RHEINMETALL

FIRST IN AIRBURST TECHNOLOGY

PASSION FOR **TECHNOLOGY.**

RHEINMETALL

INTRODUCTION

Classic ammunition types like High Explosives or Armour Piercing cartridges were designed with a focus to counter on traditional targets encountered in the battlefield. Since that time the scope of military operations has broadened considerably and today includes new applications such as “Military Operations in Urban Terrain” (MOUT) and counter-UAV. Traditional ammunition types are often not suitable to engage these targets. Engaging troops at long distances of over 1500 m using classic HE cartridges requires a substantial number of rounds. Due to the limited effects of traditional rounds and the diversity of modern operations, many different ammunition types are required putting an undue burden on logistics, training and last but not least costs.

A more modern, general-purpose round is called for to effectively and efficiently deal with traditional and new targets alike.

The integration of the Rheinmetall ABM-solution into the MK44 Bushmaster® Automatic Cannon and the target-dependent optimization of the ABM functionality will greatly enhance the mission effectiveness of these units and offer a truly all mission capability.

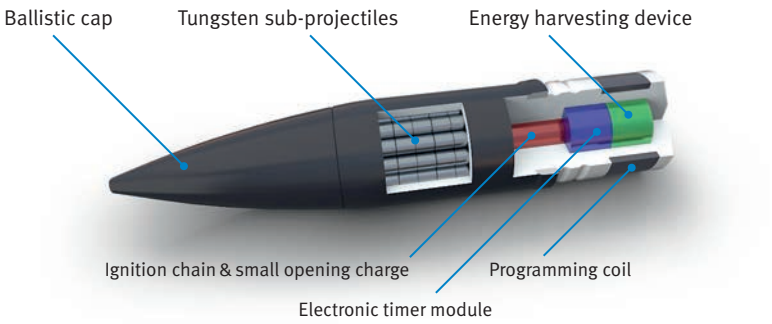
AMMUNITION

Rheinmetall provides a comprehensive medium-calibre ammunition portfolio for it’s own and other cannons. The portfolio covers a broad range of mission profiles and targets and allows to minimize the number of cartridges required balancing logistics effort and performance.

The ammunition combines a high penetration performance, versatility, reliability, low dispersion and handling safety. Matching target practice and drill rounds complete the portfolio.

The Air Burst Munition (ABM) features precise muzzle velocity compensation per round and can be used in a programmed and un-programmed mode. In programmed mode each round delivers highly effective tungsten carbide sub-projectiles to a larger area and reaches a very high kill probability per round. In un-programmed mode it features a high penetration capability against urban targets and against lightly armored vehicles (attack helicopters, BTR80). ABM ammunition can also be used in the air defense role and in the ground role. The ABM mode of action can be based on high explosives or kinetic energy effect. The Rheinmetall ABM uses kinetic energy sub-projectiles and is called Kinetic Energy Time Fuze (KETF) munition.

The round is built around a programmable time fuze and a payload of tungsten sub-projectiles. The programmable fuze contains an energy-harvesting device (no batteries), a programming coil, an electronic timer module, an ignition train and a small opening charge. The energy-harvesting device produces electrical energy when the projectile is fired. The electronic timer module is programmed via the programming coil while leaving the barrel. The ignition train and opening charge release the spin-stabilized sub projectiles from the round into a standard distribution pattern at a selected point in front of the target. The round will self-destruct outside its tactical range if it is not programmed properly.



LIGHT WEIGHT PROGRAMMING KIT

The MK44 cannon can be equipped with a 1-coil programming base which also includes the muzzle brake. The platform is fitted out with an ABM electronics unit interfacing with the fire control unit (FCU). These units are connected via a harness. All form the Light Weight Programming Kit (LPK).

ABM electronics (Puma): 296 x 192 x 180 mm, 5.5 kg

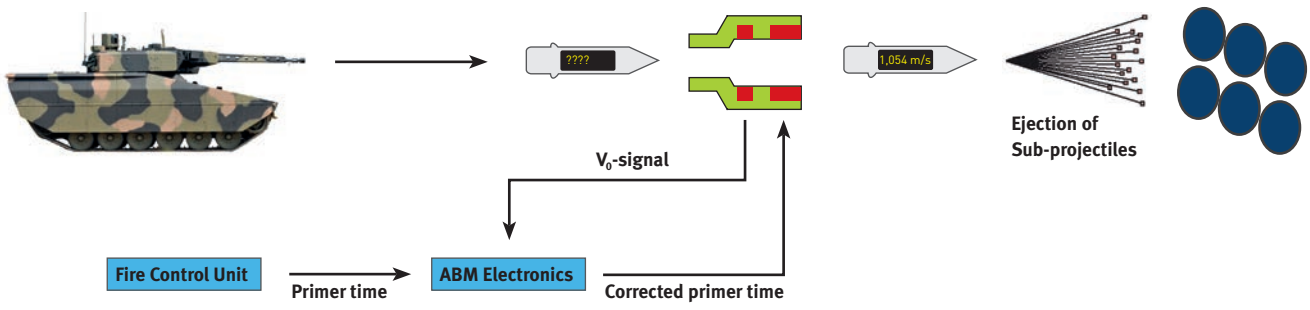
1-coil programming base

The ABM electronics compensates for the deviation of the measured speed from the nominal speed and defines the corrected fuze setting. The programming base then programs this fuze setting into the round's timer electronics so that each round releases the sub-projectiles at the optimal expulsion distance in front of the target independently of ammunition temperature and barrel condition.

