

CDC 2W051A

Munitions Systems Journeyman

Volume 3. Munitions Stockpile Surveillance Program



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VOLUME 3 of CDC 2W051A, *Munitions Systems Journeyman*, discusses the Munitions Surveillance Program and munitions storage.

Unit 1 of this volume discusses the policies and procedures used in munitions inspection and the munitions surveillance program.

Unit 2 covers the types of munitions storage facilities, site planning and principles used to warehouse munitions.

A glossary is included for your use.

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NOTE:

In this volume, the subject matter is divided into self-contained units. A unit menu begins each unit, identifying the lesson headings and numbers. After reading the unit menu page and unit introduction, study the section, answer the self-test questions, and compare your answers with those given at the end of the unit. Then complete the unit review exercises.

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Unit 1. Munitions Inspection

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IN AN ENVIRONMENT of ever-decreasing defense dollars; strict control by the Environmental Protection Agency; and enforcing public laws to identify, prosecute, and punish military violators, we must ensure the items we handle and transport meet the highest standards of product assurance. Specific inspection requirements, certification procedures, and transportation controls are in place to help you accomplish this goal. This unit covers the policies and procedures used in the inspection element for maintaining our munitions assets in a combat ready state.

1-1. Munitions Surveillance Program

Non-nuclear product assurance encompasses all Air Force programs. Its purpose is to ensure user confidence that the munitions stockpile is reliable and maintainable. This program tracks, monitors, and certifies munitions during the complete life cycle of each munitions asset. The program provides policy and procedures for munitions packaging, handling, transport, storage, inspection, testing, safety, and disposal. This section covers non-nuclear munitions inspections and the documentation generated by an inspection.

401. Munitions serviceability policies and terms

When inspecting munitions items, inspectors are required to determine the item's serviceability or certify that the item no longer contains explosives or hazardous material. Personnel assigned to the inspection section are carefully selected and appointed in writing. In this lesson, we talk about selecting and appointing munitions inspectors and the requirements they must meet. We also discuss the terms and definitions used in serviceability procedures.

Senior munitions inspector

Munitions supervision is responsible for designating the noncommissioned officer in charge (NCOIC) of munitions inspection; this individual is appointed as the senior munitions inspector. The senior munitions inspector is responsible for verifying the qualifications and ensuring that all personnel appointed as munitions inspectors are properly trained. This responsibility means that the senior munitions inspector must establish a comprehensive training and certification program, using the USAF Qualification Training Package, and ensure that all inspectors regardless of their functional area complete the training and are certified.

Duties and responsibilities

The senior munitions inspector's specific responsibilities are outlined in AFI 21-201, *Conventional Munitions Maintenance Management*. These responsibilities include the following:

- Developing a master inspection schedule and a shelf and service life monitoring program.
- Maintaining qualifications and appointment as a munitions inspector and be qualified as an inspection trainer.
- Implementing the munitions inspector training, qualification, and recertification program.
 - Use a "Train-the-Trainer" concept to locally train and certify munitions inspectors. Munitions inspector trainers must be 7-skill levels and hold a special experience identifier (SEI) 836. While civilian and contractor personnel are not awarded skill levels or SEIs, they still must meet SEI 836 qualification requirements.
 - Ensure all munitions inspectors, regardless of workcenter assignment, are trained, qualified, and certified using the USAF Qualification Training Package for Munitions Inspector Training and Certification and any local requirements.
 - Ensure certification is recorded in the Training Business Area (TBA), AF IMT 623A, AF IMT 1098, IMDS/G081, or other suitable documentation standardized across the unit.

Munitions inspector appointments and requirements

Flight chiefs, or their equivalent, are responsible for appointing in writing qualified inspectors. A more comprehensive list of requirements can be found in AFI 21-201, *Munitions Management*. Selecting individuals for munitions inspector duties is as follows:

- Must be 2W051, 2W071, or 2W091.
- Must complete the USAF Qualification Training Package (AFQTP) for Munitions Inspector Training and Certification requirements located on the AF MC2 SharePoint site and any local requirements prior to certification.
- Document certification in the member's individual training records and/or other suitable documentation standardized for applicable unit.

Duties and responsibilities

In addition to maintenance responsibilities found in AFI 20-110, *Nuclear Weapons-Related Materiel Management* and AFI 21-101, *Aircraft and Equipment Maintenance Management* the following lists specific responsibilities of munitions inspectors in accordance with AFI 21-201:

- Informs the munitions accountable systems officer (MASO), munitions control, and munitions supervision immediately upon receipt of notifications through Conventional Munitions Restricted or Suspended (CMRS) channels of restricted or suspended munitions that affect munitions serviceability.
- Monitors shelf/service life dates by reviewing combat ammunition system (CAS) and coordinates changes/updates with the Munitions Operations element.
- Determines and assigns appropriate condition codes to all munitions assets as directed by applicable technical orders (TO).
- Initiates, maintains, and processes applicable documents and historical records.
- Ensures munitions assets are properly tagged, marked, and packed.
- Verifies accuracy of all inspection documentation.

Mission accomplishment is the bottom line. We achieve this through product assurance processes that have been proven over the years. AFI 21-201 sets the guidelines and how to select the right people to

do the job. Remember: *reliability*, *maintainability*, and *accountability* are the keys to product assurance. Product assurance is what our customers expect when they use munitions maintained by AMMO.

Inspection terms defined

The first thing you *must* understand before you start performing inspections is the terminology used within the inspection environment. The following tables list terms and definitions that provide a good starting point.

- **AFTO Form 102, Munitions Inspection Document**—The AFTO Form 102 document is used to record completion of particular inspections, time compliance technical order (TCTO) actions, and identify any deficiencies of a munitions item.
- **Ammunition Lot Number**—The ammunition lot number is an alphanumeric code systematically assigned to each munitions series (lot) at the time of manufacture, assembly, or modification. Each series is assembled under uniform conditions and is expected to function in a uniform manner. Using a typical lot number, WCC05L017-001B, let's discuss what the digits represent.

Lot Number Components	
Component	Meaning
WCC	The manufacturer's identification symbol.
05	A two digit numeric code identifying the year of manufacture.
L	A single alpha code indicates the month of production. A-M represent each month of the year excluding the letter I (that is, A-January, B-February, C-March, D-April, E-May, F-June, G-July, H-August, J-September, K-October, L-November, M-December).
017	A three-digit lot interfix number.
001	A three-digit sequence number.
B	Ammunition lot suffix. A letter is added to the sequence number when there is a modification through renovation.

- **Ammunition Lot Types**— There are several types of ammunition lots that you may encounter. These lots are explained in the next table.

Lot Types	
Type	Description
Assembled lot	<p>A designator is assigned when two or more munitions are assembled to form a complete round (operational configuration).</p> <p>Designators may be color markings, numerical, alpha, or alpha numeric codes used to track a group of lot numbered items used to assemble a set of complete rounds munitions.</p> <p>Each component lot number is traceable to the assembled lot designator.</p> <p>The primary use of this designator is to be able to readily identify complete-round munitions containing specific sub-component lots in the event components are suspended, restricted, expended, or involved in an incident.</p>

Lot Types	
Type	Description
Functional lot	<p>A functional lot is a quantity of two or more types of cartridges packed in an authorized combination as an item of issue for field use in a weapon system.</p> <p>A functional lot is commonly referred to as a “combat mix.”</p> <p>An example is 5.56 mm ball and tracer packed together in the same clip or link.</p>
Regrouped lot	<p>Regrouped lots are formed by combining two or more lots of the same national stock number (NSN), model, and type munitions that are individually too small to manage for operational use.</p> <p>They are assigned a local regrouped lot number following the procedures identified in TO 11A-1-10, <i>Air Force Munitions Surveillance Program and Serviceability Procedures</i>.</p>
Pseudo lot	A pseudo lot may be used to locally assign lot numbers to facilitate management of assets that were never assigned a lot number at manufacturer and for items controlled by serial number in Combat Ammunition System (CAS).
Local lot	Local lot numbers are assigned to serviceable munitions where lot identity has been lost or cannot be determined or commercial off-the-shelf (COTS) munitions, as authorized by the item TO or OO-ALC.

- **Barrier-Sealed Container**—A barrier-sealed container is a bag sealed by heat and is leak proof under normal temperatures and atmospheric conditions.
- **Hermetically Sealed Container**— A hermetically sealed container is a metal can that is sealed to exclude air. It is leak proof at normal temperatures and atmospheric pressure. Such a container is generally used with munitions items whose service life starts once the container is opened, since the container is *not* hermetically re-sealable.
- **Humidity Controlled Containers**—Humidity controlled containers contain desiccant and a humidity indicator which indicates the relative humidity inside the container (that is, a BSU-49 container or missile container).
- **Corrosion Damage**—Corrosion is the deterioration of metal from reaction to its environment. Corrosion occurs because most metals have a tendency to return to a natural state. Since corrosion can be so common place, it is essential to understand corrosion definitions. The following table lists the types of corrosion in order from the *least to the most serious* condition.

Corrosion Damage	
Type	Definition
Minor corrosion	<p>Minor corrosion appears as a gray, black, or reddish film or surface rust on ferrous metals (metals that contain iron) and in various color formations on nonferrous metals (blue-green on copper, brass, and bronze and as a white powder on aluminum).</p> <p>It is easily removed and does not project beyond the surface. Etching or pitting has <i>not</i> occurred.</p>
Etching	Etching damage on metal appears as marked lines, but no pits are visible to the naked eye.
Pitting	Pitting is damage beyond minor corrosion discoloration or etching stage.

Corrosion Damage	
Type	Definition
Developed rust	Developed rust is damage where the surface is covered with rust and pitting and rust patches are <i>not</i> caked.
Caked rust	Caked rust damage projects beyond the surface in such a compact growth it presents a caked appearance. Pits are readily visible to the naked eye.
Major corrosion	Major corrosion is advanced stages of etching, pitting, developed, or caked rust that affect the form, fit, or function of an item. It is <i>not</i> readily removable and projects beyond the surface.

- Defect—A defect is any nonconformance within specified requirements. An item may be scratched in any number of places; however, the defect is counted once rather than counting each scratch as a separate defect. Several spots of rust may be observed, but all are classed as one defect. If both scratches and rust appear, then the item contains two defects.
- Defect Standards—Defect standards are ammunition and marking defects that we classify into the following four categories list in the next table.

Defect Standards	
Type	Description
Incidental defects	Incidental defects do not fit into any other defect classification and are not identified in the applicable classification of defects table in the item technical manual. Incidental defects are annotated on serviceability records, but are <i>not</i> considered when evaluating lot serviceability. Any marking other than critical, major, and/or minor should be corrected if and when maintenance becomes necessary. These are very rare because most defects can ultimately be classified as at least minor defects.
Minor defect	A <i>minor defect</i> is a defect, other than critical or major, that is <i>not</i> likely to result in failure during use. It does <i>not</i> affect use or operation of the item, but <i>should be corrected before issue</i> . Marking of defects other than critical and/or major should be corrected before issue. Examples of minor marking defects are incorrect or missing lot number (only when the item can be identified) and missing the proper shipping name in the item packing.
Major defect	A <i>major defect</i> is a defect, other than critical, that is likely to result in <i>failure in tactical use</i> or which precludes or reduces materially the usability of the item for its intended use. A major marking defect can cause misuse or failure.
Critical defect	A <i>critical defect</i> is likely to result in <i>hazardous or unsafe</i> conditions for individuals using, transporting, and maintaining munitions; or a defect likely to cause the destruction of, or serious damage to, the weapon or launcher under normal training or combat conditions. Critical marking defects can result in hazardous or unsafe conditions for persons using or maintaining the item (for example, incorrect delay time, incorrect color or type of smoke or signal, and high-explosive ammunition with practice marking, and so forth).

- Defective Item—A defective item is an item that contains one or more major defects. A defective item is used in determining serviceability of a lot rather than accepting or rejecting a lot based on a count of individual defects. Understanding the difference between a defect and a defective item becomes very important when you perform a periodic inspection.
- Empty Non-nuclear Munitions—Empty non-nuclear munitions are munitions items or components that had explosive material completely removed or omitted at the time of manufacture and *not* replaced by other materials.
- Inert Non-nuclear Munitions—Inert non-nuclear munitions are munitions items or components which have inert material such as sand, concrete, or vermiculite in place of explosive material.
- Nonexplosive Items—Nonexplosive items are munitions items or components never intended or designed to contain explosive material (that is, fin assemblies, links, and so forth).
- Explosives Material—Explosives material consists of explosive mixtures, propellants and pyrotechnic mixtures used in munitions items and components.
- Exudation—Exudation is the oozing of explosive and/or inert filler from munitions items.
- Function Test—This test is a test in which an item is functioned under controlled conditions to determine if the item performs as required.
- In-check—In-check is a process of validating shipping document national stock number (NSN), lot number, and quantities against physical assets received, checking container condition prior to storage, and processing documents into CAS to facilitate receiving inspection scheduling.
- Munitions Condition Codes—Munitions condition codes are a sequence of alphabetical letters indicating the current serviceability status of munitions items.
- Munitions Residue—Munitions residue is the material remaining after a munitions item has had its explosive filler removed by either normal functioning or demilitarization.
- Lite or Light Box—A lite or light box is a standard box or container, specified by item packaging drawing, containing *less* than the standard quantity/pack for the item.
- Nonstandard Box/Container— Nonstandard box/container is a box or container that does *not* comply with the specific item technical order, transportation packing order, or special packaging instruction drawings for the item. Explosives items *cannot* be shipped in a nonstandard box or container.
- Special Packaging Instruction—Special packaging instructions (SPI) are detailed packaging instructions and drawings, used to construct packages for items requiring special preservation and packing. A SPI includes details for special blocking, bracing, cushioning, shock mounts, tie-down devices and positioning of the item in the pack. A SPI also includes packaging material specifications.
- Operational Use Munitions—Operational use munitions are items that have been removed from their standard packaging and are currently in use.
- Sample Size—The sample size is the number of items selected at *random* for inspection or test. Service Life—the service life is the length of time an item can remain installed in operating configuration or in actual use. The expiration date for service life is the last day of the expiration month regardless of the actual date of expiration. *The service life will not exceed the shelf life of an item.*

- **Shelf Life**—The shelf life is the length of time an item can remain in storage under prescribed packaging and storage conditions. The shelf life expiration date for items listed with month and year is the last day of the listed month. *Shelf life begins on the item's manufacture, assembly or rework date.*
- **Standard Box/Package**—Standard packs for munitions vary by the item. Several packs may be considered standard for each item. Item TOs and the SPI list standard packs for specific items.
- **Department of Defense Identification Code**—The Department of Defense Identification Code (DODIC), when assigned by DOD, is an integral part of the munitions NSN. The DODIC is a four-digit alphanumeric identifier used for identification and unitizing a munitions item under its form, fit, and functional characteristics. This four-digit identifier, when assigned, appears *after* the NSN and is reflected on the *inner and outer* pack and/or container.
- **Locally Assigned Ammunition Reporting Code**—The locally assigned ammunition reporting code is a temporary DODIC assigned by 505 CBSS/GLLB. This four-digit alphanumeric identifier is an integral part of the munitions' NSN when assigned and is used as an identifier in place of the official DODIC until a DODIC is assigned by catalogers. Once assigned—the official DODIC should replace all locally assigned ammunition reporting code markings in order to reduce confusion.
- **Conventional Munitions Restricted or Suspended**—The Conventional Munitions Restricted or Suspended (CMRS) database is our primary source for identifying suspended or restricted munitions, and for releasing items that were suspended or restricted. This database applies to anybody within the Air Force who uses, transports, stores, issues, receives, or inspects munitions. *It applies to you.* This database contains information regarding restricted use and unsafe types of specific lots of conventional munitions and includes those items whose performance or safety for use is questionable.
- **Restricted Munitions**—Restricted munitions are munitions that can't be expected to meet performance under all conditions. You are required to separate and identify these munitions until testing is accomplished or a "fix" is directed. Once engineering studies have been completed, the items will be restricted to certain applications, released, or permanently suspended from issue or use.
- **Suspended Munitions**—Suspended munitions are items that are withdrawn from issue and use because they are suspected of being or known to be unsafe or otherwise defective. Lots suspected of being unsafe or otherwise defective are suspended with a suspense number. This normally constitutes a temporary suspension pending investigation. Upon completion of the investigation and determination of true condition, the lot is permanently suspended, released for restricted issue and use, or released for unrestricted issue and use.
- **Fix**—Fix indicates an action that is required to restore items to a serviceable condition. Stockpiles that contain munitions listed in this manual must apply the appropriate condition code based on the indicated fix. Items remain suspended from issue and use until the specified fix is accomplished. Suspended lots that have had a fix applied are normally identified by a suffix added to the lot number.

402. Munitions serviceability procedures

The USAF munitions surveillance program provides the user a high degree of confidence that munitions have not been adversely affected by storage conditions, age, use, or the environment, and can be expected to perform as designed. This program includes both field level and Air Logistics Center (ALC) inspection and testing to ensure munitions serviceability. It allows inspectors to communicate with ALC and vice versa regarding the condition of a particular munitions asset. This lesson describes the preliminary steps required prior to an inspection and discusses the types of surveillance inspections that are performed.

Serviceability

The serviceability of munitions and equipment items is essential to mission accomplishment. Unsafe and unserviceable items can be dangerous and hazardous. Just as we have inspection programs to check our mission effectiveness, we also have inspections that ensure munitions are serviceable and ready for use. Three references are required for every inspection performed

- CMRS is used to verify suspensions, restrictions, or releases.
- TO 11A-1-10 governs the general inspection requirements for all inspections and the items TO gives detailed instructions and specific checkpoints for inspections.

Barrier bag requirements

Like any operation involving explosives, you must prepare the work area and determine the tools and equipment you'll need before you actually begin the task. Before opening items sealed in barrier bags that require resealing, you must have a sealing machine, a sufficient supply of barrier bag material, and a device for removing the air from the bag. Certain munitions items (pyrotechnics) sealed in barrier bags have a natural tendency to produce gases when stored for prolonged periods of time or when subjected to extreme temperature changes. This characteristic gives the barrier bag a "ballooned" effect. Ballooned barrier bags can produce enough pressure to expand and open the wooden box holding the bag. In addition, the gases contained in the barrier bag may be ignitable. When you come across this condition, follow the instructions identified in the specific item TO.

NOTE: No special markings are required on the bag or on the container holding item(s) in a resealed barrier bag.

