracy is affected by the pistol itself.

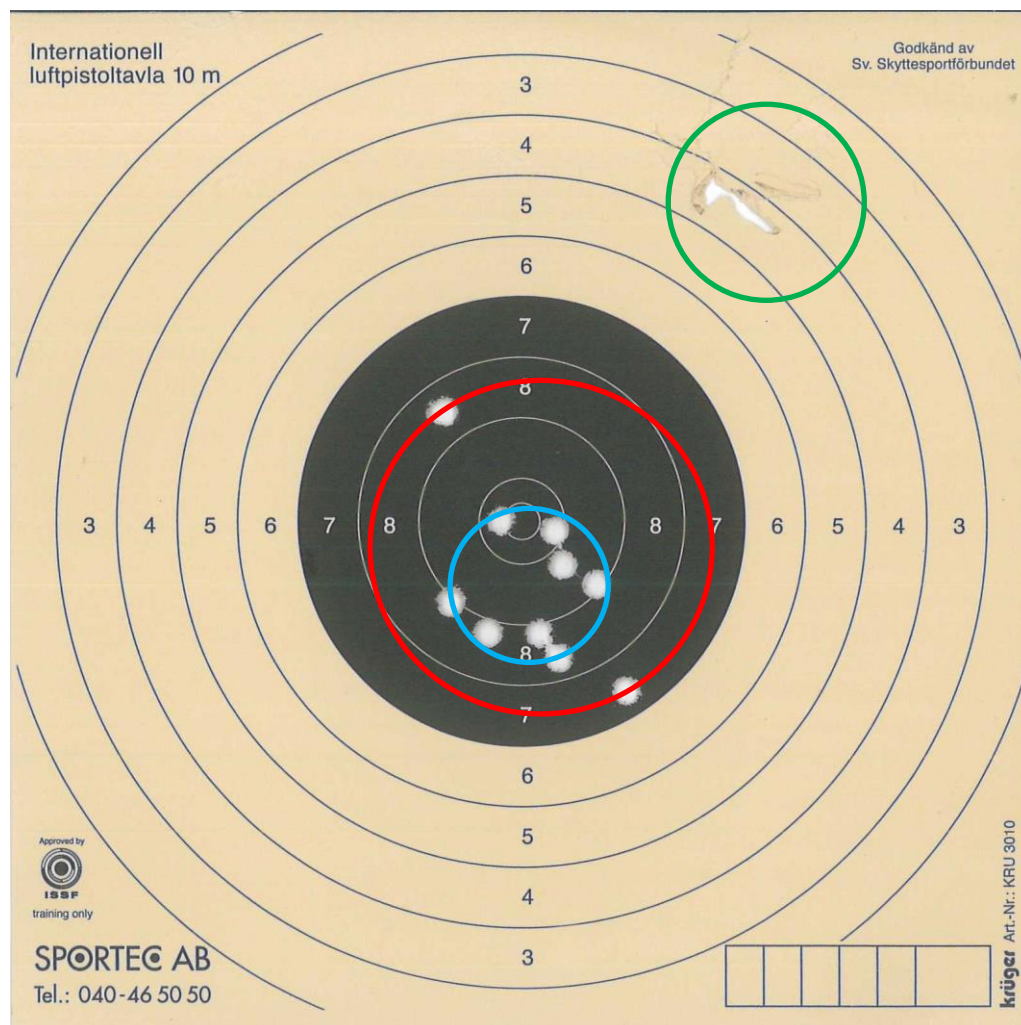


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## Test 1 Setup

A Universal Receiver was used, fitted with a 120mm long 6.5x25 CBJ barrel. 10 shots were fired at 10m range.

