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PURPOSE

This guide supplies personnel in possession of ammunition and explosives (AE) with information on how to manage the risks associated with AE storage and handling; it is designed for use by personnel who have had academic exposure to the concepts herein. The general information contained in this guide regards typical ammunition storage and handling activities, and meets criteria contained in Army Regulation (AR) 385-10, The Army Safety Program, Department of the Army Pamphlet (DA PAM) 385-64, Ammunition and Explosives Safety Standards, and DA PAM 385-30, Risk Management. AE will be referred to as ammo in the contents of this guide.

INTRODUCTION

Separation distances protect against effects of blast or overpressure; high-speed, low-angle fragmentation; and fire from accidental or enemy action. The greater the distance from a potential explosion site (PES), the greater protection the exposed site (ES) is afforded. Protection from fragments can also be supplied by properly constructed and located barricades.

When possible, all ammo should be stored in its original packaging in a designated ammo storage area. Original packaging may furnish greater protection from the effects of detonation and prevent the ammo from contributing to the detonation.

It is imperative that the proper degree of protection is supplied for personnel and assets. A lesser distance, and thus lesser protection, is acceptable risk for related personnel and operations directly associated with the ammo storage area mission. A greater distance and a higher level of protection is required for all other personnel. Examples of unrelated personnel or operations requiring a higher degree of protection are

- dining facilities;
- barracks;
- morale, welfare, and recreation (MWR) facilities;
- Army and Air Force Exchange Service; and
- medical facilities.

WHERE TO GO FOR HELP

Explosives safety assistance can be obtained from command safety personnel or Quality Assurance Specialist (Ammunition Surveillance) (QASAS) personnel, usually located at the ammunition supply point or with the supporting logistics cell. If additional assistance is needed, contact the Command Safety Office and request assistance from the U.S. Army Technical Center for Explosives Safety at usarmy.mcalester.usamc.list.dac-es-hotline, DSN: 956-8104, or Commercial: (918) 420-8992. Additional explosives safety information can be found on the Munitions and Explosives Safety Forum: https://www.dau.mil/cop/ammo/Pages/Default.aspx.
DISTANCES

QUANTITY DISTANCE

The application of the rules on separation is called quantity distance (QD).

QD is the balance between the type and amount of explosives at a location and the protection of assets and personnel from the unacceptable effects of unintended explosion at that location.

MEASURING DISTANCES

Distances should be measured from the exterior edge of any ammo or ammo container to the nearest edge of any site exposed to the ammo.

INTERNAL DISTANCES

Internal distances are those required for the separation of operating facilities and storage sites in the confines of an ammo storage area. Internal distances are the minimum required by DA PAM 385-64 and technical data packages approved by the Department of Defense Explosives Safety Board (DDESB).

INTERMAGAZINE DISTANCE

Intermagazine distance (IMD) is the distance required between two ammo storage locations, such as pads in an ammunition supply point (ASP) or ammunition holding area (AHA).

INTRALINE DISTANCE

Intraline distance (ILD) is the distance maintained from a PES, such as a pad in an ASP, to an associated ES, such as ammo surveillance or ammo maintenance. ILD can be barricaded (B) or unbarricaded (U).
IMD and ILD are adjusted based on the presence or absence of properly designed and constructed barricades (see the Barricades section). These internal distances are expected to prevent ammo stack A from instantly detonating ammo stack B. Delayed propagation of an explosives event to adjacent storage locations is still possible.

**EXPECTED EFFECTS**

*It is extremely important that applicable internal distances are established and maintained between explosives locations.*

If these distances are not maintained, an explosive event can propagate rapidly between sites, resulting in the destruction of all ammunition and explosives assets, rendering the unit incapable of performing its mission, and denying access to the area until explosive ordnance disposal (EOD) can render safe damaged items. Although prompt propagation is not expected, collateral damage to ammunition on nearby storage sites and operating facilities may be so severe that the assets may become unserviceable.

*A greater distance than the minimum standard will furnish greater protection and survivability to nearby assets.*

**EXTERNAL DISTANCES**

External distances are those required for the separation of personnel and facilities that are outside the confines of an ammo storage area and are not directly related to or associated with the ammo storage area mission. These external distances are described as

- inhabited building distance (IBD) and
- public traffic route distance (PTRD).

Examples of IBD are the installation boundary, dining facilities, billeting, MWR facilities, medical facilities, tactical operations center, fuel and water storage, and other life support facilities. Examples of PTRD are on-base roads (external to the ammo area), power lines, navigable rivers, open-air recreational facilities, and open-air training ranges. Generally, PTRD is 60 percent IBD.
Realistically, the required distances are not always possible in a deployment situation. In the initial deployment, commanders must follow Army Techniques Publication (ATP) 5-19 and use risk management to detect and minimize the risk to personnel and mission capability. Once the situation has stabilized, efforts should be made to comply with QD requirements, including considering moving personnel and material assets that are at risk from the stored ammunition or establishing a new ammunition facility. If QD compliance is still not possible, a DA Form 7632, “Deviation Approval and Risk Acceptance Document (DARAD),” must be initiated. DARADs are explained later in this guide.

**INHABITED BUILDING DISTANCE**

IBD supplies excellent protection to personnel and material assets from blast effects and very good protection from fragments. There is moderate risk of serious injury and possible fatalities from rogue fragments.

**PUBLIC TRAFFIC ROUTE DISTANCE**

PTRD furnishes less protection with a higher probability of serious injuries and fatalities than IBD. Most material assets at PTRD can be expected to be serviceable or easily repairable.
BARRICADES

Properly constructed and located barricades reduce the internal footprint (IMD/ILD) of an AHA or any other ammo operation or site. They do not reduce the external footprint. Barricades will stop high-velocity, low-angle fragments but are ineffective in preventing high, lobbed fragments. For this reason, there is no reduction in the external distance (IBD/PTRD) based on the presence of barricades.

Barricades are typically built of earth construction and do not use concrete, heavy steel, stones, or debris heavier than 10 lbs. or larger than 6 inches in diameter in the fill or cover due to the added fragmentation or spalling hazard they create. A natural land feature can be used as a barricade if there is line-of-sight plus 1 foot between the ammo locations, and the top of the natural feature is at least 1 foot thick. HESCO Concertainer barricades meet the requirements of a properly constructed barricade.