Hermetically sealed container requirements

The inspection of hermetically sealed containers reflects the integrity of the munitions inside. In other words, if the can is good, we consider the items inside good. Hermetically sealed containers are *not* opened during inspections except under the following conditions:

- The specific item technical order directs that the container be opened.
- The outer appearance of the container indicates signs of damage or corrosion that may have penetrated the container.

When you open a hermetically sealed container, you are starting the service life of the items inside. If you have to open a sealed container, make sure you close it using two layers of waterproof pressure sensitive tape, commonly referred to as "Duct Tape." Identify previously opened hermetically sealed cans by conspicuously marking the outer container "NOT HERMETICALLY SEALED." This allows storage personnel to easily locate these containers during a periodic inspection.

Types of surveillance inspections

The munitions inspector performs many different kinds of inspections. Let's discuss those in further detail.

General inspection procedures

Follow these procedures while performing any inspection. You can break the general inspection procedures down into six major steps listed in the following table. Although these steps are in no particular order, they must be completed.

General Inspection Procedures	
Step	Action
1	<p>Check the ammunition lot or serial number against CMRS to ensure that the item(s) has not been restricted or suspended from use.</p> <p>Our customer's safety and America's combat capability depend on our customers receiving only serviceable munitions that can be used to perform their intended function. This is why it is paramount that we use CMRS to verify that assets are not suspended or restricted before issuing munitions assets.</p> <p>We must always be vigilant of items already issued to our customers when a new suspension or restriction is assigned to a munitions item. Checking for suspensions or restrictions requires you to use your core values each and every time you perform an inspection.</p>
2	<p>Check current item TO/WEBFLIS/JHCS for the controlled inventory item code (CIIC) and DODAC (FSC-DODIC) to determine if the NSN and CIIC are correct. CAS IDR may be used as a secondary source for this information.</p> <p>When conflicting information exists with WEBFLIS and/or the item TO, contact OO-ALC/GHG Munitions Division using the CRM tool on the GACP web site or create an IDR challenge in CAS.</p>
3	Check the external packaging for obvious defects and that the packaging is adequate to withstand additional handling, storage, and/or shipment.
4	<p>Check the external markings for the minimum required markings in accordance with the item TO, TO 11A-1-10, and the SPI. These include the following:</p> <ul style="list-style-type: none"> • The NSN and DODIC. • The nomenclature. • Lot number. • United Nations serial number and proper shipping name. • Lite-box marking. • Quantity and unit of issue. • Date of manufacture. • Weight/cube. • Performance oriented packaging (POP) markings.
5	Verify that enough shelf and service life remains for the item's intended use/purpose. If shelf or service life is within 24 months of expiring, place item(s) in condition code C (priority issue).
6	<p>Use the Product Quality Deficiency Reporting (PQDR) system if required. This system provides munitions engineers with data on the condition of assets stored at USAF units. The data is used to make determinations on inspection intervals, trends by lot, and so forth. Munitions inspectors use this system when one of the following occurs:</p> <ul style="list-style-type: none"> • A critical defect. • Major/minor defects not listed in the item TO. • Defects determined by the inspector to be "unusual." • Items that malfunction during use.

Types of inspections

Now that you have accomplished all of the preliminary steps required before beginning the actual inspection, you only have one other consideration, what type of inspection you need to perform. There are several different types of inspections that can be performed on a munitions item. The type of inspection depends on what is going to happen to the item next, and at what point in the item's life

cycle the inspection is being performed. First take a look at the item TO to read what it states about the particular inspection requirements. Then look in TO 11A-1-10 for further guidance. Let's take a closer look at the different inspections in the table below.

Types of Inspections	
Inspection	Description
Receiving inspections (RI)	Receiving inspections (RI) are accomplished to ensure the munitions received are the same as described on the shipping documents in quantity, description, and condition classification. If defects are discovered during a receiving inspection that makes the serviceability of a lot questionable, a periodic inspection (PI) must be performed.
Periodic inspections (PI)	Periodic inspections (PI) are performed to ensure, to the highest degree of confidence, that munitions have not been adversely affected by environment, storage conditions, age or use. It also identifies defects that reduce reliability.
Shipping inspections (SI)	Shipping inspections (SI) are accomplished to ensure that munitions prepared for shipment are the same quantity, description, and condition classification as reflected on the shipping document and are properly marked or labeled to meet transportation requirements.
Special inspections (SPI)	If reject limits are met or exceeded during a periodic inspection, a 100 percent special inspection (SPI) is performed. SPIs are inspections which must be directed by a competent authority (Air Logistics Center, owning major command, flight commander/chief, or senior munitions inspector) to be completed according to specific instructions from that authority.
Pre-issue inspections (PI)	Pre-issue inspections (PII) are performed to provide a final check to ensure munitions reflected on the issue document are authorized, <i>not</i> suspended, and suitable for their intended use.
Returned munitions inspections (RMI)	Returned munitions inspections (RMI) are performed to ensure munitions items returned from users are properly identified, classified, and packaged prior to being returned to base stock.
Storage monitoring inspections (SMI)	SMIs are performed to monitor the condition of stored assets. The senior munitions inspector is responsible for managing the program, but the inspection can be performed by anyone who is trained and documented by a munitions inspector.

403. Identifying condition codes and tagging munitions

Every AF munitions item has a condition code. A condition code is an alphabetical letter indicating the current serviceability status of the item. Identifying and assigning condition codes are some of the more challenging tasks of a munitions inspector. Once the appropriate condition code is identified and assigned, the munitions asset will have the appropriate DD Form 1500 series tag attached which will identify its condition. Keep in mind that condition code "A" assets are not required to be tagged. So if there is no DD Form 1500 series attached to the item, you can assume it is in condition code "A." Condition codes are also annotated in the Lot History section of the combat ammunition system (CAS).

Condition codes

Munitions are assigned only one condition code; however, more than one condition code may apply. If this is the case, use the most restrictive condition code. Munitions condition codes are universally used throughout the DOD. Condition codes are outlined in TO 11A-1-10 and TO 00-20-3, and are described in the following table.

Condition Codes	
Code	Description
A — Serviceable (issuable without qualification)	<p>Ammunition in this category is new, used, repaired, or reconditioned and is serviceable for issue to all customers without limitation or restriction.</p> <p>AF units do <i>not</i> require condition code tags on these items.</p>
B — Serviceable (issuable with qualification)	<p>Ammunition in this category is also new, used, repaired, or reconditioned ammunition that is serviceable and issuable for its intended purpose.</p> <p>However, this ammunition is restricted from issue to specific units, activities, or geographical areas because of its limited usefulness and, in some cases, short service-life expectancy.</p> <p>Examples are items identified for training only.</p>
C — Serviceable (priority issue)	<p>Items in condition code C are serviceable and can be issued to selected using organizations. Items in this category must be issued before condition code A or B materials to avoid loss of a usable asset.</p> <p>USAF units place items in this condition code when the item's service life is within 2 years of the shelf life expiration or when the service life of an item has started.</p>
D — Serviceable (test/modification)	<p>Condition code D category items include serviceable material that requires testing, alteration, modification, conversion, or disassembly.</p> <p>Do <i>not</i> confuse these items with materials that must be inspected or tested immediately before issue.</p> <p>Condition code D materials are those identified by Air Force Materiel Command or other MAJCOMs requiring tests on a particular asset.</p>
E — Unserviceable (limited restoration)	<p>Munitions in the condition code E group include items that involve only limited expense or effort to restore to a serviceable condition.</p> <p>Munitions maintenance sections perform this restoration by cleaning, painting, packaging, and so forth.</p> <p>Items are considered serviceable if found in an unserviceable container and <i>may be issued</i> if it meets the needs of the user.</p>
F — Unserviceable (repairable)	<p>Materials placed in condition code F are considered economically repairable and require repair, overhaul, or reconditioning at higher than the base level.</p> <p>This category also includes repairable items that are radioactively contaminated.</p>
G — Unserviceable (incomplete)	<p>Condition code G items are unserviceable items, which require additional parts or components to become a complete item prior to issue.</p>
H — Unserviceable (condemned)	<p>Condition code H items have been determined to be uneconomically repairable.</p> <p>Non-hazardous items are placed in this condition code until local demilitarization or disposal is performed.</p>
J — Suspended (in stock)	<p>Condition code J is assigned to items that are in stock but suspended from issue and use. This includes items that have been suspended pending lot acceptance test in the CMRS system. Items also may be awaiting condition classification or analysis, where the true condition is not known.</p> <p>This category also includes AF material for which TOs are <i>not</i> available or munitions are overdue inspection.</p>
K — Suspended (returns)	<p>Condition code K applies to items turned in by custodians and awaiting condition classification.</p> <p>This material must be properly classified within 45 days, unless granted an extension by the owning service.</p>

Condition Codes	
Code	Description
L — Suspended (litigation)	Items in this condition code L are being held pending litigation or negotiation with contractors or common carriers. Examples include items that were damaged in transit, and pending financial resolution.
M — Suspended (in work)	Items in condition code M category are identified on inventory control records. These items have been turned over to a maintenance facility or contractor for processing. This is one of the least used condition codes.
N — Suspended (ammunition suitable for emergency combat use only)	Items in condition code N are suspended from issue and use, <i>except for emergency combat use</i> .
P — Unserviceable (reclamation)	Condition code P includes material determined to be hazardous, uneconomically repairable, and unserviceable. The Air Force has adopted a business practice to use this condition code for hazardous items including non-repairable aircraft egress items removed for time change with shelf/service life within 9 months of expiration. Items are placed in this condition code for further evaluation and reclamation.
V — Unserviceable (waste military munitions)	Waste military munitions will be assigned condition code V only under the authority of a designated DOD or service designated disposal authority. The waste munitions must meet criteria of waste munitions under the EPA military munitions rule implementation policy, be safe to store and ship based on DOD Explosive Safety Board Department of Transportation criteria, and have a current serviceability inspection. <i>It is not applicable to nonexplosive items.</i>

DD Form 1500 series condition tags

The DD Form 1500-series tags are mandatory for other than condition code “A” assets. If no tag is present, then we assume the item(s) are serviceable without restrictions. Items are tagged as follows:

- One tag is attached to each crate, box, metal container, or banded pallet or each loose item.
- For items that are bulk/blocked stacked (for example, 20 mm ammunition and MJU-series flares) only one tag is required per stack, as long as normal lot-to-lot separation is maintained.

Tags are color coded for easy identification. The most important aspect of tagging your items is safety. If the assets aren’t properly tagged, they could get mixed in with different coded assets which could cause a hazardous situation. The requirements for filling out the DD Form 1500 series tags are identified in TO 00-20-3 *Maintenance Processing of Repairable Property and the Repair Cycle Asset Control System*, and TO 11A-1-10. Let’s take a closer look at each tag used within the munitions storage areas worldwide in the next table. Tags may be hand-written or electronically generated.

DD Form1500 Series Condition Tags	
Tag	Description
DD Form 1574/1574-1, Serviceable	Commonly referred to as the “yellow” tag (the margins and text are yellow) this tag identifies serviceable munitions in condition codes A, B, or C. Place the tag on new, used, repaired, or reconditioned munitions items that are serviceable.

DD Form 1500 Series Condition Tags	
Tag	Description
DD Form 1575/1575-1, Suspended	The "brown" tag (the margins and text are brown) identifies suspended material in condition codes J, K, L, M, and N.
DD Form 1576/1576-1, Serviceable (test/modification)	The "blue" tag (the margins and text are blue) is identical to the other tags but is only used with condition code D. It identifies items that are earmarked for test and modification.
DD Form 1577/1577-1, Unserviceable (condemned)	The "red" tag (the margins and text are red) identifies materiel that has been determined to be unserviceable and uneconomical to repair, or condemnation has been directed by a TCTO. It is used for condition codes H, P and V.
DD Form 1577-2/1577-3, Unserviceable (repairable)	This "green" tag (the margins and text are green) identifies munitions items that are in the unserviceable/repairable condition codes E, F, and G.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

401. Munitions serviceability policies and terms

- Who appoints munitions inspectors?
- What skill level(s) must be earned before becoming a certified munitions inspector?
- List at least three responsibilities of a munitions inspector.
- Match each term in column B with its definition in column A. Column B items may be used once, more than once, or not at all.

Column A

- ____ (1) This type of flaw affects the form, fit or function of an item.
- ____ (2) Any nonconformance within specified requirements.
- ____ (3) A defect likely to result in hazardous or unsafe conditions.
- ____ (4) A defect that reduces materially the usability of the item.
- ____ (5) An item whose explosive material has been removed and never replaced.
- ____ (6) The number of items selected at random for inspection.
- ____ (7) The length of time an item can remain in storage under prescribed packaging and storage conditions.

Column B

- a. Pitting.
- b. Major corrosion.
- c. Defect.
- d. Reject limit
- e. Shelf life.
- f. Inert munitions item.
- g. Sample size.
- h. Major defect.
- i. Service life.
- j. Empty non-nuclear munitions item.
- k. Critical defect.

402. Munitions serviceability procedures

1. What is the purpose of the munitions surveillance program?
2. What technical order provides guidance on general inspection requirements for all inspections?
3. Under what two conditions are inspectors required to open hermetically sealed containers?
4. List at least three steps that must be completed for general inspection procedures.
5. What inspection ensures the highest degree of confidence in which the inspector looks for defects that may reduce reliability?
6. What type of inspection is performed at the direction of competent authorities, the MAJCOM, or Air Logistics Center (ALC)?

403. Identifying condition codes and tagging munitions

1. What must you do if two condition codes apply to the same item?
2. What condition code applies if an item is issuable with qualification?
3. What condition code applies if an item is considered unserviceable until limited restoration has been accomplished?
4. What condition code applies if an item is suspended in stock?
5. What condition code applies if an item is suspended for emergency combat use only?
6. What unserviceable tag identifies condition codes H, P, and V items?

1-2. Inspection Documentation

In this section we discuss the two methods we use to record inspection results. The AFTO Form 102 and CAS provide the munitions inspector with the means to ensure that an accurate history is captured and maintained throughout the lifecycle of an item.

404. Documenting inspection results

The overall serviceability of the Air Force's munitions stockpile is the inherent responsibility of munitions inspectors. The AFTO Form 102, Munitions Inspection Document, and the CAS are essential tools used to document the results of inspections and to maintain lot history.

AFTO Form 102

Direct input is the preferred method of loading inspection results into CAS. The AFTO Form 102 is used as a document to update item lot history for units that do *not* elect direct input of inspection results into CAS. Once historical records are updated in CAS the AFTO Form 102 may be disposed.

Combat Ammunition System

As we stated earlier, CAS is an essential tool for the munitions inspector to ensure that an accurate history is captured for an inspection. The idea is to document inspection results and provide confidence to everyone involved that the munitions stockpile is available for any worldwide contingency. The CAS inspection subsystem provides the ability to

- update lot history information;
- change condition codes;
- produce disposition requests from a condition code change;
- monitor periodic and storage monitoring inspection due dates; and
- monitor and update shelf/service life expiration dates.

CAS programs

There are several programs that an inspector can use to perform day-to-day operations in CAS. The inspection related programs described in the following table are found under the CAS accountability tab.

Combat Ammunition System Programs	
Program	Description
Asset Balance Inquiry	<p>The Asset Balance Inquiry displays condition and status of stockpile and custody assets.</p> <p>Information provided includes the following:</p> <ul style="list-style-type: none"> • Structure number. • Location. • Condition code. • Lot number. • Freeze code. • Document number. • Category code. • Ammunition disposition request (ADR) information.

Combat Ammunition System Programs	
Program	Description
Turn-in Process	<p>The Turn-in Process allows a user to process turn-ins.</p> <p>Once you have accessed the program, you have the option to perform the following turn-ins:</p> <ul style="list-style-type: none"> • Custody. • Complete round. • Due-in for maintenance (DIFM). • Expenditure. • Found on base. <p>Ensure that you use the right turn in screen for your transaction. You may have to check the DIFM listings or run inquiries to verify the data before you use it.</p>
Receipt Processing	<p>Access the Receipt Processing program to bring an item that has shown up on your base for the first time on record.</p> <p>After accessing the program you are given the option to either select from a list or input a document number.</p> <ul style="list-style-type: none"> • If in-transit data has been loaded into the system, then you should find the document number by selecting if from a list. • If <i>no</i> in-transit data was loaded by the shipping activity or you receive an item without shipping documentation, then you will have to load the document into CAS by selecting the enter document number feature.
Inspection Menu	<p>The inspection subsystem menu helps to ensure stockpile asset reliability. The following processes that significantly contribute to reliability are:</p> <ul style="list-style-type: none"> • Monitoring safety restriction information provided by safety supplements. • Updating lot history information sent to the receiving activity by the shipping activity. • Entering condition code changes as a result of inspection. • Producing disposition requests from a condition code change.
Regroup Maintenance	<p>Inspection data helps ensure stockpile asset reliability. As part of the inspection process, <i>regrouping lots</i> is necessary when lot sizes are reduced to quantities that cannot support operational requirements.</p> <p>For example, if a lot of 20 mm ammunition has a quantity of 234 rounds, yet the operational quantity for a particular aircraft is 510 rounds, the smaller lot of 234 rounds could be combined with other lots in order to meet the aircraft's requirement for issue and use.</p> <p>A regroup lot number is assigned for the total quantity of those lots combined, and a new lot history record is created when the regroup lot number is assigned. This allows the user to load, tear down, inquire, and/or update regroup lot numbers.</p>
Asset Serviceability	<p>Asset Serviceability is used to maintain the serviceability of all ammunition assets; ensuring that only serviceable assets are available for issue and use.</p> <p>The service and shelf life of each asset is based on start dates and date of manufacture (shelf life).</p>

