

5.7mm NATO caliber: defeating the target

Why is the 5.7x28mm the optimum choice for pistols and compact close-range weapons on modern-day battlefields?

The projectile is what hits the target

The performance of the cartridge is the primary factor determining the combat effectiveness of small arms. A well-designed weapon will not be effective if the projectile is not able to incapacitate the target. A powerful cartridge will be effective, but if it makes the weapon too big and heavy or gives too much recoil, it will not be suited for use in compact weapons.

Pistols and compact close-range weapons need a cartridge that rapidly incapacitates the target while being light and compact with minimal recoil.

Mission requirement

A pistol designed for combat against an enemy wearing modern military equipment must reliably achieve a number of essential effects. Failure to carry out any of these functions means that the ammunition, and therefore the weapon, is useless.



Hit

The projectile must hit the target to be effective. Incapacitation effect depends more on where the projectile hits (placement) than the energy carried by the projectile. **The weapon/ammunition system must have intrinsic accuracy.** Reduced recoil will help the user to be more accurate, this is vital since accuracy in combat depends more on the shooter than the weapon.



Penetrate

In the past soldiers wore only normal textiles so penetration was not a problem. **Today military personnel wear body armor that protects nearly all vital organs.** A minimal level of protection with a vest and helmet made of aramid fiber (for example Kevlar®*) will stop standard military pistol caliber projectiles.



Incapacitate

The weapon and its ammunition exist for only one reason, to incapacitate the enemy. **The projectile must generate sufficient wounding effect for rapid incapacitation.**

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If the old way doesn't work...

The most widely used military handgun cartridge is the 9x19mm Parabellum. This cartridge was designed in 1901 when military aviation was using balloons. It is not surprising that the 9mm has serious limitations on today's battlefield.



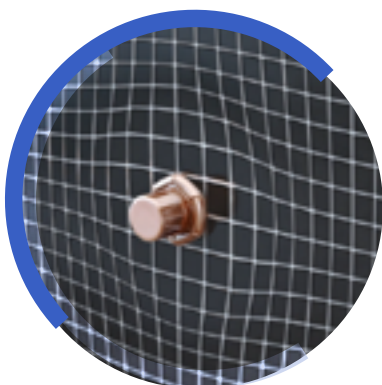
Hit

The 9mm has acceptable accuracy for use in a handgun. It can be used in shoulder-fired weapons for ranges up to about 75 meters. Beyond this distance aim must be adjusted to compensate for the curved trajectory of the projectile.



Penetrate

The 9mm standard ball projectile does not penetrate basic body armor designed to protect against fragments. The round-nosed large diameter projectile tries to tear a hole by stretching the fiber which is designed to resist this action. Most areas of the body where hits can rapidly incapacitate an enemy are protected.



› The 9mm projectile is stopped by basic body armor



Incapacitate

The 9mm projectile passes through the body causing a narrow cavity. Unless a vital organ is hit there will be relatively little immediate effect. Hollow-point expanding projectiles are used by Law Enforcement to give better incapacitation, however expansion does not occur reliably, and projectiles designed to deform are banned for military use by the Hague Convention.



› A 9mm projectile passes through an entire block of gelatin, causing increased risk of overpenetration and collateral damage.



› 9x19mm NATO Ball

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...Try a new solution

FN Herstal started design of the 5.7x28mm cartridge in the late 1980s when body armor was becoming standard combat equipment, so it is fully effective on the modern-day battlefield. It was necessary to create a new cartridge because no existing cartridge met the requirements. There was a large gap between traditional handgun cartridges which have become ineffective, and rifle cartridges which are effective but excessive for a handgun.

FN Herstal benefitted from a unique and long experience designing both ammunition and weapons, ensuring that the guns and the ammunition were fully compatible. The FN® 5.7x28mm NATO cartridge is radically different to classic handgun cartridges. A cartridge like the 9mm fires an almost spherical, large diameter, heavy projectile at low velocity. The 5.7mm NATO cartridge fires an aerodynamically shaped small diameter, lightweight projectile at high velocity. This is the way that rifle cartridges are designed.