## Result test 1



—  $D_{100} = 44\text{mm}$

—  $D_{80} = 20\text{mm}$

— Green circle = Sabot hit

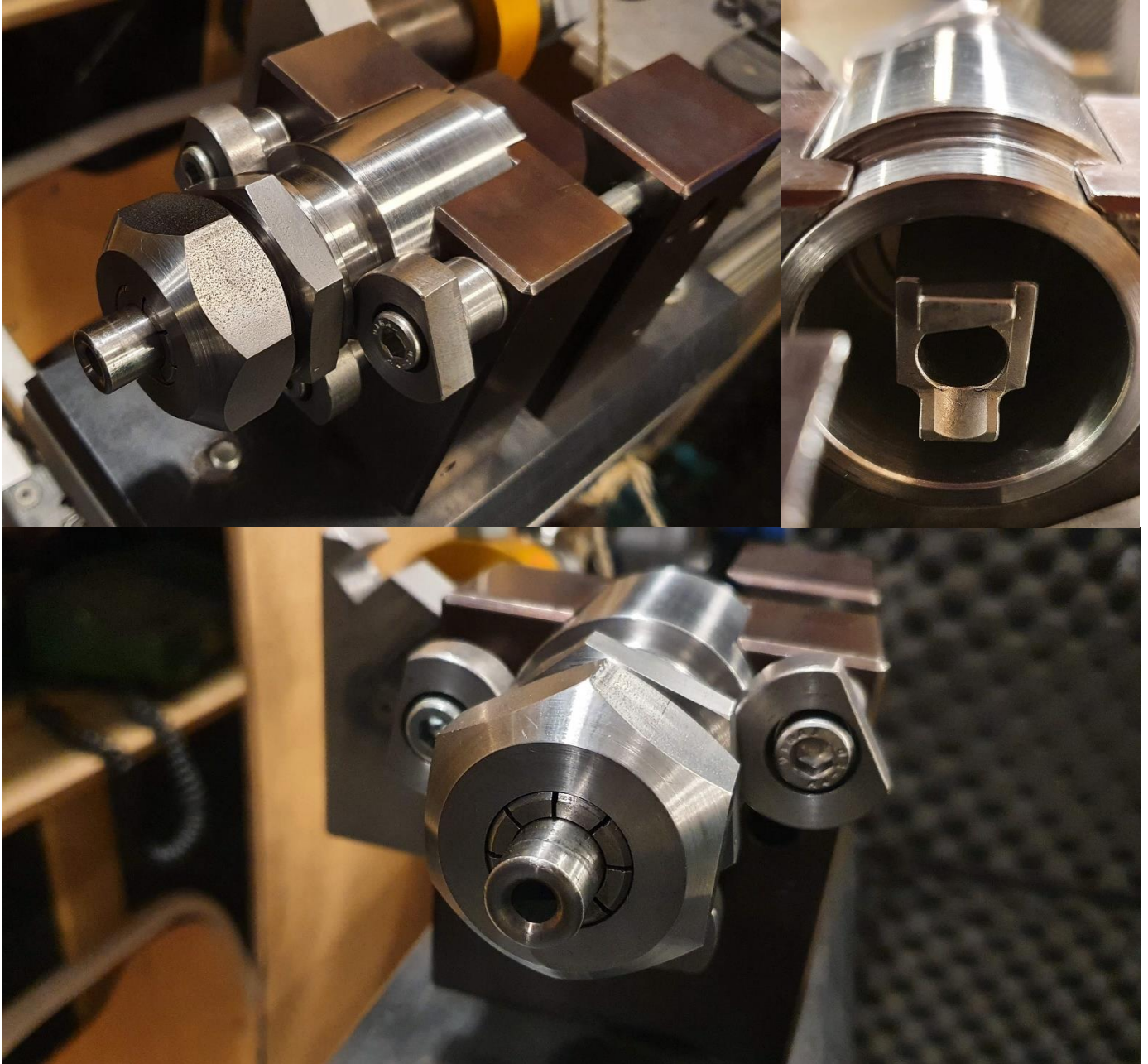
Due to the complexity of the separation of the core projectile from the sabot after leaving the muzzle, it can sometimes be noted that one or two hits in a 10-shot series slightly deviates from the rest. That is why both 100% pattern size (red) and 80% pattern size (blue) are shown with circles.

Important to notice is that the holes are only 4mm in diameter, which is why they seem to be very dispersed. If it would have been 9mm holes, there would be one big u-shaped hole in the middle and two separate holes up left and down right.