Combat Ammunition System Programs	
Program	Description
Asset Identity Change	Using the Asset Identity Change program, you are able to change lot numbers, stock numbers, and condition codes.
Date of Manufacture Maintenance	<p>The Date of Manufacture Maintenance program is used to load and update the date of manufacture for each lot number on the database.</p> <p>This date is crucial for PI type inspection requirements and shelf life expiration dates.</p>
Inspection Template Maintenance	<p>The Inspection Template Maintenance process allows users to load, inquire, or delete inspection template data.</p> <p>Inspection templates are used to identify specific assets that require SMI or an out-of-cycle PI, such as the following:</p> <ul style="list-style-type: none"> • Assets stored outside. • Shipping containers requiring an SMI. • Assets directed to receive PIs outside the normal inspection interval.
Inspection Due Date Inquiry	<p>The Inspection Due Date Inquiry program provides the user with the capability to determine the next periodic inspection due date for an NSN or NSN/Lot # combination.</p> <p>This inquiry displays the next due date for stockpile, custody, and/or outbound assets, based on intervals loaded in the IDR.</p> <p>In addition the program displays those records that are <i>overdue inspection</i>.</p>
Inspection History Maintenance	Inspection History Maintenance provides the capability to load, update, or delete inspection history records on stockpile, custody, outbound, or complete rounds.
Safety Suspense	<p>This Safety Suspense program allows user to load and update safety suspense and release information. The user may choose the review before update or the update records option from the action drop-down box.</p> <p>Selecting the <i>review before update option</i> allows the user to review what assets are affected prior to the actual condition code change. This enables the user to plan for possible movement or scheduling of these assets for the safety suspense action.</p> <p>The data that is to be entered in this program is found within the supplement notice.</p>
Ammunition Disposition Request Maintenance	<p>The ADR Maintenance program is used to ADR unserviceable assets and allows for reporting them to Hill AFB, UT, or Warner Robins AFB, GA, for disposition instructions.</p> <p>This program does not generate a document because the user has the capability to add assets to an existing ADR that still has PENDING status.</p>
Ammunition Disposition Request Process	<p>The ammunition disposition request process program is used by local MASOs and Equipment Specialists at the ammunition control point (ACP) to provide final disposition instructions on ADR actions. The program can also be used as an inquiry for CAS Users as a READ ONLY display.</p> <p>All munitions are retained in the Air Force inventory as long as there is a requirement and the assets are serviceable or economically repairable or recoverable, whether they remain usable or have been designated as unserviceable, and are managed according to Air Force Manual (AFMAN) 91-201, <i>USAF Explosives Safety Standards</i>.</p>

Combat Ammunition System Programs	
Program	Description
	<p>When stock numbered munitions become unserviceable at base level and the item(s) cannot be assigned a condition code “E”, “F”, or “G”, the munitions inspector assigns condition code “P” to the item(s), establishes the ADR in CAS, and forwards to the MASO for approval. The MASO then forwards the ADR to the appropriate designated disposal authority.</p> <p>Ammunition disposition requests (ADR) must include, <i>as a minimum</i>, the following information:</p> <ul style="list-style-type: none"> • ADR number. • Date submitted. • NSN. • Lot number(s), if applicable. • Condition code. • Quantity. • Reason for reporting. <p>Base-level disposition is authorized for local disposal of nonexplosive (inert) munitions components. The MASO may authorize local disposal of unserviceable and non-repairable inert munitions valued at <i>less than</i> \$500 per item.</p>
Inspection History Inquiry	<p>The Inspection History Inquiry allows the user to inquire about stockpile, custody, outbound, and complete round inspection history records.</p> <p>An “All” selection is also provided to display all lot history inspections for an entered NSN.</p>
Inspection History Validation	<p>The Inspection History Validation lists all lot history inspection records that have been loaded and changed. Information listed includes the:</p> <ul style="list-style-type: none"> • Inspector’s name. • Individual who processed the load or modification. • Date this action took place.

Reports Menu

There are numerous reports we use every day to perform our day-to-day functions. Some of them and a description of their purpose are included in the table below. Although not all-inclusive, these reports along with others in CAS will help you do your job much easier.

Reports	
Type	Description
Custody Account Listing	<p>In this menu, a Custody Account Listing by Org/Shop is produced. This list provides custodians and unit commanders asset visibility.</p> <p>It lists custody account records in organization, shop code, NSN, and lot number sequence.</p> <p>We use this listing to verify data when performing turn-ins from a custody account.</p>
Asset Balance-Periodic Inspection	<p>The Asset Balance-Periodic Inspection menu produces the Asset Balance Report Periodic Inspection.</p> <p>Schedulers use this report to assess the munitions stockpile asset availability</p>

Reports	
Type	Description
	so that they can schedule periodic inspections <i>before assets go overdue</i> .
Lot History Inspection Report	The Lot History Inspection Report extracts lot history inspection data and produces a report with a listing of lot history and inspection data. We include this report with all munitions shipments to satisfy our history record requirement IAW TO 11A-1-10.
Lot Verification Report	<p>The Lot Verification Report extracts lot number verification data and produces a report with a listing of lot history and inspection data for a DODAAC, NSN, and lot/serial number.</p> <p>For example, if you have lot LOP-1-4 and LOP 1-4, CAS disregards all spaces and dashes and flags this lot number for review so that you can maintain uniformity between your lots.</p> <p>It allows you to correct lots that are loaded incorrectly in CAS.</p>

405. Discrepancy/deficiency reporting

Discrepancy reporting is used to identify incorrect actions from the manufacturer who built the item for military use, the ammo troops that prepared the items for transport, or the agency that actually delivered the items to your base. This lesson describes the actions required by the munitions inspector to identify, notify, and prevent recurrence of actions that resulted in a discrepancy.

Supply Discrepancy Report

A Supply Discrepancy Report (SDR) is used to identify a shipping related problem caused by the shipping activity. The shipping activity may be the manufacturer, a contractor, another base, or another service (Army, Navy, Marine Corps). You may sometimes hear a Supply Discrepancy Report (SDR) referred to by its old name, Report of Discrepancy (ROD). The purpose of preparing SDRs is to determine the cause of discrepancies, affect corrective action, and prevent recurrence. SDR procedures are covered by AFJMAN 23-215, *Reporting of Supply Discrepancies*. This manual provides procedures governing the methods and conditions under which shipping (item) discrepancies and packaging discrepancies are reported and replies furnished. These reports and replies from the action activity are documented on the SF 364, Supply Discrepancy Report. The standard form (SF) 364, National Stock Number 7540-00-159-4442 is a controlled form that can be secured through regular supply channels. SDRs provide support for adjusting property and financial inventory accounting records; information as a basis for claims against contractors; notification to shippers; visibility of preservation, packing, marking, and unitization discrepancies; required corrective actions; disposition instructions; and information for management evaluations.

Types

When you identify a supply discrepancy, you must first determine what category it falls into. There are two categories of SDR discrepancies—shipping and packaging, which are described in the following table.

SDR Discrepancy Categories	
Type	Description
Shipping	Shipping type discrepancies include any variation in quantity or condition of material from that shown on the shipping document, incorrect and misdirected material, receipt of canceled requirements, improper or inadequate technical or supply documentation, and other discrepancies included in AFJMAN 23-215, and <i>not</i> the result of a transportation error or product quality deficiency.

SDR Discrepancy Categories	
Type	Description
Packaging	<p>Packaging type discrepancies are defined as any unsatisfactory condition due to improper or inadequate packaging, which causes the item, shipment, or packaging to be vulnerable to loss, delay, or damage, or unnecessary expense to the US government.</p> <p>Packaging type discrepancies included are problems with preservation, packing, marking, and unitization.</p>

Time standards

Now that you are aware of the two types of discrepancies, the question of how long you have to report what you find needs to be answered. Submit supply discrepancy reports (SDRs) as soon as possible, but not later than the time standards in AFJMAN 23-215. The time standards for reporting vary depending on different factors. For instance, if you discover a packaging type discrepancy shipment with mission or life endangering problems or a shortage or overage of explosives, immediately report it to the shipping activity, contracting office, or control point by the quickest communication medium (usually telephone). Follow up and submit a formal report within 24 hours of the initial report. You must report a shortage or overage of ammunition or explosives within 24 hours of discovery. All other discrepancies must be reported within 90 calendar days (from date of shipment) if in the CONUS, or 150 days calendar days (from date of shipment) if overseas.

Time limits for reporting of discrepancies relating to contractor warranties are prescribed in individual warranty clauses and/or contracts, and time limits *do not* apply to short shipment and wrong item discrepancies discovered upon opening a sealed vendor pack. If you must make a late submission, annotate the reason for the delay or identify the discrepancy code on the SF 364. The action activity (the shipper) will honor the report, but late SDRs lacking justification are normally used by the action activity in the system evaluation and correction process. Be aware, reporting activities (shipment recipient) are required to send SDRs, even after the time standard has elapsed.

Response time standards

Just as the reporting activity has time limits for submitting supply discrepancy reports, the action activity also has response timeframe requirements. For SDRs concerning controlled inventory item code CIIC items, the action activity must reply within 30 calendar days. SDRs that are forwarded by the International Logistics Control Office on behalf of security assistance personnel must also be answered within 30 days. The security assistance department of the International Logistics Control Office handles sales of USAF munitions to foreign governments, and these SDRs only apply to distribution depots (Hill AFB and Warner-Robbins AFB). All other types of SDRs require a response within 55 calendar days.

Follow up and unresolved SDRs

If the action activity does not respond within the prescribed timeframe, the reporting activity will send a follow-up inquiry using a hard copy or automated means. At the top of the report, the words “**FOLLOW-UP**” are annotated, with the date the follow-up was prepared. If the reporting activity still does not receive a response after completing the follow-up, forward a copy of the SDR and supporting documentation to the service/agency SDR processing focal point for assistance. The action activity then has 45 calendar days to provide a response.

Contested reports

If a report is contested, for example, the reporting activity does not concur with a reply received in response to an SDR; the focal point must be notified for assistance. After reviewing all data relating to the problem, the focal point provides a decision to the reporting activity within 45 calendar days of the date the correspondence was received. The decision will be final.

Invalid/incorrect reports

If an invalid or incorrect report is submitted, it is cancelled or corrected using hard-copy (paper) or automated means. All cancelled/corrected reports are sent to the same distribution list as the initial SDR, and the report is annotated “**CANCELLED**” or “**CORRECTED**” with the date of the follow up at the top of the form. The SDR program is an important part of the receiving process. Identifying and reporting shipper deficiencies should eliminate future problems, and can help you with your own shipments (you’ll double check your own shipments for the same problems you reported). IAW AFI 21-201, you prepare and submit an SF Form 364, to the appropriate activity with an information copy to the MAJCOM.

These are just a few things to keep in mind when receiving items and preparing items for shipment. If you identify a situation that requires a SF Form 364, follow the instructions contained in AFJMAN 23-215.

Transportation discrepancy report

Transportation discrepancies reports (TDR) are problems identified during a receiving inspection. These problems are attributable to the carrier (FedEx, UPS, USPS, Boyle, and so forth) and must be reported to the transportation officer or the transportation management office (TMO) immediately upon discovery. To better understand ammo’s role in the TDR process, you must understand the governing regulation for TDRs—DOD 4500.9-R, *Defense Transportation Regulation*. This regulation contains important definitions, responsibilities, and procedures that are used when reporting a TDR.

Munitions personnel rarely use the TDR because the base transportation office is the agency that deals directly with the common carriers. TDRs are documented and submitted by personnel from the transportation management office, *not* ammo troops. However, as ammo troops, we are the technical experts on munitions and the associated packaging, labeling, cost, and documentation requirements, and so forth. As munitions inspectors we are required by TO 11A-1-10 to be familiar with the TDR system. This is because we assist the transportation officer in identifying the information required to complete the TDR.

Procedures

There are certain procedures that must be followed when a carrier arrives. First, contact TMO. A TMO representative should be present when breaking seals and opening the truck. If no TMO representative is present, immediately notify TMO of discrepancies found that involve shipments of classified/protected items. Check all containers and pallets for obvious defects. During the in-check, document possible discrepancies. Report all discrepancies attributable to the carrier to TMO. The transportation officer then documents and submits the TDR. Some information items ammo provides to the transportation officer are listed below:

- Copy of the DD Form 1348, DOD Single Line Item Requisition System Document (Manual), including the following information:
 - NSN.
 - Noun or nomenclature.
 - Condition code assigned to assets before and after receiving inspection.
 - Quantity.
 - Value.
- Are assets repairable? A repairable value statement.
- Signed affidavit by the person who discovered the shortage or damage. The affidavit must include a detailed explanation of time, place, how discovery was made, who discovered the damage and the extent of damage.

If the offense is serious enough, the carrier may be required to reimburse the government. Examples of reimbursable offenses attributed to the carrier are theft, damage, or lost shipments.

Miscellaneous transportation discrepancies

Another category, called miscellaneous transportation discrepancies, involves discrepancies that have no direct cost to the government but identifying them will help improve carrier service.

Examples of miscellaneous transportation discrepancies are

- transit time between point of origin and destination *exceeds* required delivery date;
- when improper loading, stowing, handling, blocking, lashing, or bracing discrepancies are involved and there is no loss or damage to the cargo; and
- when broken, missing, or improper seals are found, but there is *not* apparent loss or damage to the cargo.

Exceptions to reporting

There are some exceptions to reporting. These exceptions are

- reporting, adjusting, and accounting for supply (item) discrepancies; preservation, packaging, packing, and supply item identification marking. These are reported as Supply Discrepancy Reports (SDR);
- discrepancies in Foreign Military Sales shipments not in government-controlled transportation; and
- discrepancies that occur in movement of material to or from on-station sites or satellite activities using equipment assigned to a government activity, agency, or contractor-vendor operation.

Documentation

The documents used to report TDRs are the SF 361, Transportation Discrepancies Report, and the Joint Message Form, which is described in the following table:

TDR Reporting Documents	
Type	Description
SF 361	<p>The SF 361 is used to notify or confirm notification to carriers of a problem with a shipment.</p> <p>It may also be used to change or cancel a previously issued TDR, request disposition instructions, and support claims against carriers and contractors.</p>
Joint Message Form	<p>The Joint Message Form is prepared for transportation discrepancies applicable to CLASSIFIED or PROTECTED (including HAZMAT and AA&E) shipments.</p> <p>Defense Transportation Regulation 4500.9-R Part II, <i>Cargo Movement</i>, provides the guidance for preparing the SF 361, <i>Transportation Discrepancies Report</i> and Joint Message Form.</p> <p>TDRs are an important part of the product improvement process. By identifying carrier caused discrepancies, we can eliminate future problems and recover lost funds.</p>

Product quality deficiency report

Product quality deficiency reports (QDRs) are reports of problems and defects on military weapon systems caused by the manufacturer. TO 11A-1-10 states that the PQDR system provides munitions engineers with data on condition of assets stored at AF units. It also states that inspectors will report critical defects, major/minor defects not listed in the TO, unusual defects, and items that malfunctioned during use as deficiencies under this system.

According to TO 00-35D-54, *USAF Deficiency Reporting and Investigation System*, the purpose of a PQDR is to identify, investigate, and resolve these deficiencies. PQDR procedures in TO 00-35D-54 and the USAF deficiency reporting and investigating system (DRIS) apply to USAF and contractor

members and organizations who operate or sustain USAF-owned or -managed military or weapon systems, including Joint systems, subsystems, and end items; including trainers, test and support equipment; as well as vehicles, clothing, and textiles. For military and weapon systems, DRIS will be established not later than acquisition design baseline and will continue throughout the system life cycle. Product quality deficiencies are reported using the Standard Form (SF) 368, Product Quality Deficiency Report, or equivalent format.

Deficiency classifications

After the classification of a defect, the deficiency which caused the defect must be determined. There are two deficiency classifications: design and quality, which are discussed in the following table:

Deficiency Classifications	
Type	Description
Design	A design deficiency results in any condition that limits or prevents the use of materiel for the purpose intended, where the materiel meets all other specifications or contractual requirements. These deficiencies cannot be corrected except through a design or specification change.
Quality	A quality deficiency is attributable to errors in workmanship; nonconformance to specifications (initial failure), drawing standards, or other technical requirements. An <i>exhibit</i> is the failed/deficient or non-conforming item.

Deficiency categories

PQDRs are then broken down into one of two categories based on severity, mission impact, urgency of response, and safety. The following table lists two categories of deficiency reports which are category I and II.

Deficiency Categories	
Category	Description
Category I Deficiency Report	Category I (Cat I) identifies a deficiency which: <ul style="list-style-type: none"> • May cause death, severe injury, or severe occupational illness. • May cause loss or major damage to a weapon system. • Critically restricts the combat readiness capabilities of the using organization. • Would result in a production line stoppage.
Category II Deficiency Report	Category II (Cat II) identifies a deficiency which may impede or constrain successful mission accomplishment (system <i>does not meet minimum operational requirements</i> but also <i>does not meet</i> the safety or mission impact criteria of a Category I deficiency). It may also be a condition that complements, but is not absolutely required for, successful mission accomplishment. The recommended enhancement, if incorporated, will improve a system's operational effectiveness or suitability.

Priority Code

After a PQDR report has been assigned a category code, all Category I and Category II reports are then assigned a priority code. Assigning a priority code to all other Category II reports is optional. These priority codes help to define the deficiencies impact. See Table 1-2 in TO 00-35D-54 for a full explanation of all the priority codes. As a general rule:

- Priority 1A through 1C identifies an *emergency* condition;
- Priority 2A through 3B identifies an *urgent* conditional; and
- Priority 4A through priority 5 identifies a *routine* condition.

Deficiency Reporting Criteria

TO 00-35D-54 also identifies the roles and responsibilities of everyone involved in the PQDR process. The *originator* is defined as the individual who discovers the deficiency and initiates the deficiency report. This person is responsible for forwarding a draft copy of the SF 368, or DREAMS (E-mail form), to the originating point within 24 hours for Cat I deficiencies and 3 workdays for CAT II. The originator tags the exhibit with two copies each of DD Form 1575 and DD Form 2332 (PQDR exhibit tag). She/he then segregates the exhibit and waits for disposition instructions. In munitions, the originator ensures that the exhibit has been returned to base stock and placed into condition code "J."

Deficiency Reporting Database System

The DRIS database is managed by the Materiel Systems Group at Wright-Patterson AFB, OH. The system provides the capability of a full-text retrieval data base management system for tracking the progress of deficiency investigations. The structure of the system allows for real-time, on-line interrogation of data. Users may query the database via a telnet session or a web-browser interface.

Government employees requiring access to the USAF DRIS database must provide all the required information from the User Account Access Request form (<https://www.asc.wpafb.af.mil/infocen>) to the file manager. This information includes such basics as name, office symbol, phone number, installation, position, title, and database access requirements.

In summary, the PQDR process is used to report and resolve manufacturer deficiencies on military equipment. There are two categories of PQDRs, Cat I and II. The different categories have different time requirements for necessary actions to be taken. PQDRs are entered, tracked, and updated in the DRIS database, which provides the capability to retrieve information concerning submitted PQDRs. Information such as disposition actions are loaded by the *action point* so that the *originating point* knows what actions need to be taken. If problems are not reported in a timely manner, they can and usually do recur and cost the Air Force money by having to acquire replacement items and taking valuable storage space.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

404. Documenting inspection results

1. Direct input is the preferred method of loading what type of information into CAS?
2. When direct input into CAS is not used, what form is used to update item lot history?
3. What CAS program displays condition and status of stockpile and custody assets?
4. What CAS program is used by local MASOs and Equipment Specialists at the Ammunition Control Point to provide final disposition instructions on ADR actions?
5. What CAS report is included with shipments to satisfy lot history record requirements in accordance with TO 11A-1-10?

