

20 MM FRANGIBLE ARMOUR PIERCING PROJECTILE

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Abstract:

The new risks, challenges and threads of the 21th century, so many and diverse, increase the complexity of air force operations. Having into the account the development of IT and technology, the air supremacy is dependent on the strength of technical progress: precisely guided bombs, unmanned aerial vehicle, satellite command systems, which allow fast and accurate hits, with a maximum effect on target.

A new type of ammunition that is used to achieve air supremacy is the frangible armour piercing ammunition. This type of ammunition is generally used in close combat and so, it has an increased probability of hitting its target. The frangible armour piercing projectile can be used against a large range of targets, such as airplanes and lightly armoured targets (helicopters and armoured carriers).

Keywords: *frangible, projectile, target penetration.*

1. FAP ammunition description

Frangible Armour Piercing is a new type of high-performance, explosive-free, multi-purpose ammunition developed to be used in air to air or air to ground combat. Each projectile has a penetrator consisting of individual frangible heavy metal pellets and heavy metal sub-projectiles. After penetrating its target, the heavy metal pellets disintegrate into multiple fragments. As the fragments penetrate deeper into the target interior, the number of fragments increases, turning into a cascade of heavy metal. This is a highly effective method to neutralize armoured targets on the ground and in the air. Thanks to their special design FAP projectiles never result in ricochets

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as the projectile core disintegrates upon impact. The FAP multi-purpose projectile is available in caliber 20 mm x 102, 25 mm x 137 and 27 mm x 145.

The 20mm Frangible Armor Piercing (FAP) projectile was designed to be used against both “hard” and “soft” targets without the use of explosives and fuzes. On impact, the frangible core penetrates the outer skin of the target, progressively breaking up as it passes through the remaining structure. In the process, it releases highly energetic fragments, which cause damage deep inside the target.

Frangible cartridges come in a variety of configurations, all of which perform in the same basic manner. ^[1] Figure 1 shows two of the possible configurations for FAP projectile.



Figure 1. a) FAP projectile with heavy metal pellets; b) FAP projectile with discarding sabot ^{[2][3]}

While testing the penetration depth of FAP projectile, it was proven that the penetration depths are comparable with those of full metal jacket and hollow point projectiles. The advantage of using FAP projectile is an improved kinetic energy transfer from projectile to its target.

The frangible core of the projectile, continuously fragmentate itself during target penetration, thus generating a fragments fascicle. The fragments fascicle in addition to the axial effect, it also achieves a radial effect, such as shown in figure 2.



Figure 2. FAP projectile effect in ballistic gel^[4]

2. Environmentally friendly ammunition

During the development of FAP ammunition, an important criteria taken into consideration was the implementation of safer weapon solutions. This would ease the environmental pressure on ranges and training areas and decrease the health hazards for the users. The main goal was to reach a near-zero dud rate and eliminate the contamination with toxic and carcinogenic compounds.^[1]

Several steps were taken to facilitate the use of a non-lead bullet material composed of tin and tungsten. Non-lead projectiles fabricated using powder metallurgy simulants have proven to be faithful replacements for their lead analogs. The ammunition assembled using non-lead projectiles and propellant charges have the same ballistic characteristics as the currently available products. The use of the non-lead material has also increased the accuracy.

Conclusions

The most significant advantage of using FAP projectile is represented by its increased accuracy and penetration efficiency.

The FAP projectile is also a solution regarding the use of safe and environmentally friendly weapons.

References

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