The barricade diagram shows general details of a barricade. Properly designed barricades use a 2:1 ratio (2 feet of run for every 1 foot of rise). A MIL 7 topped by a MIL 4 HESCO works well for this configuration.
Concrete barriers (i.e., T-walls and Texas or Jersey barriers) DO NOT supply barricade protection for explosives safety purposes. They may be of value for force protection, but do not reduce QD requirements.
Blast/Fragment Effects Chart Unbarricaded

<table>
<thead>
<tr>
<th>Distance in Feet</th>
<th>EFFECTS</th>
<th>EFFECTS</th>
<th>EFFECTS</th>
<th>EFFECTS</th>
<th>EFFECTS</th>
</tr>
</thead>
</table>
| 0               | • Personnel
Killed by blast
Aircraft
Destroyed by blast
Vehicles
Overturned and crushed
Buildings
Destroyed by blast |
| 228             | • Personnel
Seriously injured or killed by blast
Aircraft
Heavily damaged
Vehicles
Severely damaged
Buildings
Damaged to near destruction |
| 372             | • Personnel
Seriously injured by frag., 2% chance eardrum damage
Aircraft
Structural damage
Vehicles
Extensively damaged
Buildings
Damaged—50% of replacement cost |
| 750             | • Personnel
Minor to moderate injury by fragments & building debris
Aircraft
Minor structural damage, fragment penetration possible
Vehicles
Minor damage
Buildings
Damaged—20% of replacement cost |
| 1,250           | • Personnel
Minor injury from bldg. debris and flying glass
Aircraft
Minor fragment damage possible
Vehicles
Minor fragment damage possible
Buildings
Damaged—5% of replacement cost |

NOT SIGNIFICANT EFFECTS

TOTAL DESTRUCTION

IMD(U)  ILD(U)  PTRD  IBD  KILLED  SERIOUS INJURIES  INJURIES LIKELY  INJURIES POSSIBLE

NOT MISSION CAPABLE  COMBAT EFFECTIVE

* Delayed propagation is possible from fire and firebrands (lobbed or projected debris). Prompt Propagation (sympathetic detonation) of packaged ammo is not likely.

NOTE: The effects shown in each column are the effects that can be expected at or near the distance on the left side of the column and will diminish with increased distance.
Blast/Fragment Effects Chart Barricaded

<table>
<thead>
<tr>
<th>Distance in Feet</th>
<th>IMD(B)</th>
<th>ILD(U)**</th>
<th>PTRD</th>
<th>IBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>124</td>
<td>372</td>
<td>496</td>
<td>827</td>
</tr>
</tbody>
</table>

- **Personnel**
  - Killed by blast
  - Seriously injured or killed by blast
  - Severely damaged
  - Damaged to near destruction

- **Aircraft**
  - Heavily damaged
  - Structural damage
  - Extensively damaged
  - Damaged—50% of replacement cost

- **Vehicles**
  - Overturned and crushed
  - Severely damaged
  - Extensively damaged
  - Damaged—5% of replacement cost

- **Buildings**
  - Destroyed by blast
  - Damaged—20% of replacement cost

**TOTAL DESTRUCTION**

- **Personnel**
  - Killed
  - Seriously injured or killed
  - Severely injured by fragments, 2% chance of eardrum damage

- **Aircraft**
  - Heavily damaged
  - Minor structural damage, fragment penetration possible
  - Minor damage

- **Vehicles**
  - Severely damaged
  - Minor damage

- **Buildings**
  - Destroyed
  - Damaged—5% of replacement cost

**EFFECTS**

- **Personnel**
  - Minor injury from building debris and flying glass
  - Minor injury from frag., 2% chance of eardrum damage

- **Aircraft**
  - Minor fragment damage possible

- **Vehicles**
  - Minor damage possible

- **Buildings**
  - Damaged—5% of replacement cost

**NOT MISSION CAPABLE**

- **ASSET LOSS**
  - Not mission capable
  - Asset loss

- **ASSET PROTECTION**
  - Combat effective

*Delayed propagation is possible from fire and firebrands (lobbed or projected debris). Prompt Propagation (sympathetic detonation) of packaged ammo is not likely.

**ILD(B)** is not shown due to limited application.
CHARACTERISTICS

NET EXPLOSIVE WEIGHT

If the net explosive weight (NEW) is not marked on the box, how would you calculate the NEW for this item?

Based on the Department of Defense Identification Code (DODIC) G881,

1. Calculate the amount of ammo: 2 boxes with 30 rounds per box. $2 \times 30 = 60$ rounds.

2. Locate the NEW in the Joint Hazard Classification System (JHCS) or Yellow Book.

<table>
<thead>
<tr>
<th>DODIC</th>
<th>Nomenclature</th>
<th>HC/DIV/CG</th>
<th>Note(s)</th>
<th>UNO SER#</th>
<th>CIIC</th>
<th>NEW QDLB</th>
<th>NEW QDKG</th>
</tr>
</thead>
<tbody>
<tr>
<td>G878</td>
<td>Fuze, Hand Grenade M228</td>
<td>1.4B</td>
<td>0257</td>
<td>4</td>
<td>0.0050</td>
<td>0.0023</td>
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<td>G880</td>
<td>Grenade, Hand Frag. M61</td>
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<td>2</td>
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<td>Grenade, Hand Frag. M67</td>
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<td>0292</td>
<td>2</td>
<td>0.4137</td>
<td>0.1877</td>
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<tr>
<td>G890</td>
<td>Grenade, Hand Frag. MK2/M26 Ser.</td>
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<td>0292</td>
<td>2</td>
<td>0.3900</td>
<td>0.1769</td>
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<tr>
<td>G892</td>
<td>Grenade, Hand Frag. MK2A1</td>
<td>1.1F</td>
<td>0292</td>
<td>2</td>
<td>0.1000</td>
<td>0.0454</td>
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<tr>
<td>G895</td>
<td>Grenade, Hand Illum. MK1-0, 1, 2</td>
<td>1.3G</td>
<td>0254</td>
<td>4</td>
<td>0.2550</td>
<td>0.1157</td>
<td></td>
</tr>
</tbody>
</table>

Excerpted from the Yellow Book, Rev. 18, page 66.