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## Test 2 Setup

The 114mm long Glock 17 gen 3 barrel in caliber 6.5x25 CBJ was taken out of the pistol and fitted inside an adapter, that was then mounted in a Universal Receiver. See pictures below.

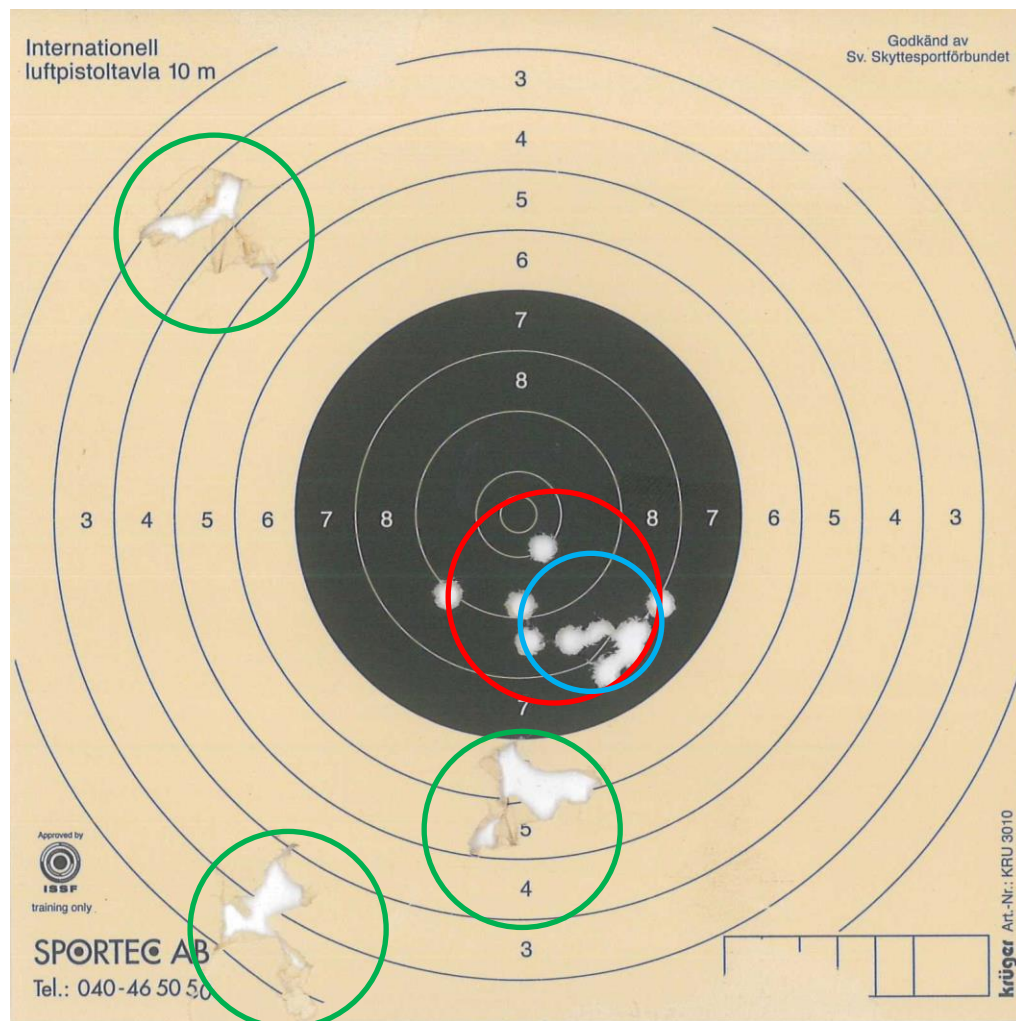


Three 10-shot groups were shot at 10m range. Velocities were measured 1m in front of the muzzle.



