



Advances in Tungsten Core Projectiles for Small Arms

***High Performance Armour Piercing Capability
for Special Operations, Armed Forces and Law Enforcement***

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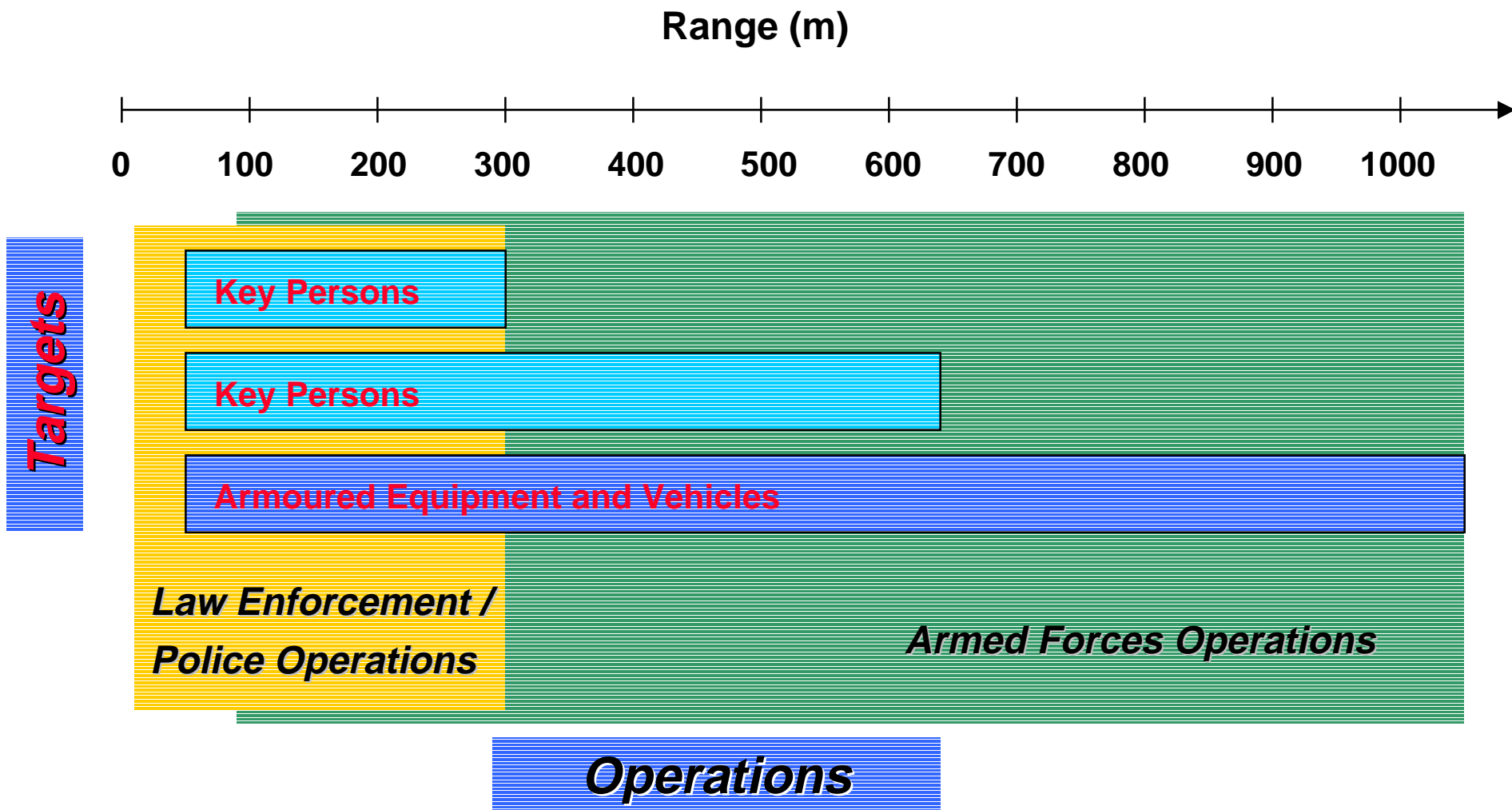
SM Swiss Ammunition Enterprise

Small Arms Symposium, Parsippany, New Jersey
23 June 1999

Sniper Actions



Basic Requirements





Sniper Actions

Concept of Operation

- ▶ **Neutralisation fire within Special Operations**
- ▶ **Medium range defeating of key persons**
 - **protected by heavy body armour**
 - **protected by armoured glass**
 - **protected by light metallic/composite armour**
- ▶ **Medium and long range defeating of equipment and vehicles with light metallic / composite armours**
- ▶ **High Precision single-shot operation mode**