3. Multiply: $60 \times 0.4137$ lbs. = 24.83 lbs.

HAZARD CLASSIFICATION

The official source for determining the hazard class/division (HCD) and the NEW for ammo items is the JHCS available at (requires login and password): https://mhp.redstone.army.mil. An unofficial source for HCD and NEW is the Yellow Book, available by email request to usarmy.mcalester.usamc.list.dac-yellowbook@mail.mil.
Using the “Yellow Book”

<table>
<thead>
<tr>
<th>DODIC</th>
<th>Nomenclature</th>
<th>HC/DIV CG</th>
<th>NOTE(S)</th>
<th>UNO SER #</th>
<th>CIIC</th>
<th>NEW QDLB</th>
</tr>
</thead>
<tbody>
<tr>
<td>C546</td>
<td>CTG, 105mm Hera M913 (1315)</td>
<td>1.2.1E</td>
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<td>0321</td>
<td>7</td>
<td>12.8507</td>
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<tr>
<td>C601</td>
<td>CTG, 90mm Cannister Aper. M377</td>
<td>1.2.1C</td>
<td></td>
<td>0328</td>
<td>7</td>
<td>9.0572</td>
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<tr>
<td>C623</td>
<td>CTG, 120mm HE M993</td>
<td>1.1E</td>
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<td>0006</td>
<td>7</td>
<td>7.9176</td>
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<td>C624</td>
<td>CTG, 120mm SMK WP XM/M929</td>
<td>1.2.2H</td>
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<td>C625</td>
<td>CTG, 120mm Illum. XM/M930</td>
<td>1.2.1G</td>
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<td>C650</td>
<td>CTG, 106mm Heat M344/A1</td>
<td>1.2.1E</td>
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<td>0321</td>
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<td>10.8900</td>
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<tr>
<td>C651</td>
<td>CTG, 106mm HEP-T M346/A1</td>
<td>1.1F</td>
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<td>0005</td>
<td>7</td>
<td>15.8968</td>
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</table>

This is a typical data page from the Yellow Book. A DODIC is a four-digit alphanumeric designation for the different types of ammo. Nomenclature is the military name for the item. The “HC/DIV CG” column contains information to calculate the hazard associated with an ammo item and types of ammo that can be located together. The “NEW QDLB” column has information to calculate how much ammo may be placed in any given location. How these types of information are used is discussed in other portions of the booklet.

The Department of Defense (DOD) uses the international system of classification devised by the United Nations Organization (UNO) for transport of dangerous goods. The UNO classification system defines nine hazard classes (HC). Class 1 contains most ammunition and explosive items. The hazard division is a numerical designator within an HC indicating an item’s associated hazards and potential for causing casualties and property damage. For example, in HC 1 (explosives), there are six divisions. The first four are listed below.

**Division 1.1**

Explosives that have a mass explosion hazard, i.e., a mass explosion effects the entire load instantaneously. Examples include artillery projectiles, frag grenades, and some types of missiles.
Division 1.2
High explosives filled items that, when detonated, are NOT expected to explode all the others in the same location at the same time. This presents a fragment hazard. Examples include some types of mortar rounds, linked ammo, and simulators.

Division 1.3
Ammo that has a significant fire hazard. When started, the fire typically cannot be put out. This may have a minor fragment or explosion hazard. Examples include propelling charges, signals, and rocket motors.

Division 1.4
Ammo that has a relatively minor explosion hazard. Some types include signal cartridges and ammo for pistols, rifles, shotguns, and machine guns.

STORAGE COMPATIBILITY
Ammo is grouped in hazard divisions to accurately indicate its damage-causing potential in an unintentional detonation or fire. It is also categorized into one of thirteen storage compatibility groups (SCGs). The SCG is a letter designation assigned to indicate what may be stored or transported together without significantly increasing either the probability of an accident or the magnitude of an accident’s effects. The SCG assigned to a particular type of ammo can also be found in the JHCS or Yellow Book under the column “HC/DIV CG.” It is the letter following the hazard classification. Using the previous example, the SCG for G881 is “F.”

### Storage Compatibility Mixing Chart

<table>
<thead>
<tr>
<th>Group</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>N</th>
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<tr>
<td>A</td>
<td>X</td>
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</tbody>
</table>

Excerpt from DA PAM 385–64, 24 May 2011.

Table Notes:
1. “X” at the intersection of a row and column indicates that items assigned to those SCG may be stored together; otherwise, mixing is either prohibited or restricted according to note 2.
2. “Z” at the intersection of a row and column indicates that those two SCG may not be stored together without the proper permission. When such conditions as operational considerations or magazine non-availability and safety are not sacrificed, logical mixed storage of limited quantities of some items of different groups may be approved. These relaxations of mixed storage shall be approved by the major Army command and are not considered waivers.
3. Mixed storage of 4,000 kg. or less combined net explosives weight of various types of ammo is authorized without regard to compatibility. * Exception, items in SGC “L” cannot be stored with other items.
AMMO STORAGE AREAS

Storage areas can include the following.

Operating facilities (in the open or in structures) can include

- workshops,
- reconfiguration (pack, unpack, repack) operations,
- minor maintenance operations,
- issue and turn-in operations, and
- administrative office spaces directly related to the ammo mission.

There are two general types of ammo storage areas in a contingency environment:

- **AHA**: Areas where ammo has already been issued to the unit or troops
  - basic load ammunition holding areas (BLAHAs)
  - ammunition transfer and holding areas (ATHPs)
  - aviation AHAs (Avn AHA)
  - artillery AHAs (Arty AHA)
- **ASP**: Areas where ammo has not been issued to the unit or troops
  - theater storage areas
  - corps storage areas.

**AHA STORAGE**

AHA storage sites (also known as BLAHA, ATHP, Avn AHA, Arty AHA, etc.) are locations where ammo that has been issued to units can be safely stored. They may consist of one or more storage sites and include acceptance of risks to personnel, facilities, and equipment that are greater than normally permitted. An AHA storage site can be an open pad, uploaded vehicle, MILVAN or ISO container, barricaded cell, etc.

The concept of BLAHA storage may also supply QD separations during mobile operations. The maximum NEW at any single BLAHA storage site must not exceed 8,818 lbs. (4,000 kg.). A BLAHA may have multiple cells, but none can exceed 8,818 lbs. and each must be separated from adjacent sites by the applicable separation distance.

SCG and HCD criteria are somewhat relaxed for some AHA storage. AHA mixing rules for HCD require only that the NEW for all ammo in HCDs 1.1, 1.2, and 1.3 shall be added together and considered as HCD 1.1. The NEW for ammo classified as HCD 1.4 may be disregarded. Ammo classified as HCD/SCG 4.1G and 6.1G...
may also be stored in an AHA without restriction. Although the SCG and HCD criteria have been relaxed for AHA sites, storage should be in full compliance with peacetime storage criteria whenever possible.

