

IM in the Field - Experience of Reduced Sensitivity Mortar Cartridges to Actual Combat Threat Stimuli

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National Quality Award - 2007 Recipient

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

US Mortar Systems



60mm M224



I-81mm M252



120mm M120 / M121

IM Design Features Incorporated into US 60mm HE Ammo (M720A1 & M768)

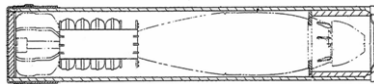


- **PBXN-5 Explosive Fuze Booster**
 - Improved thermal response than former COMP A5 explosive - Burning / pressure rupture vs. partial detonation in Variable Confinement Cook-off tests (VCCT) .
 - Approved in-line explosive (MIL-STD-1316).
 - Already utilized in M734A1 and M783 Fuzes (lead charge).
- **Plastic Fuze Adapter**
 - Provides warhead venting.
 - Prevents internal pressure buildup and acceleration of a burning reaction to a deflagration / explosion (upon auto-ignition / cook-off of explosive fill in a fire or exposure to thermal stimuli).
- **PAX-21 Explosive Main Charge**
 - Less shock sensitive than former COMP B explosive fill - 165 cards vs. 208 cards NOL gap tests (LSGT).
 - Improved behavior in burning reactions.
 - Non-TNT based, melt-pour explosive
 - Minimal impact on existing loading facilities.

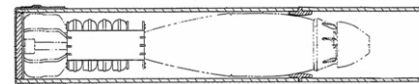
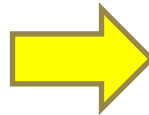
IM Design Features Incorporated into Packaging for 60mm M720A1 & M768 HE Mortar Ammo

➤ Fibertube Container

- Eliminated metal packing clip (inserted into fuze wrench slots) - Cartridge presently supported on projectile body by a new plastic ring / fiberboard sleeve system.
- Longer container to provide additional space for fuze separation and optimal warhead venting.



PA78 FIBER TUBE
W/ METAL FUZE SUPPORT CLIP



PA164 FIBER TUBE
W/ PLASTIC PROJECTILE BODY SUPPORT RING

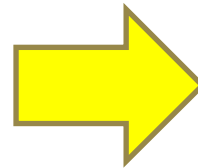
➤ Metal Ammo Container

- Taller can for longer PA164 fibertubes.
- Intumescent paint coating eliminated due to unresolved durability problem (i.e. cracking / de-lamination during rough handling tests at extreme cold environment).

Developmental IM Testing (Fast Cook-off)



**Non IM- 60mm M720
HE Cartridges**

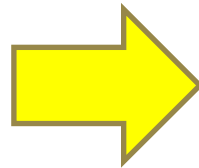


**Projectile Body Fragments and
Unconsumed COMP B Explosive (TYPE II
Response)**

Developmental IM Testing (Fast Cook-off)



**IM Enhanced - 60mm
M720A1 / M768 HE
Cartridges**



**Burned-out Projectiles (TYPE
V Response)**

Mine Resistant Ambush Protected (MRAP) Vehicles



Afghanistan (September 2009)

- MRAP vehicle hit by an Improvised Explosive Device (IED).
- IED ruptured the vehicle's hull and fuel tank, which engulfed the vehicle in flames.
- Seven-man crew and 60mm M768 HE mortar ammunition were inside the cabin.
- Although several soldiers were seriously injured, all survived.
- Insensitive Munitions (IM) features of 60mm M768 HE cartridges credited with averting a greater disaster.



Response to Actual Combat Threat (IED) Stimuli



Exterior of MRAP



**Burned out
projectile**

**Interior of MRAP after IED
attack and resulting fire.**



**Burned-out 60mm
M768 projectiles
recovered from MRAP**

US Mortar Ammunition IM Enhancements

- **Real Benefits**
 - **Increased Soldier Survivability**
 - **Reduced Collateral Damage**
 - **Enhanced Safety**
 - **Logistics (Improved Ammo Storage)**
- **Additional (Ongoing) Design Improvements**
 - **IMX-104 Explosive Fill**
 - **PBXW-14 Fuze Booster Explosive**