Hit

The 5.7mm was designed for an effective range of 200m from a shoulder-fired weapon. The intrinsic accuracy of the cartridge is therefore more than sufficient for a handgun. The aerodynamic shape and high velocity ensure a very flat trajectory, so no compensation for "bullet drop" is needed.



• 5.7x28mm SS190 Ball NATO

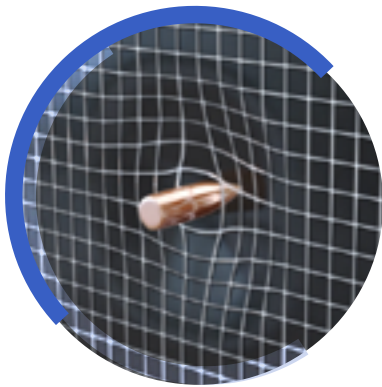
The short flight time reduces the need to aim ahead of a moving target. The 5.7mm NATO cartridge gives 30% less recoil than the 9mm, which helps the average shooter to achieve better results, especially when firing multiple shots as fast as possible. Since the user is the factor that causes the most dispersion, this greatly increases the operational hit probability of the entire weapon/ammunition/user combination.

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Penetrate

Unlike traditional pistol projectiles the 5.7mm has a sharp tip that passes between the threads of soft body armor. If the projectile hits a thread, all the energy is concentrated on a very small area, so the thread is cut. The projectile uses almost no energy to go through a vest. Penetration of barriers such as a vehicle body is better than other pistol calibers because the 5.7mm projectile with its hard, pointed tip and small diameter concentrates its energy on a much smaller surface.

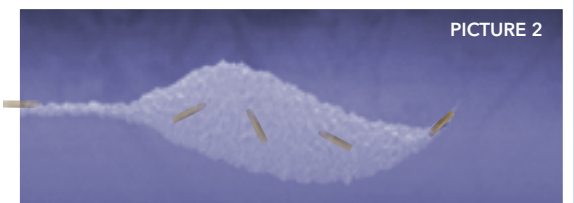


▸ The 5.7x28mm cartridge passes between the threads of soft body armor (up to NIJ level IIIA).



Incapacitate

The 5.7mm projectile is a long, thin, high velocity projectile. The 5.7mm projectile has a tumbling action that creates a permanent cavity that can only be achieved using hollow point projectiles in traditional pistol calibers.



▸ The 5.7x28mm SS190 Ball NATO projectile tumbles inside the block of gelatin without deforming. It causes no overpenetration and greatly reduces risk of collateral damage. Pictures 1 and 2 above show temporary cavity and permanent cavity respectively.

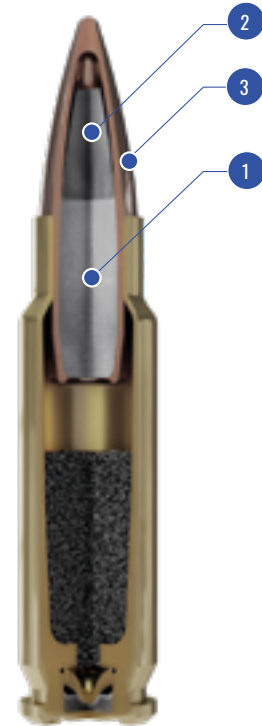
For most of its passage in the body it is side-on to the line of travel, presenting a large flat surface. The impact velocity of almost twice the speed of sound combined with the tumbling effect gives an impressive temporary cavity, but what is more important is the permanent cavity that represents destruction of tissue.

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Why is the 5.7x28mm caliber so effective and reliable in today's combat situations ?

The 5.7mm standard ball projectile is composed of a steel tip, an aluminum core and a steel jacket. This one type of projectile provides the accuracy, penetration and incapacitation needed to meet the great majority of combat situations, together with limited risk of collateral damage.

