Lethality – what threat do we want to defeat?

<table>
<thead>
<tr>
<th></th>
<th>Soft Targets</th>
<th>Medium Hard Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Infantry no cover</td>
<td>Infantry taking cover</td>
</tr>
<tr>
<td><strong>HE</strong></td>
<td><strong>Green</strong></td>
<td><strong>Red</strong></td>
</tr>
<tr>
<td><strong>HE ABM</strong></td>
<td><strong>Green</strong></td>
<td><strong>Red</strong></td>
</tr>
<tr>
<td><strong>HEDP</strong></td>
<td><strong>Red</strong></td>
<td><strong>Green</strong></td>
</tr>
<tr>
<td><strong>HEDP ABM</strong></td>
<td><strong>Yellow</strong></td>
<td><strong>Green</strong></td>
</tr>
</tbody>
</table>
Rheinmetall 40mm x 53 Automatic Grenade Launcher Upgrade Package

Rheinmetall’s 40mm x 53 Automatic Grenade Launcher (AGL) Upgrade Package provides all current AGL’s with the ability to fire programmable air burst munitions (ABM).

- The complete system consists of:
  - Rheinmetall 40mm x 53 ABM (HE or HEDP)
  - Rheinmetall Vingmate AGL Fire Control System (FCS)
  - Aimpoint Electro-optic Sight
  - Infrared (IR) Fuze Programming Unit (PU)

The Upgrade Package converts the AGL from an area suppression weapon to a precision weapons systems capable of engaging targets “one burst, one kill” out to 2,200 m.

- The Upgrade Package:
  - Greatly increases the first shot probability of hit ($P_h$)
  - Eliminates the need for “walking” fires onto the target
  - Provides airbursting and counter-defilade capabilities

The Rheinmetall 40mm x 53 ABM is available in both HE and HEDP versions and features an advanced IR-programmable fuze.
The Rheinmetall 40mm x 53 AGL Upgrade Package Overview

- **VINGMATE**
- **AIMPOINT**
- **tbd**

**Weapon Stations**
- MK19
- MK47
- GMG

**Soft Mount & Tripod**
- ABM Ammo
- IR Programmer

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Rheinmetall makes the 40mm x 53 ABM in both High Explosive (HE) and High Explosive Dual Purpose (HEDP) versions. Cartridge highlights include:

- Insensitive Munitions (IM) – compliant explosives and IM-compliant propulsion system

- 100% ballistic match between HEDP and HE cartridges for best compatibility in mixed belts

- Safe Separation Distance < 200m
  - M430: 300m
  - Diehl DM42: 400m

- Target Effects
  - HEDP – Penetration ≥80mm RHA and >1000 Fragments
  - HE – Fragmentation > 1400 Fragments

- Electronic Self Destruct
The Ammunition: 40mm x 53 ABM IM Propulsion System

Both versions of the ABM cartridge use Rheinmetall’s new IM Propulsion System

- Inside the propulsion system is an integrated IM venting device
- When an external heat source is applied to the cartridge, the IM venting device opens, thereby preventing the explosive separation of the projectile from the Propulsion System (the ammunition stays in the ammunition can.)

Advantage

- IM-compliant IAW STANAG 4439
- Integration of the IM Propulsion is planned for all Rheinmetall 40mm x 53 ammunition

Time line

- End of Development 1. Qtr 2010
- Start Qualification 2. Qtr 2010
- End of USMC Qualification 2. Qtr 2011
The Ammunition: 40mm x 53 ABM HE Cartridge

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions [mm]</td>
<td>Ø 40 x 112</td>
</tr>
<tr>
<td>Cartridge Weight</td>
<td>approx. 340 g</td>
</tr>
<tr>
<td>Range</td>
<td>2200 m</td>
</tr>
<tr>
<td>Ignition</td>
<td>Impact fuze</td>
</tr>
<tr>
<td>Velocity V4</td>
<td>240m/s</td>
</tr>
<tr>
<td>Number of fragments:</td>
<td>&gt;1400</td>
</tr>
<tr>
<td>Fuze type:</td>
<td>Top fuze with SD Arming</td>
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<tr>
<td>Arming distance:</td>
<td>18 - 40 m</td>
</tr>
<tr>
<td>Self destruction:</td>
<td>20 sec.</td>
</tr>
</tbody>
</table>
The Ammunition: Lethality of 40mm x 53 ABM HE Cartridge

Lethality at 5m

5m Distance + 25% Fragments

10m Distance + 30% Fragments
The Ammunition: 40mm x 53 ABM HEDP Cartridge

Technical data

- Dimensions [mm]: Ø 40 x 112
- Cartridge Weight: approx. 340 g
- Range: 2.200 m
- Ignition: Impact fuze
- Velocity V4: 240m/s
- Penetration Capability: 80mm RHA Steel
- Number of fragments: >1000
- Fuze type: Top fuze with SD Arming
- Distance: 18 - 40 m
- Self destruction: 20 sec.
The Ammunition: Lethality of 40mm x 53 ABM HEDP Cartridge (1)

Lethality at 5m

- MK315
- M430 (HEDP)
- RWM HEDP

5m Distance
+ 25% Fragments

Lethality at 10m

10m Distance
>+100% Fragments
(Nammo HEDP)
+ 40% M430

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The Ammunition: Lethality of 40mm x 53 ABM HEDP Cartridge (2)

Penetration

- RWM
- M430
- MK315

RWM gives 24% more penetration

Safe Separation Distance

- Diehl
- M430
- RWM

Improved Gunner Safety
40mmx53 High Explosive Dual Purpose
Shaped Charge Penetration on 80mm RHA Steel Class K
The IR Programming Unit: Affordable ABM capability

The Rheinmetall IR programming unit for the 40mm x 53 ABM cartridge has several unique advantages:

- No Jamming possible
- No modification to existing MK 19, MK 47 and GMG launchers
- Co-Location possible
- Programming Device can be integrated in Vingmate FCS
- Affordable
- In House production
- Construction kit
The IR Programming Unit: 40mm x 53 ABM
VINGMATE

Automatic Grenade Launcher
Fire Control System
**Vingmate FCS:** Highly Capable yet Simple-to-Operate

- LRF
- Day Camera
- Ballistics Computer
- GPS
- DMC

Modular design to meet user specific requirements
Prepared for future requirements
Vingmate FCS: Design Considerations

• Ability to hit targets at long range
  • Requires magnification
  • Requires sight to move in order to super elevate

• Modularity - ability to mount other sensors and give them the same ballistic compensation
  • Thermal sights
  • Laser pointers

• Softmount mounting
  • Reduce recoil effects
  • Improve first hit probability and grouping

• Eliminate reliance on T&E

• Ease of Operation
Vingmate FCS: Basic Operation

1. Laze
2. Aim
3. Fire

Gunner display presents distance to target and a ballistically corrected aim point (including spin drift compensation).
40mm HV ABM
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Questions?