405. Discrepancy/deficiency reporting

1. When you identify a supply discrepancy, what is the first thing you must determine?
2. What type of discrepancy applies if you discover any variation in quantity or condition of materiel from that reflected on the supply documents?
3. Which publication identifies the time standards for submitting supply discrepancy reports (SDRs)?
4. If problems attributable to a carrier are found during a receiving inspection, who should you notify immediately about the discrepancies?
5. What is the role of munitions inspectors for processing a transportation discrepancy report (TDR)?
6. What two forms are used to report transportation discrepancies of applicable CLASSIFIED or PROTECTED shipments?
7. Which report is used to identify problems attributable to the manufacturer of munitions/military weapon systems?

1-3. Receiving/Shipping Munitions

In most munitions storage areas (MSA) throughout the world, the inspection element is responsible for identifying/certifying inert and empty items, as well as empty containers. In this section you learn the requirements for both. Let's start with identifying inert and empty items.

406. Identify/certify inert/empty items, residue, and containers

Two inspections require the use of TO 11A-1-53, *General Instructions for Ammunitions Color Coding, Identification of Empty and Inert Loaded Ammunition Items and Components, and Assignment of Version Numbers to Training and Dummy Ammunition Items*: the shipping and pre-issue inspections. Inert and empty munitions must be properly identified and marked in accordance with TO 11A-1-53 as containing no explosive material. These items may then be used for training or display. It is imperative that these items be properly identified so that they are not confused with the live items they resemble. Let's look at how these items are identified.

Inert items

An inert item is a munitions item or component whose explosive material has been replaced by an inert material. The item feels or weighs approximately as much as the live item it represents. As outlined in TO 11A-1-53, the Air Force uses a color coding system to help identify items. For instance, practice ammunition is identified with a light blue color. If the item is large enough; a light blue band is marked around the circumference of the item. The items are either impressed, stenciled, or etched with the word "INERT" as applicable. As practice munitions are capable of being used in a delivery system, these items may or may not contain a small explosive element.

Empty items

Empty nonnuclear munition items have had their explosive material completely removed or left out during the time of manufacture, and *not* replaced by other materials. These items must be impressed and stenciled the word “EMPTY.” In addition to being properly identified as empty or inert, all components stock listed as explosive which have had their explosive material removed for training, display, or research and development, must have four holes, no smaller than ¼ inch, drilled 90° apart through the area that normally contains the explosives material. An item too small for the ¼-inch holes are drilled with a like number, or fewer holes of a smaller diameter comparable with the item or component.

The following list provides exceptions to the drilling requirements:

- The presence of the drilled holes impairs the item’s function or designed use.
- Stock listed items that are procured and issued as inert loaded or empty.
- Inert loaded or empty items on permanent display in museums or mounted on display boards or wall plaques.

Inspecting munitions residue and reusable containers

Another function of the inspection element is to make sure that items destined for resale are safe, and empty containers are empty. Munitions inspectors use TO 11A-1-60, *General Instructions Inspection of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to, or Containing Explosives*, to inspect/certify empty and munitions residue containers. Munitions personnel performing procedures outlined in TO 11A-1-60 must be knowledgeable of the following supplementary areas:

- Precious metals recovery program.
- Disposal of classified material.
- Demilitarization requirements and procedures.

Let’s take a look at the requirements for two of the most often certified items—munitions residue and empty munitions containers.

Munitions residue

Munitions residue is the material remaining after a munitions item has had its explosive filler removed by normal functioning or demilitarization. All non-nuclear munitions are 100 percent visually inspected to ensure that live rounds, primers, and explosive material has been removed before turn-in to the defense reutilization and marketing office (DRMO). Items that cannot be visually inspected are 100 percent physically inspected (that is, using depth gauges, mirrors, or other inspection devices). All munitions fragments, such as those found scattered within the boundaries of a munitions demolition range are inspected for hazardous explosive material. You most often deal with munitions residue when the firing range turns in spent brass or expended munitions are returned from the flightline.

Once you inspect the items, place them in containers and seal the container with steel band(s) or seals. If there is any evidence of tampering after sealing you are required to re-inspect and re-certify the containers. Mark the containers “Munitions Residue.” Attach a signed certificate of clearance to the outside of the container, and as part of the turn-in/shipment documentation. The certificate of clearance will state the following:

“This certifies and verifies that the ammunitions, explosives, dangerous articles residue, range residue, and/or explosive contaminated property listed has been 100 percent properly inspected and to the best of our knowledge and belief, are inert and/or free of explosives or related material.”

Empty munitions containers

All containers will be 100 percent inspected to ensure that they are free of munitions/explosives residue. Just like the certified removal of munitions residue procedures, attach a legible signed certificate of clearance to the outside of individual containers, and as part of the turn-in/shipment document.



Immediately, after you inspect the containers, mark, seal, and segregate them. Individual containers destined for depots, re-use, or if the disposition is undetermined, all must have a certificate of clearance as part of the turn-in/shipment paperwork.

Mark all containers certified empty with the word “EMPTY” stenciled or printed on the upper half of the container on the same side that had the old identification. Completely obliterate the old munitions item identification and UN serial numbers. Do *not* obliterate the container markings (that is, container NSN, part number, and nomenclature). Do *not* remove a container’s performance oriented packaging markings. Empty containers need not be individually sealed if they are palletized and certified as a unit.

Before DRMO accepts empty munitions containers, container tops (lids) must be removed and must not be replaced until DRMO accepts the containers. We cannot overemphasize the importance of making sure that the container is in fact empty. Consider the consequences of certifying a container empty only to find out later there was a live missile in that container!

407. Receipt of munitions

Air Force munitions storage areas must receive and ship the specific munitions commodities required to support the unit’s wartime and peacetime training missions. The AF ships its munitions by all modes of transportation: ground, air, and ocean-going vessel. This section is devoted entirely to the different transport modes, the required forms used, and the packaging and marking requirements.

When receiving munitions, the normal state-side mode of transport is commercial cargo truck. Overseas, the mode of choice is the International Organization for Standardization (ISO) container by water vessel/ship. However, that does not mean that you won’t be called upon to receive an aircraft load full of munitions. In fact, during Operations Desert Shield/Storm, most of the munitions were transported by ship to the using countries. In other words, it is highly likely that you will receive munitions by each of the modes available to the Air Force.

Initial inspection

The initial inspection starts with visually inspecting the seals to verify that they are intact and there are no signs of damage or tampering. If there is evidence of tampering or the seals are missing, immediately perform an inventory to verify the quantities received and determine the extent, if any, of damage or theft. Note that this inspection is not as detailed as the receiving inspection identified in TO 11A-1-10. Personnel authorized to receipt for munitions will in-check assets. In-checking consists of comparing shipping documents with outer container markings (identity and quantity).

Receipt Discrepancies

When the received quantity, lot number, or NSN is different from the shipping document, the in-checker circles the erroneous information on the document, enters the correct information and initials the changes. Initiate research to resolve any discrepancy noted during in-checking munitions assets. Incoming ammunition shipments of nonstandard items received without sufficient documentation constitute a potential safety hazard to both facilities and personnel. Notify the munitions flight chief prior to accepting these assets. If munitions assets are received without sufficient accountability documentation, contact the shipping activity and request that the proper documentation be provided immediately. Once all the information is validated, prepare an off-line shipping document, DD Form 1348-1, Issue Release/Receipt Document, and process the receipt. Stamp or annotate the DD Form 1348-1, “Shipping documentation not received.” Prepare and distribute SF 364 or an electronic version to the applicable organization’s e-mail account. Munitions received without minimum essential technical data (that is, handling, storage, inspection, and disposal procedures) are placed in condition code J. Attempt to obtain the required technical data immediately. When instructions and minimum essential technical data have been provided, inspect the item, place it in the appropriate condition code, and, if serviceable, it may be issued to designated and authorized users. If any transport vehicle is found or suspected to be in a hazardous condition by other than normal circumstances, take immediate action to isolate the *suspect* transport vehicle consistent with

applicable quantity-distance (QD) separation standards. Separation of the transport vehicle takes place *before any other action is taken*. Move the vehicle to a suspect vehicle holding area isolated from other locations unless it is more hazardous to move the vehicle.

Activities that may be performed at the initial inspection location *before* moving the munitions to the storage area include

- external visual inspection of the motor vehicles and/or aircraft;
- visual inspection of the external munitions container (packaging) within motor vehicles and/or aircraft; and
- transfer of munitions containers from trucks and trailers between the commercial carrier and AF transportation equipment.

After the initial inspection has been complied with, the assets are ready for the munitions inspection section to do the RI using TO 11A-1-10 and the applicable item TO. We previously discussed the RI procedures in this unit.

408. Shipment of munitions

Rules governing shipment of munitions are stringent and detailed. In this lesson you learn about the requirements for packaging, documenting, and labeling munitions for shipment by various modes of transport.

General requirements

Before shipping any munitions item, no matter what the mode of shipment is, there are certain actions that must take place. International, federal, and military regulations require the shipper to certify that hazardous materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation. Depending on the mode or whether the shipment moves by commercial or by military transportation, the specific language may vary and specific forms may be prescribed. When preparing to transport hazardous waste, hazardous waste manifests are required as well as appropriate EPA generator and transporter identification numbers.

A shipping inspection is conducted according to TO 11A-1-10, the specific item's TO, and additional guidance provided by higher headquarters. This is when you verify all of the documentation for accuracy. The following are a few questions you have to answer:

- What mode of transportation are you using?
- Is the item(s) marked and labeled correctly?
- Is the item(s) packaged correctly?

Governing directives

The mode of transportation dictates which publications you use to determine the labeling, marking, and packing requirements. For instance, Title 49 *Code of Federal Regulations* (CFR49), *Hazardous Materials Regulation, Transportation*, regulates commercial shipment of hazardous material, including explosives, by motor vehicle, cargo aircraft, and ship within the United States. The Air Force implements the requirements of CFR 49 by placing guidance into Air Force policy directives, regulations, instructions, and pamphlets. If you are preparing items for military air transportation, you follow the mandatory guidelines outlined in AFMAN 24-204, *Preparing Hazardous Materials for Military Air Shipments*.

Certification requirements

Personnel responsible for preparing, packaging, or marking hazardous materials must certify that the items are safe for transportation. The installation or activity commander or designated representative authorizes munitions personnel to do this. This authorization must include the scope of the individual's authority. Most munitions personnel who prepare munitions for air shipment are authorized to certify only munitions items using the shipper's declaration for dangerous goods.

Because munitions personnel are normally limited to certifying munitions items, these individuals fall under the technical specialist category identified in AFMAN 24-204. Technical specialists are trained and qualified to maintain an item by technical specialty for only those hazardous materials (munitions) in their specialty. If you are shipping your assets by truck your certification for safe transportation is your signature on the shipping documents.

Vehicle shipments

To assist you in loading, blocking, and bracing munitions for over the road transport, refer to TO 11A-1-61-1, *Storage and Outloading Instructions for Conventional Ammunition (Igloo, Magazine, Military Van, Truck-loading, and Car-loading)*. A representative sample of truck-loading drawings is shown in figure 1-1; these requirements are very specific.

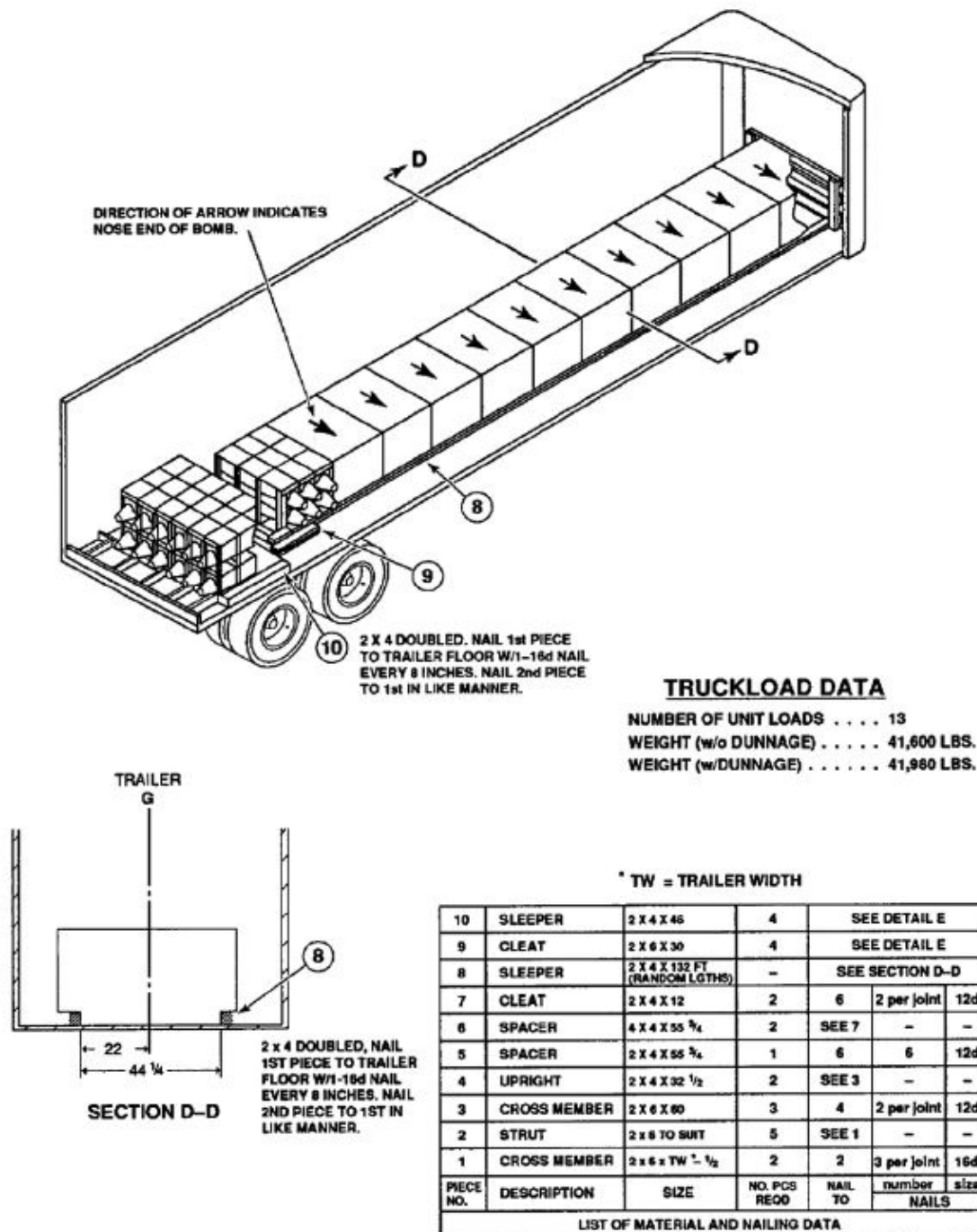


Figure 1-1. Sample, truck-loading drawing.

Aircraft shipments

The movement of explosives by air on commercial aircraft is regulated by the Federal Aviation Administration. The Federal Aviation Administration's regulatory requirements are now incorporated into CFR-49. Instructions about explosives-laden military aircraft (and certain DOD contract aircraft operations) are governed by AFMAN 24-204; Air Force Joint Instructions (AFJI) 11-204, *Operational Procedures for Aircraft Carrying Hazardous Materials*; and applicable aircraft TOs.

AFJI 11-204 deals mainly with aerial port operations; for example, where to park explosive-laden aircraft, work that can be performed, escort and on-scene commander responsibilities, and so forth. As a technical specialist, you are responsible for preparing the item(s) for military air shipments IAW AFMAN 24-204. Let's take a look at a few of those responsibilities.

Shipping activities must implement a quality control program to ensure that inspections (100 percent) are performed on munitions before they enter into the air transport system. The inspection focuses on packing, marking, labeling, and safety certification criteria to satisfy the requirements of AFMAN 24-204 and specific airlift criteria. The originating activity must

- conduct a visual examination of the exterior shipping container and review of the shipping documents;
- open exterior containers only when there is physical evidence to support suspected damage of the inner receptacles or if the external markings do *not* correspond to the type of container; and
- reseal opened containers according to the SPI.

Aircraft Cargo Pallet System

Once you have inspected the items and ensured that they are ready for shipment you must properly palletize them. Since items are not just thrown on the aircraft, they must be palletized to make sure the weight and bulk do not cause a hazard to the property or the aircraft. One of the key items is the master pallet (463L pallet), which, when turned sideways, fits on the rollers of a C-130 aircraft when turned lengthwise, fits on the bed of a truck. Before the development of the Air Force's 463L Materials-Handling System, individual pieces of cargo were floor-loaded by hand. However, as aircraft grew in size and productivity, cargo-handling and aircraft-loading efficiency were upgraded. The Air Force devised a cargo handling system, called the 463L System that reduces aircraft ground time, loads aircraft more fully, and eases the ground handling of cargo. Combining the 463L vehicles, pallets, rollers, and rails within the aircraft, can reduce ground time by as much as 75 percent.

The 463L cargo system

The 463L cargo system includes a pallet of metal sandwich construction specifically designed for palletizing and transporting air cargo on roller-type conveyors in the terminal, restraint rails and roller conveyors in the aircraft, and cargo loading and unloading vehicles. It is equipped with locking arrangement for locking the pallet into the aircraft rail system for restraint during flight and tie-down rings to secure the net, cargo tie-down, and aircraft pallet.

The 463L pallet

The 463L pallet is made of corrosion-resistant aluminum with a soft wood or fiberglass core and is framed on all sides by aluminum rails. The rails have 22 tie-down rings attached with six rings on each long side and five rings on each short side. Each ring has a 7,500-pound restraint capacity. The rails also have indents (notches) that accept the detent locks located on numerous types of material-handling equipment and on all airlift-capable aircraft. The overall dimensions of the 463L pallet are 88 inches long by 108 inches wide by 2 ¼ inches thick. However, the usable dimensions of the upper surface are 84 inches wide by 104 inches long. This allows two inches around the periphery of the pallet to attach straps, nets, or other restraint devices. An empty 463L pallet weighs 290 pounds (355 pounds with a complete set of nets) and has a maximum load capacity of 10,000 pounds. The

maximum pound per square inch for the 463L pallet is 250 pounds. If a load exceeds this limitation, then shoring must be used to spread the load over a larger area.

