

Body Armour Guidance: Factsheet 5 – Test Procedures

Stab-Resistant Body Armour

In the UK, the relevant test standard for stab-resistant body armour is found in the HO CAST standard of 2017 ^[1] and should be read in conjunction with the HO CAST 2017 Guidance document ^[2]. The HO CAST 2017 standard includes both knife and spike resistance. This factsheet will only briefly describe the contents of the standard, as the full reference is easily available on the website.

The test is based upon a standardised knife blade or spike being dropped onto body armour under gravity. The blade is mounted in a sabot and by choosing different heights from which to drop the sabot and blade/spike, the kinetic energy of impact can be controlled. Figure 1 shows a schematic of the knife, sabot and armour position.

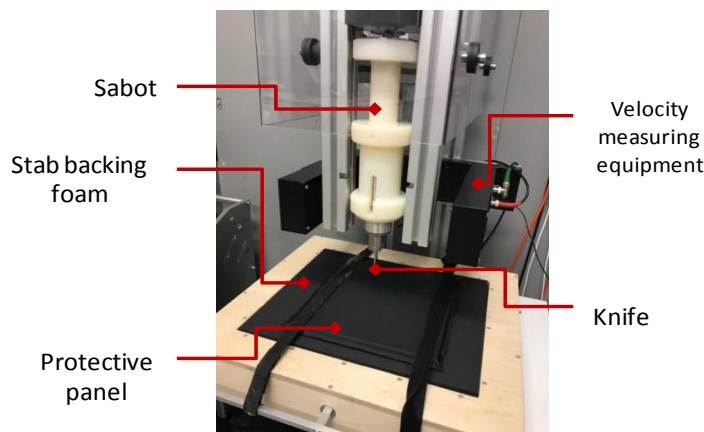
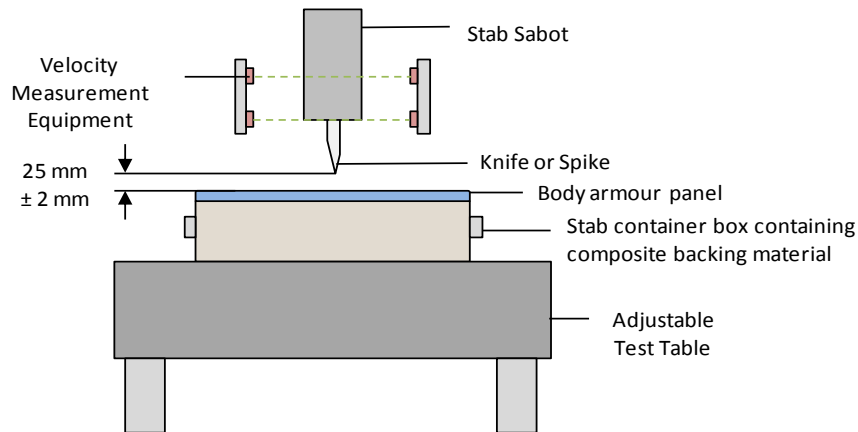


Figure 1: Knife Test Apparatus

Slash-Resistant Body Armour

The 2018 Home Office standard ^[3] covers testing of slash resistant materials. This test consists of a 'Stanley®' blade mounted in a drop tower. The blade is mounted in a Slash Missile, in such a manner as to cause the slash motion to be at 2° to the armour sample (which is mounted on the Force Table). The general test configuration is shown in Figure 2

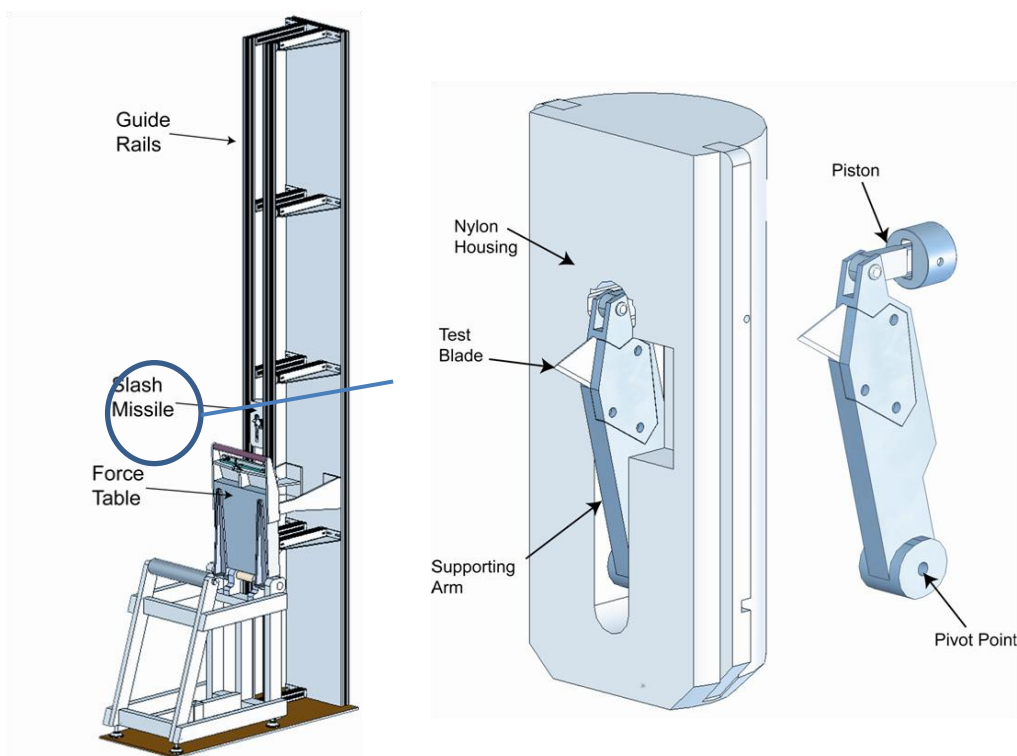


Figure E.2: Home Office Slash Test Rig

Three armour packs are tested, each with three strikes. The samples will have passed the test if no penetration has occurred with a force of less than 60 N, and the average force from all nine slashes of penetration shall be 80 N or greater.