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## Results test 2



■ D<sub>100</sub> = 28mm

■ D<sub>80</sub> = 18mm

■ Green circle = Sabot hit

Measured velocities [m/s]:

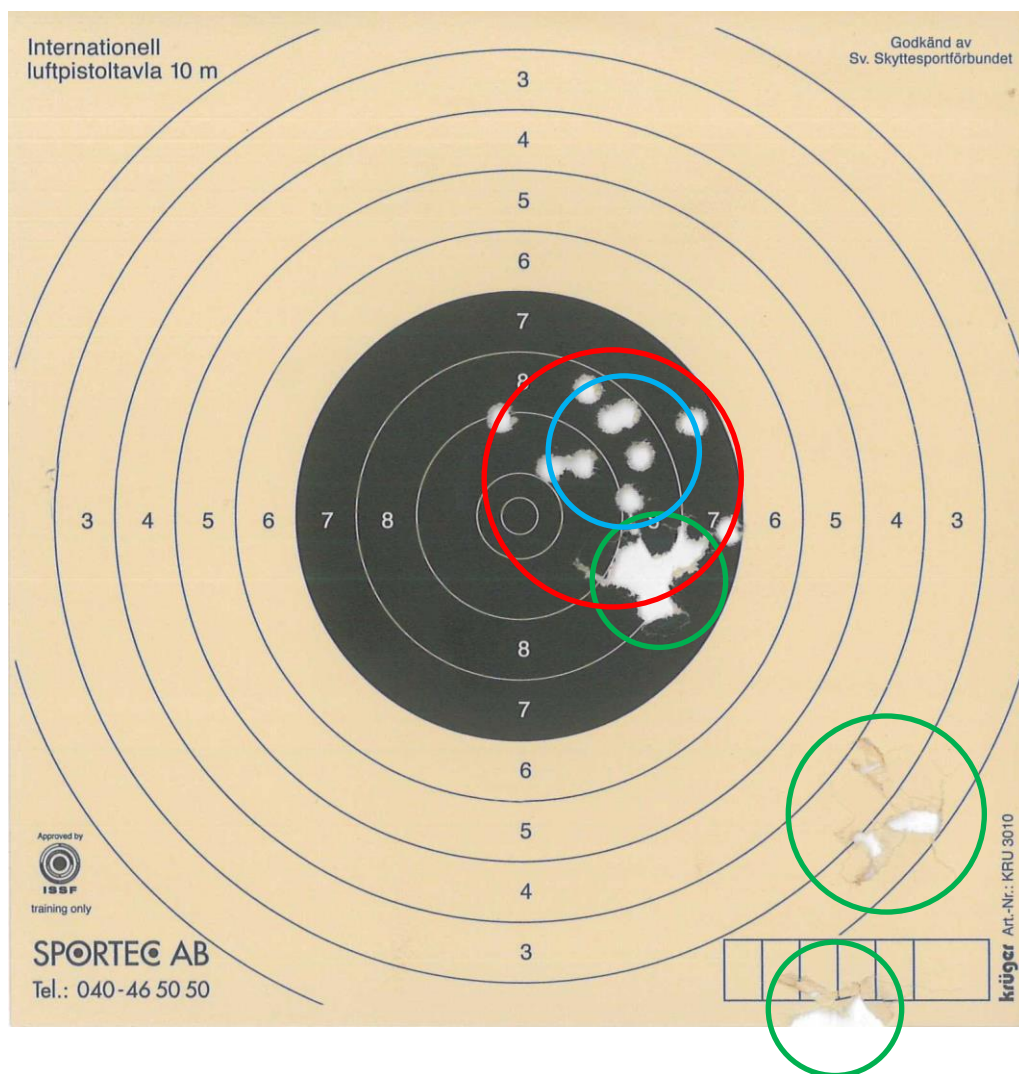
|    |       |
|----|-------|
| 1  | 751,9 |
| 2  | 756,7 |
| 3  | 756,3 |
| 4  | 745,8 |
| 5  | 752,4 |
| 6  | 741,3 |
| 7  | 750,0 |
| 8  | 744,2 |
| 9  | 741,2 |
| 10 | 756,4 |

V<sub>average</sub> = 749,6

Standard deviation = 6,1 m/s



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■ D<sub>100</sub> = 34mm

■ D<sub>80</sub> = 20mm

■ Green circle = Sabot hit

Measured velocities [m/s]:

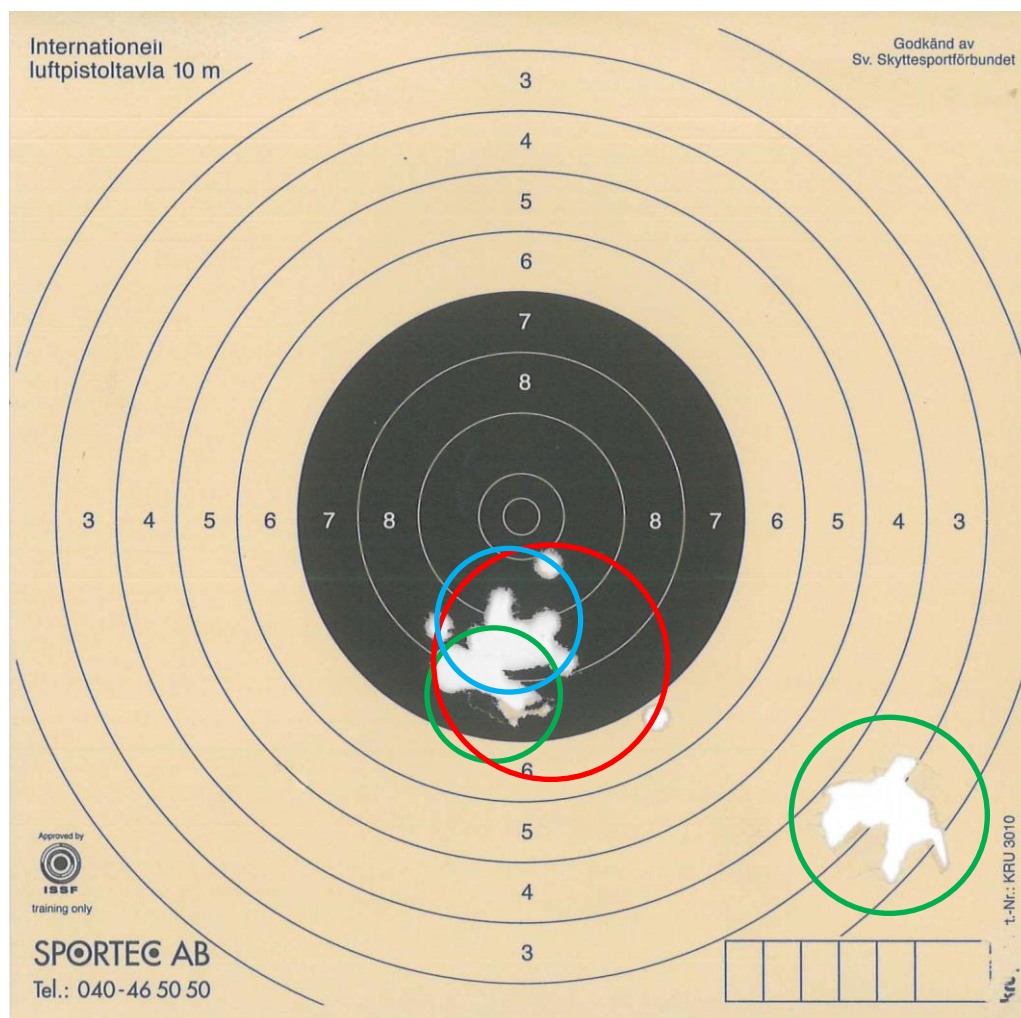
|    |       |
|----|-------|
| 1  | 752,4 |
| 2  | 752,4 |
| 3  | 745,1 |
| 4  | 749,0 |
| 5  | 755,7 |
| 6  | 742,4 |
| 7  | 739,7 |
| 8  | 744,9 |
| 9  | 755,1 |
| 10 | 749,6 |

V<sub>average</sub> = 748,6

Standard deviation = 5,4 m/s



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■  $D_{100} = 31\text{mm}$

■  $D_{80} = 19\text{mm}$

■ Green circle = Sabot hit

Measured velocities [m/s]:

|    |       |
|----|-------|
| 1  | 738,3 |
| 2  | 755,9 |
| 3  | 746,5 |
| 4  | 758,0 |
| 5  | 738,4 |
| 6  | 755,9 |
| 7  | 753,2 |
| 8  | 749,5 |
| 9  | 754,3 |
| 10 | 741,2 |

$V_{\text{average}} = 749,1$

Standard deviation = 7,6 m/s

Unfortunately, on the 9<sup>th</sup> shot, the sabot hit parts of the previous holes, which is why the hit pattern looks irregular.