**ASP STORAGE**

ASP storage sites are logistical storage locations for ammo that has not been issued to using units. Typical ASP storage sites in a contingency environment include widely spaced open storage pads and protective construction using earthen berms or barricade systems, such as HESCO Concertainer barricades and steel bin barricades. Use of barricades will allow the sites (called cells or modules) to be located much closer together. Whether storage is open or barricaded, the storage sites should include environmental protection for the ammo, such as MILVANs or ISO containers or, as a minimum, some sort of sun shading.

### Reduced Explosives Safety Quantity Distance (ESQD) Storage Containers

<table>
<thead>
<tr>
<th>Section Title</th>
<th>Max. NEW (Lbs. of HD 1.1 [kilograms-kg.])</th>
<th>Min. IBD (Feet[Meters])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canine Explosive Training and Storage Magazine</td>
<td>87.5 lbs. (39 kg.) (MCE = 1.25 lbs.)</td>
<td>25' (7.62 m.)</td>
</tr>
<tr>
<td>Advanced Explosives Ordinance Disposal/Storage Magazine 7 ft. × 7 ft. × 7 ft. (EOD/MAG)</td>
<td>126.2137 lbs. (57 kg.) (MCE = 1.25 lbs.)</td>
<td>10' (3.048 m.)</td>
</tr>
<tr>
<td>Navy EOD Ready Storage Locker AIRMAG 5 ft. × 5 ft. × 5 ft.</td>
<td>8.45 lbs. (3 kg.)</td>
<td>0</td>
</tr>
<tr>
<td>GOLAN 5 storage unit</td>
<td>11 lbs. (4 kg.)</td>
<td>30' (3.35 m.)</td>
</tr>
<tr>
<td>GOLAN 10 storage unit</td>
<td>22 lbs. (9 kg.)</td>
<td>3' (0.914 m.)</td>
</tr>
<tr>
<td>GOLAN 15 storage unit</td>
<td>33 lbs. (14 kg.)</td>
<td>4' (1.22 m.)</td>
</tr>
<tr>
<td>NABCO 5V-23 storage unit (Type One—used for non-fragmenting explosives only)</td>
<td>32 lbs. (14 kg.)</td>
<td>15' (4.57 m.)</td>
</tr>
<tr>
<td>NABCO 5V-23 storage unit (Type Two—used for non-fragmenting explosives and DDESB-approved fragmenting AE only)</td>
<td>32 lbs. (14 kg.)</td>
<td>15' (4.57 m.)</td>
</tr>
<tr>
<td>NABCO 5V-50 storage unit</td>
<td>50 lbs. (22 kg.)</td>
<td>35' (10.57 m.)</td>
</tr>
<tr>
<td>NABCO 5V-80 storage unit</td>
<td>80 lbs. (36 kg.)</td>
<td>35' (10.57 m.)</td>
</tr>
<tr>
<td>MK 665 Mod 0 container storage unit</td>
<td>0.3527396 oz. (10 grams [0.01 kg.])</td>
<td>0</td>
</tr>
<tr>
<td>HESCO barricaded ARMAG (Configuration 1)</td>
<td>110 lbs. (49 kg.)</td>
<td>200' (50.95 m.)</td>
</tr>
<tr>
<td>HESCO barricaded ARMAG (Configuration 2)</td>
<td>110 lbs. (49 kg.)</td>
<td>410' (125 m.)</td>
</tr>
</tbody>
</table>
# BLAHA Storage Table of Distances

<table>
<thead>
<tr>
<th>NEQ/NEW on MILVAN Pad (1)</th>
<th>Distances (in meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (2, 4)</td>
</tr>
<tr>
<td>1,102 lbs. (500 kg.)</td>
<td>6.27</td>
</tr>
<tr>
<td>2,205 lbs. (1,000 kg.)</td>
<td>7.90</td>
</tr>
<tr>
<td>3,307 lbs. (1,500 kg.)</td>
<td>9.04</td>
</tr>
<tr>
<td>4,409 lbs. (2,000 kg.)</td>
<td>9.95</td>
</tr>
<tr>
<td>5,512 lbs. (2,500 kg.)</td>
<td>10.72</td>
</tr>
<tr>
<td>6,614 lbs. (3,000 kg.)</td>
<td>11.39</td>
</tr>
<tr>
<td>7,716 lbs. (3,500 kg.)</td>
<td>11.99</td>
</tr>
<tr>
<td>8,818 lbs. (4,000 kg.)</td>
<td>12.54</td>
</tr>
</tbody>
</table>

Notes:
1. No separation between uploaded MILVANs on a pad is required. However, the MILVANs are expected to mass detonate. The net explosives quantity/net explosives weight (NEQ/NEW) is the total explosives weight of all the MILVANs on a single pad. NEQ/NEW is computed by combining all ammo except small arms ammo. AHA storage cannot exceed 4,000 kg. per MILVAN pad.
2. At this distance, explosives are not expected to propagate but the munitions in adjacent pads will be unserviceable.
3. A detonation at the MILVAN pad is not expected to propagate to the heavy armor. The closer the heavy armor is to the MILVAN pad, the more likely the heavy armor will be damaged beyond serviceability.
4. At these distances, light armor may be damaged beyond serviceability.
5. The presence of barricades does not reduce required external distances.

Note: BLAHA and ready ammo storage areas (RASAs) are exempt from ammunition compatibility requirements.

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**BLAHA Storage Distances**

**BLAHA Storage Using Barricades, Internal Distances**

**BLAHA Storage Unbarricaded, Internal Distances**

---

![KEY](image)

**WARNING:** THE PRESENCE OF BARRICADES DOES NOT REDUCE EXTERNAL DISTANCES.
HESCO BARRICADED ARMAG, 7 ft. × 7 ft. × 7 ft.

The HESCO barricaded ARMAG has been approved by DDESB for two configurations outlined below.

Configuration 1: is a 7 ft. × 7 ft. × 7 ft. ARMAg Inc. Type 2 explosive storage magazine. The barricade is an Expeditionary Barrier System (EBS) as described in MIL-DTL-32488, Detail Specification, EBS with four walls made of 42" thick Type 1 cells, and a roof made of 24" Type 2 cells placed over fiberglass decking and supported by Type 1 cell walls.

Configuration 2: is a 7 ft. × 7 ft. × 7 ft. ARMAg Inc. Type 2 explosive storage magazine. The barricade is made up of four EBS walls with 42" thick Type 1 cells as described in MIL-DTL-32488, EBS. HESCOS are 3 ft. from ARMAg walls. No overhead cover.