Bullet-Resistant Body Armour

The 2017 Home Office standard for ballistic-resistant body armour ^[1] provides a number of different levels for both low and high velocity bullet-resistant body armour. Within Table 8 of the standard there are four levels with the prescript HO: HO1, HO2, HO3 and HO4; and one level with the prescript SG: SG1. There is also a level defined as 'Special' which can be any round specified by the user. Three examples of possible 'Special' ammunition types are given in Table 9 of the standard.

It should be noted that for the shotgun threat, SG1, the test ammunition is limited to the 1 ounce rifled lead slug, rather than any other type of shot.

For all of these tests an internal firing test range is required. The test standard explains how the test shall be conducted. Figure 3 shows a typical test range configuration.

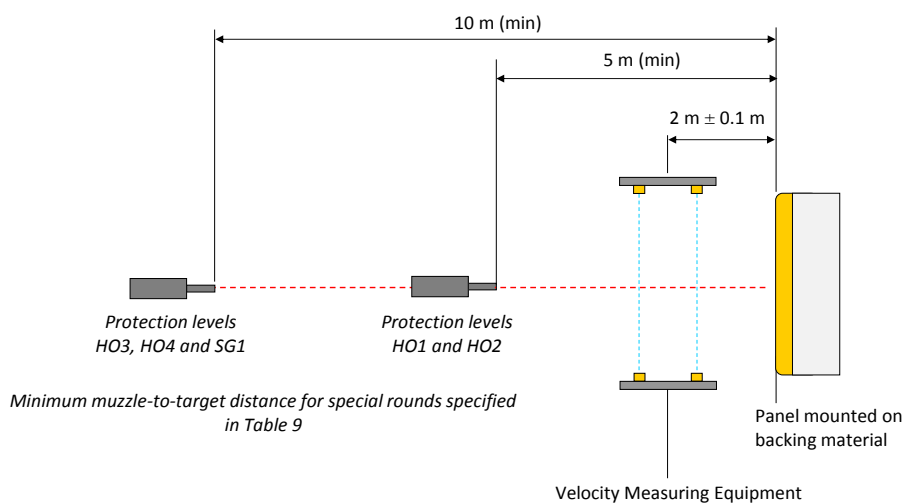


Figure 3 Typical Test Apparatus for Ballistic Testing

The test standard covers two main test requirements. Firstly there is a V_{proof} test for the ballistic resistance of the armour. Secondly there is a back-face signature (BFS) measurement. The V_{proof} test is a pass/fail test for bullets within a specific impact velocity. The V_{proof} is the threshold velocity below which no shots shall perforate the body armour.

When body armour is impacted by a bullet, it will deform into the body. If the body armour is mounted on a block of modelling clay this deformation will cause a permanent depression in the clay. This depression is known as the BFS. As part of the test standard the BFS in modelling clay must be measured and have a depth no greater than a specified value. For the Home Office standard, for soft body armour (i.e. HO1 and HO2), this threshold is 44 mm whilst for the upgrade plates (i.e. HO3 and HO4) a lower limit of 25 mm is allowable. Figure 4 below shows how the BFS in clay is measured. The measured BFS was originally intended to be an indication of the potential for BAPT.

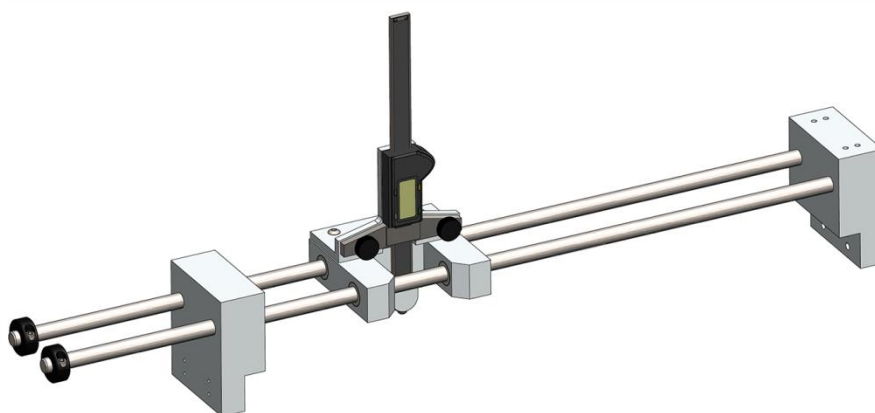


Figure 4: Tool for Measuring Back-Face Signature

References

- [1] Payne, T; O'Rourke, S; Malbon, C; Body Armour Standard (2017); CAST Publication No. 012/17, July 2017 <https://www.gov.uk/government/publications/home-office-body-armour-standard-2017>

- [2] Payne, T; O'Rourke, S; Body Armour Standard (2017) Guidance; CAST Publication No. 039/17, July 2017
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/634676/Home_Office_Body_Armour_Standard_-_Guidance__FINAL_VERSION_.pdf

- [3] Payne, T; Malbon, C; Butler, A Slash Resistant Materials; CAST Publication No. 008/19, March 2018 <https://www.gov.uk/government/publications/home-office-slash-resistant-materials-test-facilities>