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## Test 3 Setup

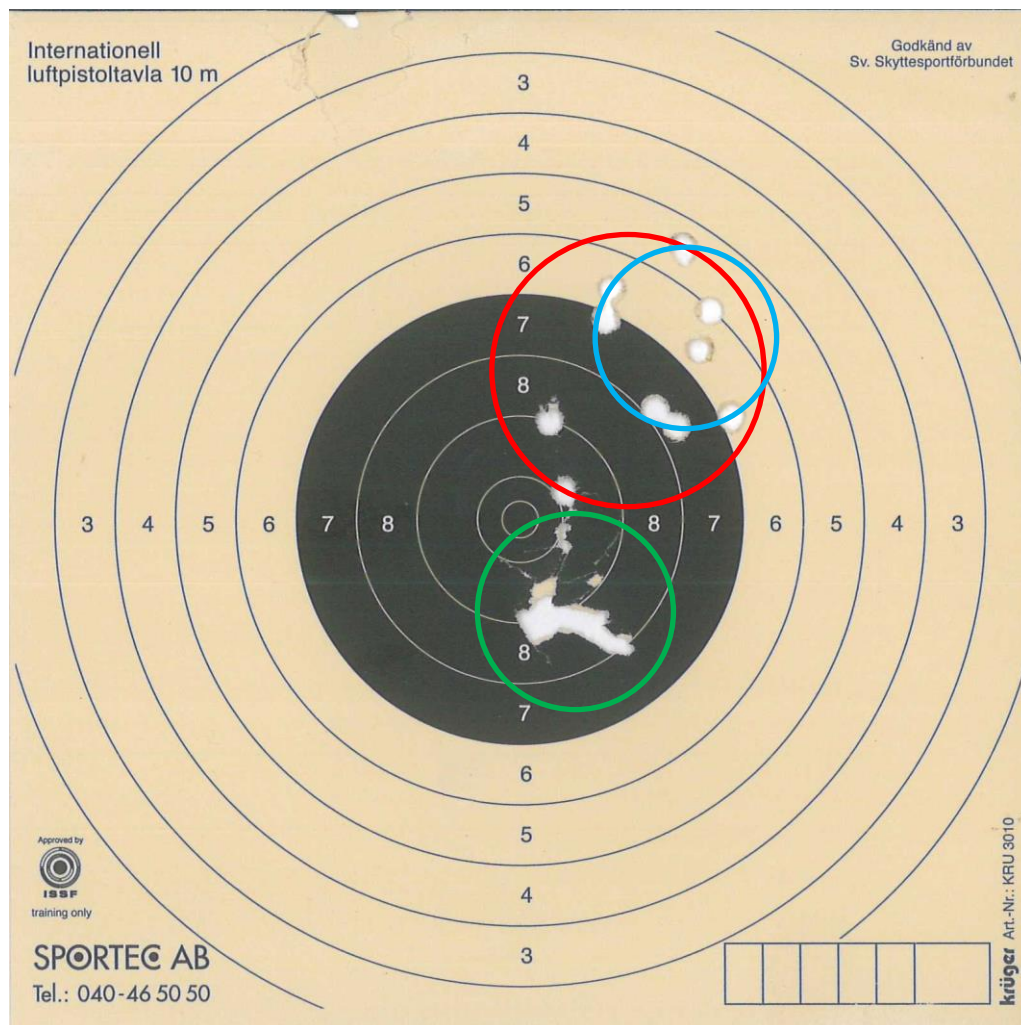
The Glock 17 gen 3 pistol was mounted in a Ransom Rest. Two 10-shot series were shot at 10m range, and velocities were measured 1m in front of the muzzle.