Sniper Actions

Ammunition Requirements



- ▶ **Absolute single-shot hit probability**
- ▶ **Highest penetration of**
 - **heavy body armour**
 - **armoured glass**
 - **light metallic / composite armour**
- ▶ **Minimum wind drift of projectile**
- ▶ **Compatible with all sniper weapons in operation**

Armour Piercing Sniper Ammunition ***SM Design Concept***



- ▶ **High efficiency propellant for maximum initial velocity**
- ▶ **High accuracy projectile of Match type with**
 - **maximum retained velocity** **(long range action)**
 - **heavy mass** **(low wind drift)**
- ▶ **High penetration capacity projectile with ceramic WC penetrator**
- ▶ **"Low wear construction" of the projectile with respect to the gun barrel**

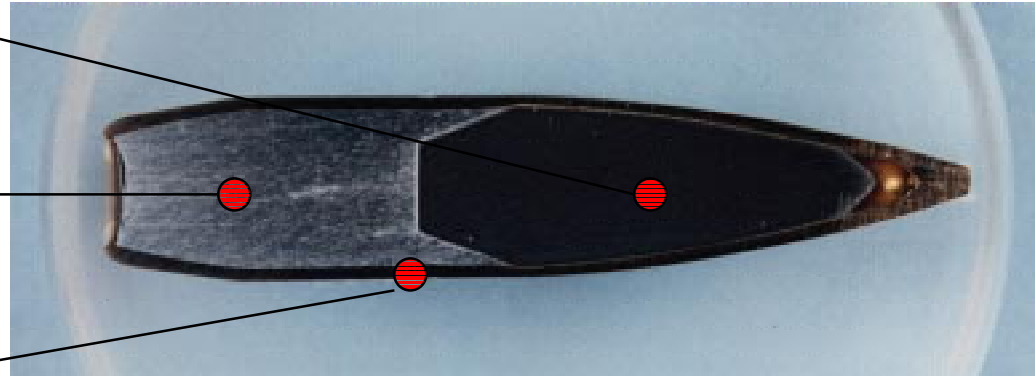
SM Armour Piercing Ammunition Projectile Design



WC Penetrator

Sn Alloy Filler

CuZn FMJ



Match Type Shape

length / diameter = 4.5

Total Projectile Mass 12.6 g /
194 grains

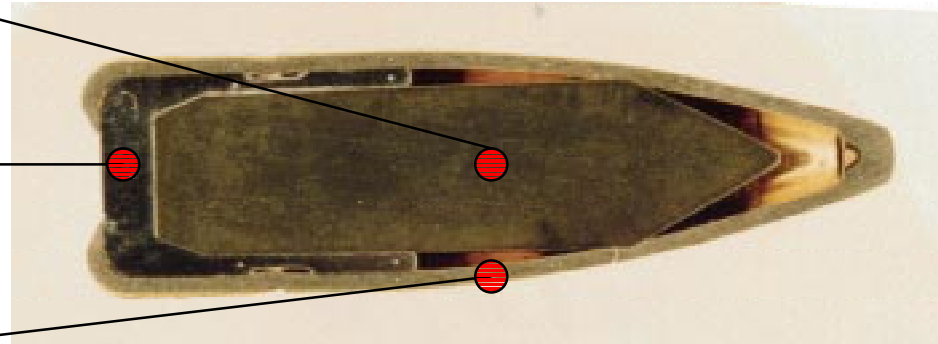
Armour Piercing Ammunition Reference System M993