Each storage magazine shall be grounded in accordance with DESR 6055.09, Defense Explosives Safety Regulation, and the techniques defined within National Fire Protection Association (NFPA) 780.
Reduced ESQD Storage Units General Notes

Requested changes shall be routed through the U.S. Army Technical Center for Explosives Safety (USATCES) for concurrence prior to substitution, removal from authorized site, addition, or modification of any storage medium.

1. Only approved magazine designs (per the approved drawings) shall be used.
2. Only approved pumice container designs (per the approved drawings) shall be used.
3. Only approved load-out configurations are permitted.
4. Approved total NEW and MCE shall not be exceeded.
5. No explosive item shall be introduced that is more sensitive to initiation by propagation than items currently approved.
6. No stacking of containers (to include on shelves) is permitted.
7. No combustible packaging (with the exception of packaging associated with items stored in the closed metal containers on the installed shelves) is permitted inside the magazines.
8. Magazine vents shall not be blocked/restricted. Exception: Vents may be blocked with configuration 1 of the HESCO Barricaded ARMAG 7’ x 7’ x 7’.
9. All HD 1.4 explosives, except what is authorized to be placed in the toolkits, shall be stored in closed metal containers placed on the installed shelves.
10. No boxes shall overhang the installed shelves.
11. Pathways shall be maintained to give personnel access to all pumice containers and to items on the shelves.
12. Larger (taller/wider) earth-filled barricades are acceptable and do not change approved NEWs and distances.

The number of MILVANS may vary based on requirements; however, critical dimensions are the same.

The HESCO barricades depicted in this drawing are the recommended configuration. Other configurations are permissible if the configuration is stable and at a minimum height of 10 ft. Although the minimum barricade height is 1 ft. above line-of-sight from the top of MILVANS in adjacent cells, a 10 ft. to 10.5 ft. barricade height will account for a slight elevation of the MILVAN.

EARTH-FILLED STEEL BIN BARRICADES

Earth-filled steel bin barricades are designed and approved to reduce the IMD between ammo storage cells. There are two types of steel bin barricades.

Option 1 Revetments

- Must be a minimum of 7 ft. (2.1 m) thick.
- Can limit a maximum creditable event (MCE) in a series of cells to the largest quantity in a single cell if the quantity in the single cell does not exceed 30,000 lbs. NEW.

Option 2 Revetments

- Must be a minimum of 5.25 ft. (1.6 m) thick.
- Can limit an MCE if no cell contains more than 5,000 lbs. NEW.

When properly sited, these cells prevent prompt propagation; however, all assets in the series of cells are at risk of loss. Although a revetment is effective in limiting the blast, there is a significant probability that the contents of many of the cells will be damaged or destroyed by the initial and subsequent fire and explosions. The extent of such losses increases with the amount of explosives present.
For steel bin barricades to be effective, the following conditions must be met:

- Ammo shall be positioned no closer than 10 ft. (3.1 m) from cell walls, no closer than 3 ft. (0.9 m) from the end of the wing walls, and no higher than 2 ft. (0.6 m) below the top of cell walls.
- Ammo shall be distributed over the available area in the cell, rather than concentrated in a small area.
- Ammo stored in a cell in quantities near the maximum NEW limit shall not be positioned in a single row of pallets, stacks, or trailers.
- The storage of ammo in flammable outer-pack configurations, such as wood boxes, shall be minimized.
- The types of ammo stored in these areas shall be verified with QASAS or Explosives Safety personnel to ensure compliance with standards.
- There shall be a 1,250 ft. external arc for IBD.
ISO TO ECM

ISO to ECM conversion is an explosives safety mitigation method available in the tactical environment. Depending on the limiting factor (NEW, IMD, ILD, or IBD) the ISO to ECM configurations can increase NEW and/or decrease QD. This design greatly reduces the probability of an event from indirect fire and the effects of an accidental explosion. If multiple rows are required, rear-to-rear ISO to ECMs are preferred because the rear-to-rear distance is the same as the side to side distance. Front-to-rear and especially front-to-front exposures should be avoided.

<table>
<thead>
<tr>
<th>Example:</th>
<th>NEW</th>
<th>IMD (side to side)</th>
<th>ILD</th>
<th>IBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO to ECM Criteria</td>
<td>262 lbs. per container</td>
<td>8 ft.</td>
<td>115 ft.</td>
<td>1,032 ft.</td>
</tr>
<tr>
<td>BLAHA Criteria</td>
<td>64 lbs. per container</td>
<td>8 ft.</td>
<td>72 ft.</td>
<td>886 ft.</td>
</tr>
<tr>
<td>ISO to ECM Criteria</td>
<td>1,405 lbs. per container</td>
<td>14 ft.</td>
<td>202 ft.</td>
<td>1,250 ft.</td>
</tr>
<tr>
<td>BLAHA Criteria</td>
<td>343 lbs. per container</td>
<td>14 ft.</td>
<td>126 ft.</td>
<td>886 ft.</td>
</tr>
<tr>
<td>ISO to ECM Criteria</td>
<td>4,742 lbs. per container</td>
<td>21 ft.</td>
<td>302 ft.</td>
<td>1,250 ft.</td>
</tr>
<tr>
<td>BLAHA Criteria</td>
<td>1,257 lbs. per container</td>
<td>21 ft.</td>
<td>189 ft.</td>
<td>886 ft.</td>
</tr>
</tbody>
</table>

Major Benefit · Mitigate probability of an event from indirect fire.
Picture · 8 foot separation (not optimal).
ARMS ROOMS

Compliance with QD and compatibility criteria is not required for mission essential or operationally necessary quantities of ammo in HCD 1.4 or 6.1 (excluding toxic chemical munitions). In addition, up to 100 lbs. NEW HCD 1.3 and up to 50 lbs. NEW hazard division (HD) 1.2.2 may be stored in this manner. However, a composite risk management worksheet shall be prepared according to Field Manual 5-19 and will be submitted with an explosives storage license for consideration by the approving official. Documentation of the risk assessment will be maintained in the designated safety office. Documentation of the risk assessment will be part of the license and maintained with all copies of the license.

LIGHT ARMOR VEHICLES

Vehicles designed to resist small arms ammunition fire and fragmentation from artillery shell detonations are considered light armor.

