

Department of Engineering & Applied Science

Weapon and Vehicle Systems Group
Cranfield University
Defence Academy of the United Kingdom
Shrivenham Swindon SN6 8LA

Direct dial: (0) 1793 785067
Departmental Office: (0) 1793 785475
Fax: (0) 1793 783192

27th June 2013

Ballistic trials were carried out on the 27th June 2013 at Cranfield University, Shrivenham on behalf of Stiletto Systems Ltd. in the presence of their representatives Philip Duggen, Kahlit Khabibullin and Sam Hoskinson.

The trials were carried out to ascertain the Ballistic Limit Velocity (V_{50}) of the Stiletto manufactures projectiles against hardened steel targets.

A full set of test results follow:

Ammunition: 13g Stiletto AP projectile

Panel Description: 15mm HARDOX 450 plate; steel hardened to 453 HBW

| Shot No. | Strike face Velocity (m/s) (Doppler) | Held/ Penetrated | Comments |
|----------|--------------------------------------|------------------|---------------------------------|
| 1 | 515 | Held | |
| 2 | 523 | Held | |
| 3 | 656 | Penetrated | |
| 4 | 617 | Held | Shot used to calculate V_{50} |
| 5 | 633 | Penetrated | Shot used to calculate V_{50} |
| 6 | 606 | Held | Shot used to calculate V_{50} |
| 7 | 633 | Penetrated | Shot used to calculate V_{50} |

4 shot $V_{50} = 622\text{ms}^{-1}$ Velocity spread = 24ms^{-1} Standard Deviation = 13.2ms^{-1}

Ammunition: 14g Stiletto AP projectile

Panel Description: 17mm HARDOX 450 plate; steel hardened to 454 HBW

| Shot No. | Strike face Velocity (m/s) (Doppler) | Held/ Penetrated | Comments |
|----------|--------------------------------------|------------------|---------------------------------|
| 1 | 598 | Held | |
| 2 | 652 | Penetrated | Shot used to calculate V_{50} |
| 3 | 637 | Held | Shot used to calculate V_{50} |
| 4 | 639 | Held | Shot used to calculate V_{50} |
| 5 | 656 | Penetrated | Shot used to calculate V_{50} |

4 shot $V_{50} = 646\text{ms}^{-1}$ Velocity spread = 19ms^{-1} Standard Deviation = 9.42ms^{-1}

The steel plate was sourced from Swedish Steel by Stiletto Systems and supplied to Cranfield University with quality inspection certificates and hardness test report, for use in the trial. This Brinell hardness test was carried out by Swedish Steel as part of their quality process and their figures are reported in the tables above. Cranfield University confirmed the dimensional accuracy of the thickness of the plates and it is Cranfield's thickness data that is reported in the same tables above.

Prediction of range at which V50 velocity would be realised.

The muzzle velocity of the 2 projectiles are reported by Stiletto Systems as 830m/s for the 13g projectile and 810m/s for the 14g projectile when fired from a Remington 700 VLC rifle with 660mm long barrel with a 1 turn in 12" twist barrel.

A Coefficient of Drag analysis of these projectiles has not been carried out, however for 7.62mm calibre projectiles a velocity loss of 1m/s per m of flight is a good approximation over short distances. Taking this, the muzzle velocities and V50S into account it would be expected that the projectiles would be able to penetrate their respective plates as shown in the following table:

| Projectile | Target Plate | Expected Range for V50 |
|------------|-----------------|------------------------|
| 13a | 15mm HARDOX 450 | 208m |
| 14g | 17mm HARDOX 450 | 164m |

For a more accurate estimate of the external ballistics of the projectiles an analysis of the projectiles Coefficient of Drag would have to be carried out.

Data and results certified correct at time of writing.



SM Champion

Lecturer
Cranfield University
Defence Academy of the UK
Shrivenham
Swindon. SN6 8DT