WC Penetrator

Aluminium Cup

Steel/ CuZn FMJ



Total Projectile Mass 8.4 g /
129 grains

Shape Factor
length / diameter 3.4

Main Differences

SM Concept versus M993 Concept



- ▶ **High performance core material**

- ▶ **High precision core dimensions**

- ▶ **Fitted shapes of core and jacket**

- ▶ **Self-positioning of the core during assembly**

- ▶ **Match type projectile shape**

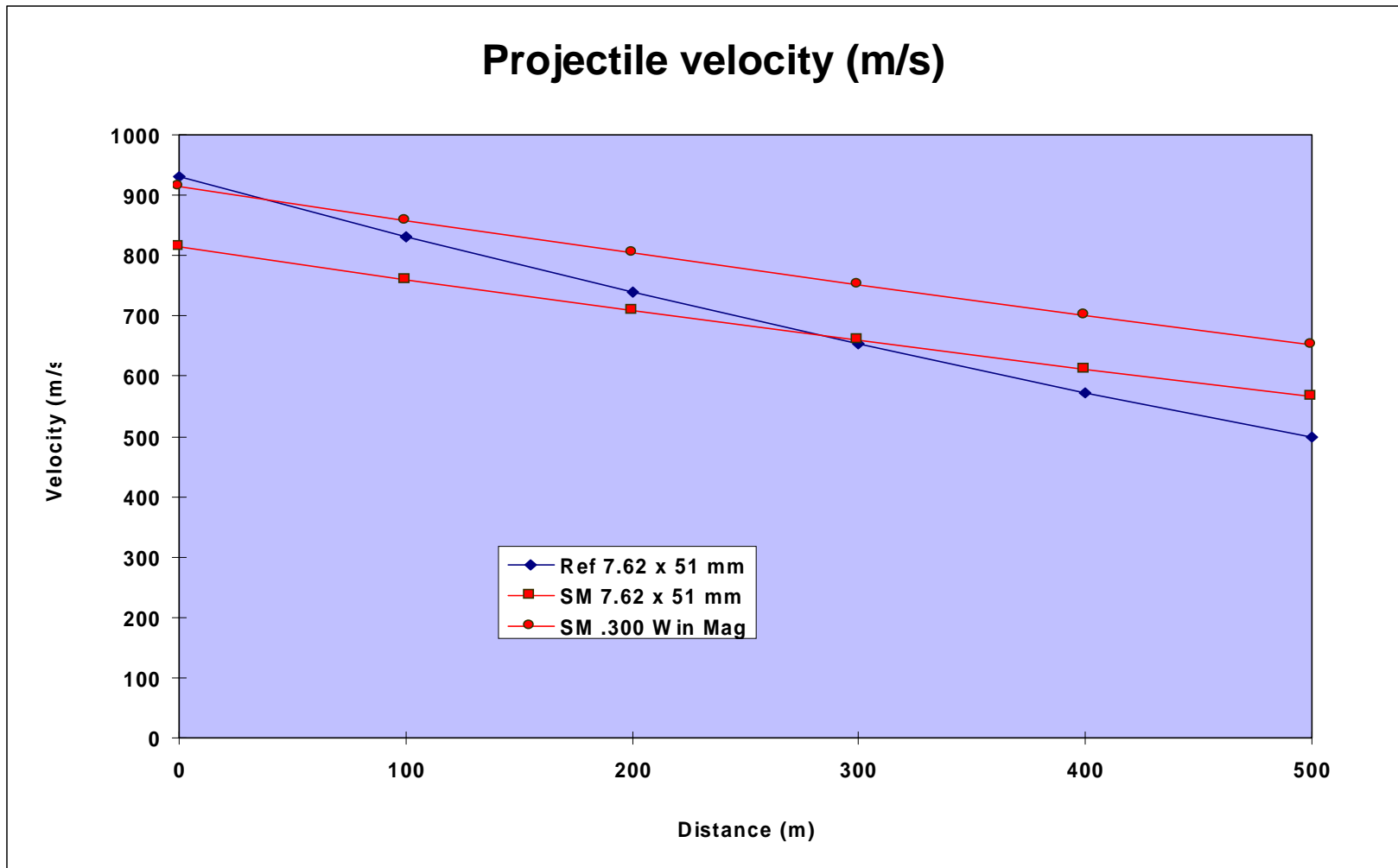
- ▶ **Increased mass of the projectile**

- ▶ **Compensation of the heavy WC core by low density Sn-Filler**

- ▶ **Trajectory matching with standard ball round and highly lethal anti-terror round**