The necked, rimless cartridge case has an almost cylindrical body which allows reliable feeding from a straight high capacity magazine. The 50-round magazine placed horizontally above the barrel of the FN P90® submachine gun would be impossible with a tapered cartridge case.



▶ 5.7x28mm SS190 Ball NATO

The projectile

- ▶ The **aluminum core (1)** reduces weight allowing high velocity with low recoil.
- ▶ The **pointed steel tip (2)** avoids deformation on impact with a hard surface, ensuring optimal penetration.
- ▶ The **steel jacket (3)** is designed to stop the projectile fragmenting as this would risk insufficient penetration depth in the body.
- ▶ The shape of the projectile and the position of its center of gravity cause it to tumble rapidly and reliably. When the projectile enters soft tissue, there is resistance at the front end that is trying to slow it down, while the inertia of forward movement is centered further back on the center of gravity. The effect is that the rear of the projectile tries to go faster than the front, causing it to yaw (tumble) 180°.

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The case

The small case diameter allows more cartridges to be stacked in a magazine that does not extend below the pistol grip.

The cartridge case design uses forward pressure on the shoulder of the case to counter recoil force which reduces overall recoil energy.



› 9x19mm NATO cartridges



› 5.7x28mm NATO cartridges

The cartridge

- › The 5.7mm cartridge weighs half as much as the 9mm, this reduces the weight of the loaded weapon, and greatly reduces the weight of a combat load of weapon and spare magazines.

The 5.7mm is not more powerful than the 9mm. It uses a similar level of power (energy) much more efficiently to be more effective.

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Two additional reasons why the 5.7x28mm should be chosen

1 Reduced collateral damage

Unintentional wounding of persons who are not being targeted is a problem for law enforcement agencies, and for military personnel if friendly forces or civilians are accidentally hit.



The primary causes of such incidents are "stray projectiles" that travel far beyond the immediate combat area, projectiles that penetrate through the intended target and strike another person, projectiles that penetrate through a wall, projectiles that ricochet off a hard surface and are deflected.

- ▶ The light weight of the 5.7mm projectile gives it less inertia, it loses velocity rapidly beyond 300m. The 5.7mm projectile retains less than 80 joules of energy (generally considered to be a minimum required to be lethal) at 400m. A 9mm projectile retains more than 80 joules beyond 800m. While being highly effective within its effective range, the 5.7mm is far less dangerous than traditional pistol cartridges beyond the intended combat range.
- ▶ The tumbling effect of the 5.7mm in soft tissue causes rapid loss of energy, so if a projectile does exit, it has virtually no remaining energy. A 5.7mm projectile fired into 10% ballistic gelatin will

penetrate about 25cm. A 9mm military ball projectile exits a 40cm block of gelatin retaining about 70% of its energy.

- ▶ The 5.7mm projectile does not penetrate bricks or concrete blocks. Lighter walls made of panels generally have 2 or more layers, the 5.7mm projectile tumbles on exiting the first layer so it has greatly reduced penetration capability on the second layer. Even if the 5.7mm projectile does penetrate through, it will retain far less energy than a 9mm projectile would.
- ▶ Direct impact on a hard surface that is not penetrated will cause the high velocity projectile to partly penetrate or break up. On a similar surface the 9mm will bounce back causing a ricochet.

2 Reduced environmental impact

- ▶ The standard 5.7mm projectile does not contain lead. The lead-free design was to achieve similar performance, it is not a modified design that sacrifices performance for environmental concerns.
- ▶ The SS190 military ball cartridge is available with a non-toxic primer.
- ▶ The propellant used in the SS190 military ball cartridge meets the latest environmental regulations.



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5.7x28mm ammunition types



FN® SS190 Ball NATO

is the standard operational round giving excellent all-round performance.