- High-Mobility, Multi-Purpose Wheeled Vehicle (HMMWV) with Frag-5 or comparable kits
- M1117 Armor Security Vehicle (ASV)
- Mine-Resistant, Ambush-Protected vehicle (MRAP), including Buffalo and RG-31
- M109/Field Artillery Ammunition Supply Vehicle (FAASV)
- M113 series vehicles
- Striker vehicle family
These vehicles are not designed to contain explosions within the vehicles, but are designed to protect contents and passengers from outside blasts and fragmentation. This design prevents propagation via high-speed, low-angle fragmentation between vehicles, but will not prevent the vehicle from coming apart in the event of an explosion. For this reason, a light armor vehicle is treated as barricaded as an ES and unbarricaded as a PES.

Separation distances are based on ammo being stored in the interior armored compartment with the door and other openings closed while parked in an authorized location. If ammo is stored in compartments external to the crew compartment, the ammo is not afforded light armor protection status and is considered non-armor. For example, for a light armored vehicle that is approximately 7 m long by 3 m wide, if there are five of these vehicles parked together, side by side, with 110.2 lbs. NEW of HCD 1.1 ammo stored internally in each, the internal footprint would be approximately 2.91 m between vehicles, making the parking area footprint 7 m by 26.64 m (five vehicles times 3 m and four spaces between them of 2.91 m each). The external distance would be 277 m by 296.64 m (add 270 m to each figure).

See the next table for internal separation.

**The separation distance is measured from the outside edge of the vehicle, not from the edge of the uploaded munitions.**

### Light Armor Vehicles Table of Distances (in meters)

<table>
<thead>
<tr>
<th>NEQ/NEW (1)(2) per Light Armor Vehicle</th>
<th>Spacing (3) between Vehicles</th>
<th>Spacing (3) from Non-Armor Vehicles</th>
<th>External (4) Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 lbs. (2 kg.)</td>
<td>0.99</td>
<td>4.75</td>
<td>270</td>
</tr>
<tr>
<td>6.6 lbs. (3 kg.)</td>
<td>1.14</td>
<td>4.97</td>
<td>270</td>
</tr>
<tr>
<td>8.8 lbs. (4 kg.)</td>
<td>1.25</td>
<td>5.13</td>
<td>270</td>
</tr>
<tr>
<td>11 lbs. (5 kg.)</td>
<td>1.35</td>
<td>5.26</td>
<td>270</td>
</tr>
<tr>
<td>2 lbs. (10 kg.)</td>
<td>1.70</td>
<td>5.68</td>
<td>270</td>
</tr>
<tr>
<td>44 lbs. (20 kg.)</td>
<td>2.14</td>
<td>6.14</td>
<td>270</td>
</tr>
<tr>
<td>66.1 lbs. (30 kg.)</td>
<td>2.45</td>
<td>6.42</td>
<td>270</td>
</tr>
<tr>
<td>88.2 lbs. (40 kg.)</td>
<td>2.70</td>
<td>6.63</td>
<td>270</td>
</tr>
<tr>
<td>110.2 lbs. (50 kg.)</td>
<td>2.91</td>
<td>6.80</td>
<td>270</td>
</tr>
</tbody>
</table>

**Notes:**
1. The NEQ/NEW is the total explosives weight of all ammo in a vehicle. NEQ/NEW includes all ammo combined, treated as HCD 1.1 (excluding HCD 1.4 materials [small arms]).
2. The design of the vehicle should supply equal barricading.
3. At this distance, explosives are not expected to propagate. At this distance, light armor or non-armor may be damaged beyond serviceability.
4. The presence of barricades does not reduce required external distances.
NOTES
The diagram depicts a FARP at an outside the continental United States installation. The rearm pads resupply the helicopters, the RASA resupplies the rearm pads, and the aviation AHA supplies the RASAs. The rearm pads should be located between helicopter landing sites for ease of loading. Internal distance is required from the FARP to the RASA and to the AHA. Additional RASA sites could be added, but each RASA must be separated from other RASAs by a minimum internal distance.

Armament pads will contain the minimum amount required for efficient operations. In no case will the amount of munitions exceed what is required to arm the maximum number of helicopters that can be refueled at one time.

Note: Commanders should carefully weigh the risks of efficient operations when those operations adversely affect internal and external QD standards.

Warning: Locate fuel downhill from ammunition and at a prudent fire distance, in NO case less than 100 ft.!
COMBAT AIRCRAFT PARKING AREA (CAPA)

Special consideration must be given to plans where contingency operations employ the use of ammo. Commanders must apply risk management when approving these plans. The proper use of such features as barricades or earth-filled, steel-bin-type barricades (ARMCO, Inc. revetment or equivalent) can decrease the magnitude of a potential event and increase the explosives capacity of limited areas.

For aircraft other than Army aircraft and for asset preservation, PTRD is required (i.e., for HCD 1.1 material, use 60 percent of IBD and for HCD 1.2, 1.3 or 1.4, apply the standard PTRD distance). PTRD may not furnish protection from fragments. To protect against low-angle, high-energy fragments, aircraft should be properly barricaded (see the Barricades section). For loaded aircraft to loaded aircraft, measure the shortest distance between explosives on one aircraft to explosives on the adjacent aircraft.

Barricades could be used to increase the allowable explosives limits. However, concrete traffic barricades (T-walls and Texas and Jersey barriers) have not been evaluated for explosives safety purposes and would not be considered barricades. HESCO Concertainers or steel bin barricades (soil, sand, or dirt filled) are considered adequate barricades but could be a source of foreign object debris on airfields.

**For Example Load**

- 2 Hellfire missiles (35.47 NEW ea.) = 71 lbs.
- 12 high explosives (9.438 NEW ea.) = 113 lbs.
- 300 rds. 30 mm (excluded) = 0

Total NEW = 184 lbs.

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**19.21 m. (63 ft.) minimum separation**

Measured between wing-stores

Equate to **IMD Unbarricaded**
FARP/CAPA BARRICADES

To mitigate damage from an incidental and accidental discharge, use the below configuration. Ensure the area where a possible round would strike the T-wall is, at a minimum, 10 inches thick. This is optional but recommended for the FARP design.

- **6 ft. HESCO Concertainer**
  - Distance must < 49 m. (160 ft.) from back of rocket tube to HESCO

- **8 ft. HESCO Concertainer**
  - Distance must < 80 m. (260 ft.) from back of rocket tube to HESCO
NOTES
DEVIAION

DEVIAION APPROVAL AND RISK ACCEPTANCE DOCUMENT

Every effort should be made to comply with explosives safety requirements. If the minimum explosives safety quantity distances, either internal or external, cannot be obtained, then the situation calls for a DARAD. According to the duration of risk, a DARAD can be an event waiver (1 month or less), waiver (1 month to 5 years), or an exemption (permanent or greater than 5 years). A DARAD can also be used for other explosives safety deficiencies, such as lack of lightning protection for ammunition storage or risk to mission capability (i.e., less than PTRD). Information on explosives safety DARADs is contained in AR 385-10 and the DA PAM 385-30.