The individually-programmed rounds are accurate and flexible enough to engage targets both in breadth and depth. The large number of sub-projectiles makes ABM-rounds ideal for engaging small or fast moving and spatially distributed targets on land, sea or in air defense. The sub-projectile spread pattern of this ammunition enables gunners to also engage concentrated targets of opportunity before they can react and disperse.

Rheinmetall offers a qualified and battle proven ABM solution that measures the actual velocity and via programming corrects each round individually to minimize the dispersion of the release distance. This ensures effective and efficient target destruction.

ABM-SYSTEM



RHEINMETALL ABM/KETF BENEFITS

- Broadest range of targets that can be engaged efficiently with a single ammunition type very well prepared for changing requirements
- Programmed and un-programmed mode – two totally different engagement characteristics
- Optimization for your key targets balancing hit- and kill probability
- Individual compensation of each round for minimal dispersion of the release distance to the target
- Reduction of your combat ammunition portfolio to the minimum – e.g. customers only use Rheinmetall's ABM and APFSDS-T
- Less than 1 g of explosives, multiple safety features, no dangerous duds
- No stored electrical energy, hence no resulting shelf live limitations
- Immune to Electronic Counter Measures
- Rounds unloaded from the cartridge chamber have the same programming status as ex-factory rounds

RHEINMETALL ABM SOLUTIONS IN SERVICE TODAY

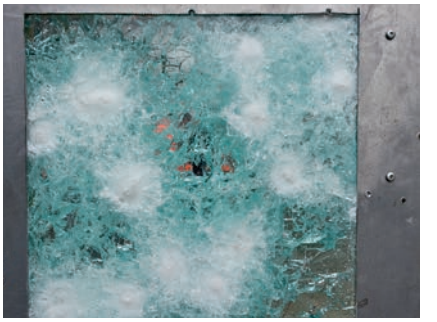
Today Rheinmetall has fielded 30 mm and 35 mm calibre ABM/KETF solutions with numerous customers worldwide.

Vehicles: PUMA – 30 mm, Boxer – 30 mm, Lynx – 30 mm, CV9035 IFV – 35 mm
Navy: Seasnake – 30 mm, Millennium Gun – 35 mm
Air defense: Skyguard, Twin Gun – 35 mm,
Skyshield, RG MK II – 35 mm
Camp protection: Mantis NBS C-RAM, C-RAM Gun – 35 mm

For the MK44 cannon, Rheinmetall chose a novel and evolutionary approach – the programming base will just use one instead of two coils for the V_0 measurement. The main advantage is that the programming base will be shorter and lighter without compromising the accuracy of the optimal expulsion distance. Simulations and live firing show that this new weight-optimized 1-coil base can even improve the accuracy of the MK44 cannon.

30 mm x 173 PMC308 KETF against 20 cm double reinforced concrete in unprogrammed mode

10 rounds of KETF ammunition precise release of tungsten sub-projectiles



30 mm x 173 PMC308 KETF blinding armoured optronics

TECHNICAL DATA	
Cartridge	30 mm x 173 PMC308 KETF
Qualified for these guns	Rheinmetall MK30-2/ABM, KCE
	ATK MK44 Bushmaster® Automatic Cannon
Firing mode	Single shot and automatic mode
Muzzle velocity	1,100 m/s
Mass of round	830 g
Mass of projectile	360 g
Total length of round	290 mm
Payload	162 cylindrical tungsten alloy sub-projectiles
Mass of sub-projectile	1.24 g
Overall payload mass	201 g
Ejection cone angle	approx. 10–15° (velocity/range dependent)
Dispersion	0.5 mil
Temperature range (functional)	–46°C to +63°C
Safety	Insensitive munition (0.9 g HE), no dangerous duds
Self-destruction	after 8.2 s (approx. 4 km)
	No stored electrical energy
	Multiple checks in the programming and timer functionality
	Muzzle safety › 64 ms (approx. 60 m)
Environment	No toxic elements
Transport/Storage	UN Classification 1.2 E
LIGHT WEIGHT PROGRAMMING KIT	
Compatibility with cannon operation	Full functionality also in automatic mode with full cadence – every
	single round is V_0-measured and optimally programmed
	The rate of fire will not be influenced
Programmable time fuze resolution	2 ms
Weight of programming base	approx. 2.7 kg (including muzzle break)
Weight of ABM electronics and harness	approx. 5.5 kg (depends on platform and customer requirements)
Environmental conditions	Temperature range (operational): –30°C to +49°C plus solar radiation 1,120 W/m²
	EMV: VG95373, GWK2
	Qualified acc. MIL-STD-810G (land vehicles) and MIL-STD-167-1/STANAG 4549 (naval applications)
Overall system reliability	› 95%, typically 98%
Programming base lifetime	
Design target	min. 4,000 full-calibre rounds or 1,500 sub-calibre rounds or a pro-rata mixture

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