FN® SS192 Soft Core

- ▶ is for use on shooting ranges designed for training with traditional handgun cartridges with a backstop that could be damaged by the SS190 Ball.



FN® L191 Tracer

- ▶ gives a highly visible trace matched to the trajectory of the SS190 to beyond 200m.



FN® FR199 Frangible

- ▶ eliminates the risk of ricochets and projectile debris from close range shooting at hard surfaces. Primarily used in close-range tactical training facilities.



FN® Sb193 Subsonic

- ▶ is specifically designed for use with a sound suppressor for maximum sound reduction.



FN® Blank

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	9x19mm NATO	5.7x28mm NATO
HIT PROBABILITY	Is designed for use at 25m.	Is designed for use at 200m.
PENETRATION OF BODY ARMOR	Is stopped by the lowest level of ballistic protection.	Penetrates soft body armor with almost no loss of energy.
INCAPACITATION	Causes a narrow cavity.	Tumbles quickly and reliably, greatly increasing the permanent cavity.
WEIGHT	The 9mm cartridge is twice the weight of the 5.7mm.	Cartridge weighs half as much as the 9mm, which enables the combatant to carry more 5.7mm cartridges on mission.
MAGAZINE CAPACITY	The bigger diameter of the 9mm allows maximum 17 rounds in a regular sized pistol magazine.	The smaller diameter of the 5.7mm allows at least 3 more cartridges than the 9mm in a similar sized pistol magazine.
COLLATERAL DAMAGE	The intrinsic design of 9mm has been proven to cause overpenetration and increased risk of collateral damage.	The 5.7mm has reduced maximum lethal range, lower risk of overpenetration and less tendency to ricochet. Overall risk of collateral damage is much lower.
ENVIRONMENTAL IMPACT	Regular duty 9mm Ball cartridges feature a lead core.	The 5.7mm projectile, primer and propellant meet recently introduced environmental regulations.
NATO STANDARDIZATION	The 9x19mm Parabellum cartridge is a NATO standard.	The 5.7x28mm caliber is a NATO standard (STANAG 4509).

The 5.7x28mm NATO caliber was designed by FN Herstal. Primarily renowned for its high-quality small arms, FN Herstal participated in the design of the 7.62x51mm NATO caliber, and designed the 5.56x45mm NATO caliber.

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FN® 5.7x28mm NATO WEAPON SYSTEM

FN Five-seveN® Pistol



▸ FN Five-seveN® Tactical Mk2



▸ FN Five-seveN® Tactical Mk2 with optional tactical light and sound suppressor

FN P90® Submachine Gun



▸ FN P90® Standard with optional integrated visible laser



▸ FN P90® Tactical with optional optical sight and visible light

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AND IN ALL
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KEY BENEFITS

- Extremely light
- 20-round magazine capacity
- Low recoil, rapid target engagement
- Short and light trigger pull
- Extremely reliable
- Very compact
- 50-round magazine capacity
- Low recoil firing single shots and full auto
- Magazine smoothly integrates on top of the receiver
- With an integrated optical sight and two lateral MIL-STD-1913 Picatinny type rails (Standard model) or with a top and two lateral MIL-STD-1913 Picatinny type rails (Tactical model)
- Optional integrated visible or infrared laser



FN HERSTAL

**More than 130 years of excellence.
Leading to the future.**

FN Herstal's mission is to design, develop and manufacture a full range of innovative solutions at the leading edge of technology, based on small arms and their ammunition, that meet specific market requirements today and in the future. Our customers are Armed Forces, Security Forces and Special Groups worldwide.

FN Herstal product range includes small arms, Less Lethal systems, and integrated weapon systems for air, sea and land applications, remote weapon stations, small caliber ammunition, and solutions that harness modern technology to enhance the capabilities of the combatant.

FN Herstal is headquartered near Liège in Belgium, with three fully owned subsidiaries: FN America (USA), FNH UK (Great Britain) and Noptel (Finland).

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