

## A COMPARISON OF THE PERFORMANCE OF VARIOUS LIGHT ARMOUR PIERCING AMMUNITION

**Ian Horsfall, Nadeem Ehsan and Wilf Bishop**

**Abstract.** Four types of light-armour piercing ammunition were fired against mild steel, high hardness steel and ceramic faced composite armour targets. The ammunition included three types of 7.62×51 mm AP and the 30-06 APM2 (7.62×63 mm) projectile. The penetrative capability of the ammunition was assessed in terms of both the ballistic limit velocity and the ballistic limit energy. The 7.62×51 mm FFV projectile, which has a tungsten carbide core, had the lowest ballistic limit velocity against all target types. The three steel cored projectiles (Hirtenberger, P80 and 30-06) showed variation in their relative performance dependent upon target type. Examination of the ballistic limit energy showed that the sharper pointed projectiles performed better against strong targets. However, against weak targets, blunt projectiles performed better as they promoted plug formation and shear failure in the target. This was in agreement with the calculated loads to initiate penetration. For the ceramic-faced targets the Florence analysis [1] was found to produce reasonable agreement with the experimental results when the effects of both the projectile core and jacket were taken into account.





### INRODUCTION

It is not always appreciated that within particular classes of ammunition such as 9 mm FMJ, 7.62 FMJ or 7.62 armour piercing (AP), there is considerable variation in performance due to detail differences in projectile design. Within broad classes of ammunition, such as typical military small arms ammunition, it has been shown [2] that performance may vary in both absolute terms and in the comparative rankings between specific projectiles for different types of target. In this paper the penetrative performance of four common varieties of light-armour piercing ammunition are compared when fired against a variety of target types. These four constructions represent a relatively narrow spread of design criteria in that they

share a common purpose (light-armour piercing) and are of similar geometry and calibre.

### EXPERIMENTAL

Ballistic tests were conducted on three target types using four types of ammunition on each. The ammunitions were 7.62×51 mm AP FFV manufactured by Bofors AB, 7.62×51 mm AP manufactured by Hirtenberger Patronfabrik, 7.62×51 mm AP P80 manufactured by Fabrique Nationale, and the 30-06 AP M2 (7.62×63 mm) manufactured by USA Government Arsenal at West Lake. All four projectiles consist of hard cores contained within a gilding metal jacket. The details of these rounds are given in Table 1, which also includes photographs of the complete projectiles and disassembled cores.

Ammunition	7.62×51 FFV Bofors AB	7.62×51 Hirtenberger Patronfabrik	7.62×51 AP Fabrique National	30-06 AP M2 US Government Arsenal
Total weight (g)	8.21	9.45	9.75	10.69
Core weight (g)	5.93	4.32	3.8	5.17
Core diameter (mm)	5.59	5.59	6.08	6.22
Core nose angle (deg)	58	flat - 2.27mm	45	54
Core hardness (Hv)	1450	750	870	785
Core material	Tungsten carbide	Steel	Steel	Steel
Complete projectiles and disassembled cores				

**Table 1. Summary of Projectile Details.**