Net sets

There are three nets to a set: one top net (yellow/tan) and two side nets (green/black). The side nets attach to the rings of the 463L pallet and the top net attaches by hooks to the rings on the side nets. Nets may be tightened using the adjustment points. The 463L pallet system and nets will restrain up to 10,000 pounds of general cargo 96 inches high.

Pallet Building

Begin building the pallet by placing three points of dunnage (4 × 4 × 88 inches) underneath the pallet. Start with the heaviest cargo, and distribute the weight out from the center. This will keep the pallet from becoming too heavy on one end. Position cargo right side up with *special handling labels facing out*. Load in a square or pyramid shape whenever possible to make the load stable. Cover the pallet with a plastic 463L pallet cover.

Before using the nets, lay them out and inspect for severability. Do *not* use nets that are torn, rotten, have loose stitching, or have bad or missing hooks. Only one bad strap or hook is enough to make the entire net unserviceable. Identify the long side (six hooks) and short side (five hooks) of the net and position the net so that the hooks point inward while attached to the pallet rings. Place the two side nets around the cargo and fasten the hooks to the rings on the pallet. Make sure the straps of the net cross at the corners. Pull the net as high over the cargo as possible, but do *not* tighten the straps until the top net is hooked in place.

Center the top net over the cargo, with the long and short sides lined up to the side nets. Hook the top net into the side nets using the O-rings located at the top and middle portion of the nets. *Never use the bottom O-rings to secure the top net.* Top net hooks should face inward, unless cargo can be damaged by the hooks. When the top net is in place, two people should pull evenly on all the straps opposite of each other to tighten the top net. Tuck the loose ends of the straps into the netting to prevent snagging during loading operations.

Mark pallets on adjacent sides with a military shipment label (DD Form 1387), and any required documents such as hazardous cargo declaration, or other identification markings. Ensure items are placed in a weather-proof shipping envelope or on a pallet identification board. The user is responsible for building 463L pallets and may be responsible for loading them onto aircraft.

Over-water shipment

Transportation of explosives and other hazardous materials by water in commercial common carrier vessels is regulated by the United States Coast Guard. Shipments overseas must be made according to the regulations of the carrier, the US Coast Guard, or the Department of the Army. The inspections, shipping documentation, and labeling are the same as a tractor-trailer munitions movement. Munitions loaded aboard ships for transport normally go one of two ways, either by “break-bulk” or containerized ammunition distribution system (CADS).

Break-bulk shipment

The break-bulk shipment method is simply stacking of palletized munitions in the cargo hold of a vessel with adequate blocking and bracing to keep the shipment from moving at sea. Break-bulk is a much slower operation when loading the vessel. Because the munitions are handled more with this method, the risk of accident or incident is increased. Also, because of the stacking limitations of some munitions, this method normally means that each vessel carries fewer munitions than it can with the containerized method.

Containerized ammunition distribution system

Shipping munitions by CADS is the most efficient, timesaving, and economical method of shipping munitions by ocean-going vessel. Simply stated, CADS is shipping munitions in military intermodal containers. These containers are transported to the port on the back of flatbed trailers designed to carry these containers. The containers are then lifted off the back of the trailer and stacked on the deck or in the cargo hold of the transporting vessel. Once the vessel docks at the receiving port, the containers are lifted off the vessel and placed on the back of flatbed trailers and transported to the desired location. This system saves time, money, and manpower.

The container of choice for use with Air Force munitions is the 20-foot-long International Organization of Standardization (ISO). This container, as shown in figure 1-2, is a double-door, side-opening container that can be fully opened to allow unobstructed access to its contents. The ISO container can be transported by commercial or military trailers. This container also contains internal tiedown rings which can be used to secure cargo during shipment.

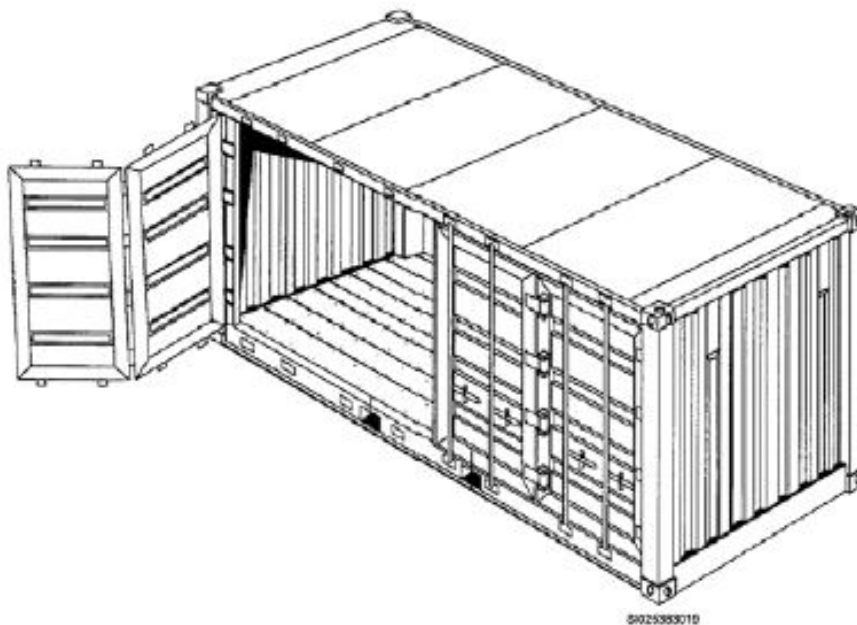


Figure 1-2. Sample, ISO container drawing.

International Organization for Standardization Shipping Container inspection

An intermodal container may not be offered for the carriage of any type of cargo unless the container is structurally serviceable. You can find container inspection criteria in MIL-HDBK-138B, *Guide to Container Inspection for Commercial and Military Intermodal Containers*. If a container has any safety related deficiency or damage that could place any person in danger, it will *not* be used. The container must bear a legible safety approval plate or a consolidated data plate. Normal wear including oxidation (rust), slight dents and scratches, and other damage that does *not* affect serviceability or the structural integrity of the container is permissible. The container type offered for service must be of suitable size, style, and configuration for its intended use. Container size and capacity must be acceptable for the shape and weight of commodity to be shipped. Container size and configuration must be compatible with handling and transportation equipment to be used. The style of container must meet approval of countries involved with the shipment. Style of container must provide proper degree of security required for the commodity to be shipped. The container inspection criteria is met through a visual examination and, except where tolerances are provided, acceptance of the container is based on the inspector's judgment. Any unacceptable deficiencies disclosed by the examination must be corrected *before* the container can be used for shipment. The inspection must be performed on the container while it is empty. Although any sequence of inspection is permissible, the

sequence of inspection contained herein is recommended and coincides with the checklists provided in MIL-HDBK-138B. A complete examination must be performed prior to acceptance. ISO container qualifications are as follows:

- DOD personnel who are certified by attending the AMMO-43 Intermodal Dry Cargo Container, or the Convention for Safe Containers course conducted by the United States Army Defense Ammunition Center. DOD inspectors must be re-certified every 48 months.
- Serviceability (pre-loading) inspection need not be performed by a certified inspector but the inspector must be experienced in detection of structural damage. For example, personnel are considered to be qualified if they have at one time received formal training and are experienced in the detection of structural damage.

409. Packaging and marking munitions shipments

We are required by military and public laws to mark and package hazardous material for safe transport. Your actions in packaging items must meet or exceed all written laws pertaining to transportation. The requirements for packaging and marking cargo vary, depending on the mode of transportation you use. In this lesson we discuss the marking and packaging requirements for the safe transportation of hazardous material.

General packaging requirements

When you prepare munitions for transportation, you must package them in containers authorized by AFJMAN 24-204; Title 49 *Code of Federal Regulations* (CFR49); the International Civil Aviation Organization technical instructions; or the International Air Transport Association dangerous goods regulations. If you do not, you are subject to fines and, in extreme cases, imprisonment.

UN specification performance-oriented packaging

The purpose of performance-oriented packaging (POP) is to keep hazardous materiel inside its container and away from people and the environment. Hazardous material, in this case, refers to the munitions that you are packaging for shipment and storage. Your goal should be to make sure that the items are packaged as safely and securely as possible to meet the purpose above. You accomplish this using several tools (special packaging instructions database and transportation regulations), which ensure that the packaging we use meets Department of Transportation (DOT) standards and UN recommendations. For example, if an SPI directs the use of a specific wooden box for packaging of hand grenades, then we must use that box to package the grenades.

Packages approved for munitions shipments have undergone several UN performance tests (drop, leakproof, stacking, and internal pressure) at package design facilities. This is the basis of POP. Determining the suitability of a container is taken seriously by packaging specialists. For this reason, field use of suitable substitutes is generally discouraged since a standard could be widely interpreted by many different people. An example of this would be where a munitions inspector packaged grenades in a thin plywood box, and the SPI called for a specific stronger type wooden box. The best rule is to follow what the guidance directs since it is based on testing.

Grandfathered items

Government-owned goods packaged before 1 January 1990 are exempt from UN specification POP requirements. Ship these items under the packaging requirements in effect at the time of packaging. Annotate the shipping papers “government-owned goods” packaged before 1 January 1990. This is commonly known as the “grandfather clause.” In addition, some SPIs allow an extension of this clause.

POP markings

Each POP certified container is marked with a series of codes that indicates what type of container is authorized, packaging group of the item the container can hold, the maximum weight of the container holding the item(s), the year the container was manufactured, and what country originated the shipment.

Again, it's important to emphasize that the POP marking *does not* identify what's in the container. It identifies that the container can safely transport hazardous materials of a certain packing group (explosives are packing group 2).

Special packaging instruction

Certain items require specific packaging requirements for shipment. This is satisfied with a special packaging instruction (SPI) developed for the item. These specific packaging/marketing instructions give detailed directions (that usually include a drawing) that are used to construct packages for items requiring special preservation. Figures 1-3 and 1-4 show an example of a typical SPI. An SPI drawing generally includes details for special blocking, bracing, cushioning, shock mounts, tiedown devices, and positioning of the item in the pack. SPI requirements take precedence over TOs or other documents.

SPECIAL PACKAGING INSTRUCTION			CODE ID 98747	SPI NO. (TPD) F00-879-3968																														
PART OR DRAWING NO. 57D9700	NATIONAL STOCK NO. 1340-00-879-3968	CURRENT REV C	SHEET 1 OF 2																															
ITEM NOMENCLATURE WARHEAD, 2.75 INCH ROCKET, FLETCHETT		ORIGINAL DATE 68085	ILL. G. HEEREN CHK. C. R. ROBERTS ENGR. M. D. WILSON AUTH. J. GARRARD																															
PRESERVATION LEVEL A METHOD III LEVEL B METHOD III LEVEL C METHOD III QUP 004 ICQ 000 CLEANING C-1 DRYING D-1 PRESERVATIVE N/A		PACKING AS SPECIFIED BELOW AND BILL OF MATERIALS LEVEL SPEC STYLE TYPE CL VRTY GR A PPP-B-621 4 2 A B PPP-B-621 4 1 B C N/A																																
MARKING IAW MIL-STD-129 SPECIAL MARKINGS: A) SPI NO. F00-879-3968 MARK THE SPI NUMBER ON THE ONE SIDE OF THE CONTAINER B) PROPER SHIPPING NAME: CARTRIDGES FOR WEAPONS. INERT PROJECTILES UN0012 C) APPLY UN POP MARKING 4C1/Y21/S/13 USA/DDO/AF70 THE * MEANS ENTER THE LAST TWO DIGITS OF THE YEAR DURING WHICH THE PACKAGING WAS MANUFACTURED.		<table border="1"> <thead> <tr> <th>LEVEL A</th> <th>LEVEL B</th> <th>LEVEL C</th> </tr> </thead> <tbody> <tr> <td>GROSS CU FT 0.867</td> <td>0.867</td> <td>N/A</td> </tr> <tr> <td>GROSS WT LBS 47.6</td> <td>47.6</td> <td>N/A</td> </tr> <tr> <td>DESIGN FRAGILITY G 100</td> <td>100</td> <td>N/A</td> </tr> <tr> <td>LENGTH 19</td> <td>WIDTH 6 3/4</td> <td>DEPTH 6 3/4</td> </tr> <tr> <td>CNTR I.D. 22</td> <td>8 1/4</td> <td>8 1/4</td> </tr> <tr> <td>LEVEL A</td> <td></td> <td></td> </tr> <tr> <td>LEVEL B</td> <td></td> <td></td> </tr> </tbody> </table>			LEVEL A	LEVEL B	LEVEL C	GROSS CU FT 0.867	0.867	N/A	GROSS WT LBS 47.6	47.6	N/A	DESIGN FRAGILITY G 100	100	N/A	LENGTH 19	WIDTH 6 3/4	DEPTH 6 3/4	CNTR I.D. 22	8 1/4	8 1/4	LEVEL A			LEVEL B								
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LTR	DESCRIPTION	DATE	APRVD																															
C	ADDED POP MARKINGS	94081	P.A.R.																															
<p>NOTICE 1: ITEMS PACKAGED AFTER 1 JAN. 1990 THAT ARE NOT IN ACCORDANCE WITH THIS SPI MUST BE REPACKAGED PRIOR TO SHIPMENT. GOVERNMENT OWNED DANGEROUS GOODS PACKAGED PRIOR TO JAN. 1990 IN THE PACKAGINGS AUTHORIZED AT THAT TIME, CAN BE SHIPPED BY SURFACE MOVEMENT OR MILITARY AIR PROVIDED THE PACKAGING'S INTEGRITY IS MAINTAINED. THE SHIPPING PAPERS WILL BE MARKED "GOVERNMENT OWNED GOODS PACKAGED PRIOR TO 1 JAN. 1990." THIS CHANGE APPLIES TO SURFACE MOVEMENT AND MILITARY AIR MOVEMENT ONLY AND DOES NOT APPLY TO COMMERCIAL AIR SHIPMENTS.</p> <p>NOTES:</p> <ol style="list-style-type: none"> CUSHIONS -2 AND -3 SHALL BE SECURED IN PLACE WITH ADHESIVE EQUAL TO MMH-A-130, TYPE II. PLACE WARHEAD NOSE DOWN IN TUBE -1 CLOSE TUBE AND SEAL WITH TAPE -4. PACK FOUR PACKED TUBES INTO EXTERIOR BOX. USE CUSHIONING -5 TO FILL VOIDS AND ASSURE A SNUG FIT. 																																		
<table border="1"> <thead> <tr> <th>QTY REQD</th> <th>NOMENCLATURE DESCRIPTION</th> <th>SIZE (INCHES UNLESS SPECIFIED)</th> <th>MATERIAL SPECIFICATION</th> <th>REVISIONS</th> </tr> </thead> <tbody> <tr> <td>-5</td> <td>A/R CUSHIONING</td> <td>A/R</td> <td>A-4-1898 GR II CL 3 (OR EQUAL)</td> <td></td> </tr> <tr> <td>-4</td> <td>TAPE</td> <td>2 X A/R</td> <td>MIL-T-43036 TYP II</td> <td></td> </tr> <tr> <td>-3</td> <td>CUSHIONS</td> <td>3.07 DIA X 1</td> <td>MIL-P-26514 TYP III CL 2 GR 8, DENSITY 2-2-5</td> <td></td> </tr> <tr> <td>-2</td> <td>CUSHIONS</td> <td>2.87 DIA X 2</td> <td>MIL-P-26514 TYP III CL 2 GR 3, DENSITY 2-2-5</td> <td></td> </tr> <tr> <td>-1</td> <td>TUBES</td> <td>2.87 DIA X 18.25</td> <td>MIL-C-2439 TYP III CL 1</td> <td></td> </tr> </tbody> </table>					QTY REQD	NOMENCLATURE DESCRIPTION	SIZE (INCHES UNLESS SPECIFIED)	MATERIAL SPECIFICATION	REVISIONS	-5	A/R CUSHIONING	A/R	A-4-1898 GR II CL 3 (OR EQUAL)		-4	TAPE	2 X A/R	MIL-T-43036 TYP II		-3	CUSHIONS	3.07 DIA X 1	MIL-P-26514 TYP III CL 2 GR 8, DENSITY 2-2-5		-2	CUSHIONS	2.87 DIA X 2	MIL-P-26514 TYP III CL 2 GR 3, DENSITY 2-2-5		-1	TUBES	2.87 DIA X 18.25	MIL-C-2439 TYP III CL 1	
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Figure 1-3. Example, typical SPI, page 1.

SI025383021

When preparing an item for transport not in its original container, have your packing and crating personnel build you a container to the SPI requirements. Following the SPI requirements allows you to use the POP markings the SPI provides. If the items are in the original containers packaged before 1 Jan 1990, the use of a SPI is not required, provided the original container gives adequate protection during shipment. Keep in mind, however, that *all* hazardous materials must be in a POP certified container.