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## Results test 3



- D<sub>100</sub> = 36mm

- D<sub>80</sub> = 24mm

- Green circle = Sabot hit

### Measured velocities [m/s]:

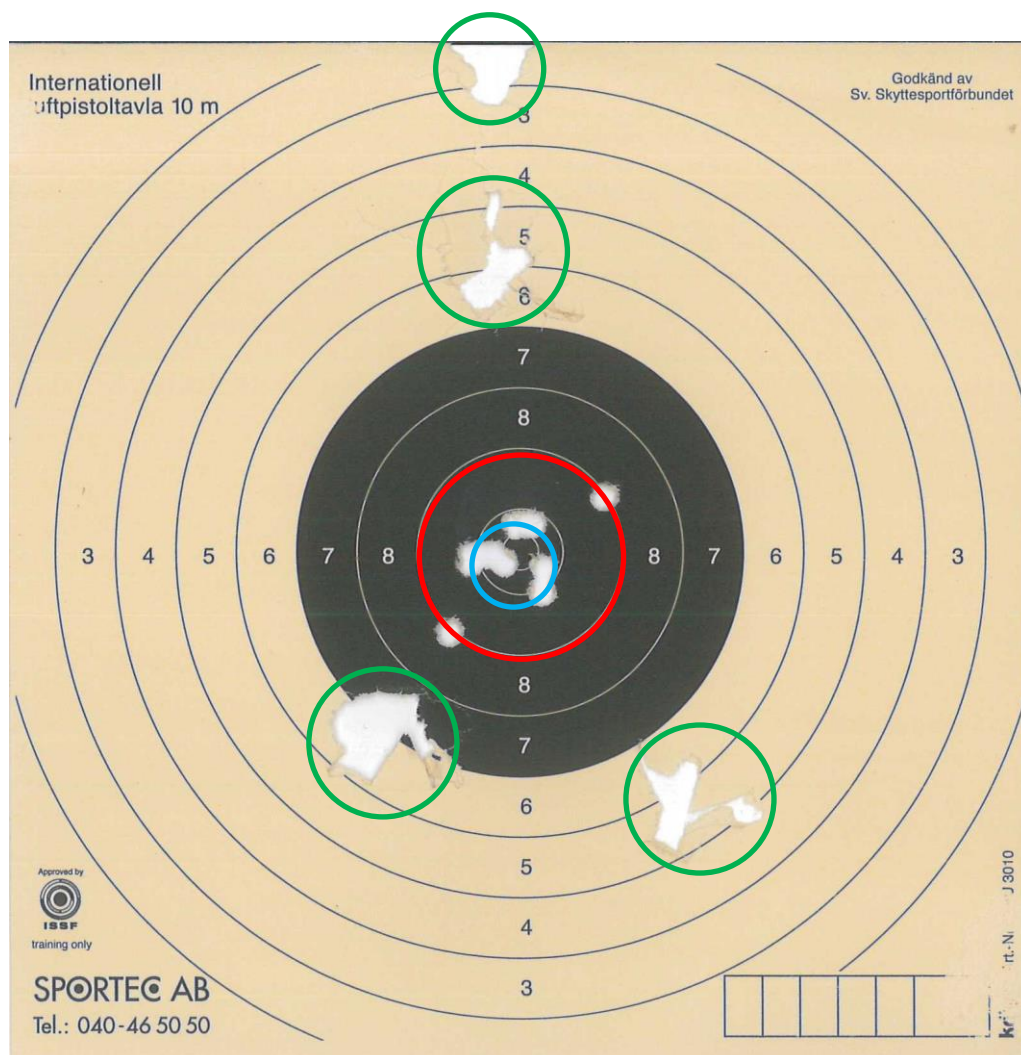
|    |       |
|----|-------|
| 1  | 742,7 |
| 2  | 742,1 |
| 3  | 749,6 |
| 4  | 739,9 |
| 5  | 751,9 |
| 6  | 756,9 |
| 7  | 752,3 |
| 8  | 753,1 |
| 9  | 757,9 |
| 10 | 745,9 |

V<sub>average</sub> = 749,2

Standard deviation = 6,3 m/s



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- D<sub>100</sub> = 27mm

- D<sub>80</sub> = 11mm

- Green circle = Sabot hit

Measured velocities [m/s]:

|    |       |
|----|-------|
| 1  | 743,2 |
| 2  | 740,1 |
| 3  | 747,6 |
| 4  | 735,9 |
| 5  | 751,3 |
| 6  | 753,2 |
| 7  | 749,3 |
| 8  | 753,1 |
| 9  | 750,3 |
| 10 | 745,9 |

$V_{\text{average}} = 748,8$

Standard deviation = 5,8 m/s



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## Reference test setup

A 100mm long 6.5x25 CBJ barrel was mounted in the Universal Receiver. Two 5 shot series were shot with 6.5x25 CBJ HET and 6.5x25 CBJ Sinter.

