40mm Low Velocity Extended Range Munitions (LVER)

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Introduction

Need for Extended Range Munitions in Urban Warfare

- Operating in Urban terrain (short ranges) means quick engagements.

- Traditional 40mm low velocity munitions has a lower muzzle velocity (75m/s), long flight time and not effective enough.

- Warfighters demand 40mm low velocity munitions with flatter trajectory and shorter time of flight to meet the wider range of threats.
Advantages of LVER Munitions

Enhanced Soldier Firepower with Extended Range

- 40mm Low Velocity Extended Range munitions (100m/s) will improve the effectiveness & flexibility of infantry soldiers fighting in urban terrain using existing LV grenade launchers.

- **Operational Benefits** of LVER Munitions
  - Quick engagement with shorter time of flight
  - Better hit probability with flatter trajectory
  - Longer range engagement of more than 600m
  - Many payloads solution are available.

- **Logistic Benefits**
  - Compatible to all existing low velocity grenade launchers with no modification.

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40mm LV ER Munitions Variants

- M4/M203
- SAR21/40GL
- SCAR MK 16
- SCAR MK 13
- SA80/UGL

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Technology

- **Key Innovations**
  - New propulsion charge system
    - No change in case length
    - No increase of propellant powder
    - Low muzzle velocity variation
  - Payload
    - Use of LV projectiles.

New propulsion design

Patented
LVER Exterior Ballistic

- Shorter time of flight (30% faster)
- Flatter trajectory (improved hit probability)
- Longer range, 600m (50%)

Dispersion Test at 100m

Engaging 150m

Engaging 200m
LVER Recoil Energy

- Results of Recoil Test

LV rds impulse test

LVER rds impulse test

<table>
<thead>
<tr>
<th>Computed Recoil Energy (See para 3.2c)</th>
<th>Limitations on Rounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15 ft-lb (20.3 joules)</td>
<td>Unlimited firing</td>
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<tr>
<td>15 to 30 ft-lb (20.3 to 40.7 joules)</td>
<td>200 rounds/day/man</td>
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<tr>
<td>30 to 45 ft-lb (40.7 to 61.0 joules)</td>
<td>100 rounds/day/man</td>
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<tr>
<td>45 to 60 ft-lb (61.0 to 81.4 joules)</td>
<td>25 rounds/day/man</td>
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<td>Greater than 60 ft-lb (81.4 joules)</td>
<td>No shoulder firing</td>
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</table>

- Reference to U.S Army TOP 3-2-504, the LVER round energy allows firing of 200 rounds/day/man.
Terminal Effects

40mm Low Velocity Extended Range (LV ER) Munitions Terminal Effects
Maximum Distance Firing

40MM LOW VELOCITY
EXTENDED RANGE
FIRING ON M203 AT 600m

Firing from M16/M203
Compliant Ammunition Standards

- All LVER ammunition are developed and qualified to international standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>TPM (S492)</th>
<th>F&amp;B (S493)</th>
<th>HE (S482)</th>
<th>HEDP (S481)</th>
<th>ABM F&amp;B (S490)</th>
<th>ABM HE (S491)</th>
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</thead>
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</table>

- Ammunition is also subjected to System Safety assessment – Mil-Std-882D
Handheld Firing by Visiting Customers
LVER Firing Demonstration

Fired from SAR21/M203

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## Technical Specifications

<table>
<thead>
<tr>
<th>Performance</th>
<th>TPM (S492)</th>
<th>F&amp;B (S493)</th>
<th>HE (S482)</th>
<th>HEDP (S481)</th>
<th>ABM F&amp;B (S490)</th>
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<td>Muzzle Safety</td>
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<td>Arming Distance</td>
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<td>Muzzle Velocity</td>
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<td>Penetration</td>
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<td>-</td>
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<td>15 mm</td>
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<td>Lethal Radius</td>
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<td>5 m</td>
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<td>PIBD</td>
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<td>Self-Destruct</td>
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<td>Yes</td>
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</tbody>
</table>

- TPM - Effective training
- F&B - Effective training indicates by Flash and Sound
- HE - Effective against personnel and soft skin targets
- HEDP - Effective against personnel and light armour targets
- ABM F&B - Effective training indicates by Flash and Sound
- ABM HE - Improved accuracy and lethality

Note: * Can have self-destruct feature.

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Summary

- **Operational Benefits**
  - Quick engagement
  - Better hit probability
  - Longer range engagement
  - Many payloads solution
  - Compatible to all existing LV grenade launchers.

- Enhanced Soldier Fighting Capability with existing LV grenade launchers

- 40mm LVER munitions is currently evaluating by various customers.

- Technology Readiness Level: 8

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Thank You