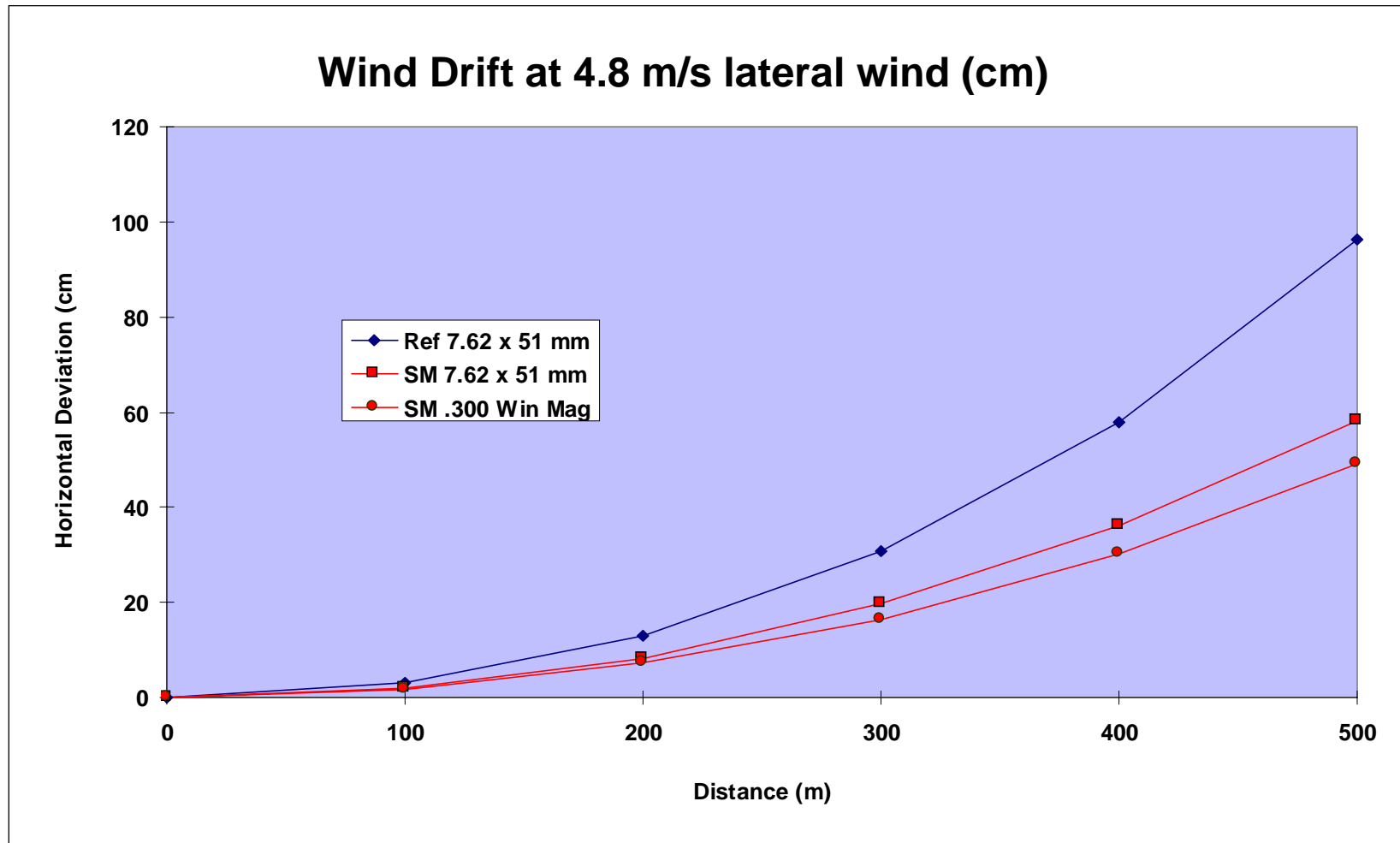
SM Armour Piercing Ammunition

Ballistics I



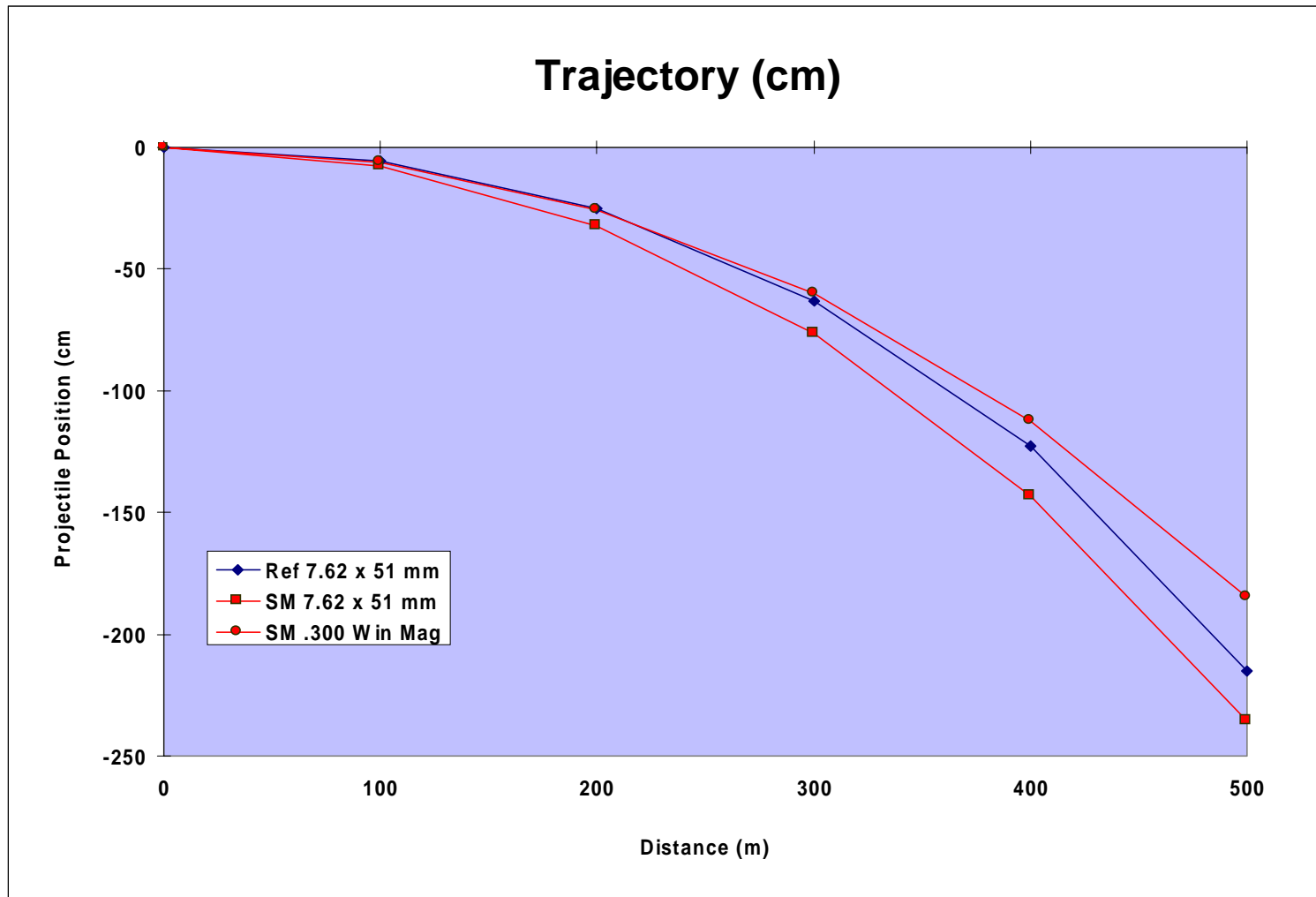