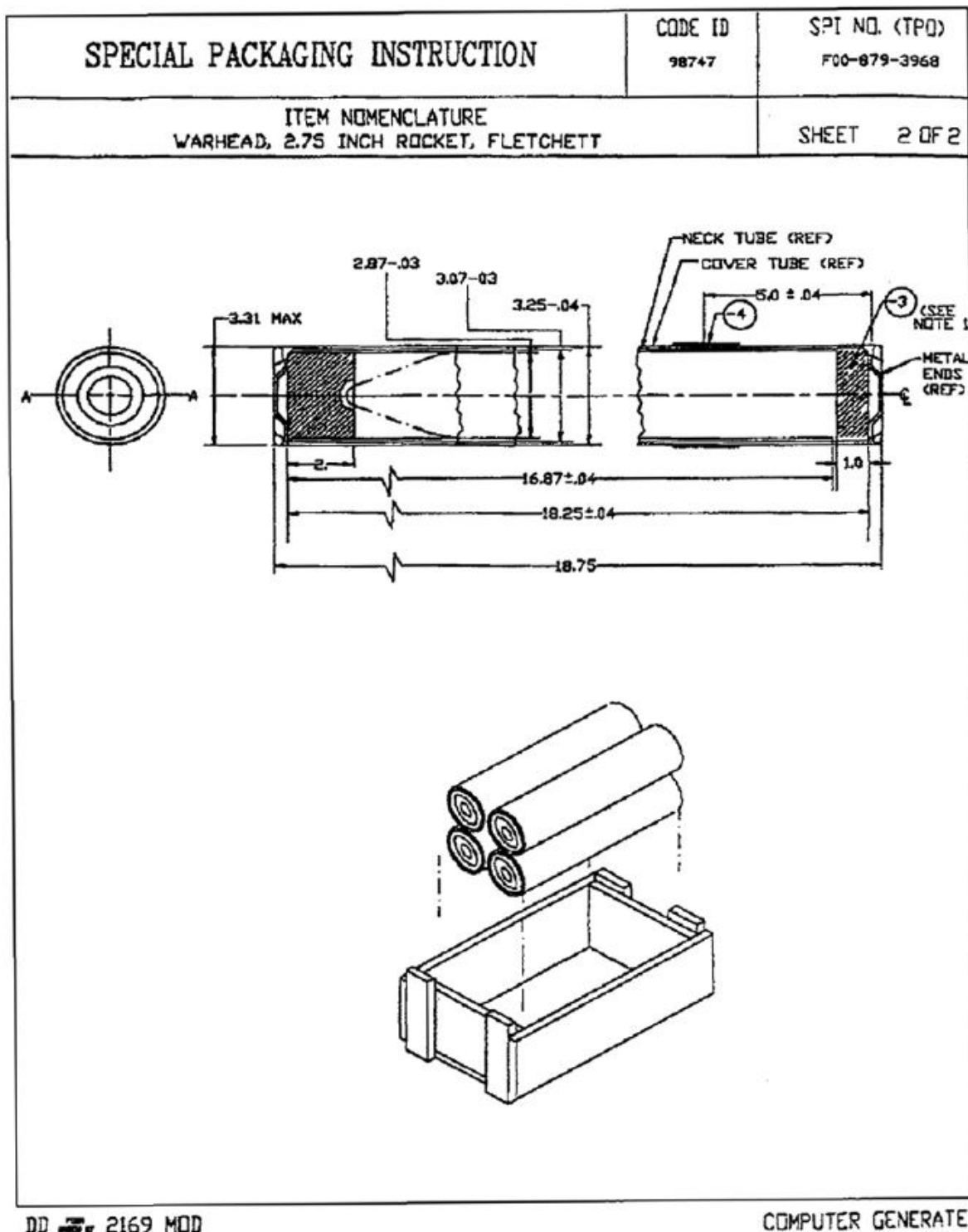


Figure 1-4. Example, typical SPI drawing.

General marking requirements

Marking the containers correctly is a major step in preparing munitions for shipment. The publications you use to do this include are included in the following list:

- The item TO.
- TO 11A-1-10.
- The SPI.
- MIL STD 129/1, *Marking For Shipment and Storage-Ammunition and Explosives*.
- The directive you are using for the mode of transportation (that is, AFJMAN 24-204, Title CFR-49, and so forth).

The important thing to remember is that anyone looking at the container should be able to identify its contents. All markings should be legible and in contrasting colors to the container(s). The front side of the container has the specific information for the item/items contained therein to include the following information:

- NSN and DODIC.
- Part number (if required by item TO).
- Nomenclature (type, model number, and item description).
- Quantity and unit of issue.
- Lot number and/or serial number.
- DOT/UN markings and labels.
- Date of manufacture if not included in the lot number.
- Weight and cube of the container.
- Packing date.
- POP markings, if required.

The top of the container has the following specific transportation information:

- The proper shipping name.
- UN number.

When using the different transportation publications, take note that items are listed by proper shipping names, not NSN or nomenclature. Use the online Joint Hazard Classification System (JHCS) to verify the proper shipping name before searching through the publications. A few examples of proper shipping names for munitions items are in the table below.

NSN	Nomenclature	Proper shipping name	UN Serial Number
1305-00-889-2043	Ctg., 20MM, M56A3, HEI	Cartridges for Weapons	0321
1330-00-028-5839	Grenade, Hand, M26	Grenades	0292
1377-00-585-9291	Ctg, Impulse, ARD-863-1	Cartridges, Power Device	0276

According to MIL-STD 129, put the POP markings on the opposite side of the nomenclature. POP markings are required for all modes of transportation, unless the items are grandfathered.

The labeling requirements are also listed in the transportation publications. Some different types of labels you use include the hazard class/division label (fig. 1-5), the shipping label, and, for air transportation, the declaration of dangerous goods.

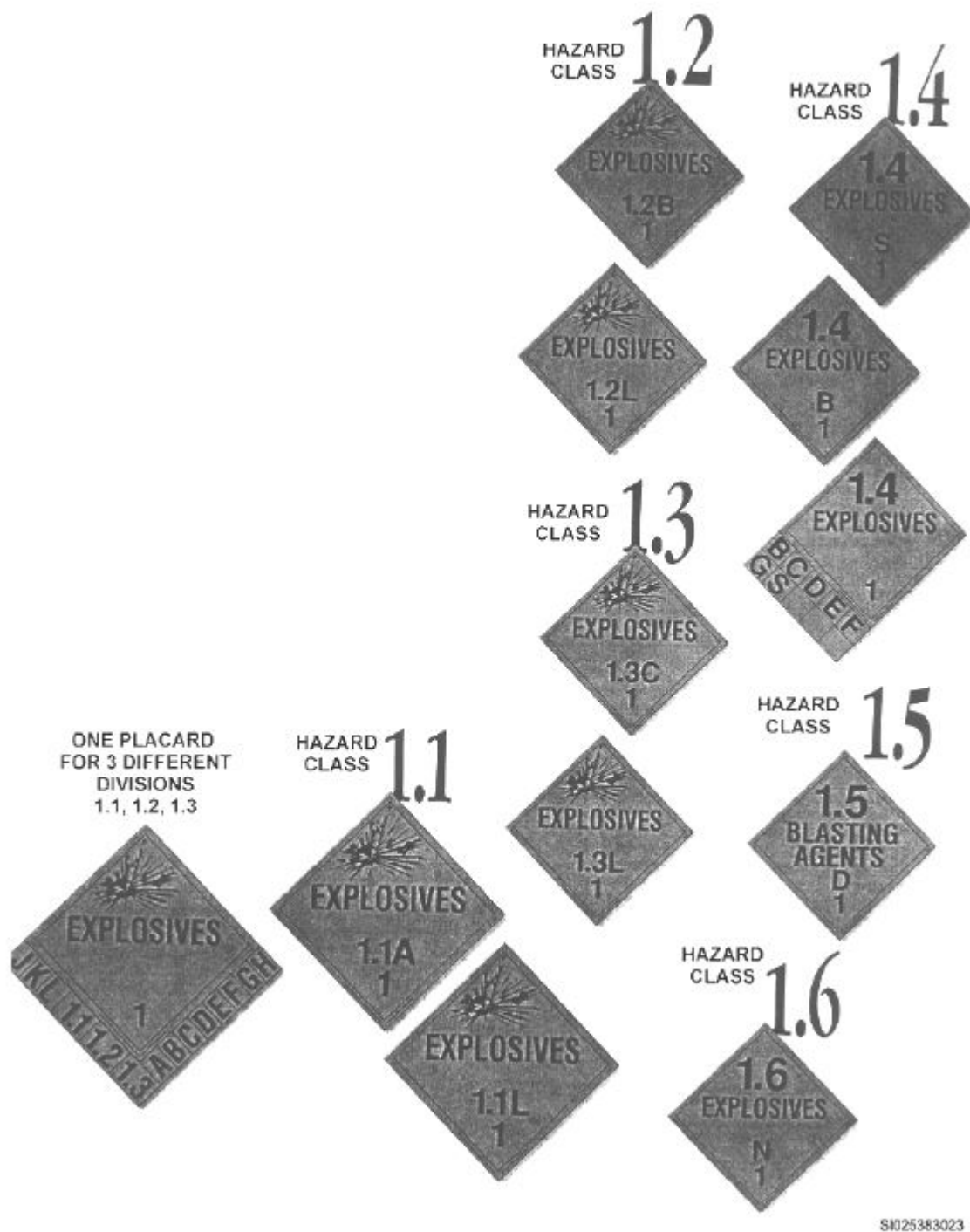


Figure 1-5. Examples of hazard labels.

Packing, marking, and preparing munitions for shipments is very time consuming and tedious. You must pay attention to details and be very thorough. If an item is packaged, labeled, or marked incorrectly, it could cause the shipment to be late, or worse, may cause an accident.

410. Munitions shipment documentation

The purpose of a shipping inspection is to ensure that the munitions prepared for shipment are the same as indicated on the shipping documents. In the inspection element, you may be tasked to help or complete the transportation paperwork associated with shipments. Munitions being shipped are

inspected in accordance with the specific item technical order and general inspection procedures. This lesson explains the typical shipping documents packaging certifications, and other documentation.

Shipping forms

The shipping documents you will use are explained in the table below.

Shipping Documents	
Document	Description
DD Form 1348-1, Issue Release/Receipt Document	<p>The DD Form 1348-1 is the standard shipping document printed out of CAS when the shipment is processed.</p> <p>This is also one of the standard forms used throughout the military supply system for shipments.</p>
DD Form 1149, Requisition and Invoice/Shipping Document	<p>This is the other standard form used within the military supply system.</p> <p>The DD Form 1149 is a common document used for the shipment of munitions from Army Depots or contract facilities.</p> <p>Certain missile items will also require a DD Form 1149.</p>
Lot History Reports	<p>For shipments moving between CAS SRAN/DODAAC locations, the shipping organization's CAS Inspection History records are available to the receiving organization in CAS and are not required to accompany the shipment.</p> <p>For Non-CAS DODAAC locations, place one printed copy of the applicable lot/serial number inspection history inside and one copy in a packing list envelope on the outside of the number one container and mark the container "DOCUMENTS ENCLOSED."</p>
AFTO Form 231, Air Munition Serviceability and Location Record	This form is used with PGM assets.
DA Form 3022-R, Army Depot Surveillance Record	<p>The DA Form 3022-R is the Army's version of our Lot History Inspection Report.</p> <p>It is very common accompanying shipments received from Army Depots.</p>
Tactical missile reporting system (TMRS)	Shipments of assets loaded in TMRS are initiated in TMRS by inspectors and are updated upon departure date and when the shipment physically departs station.

Packaging certifications

Packaging certifications, such as competent approval authority (CAA) and certification of equivalency (COE), are also important documentation you will use. The packing certifications are explained in the table below.

Packaging Certifications	
Type	Description
Competent approval authority	<p>CAAs are issued by OO-ALC for UN Numbers that do <i>not</i> require POP testing.</p> <p>Bombs are a good example. A copy of the CAA must be included with each shipment.</p>

Packaging Certifications	
Type	Description
Certification of equivalency	COEs are issued for packaging that does <i>not</i> meet CFR 49 requirements, but certifies that packaging meets or exceeds standards to keep the asset safe. These are also issued by OO-ALC and must be included with each shipment.

Other documentation

Other documentation you will use includes the interim hazard classification, the MICAP documentation, and the AF Form 191, ADR Instruction. Other documentation are explained in the table below.

Other Documentation	
Type	Description
Interim hazard classification	The interim hazard classification document assigns a hazard class to a munitions asset. It is issued by the appropriate Air Logistics Center (ALC) and must be included with the shipment as well.
MICAP documentation	All MICAP shipping paperwork must be submitted to TMO for scheduling within 24 hours of notification.
AF Form 191, ADR Instruction	When a munitions item is unserviceable and un-repairable, OO-ALC sends guidance on where to ship the asset on this form. A copy of this form must be included with each shipment.

Check shipping documents to ensure that items being shipped are the same in quantity, description, and condition classification. Enclose shipping documents in the number one container of the shipment and mark the container DOCUMENTS ENCLOSED. The proper preparation and handling of the paperwork should lead to a successful shipment.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

406. Identify/certify inert/empty items, residue, and containers

1. What TO identifies the proper marking requirements for inert and empty items?
2. What are the general principles of an inert munitions item?
3. What indicates a munitions item as practice?
4. What are the general principles of an empty munitions item?

5. What types of items are required to have holes drilled in the area that contained explosive material?
6. In what TO can you find procedures for inspecting empty containers?
7. What three areas must a person be knowledgeable of to inspect for munitions residue?
8. Describe what is meant by munitions residue?
9. What must be done to munitions residue items previously inspected if the container's seals show evidence of tampering?
10. Where are certificates of clearance placed for empty containers once required inspections are completed?

407. Receipt of munitions

1. What is the mode of choice for shipping munitions overseas?
2. During an initial inspection of an inbound shipment what do you inspect first?
3. What must the inchecker do if the received quantity, lot number or NSN is different from the shipping document?
4. If any transport vehicle is found or suspected to be in a hazardous condition attributable to other than normal circumstances what action must be taken?

408. Shipment of munitions

1. What is the governing directive for munitions shipments by military air?
2. What technical order (TO) provide guidance on blocking and bracing munitions for over-the-road travel?
3. Who regulates the movement of explosives by commercial aircraft?

4. Who regulates the transportation of explosives and other hazardous materials by water in commercial common carrier vessels?
5. Where can you find the criteria for inspecting the ISO container?

409. Packaging and marking munitions shipments

1. What is the purpose of performance oriented packaging (POP)?
2. In regards to UN specification POP requirements, what items are exempt under the grandfather clause?
3. What gives you detailed instructions on how a specific item is packed and marked for transportation?
4. Which two technical orders can assist with general marking requirements for munitions item containers?
5. What automated source can be used to verify the proper shipping name for a munitions item?

410. Munitions shipment documentation

1. What is the main purpose for a shipping inspection?
2. Who issues competent approval authority?
3. When would a certification of equivalency be issued?
4. When we enclose shipping documents in the number one container of the shipment what must you mark the container with?

Answers to Self-Test Questions

401

1. Flight chiefs or their equivalent.
2. The 5 skill level.
3. Any three of the following:
 - (1) Informs the MASO, munitions control, and munitions supervision immediately upon notification of restricted or suspended munitions through CMRS that affect munitions serviceability.
 - (2) Monitor shelf/service life dates by reviewing CAS and coordinate changes/updates.
 - (3) Determine and assign appropriate condition codes to all munitions as directed by applicable TOs.
 - (4) Initiate, maintain, and process applicable documents and historical records.
 - (5) Ensure munitions assets are properly tagged, marked, and packed.
 - (6) Verifies accuracy of all inspection documentation.
4.
 - (1) b.
 - (2) c.
 - (3) k.
 - (4) h.
 - (5) j.
 - (6) g.
 - (7) e.

402

1. To provide a high degree of confidence that munitions have not been adversely affected by storage conditions, age, use, or the environment, and can be expected to perform as designed.
2. TO 11A-1-10, *Air Force Munitions Surveillance Program and Serviceability Procedures*.
3. When the specific item technical order directs that the container be opened and when the outer appearance of the container indicates signs of damage or corrosion that may have penetrated the container.
4. Any three of the following:
 - (1) Check current item TO/WEBFLIS/JHCS for the controlled inventory item code (CIIC) and DODAC (FSC-DODIC) to determine if the NSN and CIIC are correct.
 - (2) Check the ammunition lot or serial number against CMRS to ensure the item(s) has not been restricted or suspended from use.
 - (3) Check the external packaging for obvious defects and that the packaging is adequate to withstand additional handling, storage, and/or shipment.
 - (4) Check the external markings for the minimum required markings.
 - (5) Verify that enough shelf and service life remains for the item's intended use/purpose.
5. Periodic inspection (PI).
6. Special inspection (SPI).

403

1. Use the most restrictive condition code.
2. CC/B.
3. CC/E.
4. CC/J.
5. CC/N.
6. DD Form 1577/1577-1.

404

1. Inspection results.
2. AFTO Form 102.
3. Asset Balance Inquiry.
4. Ammunition Disposition Request Process.
5. The lot history inspection report.

405

1. The category it falls into. Is it a shipping or packaging type discrepancy?
2. Shipping.
3. AFJMAN 23-215.
4. Transportation officer or the transportation management office (TMO).
5. To assist TMO in identifying the information required to complete the transportation discrepancy report.
6. SF 361 and Joint Message Form.
7. Product quality deficiency report (PQDR).

406

1. TO 11A-1-53.
2. A munitions item or component whose explosive material has been replaced by an inert material.
3. Painted light blue, or a light blue band.
4. Munition items that have had their explosive material completely removed or left out during the time of manufacture, and *not* replaced by other materials.
5. All components stocklisted as explosive which have had their explosive material removed for training, display, or research and development.
6. TO 11A-1-60.
7. (1) The precious metals recovery program, (2) disposal of classified material, and (3) demilitarization requirements and procedures.
8. Material remaining after a munitions item has had its explosive filler removed by either normal functioning or demilitarization.
9. Such a finding requires re-inspection and re-certification.
10. Attached to the outside of the container, and as part of the turn-in/shipment documents.

**407**

1. ISO container by water vessel/ship.
2. The seals.
3. Circle the erroneous information on the document, enter correct information, and initial the changes.
4. The vehicle is moved to a “suspect vehicle” holding area, unless it is more hazardous to move the vehicle.

408

1. AFMAN 24-204.
2. TO 11A-1-61-1.
3. The Federal Aviation Administration.
4. The US Coast Guard.
5. The MIL-HDBK-138B, *Guide to Container Inspection for Commercial and Military Intermodal Containers*.

409

1. To keep the hazardous materials inside the container and away from people and the environment.
2. Government owned goods packaged before 1 January 1990.
3. The special packaging instruction (SPI).
4. The item TO and TO 11A-1-10.
5. Joint Hazard Classification System (JHCS).

410

1. To ensure that the munitions prepared for shipment are the same as reflected on the shipping documents.
2. Ogden-Air Logistics Center (OO-ALC).
3. When packaging does not meet CFR 49 requirements, but certifies that packaging meets or exceeds standards to keep asset safe.
4. "DOCUMENTS ENCLOSED."

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

1. (401) Who is responsible for appointing qualified individuals to become certified munitions inspectors?
 - a. Executive officer.
 - b. Unit commander.
 - c. Element chief.
 - d. Flight chief.
2. (401) What is the *minimum* skill level requirement to be a certified munitions inspector?
 - a. 3.
 - b. 5.
 - c. 7.
 - d. There is no skill level requirement.
3. (401) Who is responsible for determining and assigning the appropriate condition codes to munitions assets?
 - a. The flight chief.
 - b. Munitions inspectors.
 - c. Munitions accountability personnel.
 - d. The munitions accountable systems officer (MASO).
4. (401) Which type of lot number is assigned to a combination of 5.56 mm ball and tracer packed together for field use?
 - a. Functional.
 - b. Regrouped.
 - c. Assembled.
 - d. Pseudo.
5. (401) A defect that is likely to result in a hazardous or unsafe condition is classified as
 - a. minor.
 - b. major.
 - c. critical.
 - d. incidental.
6. (401) A munitions item or component with its explosives material completely removed is considered
 - a. inert.
 - b. empty.
 - c. obsolete.
 - d. nonexplosive.
7. (402) When you encounter a ballooned barrier bag, which document do you follow for specific item instructions?
 - a. AFI 21-201.
 - b. AFMAN 91-201.
 - c. Item's technical order (TO).
 - d. Local operating instruction (OI).