COMMONLY ASKED QUESTIONS REGARDING DARADS

1. Who should prepare an explosives safety DARAD?

   Anyone can prepare a DARAD for a commander. The originating unit is responsible for initiating the DARAD. Generally, the Safety Officer or QASAS prepares or assists in the preparation of the DARAD form (DA Form 7632), but ultimately, the responsibility falls to whomever the commander appoints to the task.

2. What information is required?

   a. A good scale map that shows the following:
      • Location of the ammo or uploaded vehicles
      • The entire area of the external footprint
      • Information on all structures within the external footprint
      • Information on any local national structures within the external footprint.
   b. Information on the number of people that are routinely in that external footprint and the value of the structures in that external footprint. If this information is not easily available, make best estimates.

3. Who can approve an explosives safety DARAD?

   The level of approval for an explosives safety DARAD depends on two factors: the level of risk and the duration of that risk. See the excerpt from the DA PAM 385-30.

4. If an explosives safety DARAD includes hazards to other service personnel or local nationals, do you need to coordinate with those at risk?

   Yes. In the case of other U.S. services (Navy, Air Force, or Marine Corps), inform their command if Army explosives storage or operations puts their personnel or assets at risk. If the other services’ explosives storage puts Army troop assets at risk, they need to coordinate their risk acceptance document with you. In the case of local nationals, seek the advice of legal counsel.

Note: If a DARAD expires and needs to be reissued, it can only be approved at the next higher level.
### Table 4-1. Risk acceptance authority for safety standards deviation

**Risk acceptance matrix** 2, 3, 4, 5

<table>
<thead>
<tr>
<th>Category of risk</th>
<th>Event waiver</th>
<th>Waiver</th>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely high risk</td>
<td>General officer (GO)</td>
<td>Army Headquarters Commanding General (CG)</td>
<td>Army Headquarters CG</td>
</tr>
<tr>
<td>High risk</td>
<td>Brigade commanding officer (CO) or responsible O–5</td>
<td>GO</td>
<td>GO</td>
</tr>
<tr>
<td>Medium risk</td>
<td>Battalion CO or responsible O–5</td>
<td>Brigade CO or responsible O–6</td>
<td>GO$^1$</td>
</tr>
<tr>
<td>Low risk</td>
<td>Company CO or responsible O–3</td>
<td>Battalion CO or responsible O–5</td>
<td>Brigade CO or responsible O–6</td>
</tr>
</tbody>
</table>

**Legend for Table 4-1.**

- In organizations led by Army civilian leaders, equivalent civilian grades may be substituted for military ranks (see table 4-2).
- The term “Army Headquarters CG” used in the table refers to Army commands (ACCs), Army service component command (ASCCs) (including Joint Forces Land Component Commands (JFLCC) and GO level Joint Task Forces (JTFs)), direct reporting units (DRUs), and the Director, Army National Guard.

**Notes:**

1 May delegate in writing authority to accept at the next lower command level.

2 For deviations involving violations of AE or chemical agent safety standards during Joint operations planning, training, and execution, refer to CJCSI 4360.01 and Service risk acceptance guidance. See also paragraph 4–8.

3 If risk (beyond 1 month) or EH risk will always be accepted by a GO or flag officer.

4 For hazards discovered in fielded acquisition programs, risk will be accepted per DA Pam 385–16.

5 Deviations from range standards and procedures are addressed in AR 385–83.
GLOSSARY

DEFINITIONS

**AHA storage sites**—Locations where ammo that has been issued to using units can be safely stored.

**ASP storage sites**—Logistical storage locations for ammo that has not been issued to using units.

**Deviation Approval and Risk Acceptance Document (DARAD)**—Document needed if the minimum explosives safety quantity distances, either internal or external, cannot be obtained.

**Combat aircraft parking area (CAPA)**—A parking area for aircraft loaded with ammo to be available for quick reaction.

**Delayed propagation**—Occurs when an ammo site unintentionally blows up and causes adjacent ammo to blow up or burn for a few seconds to hours later.

**Department of Defense Identification Code (DODIC)**—A four-digit code assigned by the Defense Logistics Services Center; used to find the NEW.

**Exposed site**—Any location that might be affected by an unintentional detonation at an adjacent PES.

**External distance**—Required for the separation of personnel and facilities that are outside the confines of an ammo storage area and are not directly related or associated with the ammo storage area mission.

**Forward arming and refueling point (FARP)**—A temporary arming and refueling facility that an aviation unit commander organizes, equips, and deploys to support combat tactical operations.

**Hazard class/division**—A numerical designator within an HC indicating the character and predominance of associated hazards and the potential for causing personnel casualties and property damage.

**Hazardous fragment**—A fragment having an impact energy of 58 ft. per lb. or greater. This 58 ft. per lb. impact energy was calculated to be the energy required to take a soldier out of action (very likely a fatality).

**Inhabited building**—Any location where personnel not associated with the ammo area may gather, including troop billets, mess halls, MWR facilities, and maintenance shops.

**Inhabited building distance**—The distance maintained between a PES and an inhabited building; furnishes excellent protection to personnel and material assets from blast effects and very good protection from fragments.

**Intermagazine distance**—The distance required between two ammo storage locations; used to prevent explosive propagation from one location to another.

**Internal distances**—Required for the separation of operating facilities and storage sites in the confines of an ammo storage area.

**Intraline distance**—The distance maintained from a PES to an associated ES; can be barricaded or unbarricaded. Applied to ammo operations, such as ammo surveillance and ammo maintenance.

**Joint Hazard Classification System (JHCS)**—The official source for calculating the HCD and NEW for ammo items.
Light armor vehicles—Vehicles that are designed to resist small arms ammunition fire and fragmentation from artillery shell detonations.

Measuring distances—Distances should be measured from the exterior edge of any ammo storage site or ammo operating facility to the nearest edge of any exposure being considered.

Minimum hazardous fragment distance—The distance at which the areal density of hazardous fragments or debris becomes one per 600 sq. ft. At this distance, there is a 1 percent probability of a person being hit by a hazardous fragment (1 percent lethality distance).