SM Armour Piercing Ammunition

Ballistics II



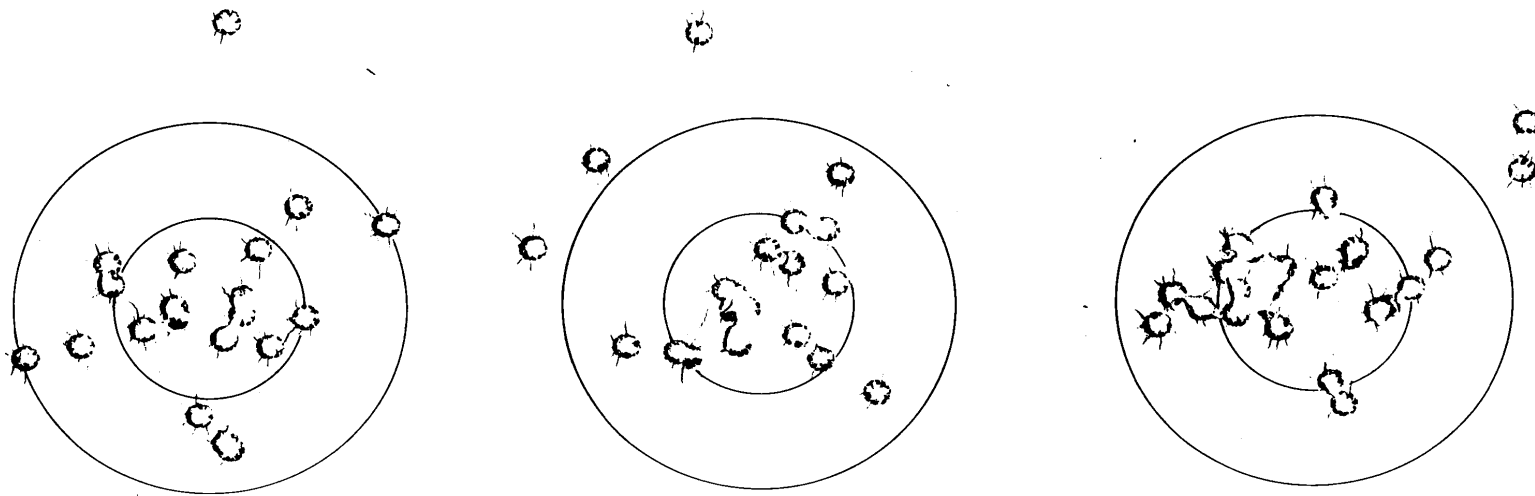
SM Armour Piercing Ammunition

