National Protective Security Authority

BODY ARMOUR GUIDANCE

Factsheet 1 – Firearms

Handguns

Handguns and sub-machine guns fire low velocity (LV) bullets with muzzle velocities typically in the range of 200 to 500 m/s. Due to their shorter barrels, bullets fired from handguns will be slower than the same bullets fired from sub-machine guns.

Figure 1: Typical LV Bullets

Typical calibres for low velocity bullets are 7.62 x 25 mm (Tokarev), 7.65 mm, .357", 9 mm (various case lengths), .38", .44" Magnum, .45" and .50". Most LV bullets are round-nosed or flat-nosed geometries. Typical examples are shown in Figure A1. They may be of a number of different construction types. The bullet will consist of a core material, usually lead, and this may be exposed, or partially or completely enclosed, in a metal jacket (usually copper or steel).

Rifles

Rifles fire high velocity (HV) bullets and similar bullets are fired from carbines and machine guns. Their muzzle velocities are typically in the range of 650 to 1,000 m/s. Typical bullet descriptions include 5.45 x 39 mm (used in an AK74), 5.56 x 45 mm (NATO), 7.62 x 39 mm (used in an AK47), 7.62 x 51 mm (NATO) and 7.62 x 54R (used in an SVD sniper rifle).

Most rifle bullets have cores of lead or mild steel in a stream-lined metal jacket and are described as 'ball' rounds. Typical examples are shown in Figure A2. For many of the bullets, armour piercing (AP) versions are available in which the cores are made of hardened steel or tungsten. These are much more penetrative than the equivalent ball rounds.

Figure 2: Typical HV Bullets

When referring to AK47 ammunition (second from right in Figure A2), it is essential to be more specific with the description. The most common type of ammunition fired from an AK47 is the 7.62 x 39 mm PS ball. However, there are many different sources of this ammunition and they do perform differently, particularly when used to test body armour plates.

High Velocity Personal Defence Weapons

One type of weapon that does not fit into the usual definitions of low and high velocity bullet weapons is what may be termed as high velocity personal defence weapons (PDW). The two most common examples of these are the FN P90 (Figure A3) and the H&K MP7 (Figure A4). These two weapons are described as personal defence weapons by the manufacturers and they are expected to replace a pistol for those personnel who do not have a requirement for an assault rifle. However, they are also being used to replace the capability of a carbine or sub-machine gun. The MP7 is currently in service with at least one UK police force.

Figure 3: FN P90

Figure 4: Heckler and Koch MP7

The performance of these weapons is such that they will defeat textile personal armour but will be defeated easily by ceramic upgrade plates.

Category	FN P90	H&K MP7
Calibre x Length (mm)	5.7 x 28	4.6 x 30
Muzzle Velocity (m/s)	715	725
Typical Bullet Mass (g)	2.0	1.6
Kinetic Energy at Muzzle (J)	540	420

Table 1: Comparison of P90 and MP7 personal defence weapons

Shotguns

Shotguns are fired from the shoulder and each cartridge usually contains a number of small spherical pellets known as a shot. A shotgun may also be used to fire a single solid projectile known as a slug. Shotguns are available in a wide variety of sizes, the most common are 12 bore (18 mm) or .410 gauge (10.4 mm).

They may have either one or two barrels. A number of different firing mechanisms are used including breech loading, pump-action, semi-automatic, and even fully automatic variants. A shotgun is generally a smoothbore firearm.

The shot pellets from a shotgun spread upon leaving the barrel, and the kinetic energy from the propellant is distributed among the pellets, which means that the energy of any one piece of shot is fairly low. In a hunting context, this makes shotguns useful primarily for hunting birds and other small game. However, in a military or law enforcement context, the large number of projectiles makes the shotgun useful as a close-quarters combat weapon or a defensive weapon at ranges when the shot will not have dispersed much. Militants or insurgents may use shotguns as they are commonly owned by civilians in many countries. Criminals frequently saw off shotgun barrels for easier transportation and concealment.

Typical muzzle velocities for shotguns are about 500 m/s. Because the energy is distributed between large numbers of individual pellets, they are fairly easy to defeat at ranges when they have started to disperse. However at close range, or with a single slug, the effect will be much more serious.