Net explosive weight (NEW)—The actual weight in pounds of explosive mixtures or compounds; used in calculating explosive limits and explosive quantity data arcs.

Operating facilities—Can include workshops, reconfiguration operations, minor maintenance operations, issue and turn-in operations, and administrative office spaces directly related to the ammo mission.

Prompt propagation—Occurs when one ammo site unintentionally blows up and at the same time causes another ammo site to blow up.

Public traffic route—Any road or street on a military post used by the general public, a passenger carrying railroad, or a waterway capable of being used by ships or barges; also describes the amount of protection required by other ES from an unintentional explosion.

Public traffic route distance—Supplies less protection than inhabited building distance with a higher probability of serious injuries and fatalities.

Quantity distance—The application of the rules on separation to ensure the proper degree of protection for personnel and assets.

Rogue fragment—A hazardous fragment projected beyond the minimum hazardous fragment distance (to a distance at which the areal density of hazardous fragments or debris is less than one per 600 sq. ft.), i.e., a fragment thrown from an explosion much further than would normally be expected.

Steel bin barricade—Earth-filled steel bins used to separate ammo.

Storage compatibility group—A letter designation assigned to indicate what may be stored or transported together.

Storage site—Can include MILVANS, ISO containers, open pads, and ARMAG containers.

Yellow Book—An unofficial source for determining HCD and NEW.
### ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>AE</td>
<td>ammunition and explosives (collectively referred to as “ammo” in this booklet)</td>
</tr>
<tr>
<td>AAFES</td>
<td>Army and Air Force Exchange Service</td>
</tr>
<tr>
<td>AGM</td>
<td>Above Ground Magazine</td>
</tr>
<tr>
<td>AHA</td>
<td>ammunition holding area</td>
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<tr>
<td>AR</td>
<td>Army Regulation</td>
</tr>
<tr>
<td>ARMAG</td>
<td>arms, ammunition &amp; explosives storage</td>
</tr>
<tr>
<td>Arty</td>
<td>artillery</td>
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<tr>
<td>ASP</td>
<td>ammunition supply point</td>
</tr>
<tr>
<td>ATHP</td>
<td>ammunition transfer and holding area</td>
</tr>
<tr>
<td>ATP</td>
<td>Army Techniques Publication</td>
</tr>
<tr>
<td>Avn</td>
<td>aviation</td>
</tr>
<tr>
<td>B</td>
<td>barricaded</td>
</tr>
<tr>
<td>BLAHA</td>
<td>basic load ammunition holding area</td>
</tr>
<tr>
<td>CAPA</td>
<td>combat aircraft parking area</td>
</tr>
<tr>
<td>CEA</td>
<td>Captured Enemy Ammunition</td>
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<tr>
<td>CSA</td>
<td>Corps Storage Area</td>
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<tr>
<td>CHU</td>
<td>containerized housing unit</td>
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<tr>
<td>CSA</td>
<td>corp storage area</td>
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<tr>
<td>DA PAM</td>
<td>Department of the Army Pamphlet</td>
</tr>
<tr>
<td>DAC</td>
<td>Defense Ammunition Center</td>
</tr>
<tr>
<td>DARAD</td>
<td>Deviation Approval and Risk Acceptance Document</td>
</tr>
<tr>
<td>DDES</td>
<td>Department of Defense Explosives Safety Board</td>
</tr>
<tr>
<td>DLSC</td>
<td>Defense Logistics Service Center</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
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<tr>
<td>DODIC</td>
<td>Department of Defense Identification Code</td>
</tr>
<tr>
<td>ECM</td>
<td>Earth Covered Magazine</td>
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<tr>
<td>EOD</td>
<td>explosive ordnance disposal</td>
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<tr>
<td>ES</td>
<td>exposed site</td>
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<tr>
<td>ESQD</td>
<td>Explosives Safety Quantity Distance</td>
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<tr>
<td>FARP</td>
<td>forward arming and refueling point</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
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<tr>
<td>FM</td>
<td>Field Manual</td>
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<tr>
<td>FOB</td>
<td>forward operating base</td>
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<tr>
<td>HC</td>
<td>hazard classes</td>
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<tr>
<td>HD</td>
<td>hazard division</td>
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<tr>
<td>HCD</td>
<td>hazard class/division</td>
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<tr>
<td>HCL</td>
<td>Hazard Classification Listing</td>
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<tr>
<td>HMMWV</td>
<td>High-Mobility, Multi-Purpose Wheeled Vehicle</td>
</tr>
<tr>
<td>IBD</td>
<td>inhabited building distance</td>
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<tr>
<td>ILD</td>
<td>intraline distance</td>
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<tr>
<td>IMD</td>
<td>intermagazine distance</td>
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<tr>
<td>ISO</td>
<td>International Standards Organization</td>
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<tr>
<td>JERRV</td>
<td>Joint Explosive Ordnance Disposal Rapid Response Vehicle (Cougar)</td>
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<tr>
<td>JHCS</td>
<td>Joint Hazard Classification System</td>
</tr>
<tr>
<td>MACOM</td>
<td>Major Army Command</td>
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<tr>
<td>MCE</td>
<td>maximum creditable event</td>
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<tr>
<td>MOOTW</td>
<td>Military Operations Other Than War</td>
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<tr>
<td>MRAP</td>
<td>Mine-Resistant, Ambush-Protected</td>
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<tr>
<td>MILVANS</td>
<td>military vans</td>
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<tr>
<td>MWR</td>
<td>morale, welfare, and recreation</td>
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<tr>
<td>NEQ</td>
<td>net explosives quantity (in kg.)</td>
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<tr>
<td>NEW</td>
<td>net explosive weight (in lbs.)</td>
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<tr>
<td>PES</td>
<td>potential explosion site</td>
</tr>
<tr>
<td>PTRD</td>
<td>public traffic route distance</td>
</tr>
<tr>
<td>QASAS</td>
<td>Quality Assurance Specialist (Ammunition Surveillance)</td>
</tr>
<tr>
<td>QD</td>
<td>quantity distance</td>
</tr>
<tr>
<td>RASA</td>
<td>ready ammunition storage area</td>
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<tr>
<td>SCG</td>
<td>storage compatibility group</td>
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<tr>
<td>TSA</td>
<td>theater storage area</td>
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<tr>
<td>U</td>
<td>unbarricaded</td>
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<tr>
<td>UNO</td>
<td>United Nations Organization</td>
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