Ballistics III



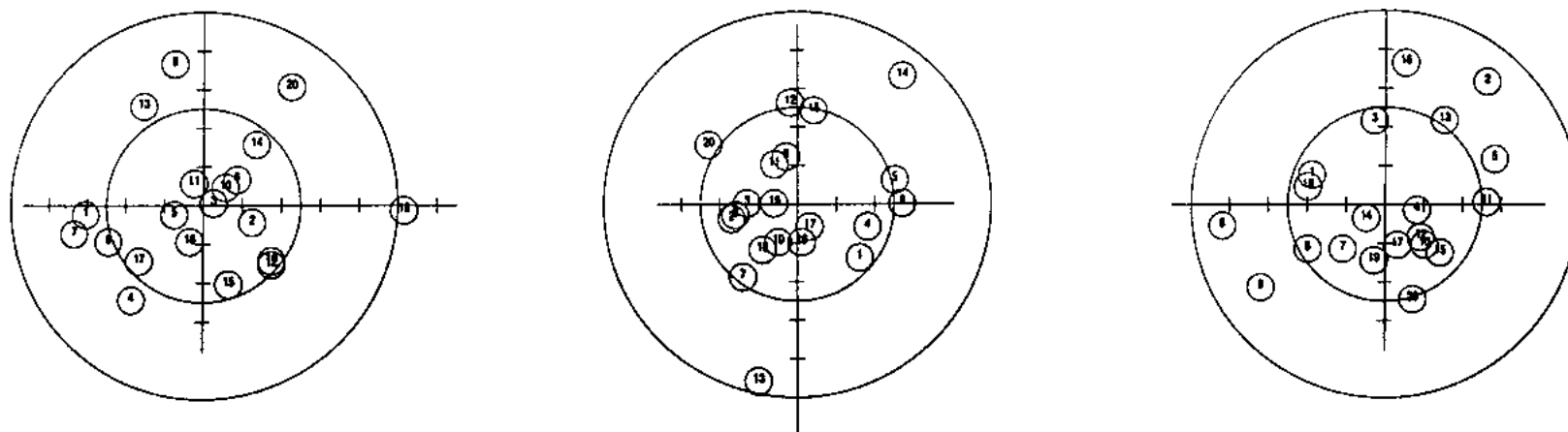
7.62 x 51 mm AP M993

Accuracy at 200 m



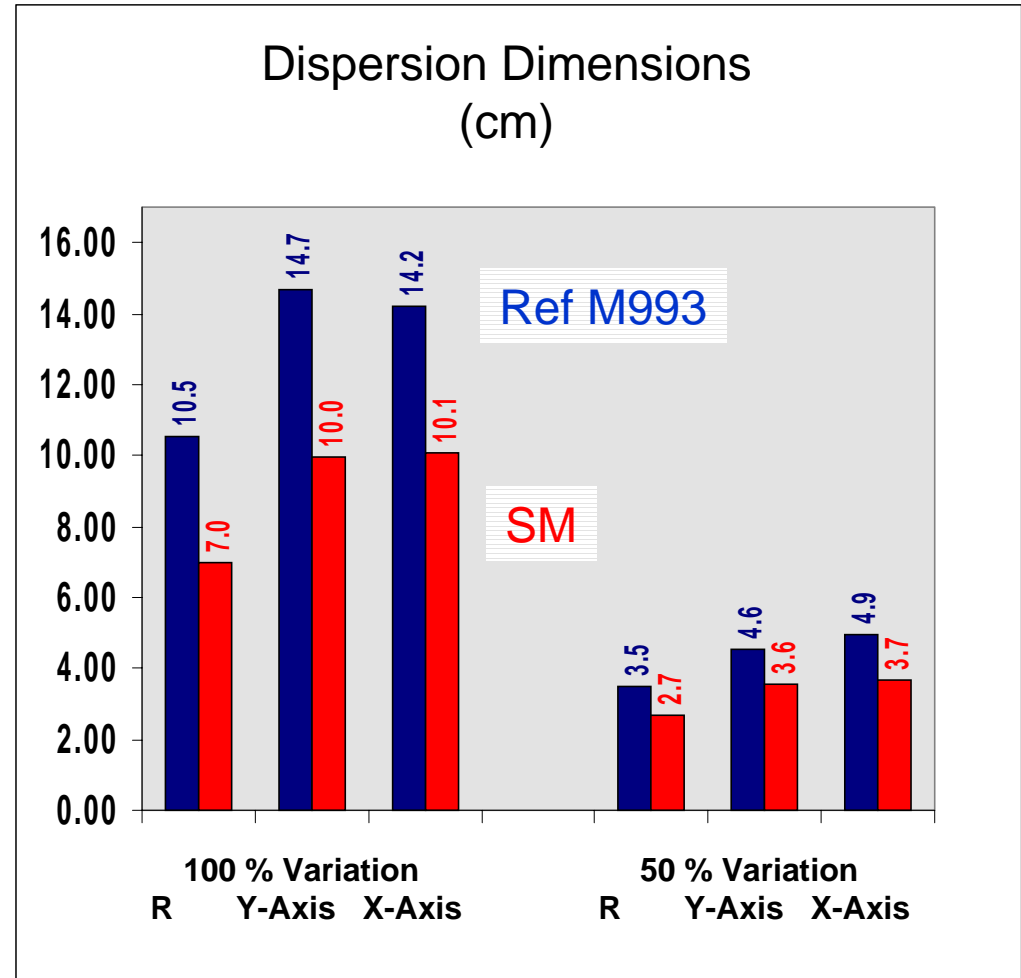
