

GUIDANCE NOTE: PROTECTION AGAINST BULLETS

CPNI EBP 13/14: June 2014

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Introduction

The use of guns by both terrorists and criminals may be considered a threat for some locations. If this is the case bullet resistance may need to be provided for parts of the building. Police Counter Terrorist Security Advisers (CTSAs) may be requested to provide advice on threats.

The aim of this guidance note is to assist the building owner, security manager and facility manager in selecting a design threat and ensuring that suitable products are used to mitigate the threat. The threat is usually defined in terms of the weapon and type of ammunition that are likely to be used. There will also be a need to decide which parts of the building need to provide resistance to attacks using guns. This may include windows, doors, walls and partitions.

If in doubt, technical advice should be sought from specialist engineers with experience and training in designing and implementing bullet resistant measures. These may be Members of the Register of Security Engineers and Specialists (RSES) www.rses.org.uk or will be able to demonstrate that they have similar levels of competence to those required for membership.

Test standards¹

There is a European test standard (BS EN 1063) for bullet resistant glass (BRG). However BRG will need to be mounted in a window frame which should also be subject to testing in accordance with the separate, complementary standards for bullet resistant windows, doors, shutters and blinds (BS EN 1522 and BS EN 1523).

Types of guns

A wide range of guns has been manufactured. To make it possible for designers and manufacturers to specify and test products, a limited range of weapons has been selected for use in the standards for bullet resistant products. These weapons represent the types of weapons that are likely to be used by terrorists or criminals and include handguns (revolvers and automatic pistols), military rifles and shotguns.

The penetration of bullets into building components depends primarily on the bullet velocity and the type of bullet. The typical bullet velocities are:

Handguns	300 to 500 m/s,
Rifles	700 to 1,000 m/s,
Shotguns	about 600 m/s.

Types of bullets

The penetration of a bullet is dependent on both the weapon (which influences the velocity) and the ammunition being used. A round of ammunition consists of the cartridge and the bullet. The cartridge has a casing (usually brass) which contains the propellant and a primer. The bullet is crimped into the open end of the cartridge case. When the primer is struck by the gun's firing pin it ignites the propellant and the gases from the propellant then drive the bullet down the gun barrel. Figure 1 shows examples of typical cartridge cases.

Most bullets are intended for use against people or animals and consist of a thin metal jacket (often of steel or a copper alloy) filled with a softer metal. Usually this is lead but other alloys are now being used to meet environmental requirements. This type of ammunition is often called a "Ball" round.

¹ BS EN 1063:2000 Glass in building – Security Glazing – Testing and classification against bullet attack
BS EN 1522:1999 Windows, doors, shutters and blinds – Bullet resistance – Requirements and classification
BS EN 1523:1999 Windows, doors, shutters and blinds – Bullet resistance – Test method



Figure 1 - Typical cartridges for a rifle (L) and a shotgun (R)

The highest threat level specified in the test standards is Armour Piercing (AP) bullets which are designed for penetrating hard metals. AP bullets have a hardened steel penetrating core inside a thin metal jacket.

Unusually the 5.56mm bullet used for threat BR/FR 5 (see the table below) has a small hardened steel penetrator in the tip of the jacket whilst the rest of the jacket is filled with a soft metal.

For the shotgun threat a single solid lead slug is used. This represents the concentration of lead shot that occurs at very close range to the shotgun before it has had time to spread.

Threat levels

The current British versions of European Standards² specify seven threats using pistols and rifles plus two threat levels using a shotgun. The pistols and rifles are listed in ascending order of threat severity.



Figure 2 - The range of bullets used in BS EN 1063:2000

² BS EN 1063:2000 Glass in building – Security Glazing – Testing and classification against bullet attack
 BS EN 1522:1999 Windows, doors, shutters and blinds – Bullet resistance – Requirements and classification
 BS EN 1523:1999 Windows, doors, shutters and blinds – Bullet resistance – Test method

The same threats are used in both the standards for BRS (BS EN 1063) and the standard for glass and windows, doors, shutters and blinds (BS EN 1522) with prefixes BR and FB respectively. The threats specify a velocity and a particular bullet type. Table 1 summarises the details of the threats and Figure 2 shows a picture of the bullets.

Table 1 – Summary of BR and FB threat details

Threat	Weapon	Calibre	Bullet Type	Mass (g)	Velocity (m/s)	Remarks
BR/FB 1	Rifle	0.22 in long rifle	Lead	2.6	360	
BR/FB 2	Hand gun	9 mm Luger	Ball	8.0	400	
BR/FB 3	Hand gun	0.357 in Magnum	Ball	10.2	430	
BR/FB 4	Hand gun	0.44 in Magnum	Ball	15.6	440	
BR/FB 5	Rifle	5.56 mm x 45	Ball with steel penetrator	4.0	950	NATO (SA80) bullet
BR/FB 6	Rifle	7.62 mm x 51	Ball	9.5	830	NATO bullet
BR/FB 7	Rifle	7.62 mm x 51	Armour piercing	9.8	820	NATO bullet
SG/FSG	Shot gun	12 bore x 70	Solid lead slug	31.0	420	

For most materials a product will also pass the lower threats than the level at which it has been successfully tested. However it is known that for some unusual combinations of materials this is not always be the case

The standards also permit additional weapons to be specified if required.

Although very widely available, the AK47 (Kalashnikov) rifle is not included in the standard threat list because of difficulty of defining test requirements as there is a wide variation in the performance of both weapons and bullets which are made by a large number of manufacturers. The performance of AK47 bullets (7.62mm x 39) is generally worse than that of the equivalent NATO ball (BR/FB 6) or AP (BR/FB7).

Further guidance

Further guidance is available in:

EBP Note 14/14 – Bullet resistant glass

EBP Note 15/14 – Bullet resistant windows, doors, blinds and shutters