8. (402) Which term is used to conspicuously mark previously opened hermetically sealed containers?
 - a. UNSEALED.
 - b. COMPROMISED SEAL.
 - c. NOT HERMETICALLY SEALED.
 - d. PRESSURE SENSITIVE SEALED.
9. (402) The step that is *not* part of the general inspection procedures is verify
 - a. suspension or restrictions.
 - b. item(s) are suitably packed.
 - c. containers are properly marked.
 - d. items have at least 2 days of shelf life remaining.
10. (402) Which inspection provides a high degree of confidence that the munitions have *not* been adversely affected by the environment, storage conditions, age, or use?
 - a. Returned munitions inspection.
 - b. Pre-issue inspection.
 - c. Periodic inspection.
 - d. Special inspection.
11. (402) Which inspection *ensures* that an item is suitable for its intended use before it is signed over to a user?
 - a. Periodic (PI).
 - b. Shipping (SI).
 - c. Receiving (RI).
 - d. Pre-issue (PII).
12. (403) What *must* you do if more than one condition code applies to the item you are inspecting?
 - a. Use the least restrictive.
 - b. Use the most restrictive.
 - c. Assign condition code "J".
 - d. Call the equipment specialist for guidance.
13. (403) Which response *best* describes condition code B?
 - a. Serviceable without qualification.
 - b. Serviceable with qualification.
 - c. Serviceable but priority issue.
 - d. Unserviceable repairable.
14. (403) DD Form 1574/1574-1 (yellow tag) is used to identify munitions in which condition?
 - a. Repairable.
 - b. Serviceable.
 - c. Condemned.
 - d. Unserviceable.
15. (403) Which unserviceable item tag is used on munitions that are *not* economical to repair?
 - a. DD Form 1574.
 - b. DD Form 1575.
 - c. DD Form 1577.
 - d. DD Form 1578.

16. (404) You *must* update historical records in which database before you can dispose of the AFTO Form 102?
 - a. Deficiency reporting and investigating system (DRIS).
 - b. Tactical missile reporting system (TMRS).
 - c. Ammunition disposition request (ADR).
 - d. Combat ammunition system (CAS).
17. (404) Which combat ammunition system (CAS) program displays condition and status of stockpile and custody assets?
 - a. Asset balance inquiry.
 - b. Regroup maintenance.
 - c. Custody account listing.
 - d. Transaction history report.
18. (404) Who may authorize local disposal of unserviceable and non-repairable inert munitions valued at less than \$500 per item?
 - a. Storage section chief.
 - b. Munitions flight chief.
 - c. Senior munitions inspector.
 - d. Munitions accountable systems officer (MASO).
19. (404) Which combat ammunition system report is included with munitions shipments IAW TO 11A-1-10?
 - a. Periodic inspection report.
 - b. Quarterly inspection report.
 - c. Lot history inspection report.
 - d. Ammunition disposition report.
20. (405) Which report is used to identify a shipping related problem caused by the shipping activity?
 - a. Lot History Report.
 - b. Supply Discrepancy Report.
 - c. Transportation Discrepancy Report.
 - d. Product Quality Deficiency Report.
21. (405) Which of the following is an example of a packaging discrepancy?
 - a. Item received in the wrong condition code.
 - b. Unacceptable substitutes shipped.
 - c. Container markings incorrect.
 - d. Missing documentation.
22. (405) When using the transportation discrepancy report (TDR), you are identifying a problem against the
 - a. person who packaged the assets.
 - b. carrier who delivered the assets.
 - c. manufacturer who produced the assets.
 - d. person who certified the assets for transportation.
23. (405) Who submits a transportation discrepancy report (TDR)?
 - a. Munitions flight chief.
 - b. Senior munitions inspector.
 - c. Transportation management office.
 - d. Munitions accountable safety officer (MASO).

24. (405) Which form is used to report product quality deficiencies (PQDR)?
- SF 362.
 - SF 363.
 - SF 364.
 - SF 368.
25. (406) You are required to use TO 11A-1-53 for which inspections of inert and empty munitions items?
- Pre-issue and returned munitions inspections.
 - Returned munitions inspection and periodic.
 - Pre-issue and shipping inspections.
 - Periodic and shipping inspections.
26. (406) Which word is impressed and stenciled on items that have had their explosive material removed and *not* replaced?
- INERT.
 - EMPTY.
 - DUMMY.
 - PRACTICE.
27. (406) Four holes, no smaller than 1/4 inch, are required to be drilled 90 degrees apart for munitions items
- procured as inert or empty.
 - displayed on a wall plaque.
 - on permanent display in a museum.
 - stock listed as explosive and have had their explosive filler removed.
28. (406) Which publication provides certifying guidance to inspectors of munitions residue and empty containers?
- TO 11A-1-10.
 - TO 11A-1-53.
 - TO 11A-1-60.
 - TO 11A-1-63.
29. (406) The material remaining after a munitions item has had its explosive filler removed by either normal functioning or demilitarization is called
- hazardous waste.
 - munitions residue.
 - nonexplosive material.
 - obsolete munitions waste.
30. (406) Where do you place the certificate of clearance after you inspect empty munitions containers?
- Inside the container.
 - Outside the container.
 - Inside the desiccant port.
 - Next to the identification markings.
31. (406) What *must* you do to the old munitions identification before you certify a container as empty?
- Nothing, the next person may need it.
 - Obliterate all markings on the container.
 - Obliterate the old munitions identification markings.
 - Nothing, as long as you stencil "empty" on the container.

32. (407) Which procedure should be performed *first* during an initial munitions inspection?
- Internal inspection of railcars, motor vehicles, or aircraft.
 - Identify the type of any corrosion spotted.
 - Open all damaged containers.
 - Visually inspect seals.
33. (407) When documentation for an incoming shipment is missing or incomplete you *must* immediately notify the
- unit commander.
 - munitions flight chief.
 - weapons safety office.
 - senior munitions inspector.
34. (407) Any vehicle found to be in a hazardous condition is considered
- suspect.
 - restricted.
 - frustrated.
 - suspended.
35. (408) The governing directive for hazardous materials movement by military air is
- AFJMAN 24-202.
 - AFMAN 24-204.
 - The orange book.
 - CFR-49.
36. (408) Which of the following regulates the transportation of explosives and other hazardous materials by water?
- US Navy.
 - US Coast Guard.
 - Homeland Security.
 - Environmental Protection Agency.
37. (408) Stacking palletized munitions in the cargo hold of a vessel is known as
- containerized distribution.
 - break-bulk shipping.
 - the stuff-it method.
 - open-stowage.
38. (408) What is the *most* efficient, time-saving, and economical method of shipping munitions by ocean-going vessel?
- Containerized ammunition distribution system (CADS).
 - Outsource to commercial shipper.
 - Stacking, blocking, and/or bracing.
 - Combat ammunition system (CAS).
39. (408) The USAF container of choice for transporting munitions by an ocean-going vessel is the
- 40-foot MILVAN container.
 - 20-foot MILVAN container.
 - 40-foot ISO container.
 - 20-foot ISO container.

40. (409) Which United Nations (UN) specification is designed to keep hazardous materials inside containers and away from people and the environment?
- a. Performance oriented packaging.
 - b. Combat ammunition system.
 - c. Container allocation system.
 - d. Packaging operations point.
41. (409) The United Nations specification performance-oriented packaging (POP) “Grandfather” clause applies to government owned goods packaged before 1 January
- a. 1988.
 - b. 1989.
 - c. 1990.
 - d. 1991.
42. (409) When you do *not* have an original container you can have one built using
- a. the special packaging instruction (SPI) drawing.
 - b. AFMAN 24-204.
 - c. MIL-STD 129.
 - d. the item’s TO.
43. (410) A common document used for shipping munitions from army depots or contract facilities is
- a. AF Form 2005.
 - b. DD Form 1131.
 - c. DD Form 1149.
 - d. DD Form 1150.
44. (410) Who issues the competent approval authority (CAA) and certification of equivalency (COE)?
- a. Munitions accountable safety officer (MASO).
 - b. Ogden-Air Logistics Center (OO-ALC).
 - c. Major command (MAJCOM).
 - d. Item manager.

Unit 2. Munitions Storage

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415. Special weapons storage	2-23

IN BASIC MILITARY TRAINING, everything within your assigned area had its own place. This kept all of your items organized and aided the inventory and inspection process. The rules we use to store and warehouse munitions follow the same concept. Like items are stored together, grouped with compatible items, and organized for ease of inventory and inspection. The storage element is actively involved in all facets of the munitions storage area requirements. First, and probably most important, they ensure that items are not removed from storage without proper authorization and documentation. They also manage storage space, control authorized explosive limits, maintain authorized compatibility, and use combat ammunition system (CAS) reports and programs to the maximum extent possible.

The Munitions Storage element will safeguard munitions according to AFMAN 91-201, *Explosives Safety Standards*, AFI 31-101, *Integrated Defense*, DOD 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunitions, and Explosives*, and any applicable technical orders (TO). Any deviation from the storage location system requires major command (MAJCOM) approval. In this unit, you'll learn the different types of storage facilities; site planning principles; the hazards, symbols and warning signs; and the principles used to warehouse different types of munitions.

2-1. Storage Area

When working in the munitions storage element, you must learn what it takes to maintain the munitions storage area (MSA) or, in some cases, what it takes to establish a munitions storage area. All storage principles must be considered when storing assets. Managers, storage personnel, and munitions control personnel interact to ensure the highest degree of storage optimization along with compliance to storage principles. AFD 21-2, *Munitions*, states that "facilities and areas will be set aside exclusively for the storage, maintenance, inspection, and repair of weapon systems." The overall goal is to ensure that assets received, stored, and issued are accurately accounted for and protected.

411. Storage area requirements and magazine types

The first thing you must understand about a munitions storage area (MSA) is that this area is always segregated from the base's centralized functions, separated by high fences and controlled entry into the potentially hazardous area. Within the MSA, the grass is neatly cut, the roads and byways are litter free, and the area is well lit during the hours of darkness. Inside the storage magazines, good housekeeping is evident. A good drainage system is also required within the area in order to keep standing water from pooling in and around storage facilities.

General storage area requirements

Munitions storage structures should be kept in good condition and suitable for storing of munitions assets in accordance with (IAW) AFMAN 91-201. Let's discuss a few general storage principles that will help to protect our munitions items. The two greatest dangers to munitions are fire and excessive heat. Lightning delivers both of these dangers. Each facility within the area is required to have a

lightning protection system. Lightning protection systems protect both munitions and personnel. The lightning protection systems are inspected and maintained IAW AFI 32-1065, *Grounding Systems*. Stored munitions must also be protected from moisture and have proper air circulation. This requirement is met by using dunnage to keep the munitions off of the ground and to provide air circulation. The minimum dunnage requirements are 2" when stored inside, 4" stored outside on an improved surface, and 6" outside on an unimproved surface. Remember, you must allow yourself sufficient space for handling, storing, and inspecting munitions inside the structures. For this reason, you should maximize vertical space as much as possible when storing munitions.

Post explosive limits in each magazine and igloo so that they are visible from all approaching roads. The exits, doors, components, and locks need to be in a good working condition; not only for the security of the munitions, but also for the protection of the personnel working in the MSA. Magazine exits should be kept closed and locked at all times, unless they are being aired, personnel are in the structure, or when permitted by the munitions flight chief.

It is mandatory to store bulk high explosives, solid propellants, and pyrotechnics indoors. Deviations from indoor storage have to be approved by the applicable MAJCOM. Often we are limited in the amount of physical storage space that we have. In this event, you may have to make decisions and give priority to the highest risk items and items requiring the most protection from the elements. Some munitions storage area structures are equipped with intrusion detection systems and require a little more detailed management. Very-high risk, high risk, and classified munitions are given priority for storage in designated alarm facilities. The storage structures listed below can be equipped with intrusion detection systems in order to store such assets.

Munitions storage magazine types

Now that we've talked about some storage requirements, let's take a look at where to store munitions. A munitions storage magazine is any building or structure, except an operating building, that is used for storing explosives. There are two general types of magazines: earth covered (igloo) and above ground (no earth covering).

Earth-covered magazines

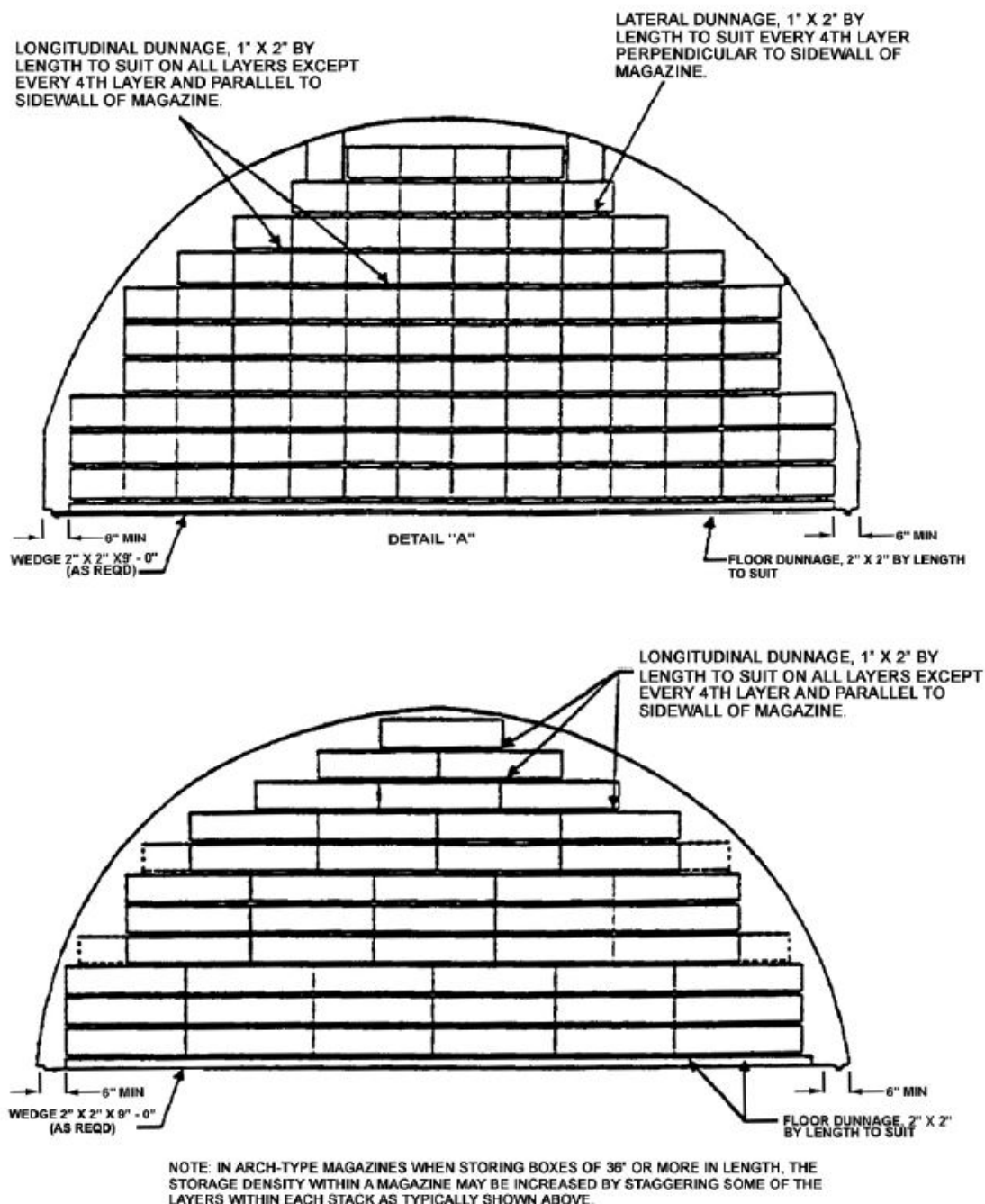
Earth-covered magazines (ECM) or "igloos" are steel or concrete structures covered with earth mounding. ECMs are divided into two categories: standard and nonstandard. The two standards are defined in the following list:

- Standard—ECMs are those igloos meeting the requirements of approved definitive drawings (or similar acceptable contractor facilities), or originally sited and approved as "standard igloos," regardless of construction details. Standard ECMs have reinforced concrete end walls.
- Nonstandard—ECMs are those igloos constructed with other than concrete or steel arches or with other than concrete end walls.

The standard earth-covered, arch-type igloo (fig. 2-1) is the *most* common type of munitions storage structure in use today. Because of the arched walls, you must carefully think out the process for storing and stacking munitions in this type of facility. This facility is made of steel-reinforced concrete that has at least 24 inches of earth cover. The material for the earth cover over these magazines must be free from stones/rocks larger than 6 inches in diameter or weighing more than 10 pounds. If there is not 24 inches of earth covering, initiate a timely work order request for civil engineering to put more earth covering on the ECMs. If this is not repaired within 90 days, the structure has to be reclassified as an above ground magazine and the quantity distance (QD) must be recalculated. Where vegetation growth is ineffective in preventing erosion, use a layer of about 2 inches of pressure-applied concrete or asphalt mixture or other suitable erosion prevention methods.

Each ECM is ventilated or has another suitable means of air circulation or dehumidification. Normally, what you find built into an igloo are ventilation grates on each side of the facility door and,

depending on the igloo size, one or more on top of the igloo. Each ventilator has a steel flap door that automatically closes in case of a fire (when the temperature reaches a maximum of 155 to 165 °F). Each flap is held open by two cables connected by a device called a fusible link. These links are designed to release the vent when a fire or heat source threatens the igloo. When the temperature exceeds the required limit, the fusible link melts and allows the flap to close. This, in turn, shuts off the air supply to the fire and kills the fire. Fusible links must *not* be painted. Check the ventilators periodically to ensure that they function properly. The ventilators may be closed where blowing snow or humid air would increase condensation buildup inside the ECM. They also may be closed to protect munitions from blowing sand. Maintain 5 feet of cleared vegetation around ECM ventilators as a firebreak.



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Figure 2-1. Typical arch-type igloo with munitions stacked inside.