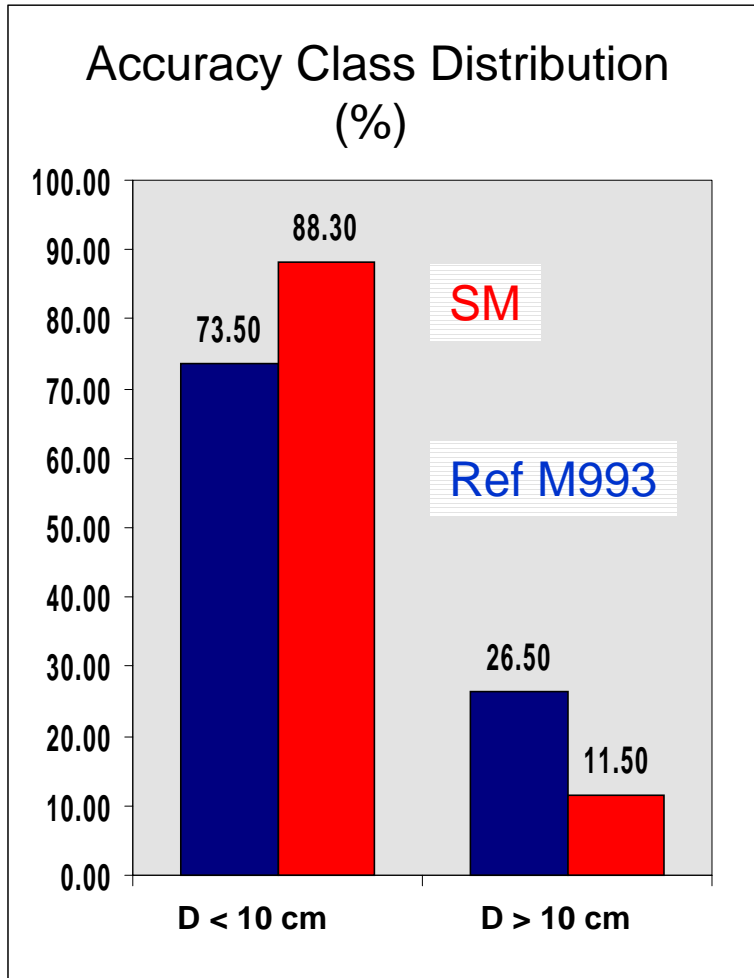
Accuracy at 200 m : < 60 % hits inside circle of 5 cm diameter