## Results 6.5x25 CBJ HET



-  $D_{100} = 9.5\text{mm}$

Measured velocities [m/s]:

|   |       |
|---|-------|
| 1 | 717,9 |
| 2 | 705,9 |
| 3 | 715,1 |
| 4 | 704,2 |
| 5 | 715,1 |

$V_{\text{average}} = 711,8$

Standard deviation = 6 m/s



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## Results 6.5x25 CBJ Sinter



■ D<sub>100</sub> = 9.5mm

Measured velocities [m/s]:

|   |       |
|---|-------|
| 1 | 709,3 |
| 2 | 709,1 |
| 3 | 704,7 |
| 4 | 710,7 |
| 5 | 705,5 |

V<sub>average</sub> = 707,9

Standard deviation = 2,6 m/s



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## Summary

The supply of test ammunition was somewhat limited for these tests, which is why the sample set is limited to a few 10-shot series. However, a pattern can clearly be seen from this data, and that is that the accuracy is relatively unchanged, even if the weapon system differs. It is important to notice that this is pre-series ammunition with components made in low volume production. In full series production the manufacturing methods will be better tweaked and the amount of projectiles that deviates from the center of the hit pattern will be greatly reduced.

The approach to this testing was to start with the theoretically most accurate weapon system – a Universal Receiver with an optimized 120mm long barrel. The next step was to test the pistol barrel under similar circumstances, so it was fitted inside a custom made adapter, which allows the Glock 17 barrel to be mounted in the same Universal Receiver. Finally, the last step was to test the accuracy from the Glock pistol mounted in a Ransom Rest, to show the theoretical accuracy of the ammunition in combination with the weapon system used in the field.

Quite surprising is the fact that the test series with the best  $D_{80}$  accuracy was fired from the pistol fitted in a Ransom Rest, which logically should have the least accuracy, because influences from the weapon system are present. This could be explained by the fact that the data samples are low and that this is mostly a coincidence, considering that the results are quite similar overall regarding the accuracy.

These targets are 135mm X 135mm in size, and all of them had at least one hit from a sabot. This shows that the separation process does not send the sabots in separate directions. At close range they can be dangerous, especially if they hit a sensitive part of a target, like an eye. At 10m range, the low density sabot has lost most of its kinetic energy and cannot penetrate skin or clothing. At this distance most of them still hit within a 500mm circle around the target. After this distance the paths of the sabots deviates more from the core projectile, but the energy is so low that they practically can be considered harmless.

A conclusion can be drawn that if the shooter is shooting past obstacles, like through a window, it is very unlikely that a sabot will hit the frame and bounce back at the shooter (unless the core projectile also hits the frame). Also, shooting past sensitive obstacles, like teammates, bystanders or hostages, the risk of the obstacles being injured by the sabot, but not hit by the core projectile is relatively low.

The measured average velocities and their respective standard deviations were also very similar during all the different test series for the 6.5x25 CBJ APDS. Consistency of all parameters is the key to achieve good accuracy.

The conclusion is that the accuracy of the 6.5x25 CBJ APDS is comparable to, or better than that of good quality 9x19mm ammunition when fired from the same type of pistol. The two reference series with 6.5x25 CBJ HET and 6.5x25 CBJ Sinter with full caliber, non-separating projectiles, had a higher degree of accuracy. This shows that the separation of the sabot from the core projectile does affect the accuracy to some extent, but it is well within normal level of accuracy for these types of weapons. Important to notice is also that the reference series were shot in a shorter barrel, but from a universal receiver, which increases the measured accuracy.