SM 7.62 x 51 mm Armour Piercing Accuracy at 200 m



Accuracy at 200 m : 80 % hits inside a circle of 5 cm diameter

SM 7.62 x 51 mm Armour Piercing Accuracy at 300 m

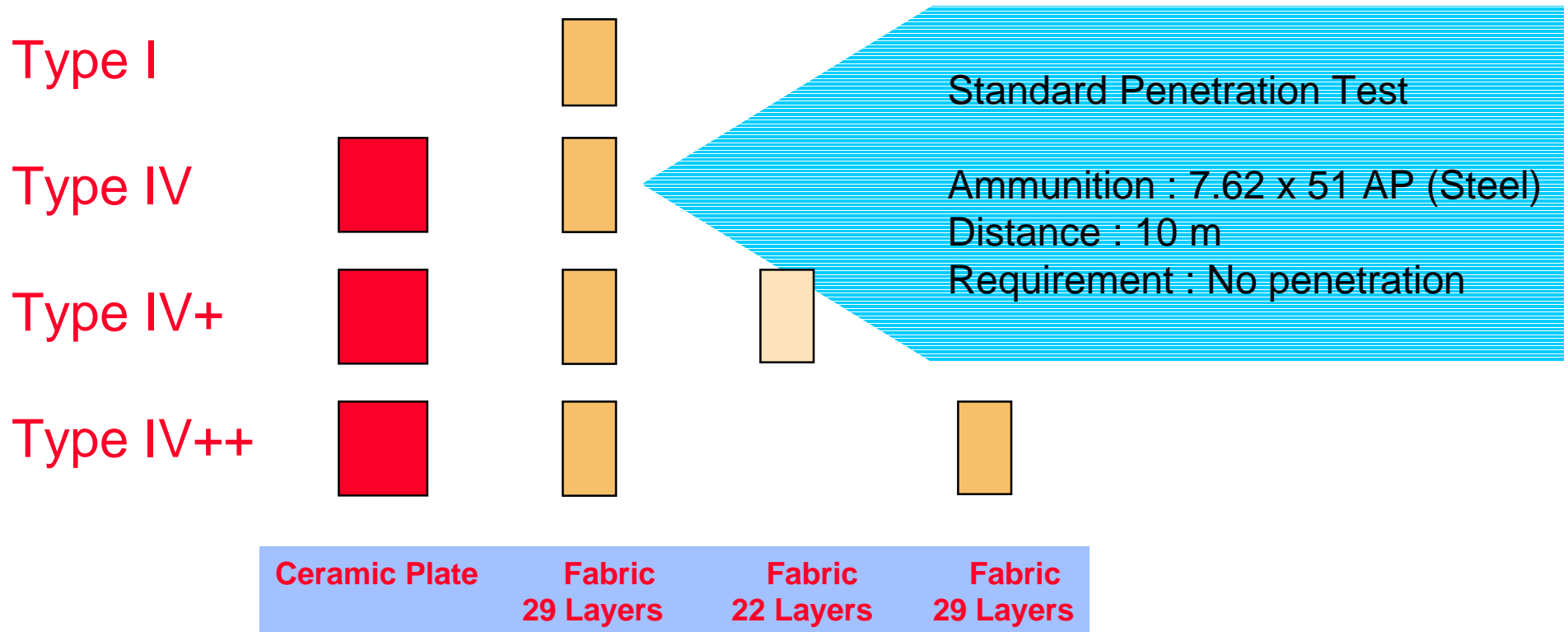


Body Armour Classification

Standard Penetration Test



Body Armour Components



SM Armour Piercing Ammunition

Penetration of Body Armour



Penetration Range

	Ref M993	SM-Ammunition		
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Body Armour	7.62 x 51	7.62 x 51	7.5 x 55	.300 WinMag
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Type IV	150 m	350 m	450 m	> 500 m
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Type IV+	100 m	200 m	250 m	> 350 m
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Type IV++		200 m	250 m	> 350 m
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SM Armour Piercing Ammunition

Summary



SM Armour Piercing ammunition is both superior in accuracy and in penetration capacity with respect to M993 reference system

SM Armour Piercing ammunition is part of a whole family of cartridges with matched trajectories, including

- FMJ and HPBT projectiles**
- highly lethal (Styx Action) deformation projectiles**

All these cartridges achieve the same point of impact without any tuning of the weapon sight

SM Armour Piercing Ammunition

Summary



SM Armour Piercing ammunition is available in the calibers

- o 7.62 x 51 mm / .308 Winchester**
- o 7.5 x 55 mm Swiss Ordnance**
- o .300 Winchester Magnum**

SM development projects include the calibers

- o .338 Lapua Magnum**
- o 5.56 x 45 mm**
- o 12.7 mm / .50**