Above ground magazines

Above ground magazines are storage facilities *without earth covering*. They do not have the same degree of protection as an earth covered magazine and, therefore, require greater QD separation.

Multicube magazines are a category of above ground magazine that are used to store small quantities of explosives. Because of their small size and separation of adjoining bays, they are ideal for segregating incompatible munitions and for supporting munitions courtesy storage. The modular storage magazine, commonly referred to as the Hayman igloo, features a pre-engineered concrete panel design with vertical walls and a flat roof to maximize storage space. The interior of the modular storage magazine is 26 feet wide and has a door opening spanning the entire width of the interior. This provides maximum capability for storing large containers in the igloo. The modular design allows the igloo to be constructed in varying lengths up to 80 feet.

The claytile warehouse, as its name implies, is made from claytile blocks on all four sides. This facility's floor is normally concrete and the roof is made of steel or tin. This type of facility is normally only used to store class/division 1.3 and 1.4 munitions and inert component storage. Of course, indoor (magazine) storage is preferable for all types of explosives and is mandatory for bulk high explosives, solid propellants, and pyrotechnics. Most of this type of facility is located at munitions depots and bases with large training commitments.

Munitions facility hasps

Now that we've covered the different structure types, let's talk about how we secure our assets within them. The hasp used to secure munitions facilities (figs. 2-2 and 2-3) must not be the weak link in the security chain. The ideal, and *most* secure, way of installing a hasp is by welding. When welding is not practical, non-reversing screws are acceptable.

Screws, bolts, and lock washers used to secure the hasp are installed from *inside the door*. This is done so that the screws and bolts are *not accessible* from outside the closed door. Affix the hasp so that the padlock is in a vertical position when locked. The keyhole should face the floor to allow for proper drainage.

In certain cases, it may be impossible to fasten the hasps to the inside of the doors with screws, bolts, or rivets. In this event, welding the hasp to the exterior of the door may be the only practical method for mounting the hasps.

Depending on your location's threat assessment, additional security measures may be required. These additional requirements may be specified by your owning MAJCOM or your local resource protection committee.

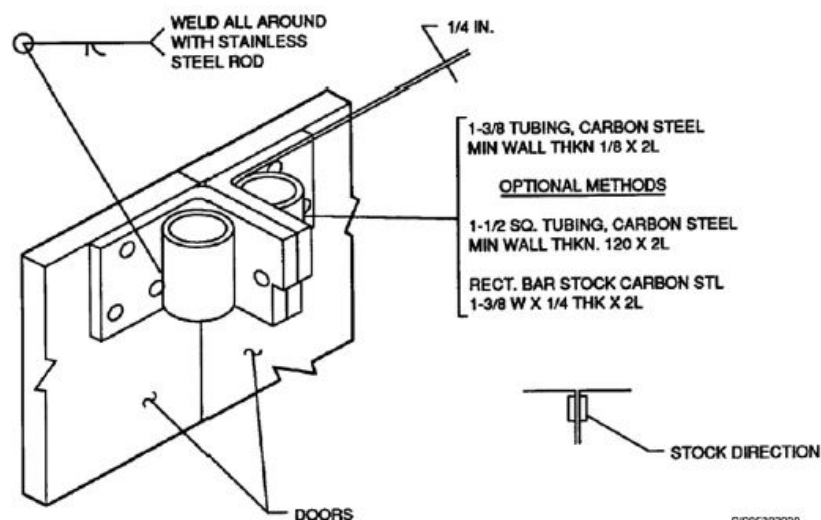


Figure 2-2. Hasp welded to outside of facility door.

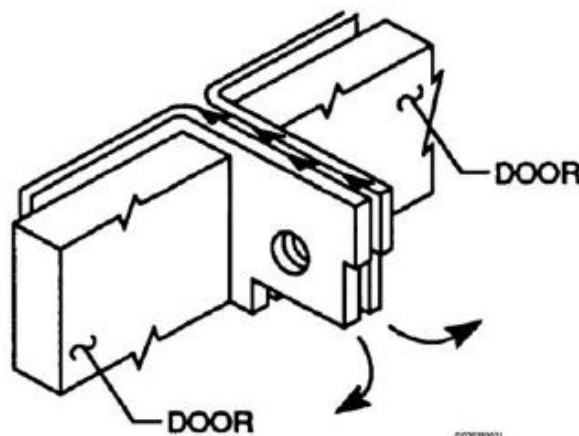


Figure 2-3. Hasp attached to the inside of facility door.

Security padlocks

Padlocks used for storage facilities consist of a steel body, a noncorrosive cylinder, a steel dead bolt, and an alloy steel shackle. The high-, medium-, and low-security padlocks are simple in design and offer more security than regular over-the-counter padlocks. However, due to the security aspects and the cost of these locks, you need to be thoroughly familiar with their various parts and features before operating or servicing them. Part of your responsibility as a munitions storage troop is to perform lock maintenance.

General maintenance of locks

In order to keep your security locks in a serviceable condition, your unit should already have an established maintenance program per TO 44H2-3-1-101, *Operation and Maintenance Instructions High, Medium, Low Security Hardware*. To keep your locks operating properly, open and close them at least once a month. For high-security locks on nuclear storage structures, this is done during your monthly audit. Schedule this action for locks on nonnuclear storage structures each month. Preventive maintenance intervals are established only after careful consideration of environmental factors at each location.

Tips for opening hard-to-open locks

Occasionally, you will find a lock that does not want to open. Following these helpful techniques:

- If the keyway in the cylinder is plugged with salt, flush the cylinder with hot water.
- If the keyway is plugged with grease or oil, spray Acetone into the cylinder.
- Once keyway is clear, squirt a small amount of molybdenum disulfide lubricant into the lock.
- Insert and extract the key several times before finally trying to unlock the lock.
- Try tapping the lock with a hard object. This sometimes loosens the bolt and allows you to open the lock.
- If you break the key off in the cylinder, use a key extractor tool.
- When you lubricate a lock, **never** use grease or oil as a lubricant. These substances cause the pins to stick.

412. Site planning principles

Where explosives are involved in a unit's mission, managing the location for explosives is the cornerstone in helping the commander meet mission requirements, maintain mission capability, and efficiently use limited resources. Planning for the proper location and construction of facilities are key elements in this effort. Safety, in coordination with civil engineering, fire, health, security and environmental agencies, is responsible for explosives site planning.

To minimize the negative effect of an accidental explosion on a unit's capability, safety and civil engineers monitor and control construction and facility use inside explosives clear zones. The *clear zone* is the area surrounding a potential explosion site (PES)—any facility that contains or is expected to contain explosives.

The explosives site plan (ESP) contains all necessary information to properly site and construct either a PES or an *exposed site* (ES)—any permanent structure, utility, or petroleum, oil, and lubricant (POL) at risk from either blast or fire effects of a PES. An ES may or may not contain explosives. An ESP usually originates in the form of a request from the wing or base. Once approved, the ESP becomes the source document for explosives capacities and controls for that facility. Generally an ESP is required whenever new facilities or operations are added inside the installation's clear zone. An ESP also serves as the approval to either increase explosives or increase the exposures hazarded by explosives.

The weapons safety office prepares and submits ESPs for facilities or operations requiring explosives safety siting approval. Approved ESPs are maintained by the safety office. The base civil engineer assists in preparing ESPs and ensures that the weapons safety office is informed of all proposed actions planned within the clear zone before design and construction begin. An approved ESP authorizes, but is not limited to the following:

- Construction or modification of explosives facilities.
- Construction or modification of nonexplosive facilities within explosives clear zones (that is, the flight office or munitions control).

The Assessment System for Hazard Reduction Survey (ASHS) is the Air Force system for computerized site planning. This preferred method improves the quantity and quality of ESPs and reduces completion time from months to days. It also simplifies data management and automates planning tasks including quantity-distance (QD) calculations, identifying explosives clear zones, and generating maps and explosives risk assessment reports. ASHS is the tool for layout of base munitions storage, maintenance, and operations throughout the Air Force and is deployed around the world.

Explosives safety distance

You *must* consider quantity-distance (QD) when handling and storing explosives. QD refers to the protection PESs require from different kinds of ESs. This is the amount (quantity) of explosive material and the distances allowed between them and other facilities, roads, runways, buildings, and so forth, for given degrees of protection. QD separations make sure that there is an *acceptable level of risk* between a PES and an ES.

Maximum credible event

A maximum credible event (MCE) is defined as the largest quantity of explosives expected to explode at one time when an item in a stack or group of items is involved in a fire. When working with Hazard Division 1.2.1, you must figure in the MCE in order to get the proper QD. Refer to Chapter 3 in AFMAN 91-201 for further guidance.

Separation criteria

Quantity distance (QD) separations are *an acceptable level of damage* between a PES and an ES. They are not absolute safe distances. QD principles are based on the following factors:

- The construction and type of PES (that is, igloo or above ground magazine).
- The explosives content of the PES (that is, hazard division 1.1, 1.2, 1.3, or 1.4).
- The construction and type of ES (that is, igloo, warehouse, hospital).
- The distance separating the PES from the ES.
- Orientation of the PES and the ES in the case of igloos and modules.

Separation is needed to reduce explosive hazards as much as possible. The locations you use for storing explosives must be separated from

- locations containing other explosives and propellants;
- inhabited buildings including structures or other places where people usually assemble or work *not* directly related to explosives operations;
- public traffic routes;
- aircraft parking and storage areas, runways and approach zones, and taxiways;
- operating lines and buildings, which are structures and other places where people usually assemble or work, that are directly related to explosives operations;
- petroleum, oil, and lubricant storage; and
- utilities, buildings, and facilities.

Types of separations

Whenever you deal with explosives, you'll need to be aware of types of separations. Here are a few types of separation you need to know.

Intermagazine distance

Intermagazine distance (IMD) is the *minimum distance* between PESs to prevent one PES from simultaneously detonating an adjacent PES. Maintaining IMD is no guarantee that propagation from one PES to another will not occur; only that they will not simultaneously detonate. IMD separation depends on the separation criteria discussed earlier. It is expected to prevent simultaneous detonation from blast overpressure from one magazine to another and offers reasonable protection against propagation from fragment impact. It does *not* protect magazines, except possibly earth-covered magazines, from severe structural damage. When there is less than the required intermagazine separation between any two or more explosives storage locations, the quantities and net explosive weight (NEW) of explosives in these locations must be added to form a single PES. For this reason, any separation between explosives locations less than IMD may not be waived.

Intraline distance

Intraline distance (ILD) provides the *minimum amount* of protection to activities associated with explosives storage and operations. Applying ILD recognizes the operational requirement that some people must be in the proximity of explosives while, at the same time, preserving some mission capability in the event of an explosive mishap. Although facilities at this distance are damaged and their occupants injured, the service provided by the facility and its occupants should continue. ILD separation prevents propagation between two explosives locations. Apply ILD to

- any two explosives operating locations;
- explosives operating buildings from explosives storage locations; and
- activities that directly support the explosives operation or area.

Inhabited building distance

The inhabited building distance (IBD) is the minimum allowable distance between a nonrelated inhabited building and an explosives location. Damage from blast effects or fragments may occur to buildings separated from the blast by IBD. Personnel are provided a high degree of protection from death or serious injury. Injuries that occur are caused primarily by glass breakage and building debris.

At this distance, personnel in the open are *not* expected to be seriously injured directly by the blast. However, there could be some personnel injuries caused by fragments and debris. This largely depends on the PES, amount of munitions and their fragmentation characteristics. AFMAN 91-201 establishes general and specific IBD minimums. For example, the minimum IBD for hazard division

(HD) 1.1 is 1,250 feet. When an item requires a minimum IBD separation, the distance required is shown as part of the HD. The following list provides examples of when to apply IBD:

- Buildings/operations involving people *not* related to munitions/explosives work.
- Essential warehouses, shops, and other facilities that must *not* be placed at risk because of their vital nature in supporting the mission.
- Public roadways with 10,000 or more passengers per day. No specific minimum separation is required for roadways on DOD installations that restrict public access.
- Flightline passenger terminals.
- Structures such as concession stands or bleachers at open recreational sites.

Public traffic route distance

Public traffic route distance is the *minimum* permissible distance between PESs and public highways or railroad lines. For HD 1.1 and 1.2, it is normally 60 percent of IBD. For example (07)1.1 would indicate a HD 1.1 item with a 700-foot-minimum IBD. Minimum public traffic route distance would be 60 percent of 700 feet, or 420 feet. For HD 1.3 and 1.4, public traffic route distance is the same as IBD. Examples of when to apply public traffic route distance are provided in the following list:

- Open passenger load and unload areas.
- Joint DOD–Non DOD use taxiway. A taxiway serving both DOD and commercial aircraft. A taxiway serving solely DOD chartered or non-DOD aircraft on DOD authorized business is *not* joint use.
- Open recreational areas where structures are *not* involved, such as ball diamonds and volleyball courts.
- Military only training areas or other combatant-type exercises and similar fixed facilities (including small classrooms) designed for use by groups or classes.
- Public roadways that have at least 400, but less than 10,000 passengers per day.

Determining QD separations

Separation criteria generally fall into two categories K factors and minimum distances. A description of the two is in the following list:

- K-factors (protection factor, number is inserted into formulas).
- Minimum distances (previously discussed).

The smaller the K factor number, the more risk we are willing to assume. In other words, *the higher the K factor number, the greater the separation must be*. The K-factor criterion provides protection against blast effects. QD does *not* guarantee complete protection from the effects of an accidental explosion, it only lessens them. To determine QD, we must know either the distance between two facilities *or* how much NEW an existing facility has or can store. Using this information find the appropriate formula or table in AFMAN 91–201 to calculate the QD requirements. Determining QD separations can be very complicated as results can be affected by a multitude of variables; this is why the wing safety office is designated as the focal point and the assessment system for hazard reduction survey (ASHS) is the preferred method for calculating explosives site plans (ESPs).

Barricades

Barricades, when constructed properly, stop fragments. Barricades are effective against low-angle, high-speed fragments and should prevent simultaneous detonation of an explosion between adjacent stacks of munitions. Vertical barricades provide the greatest protection since sloped barricades have the potential to ricochet fragments and are also less effective in deflecting blast pressure. Barricade elevation is effective when the 2° rule is used. A straight line is drawn from the top, opposite side of a stack of munitions, at a 2° angle, passing through a 3-foot-minimum thickness of a barricade

(fig. 2-4). Munitions stored according to this guidance should be safe from simultaneous propagation of an explosion from one location to another.

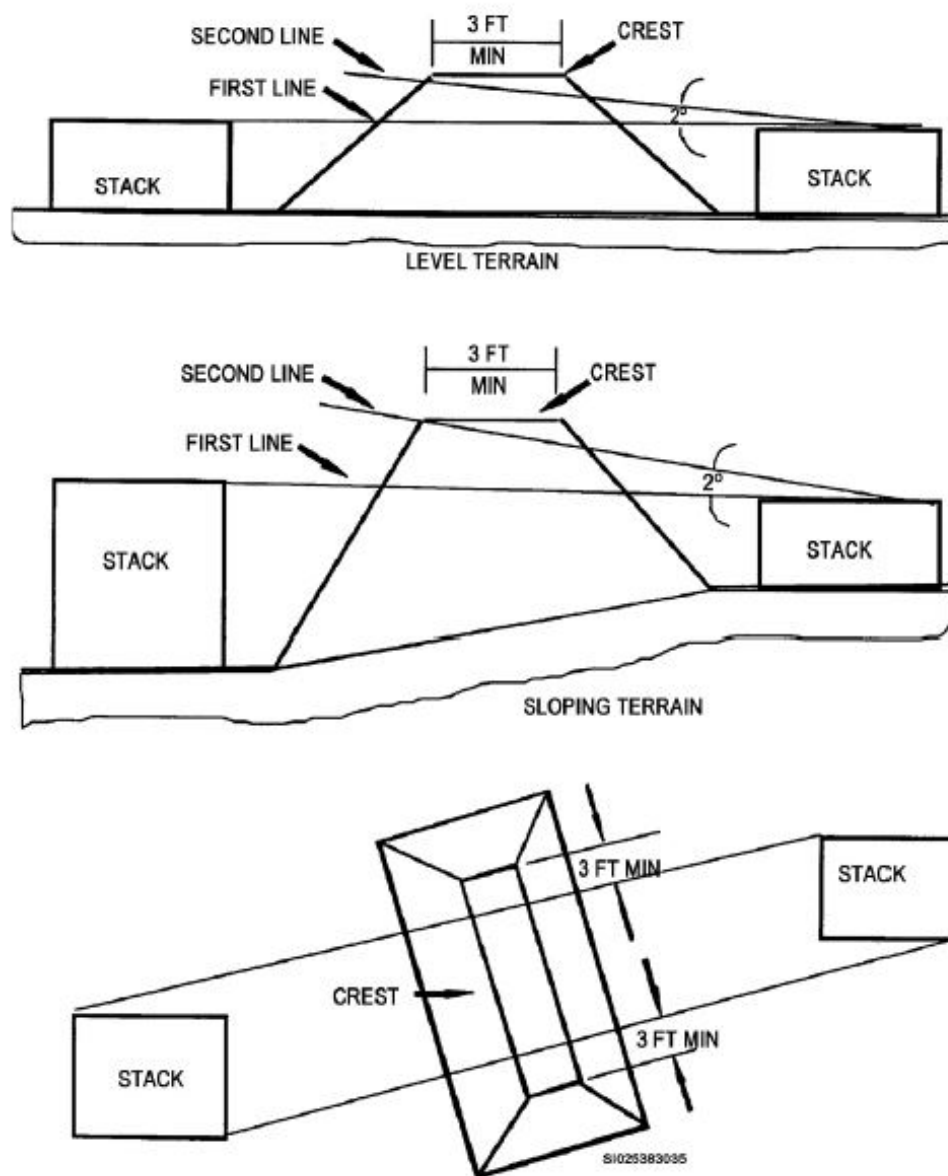


Figure 2-4. Typical barricade stack relationships.

There are three major types of barricades used throughout the Air Force. Natural, artificial, and earth-filled, steel bin-types are discussed in the table below.

Barricade Types	
Type	Description
Natural	<p>A natural barricade occurs when protected storage facilities are built underground, into hills, or separated by a hill that may reduce QD requirements.</p> <p>Consider each case separately and submit details in the site plans included in topographical maps of the terrain.</p>

Barricade Types	
Type	Description
Artificial	<p>Artificial barricades use a select cohesive earth fill, free from unhealthy organic matter, trash, debris, and frozen material.</p> <p>Do <i>not</i> use stones heavier than 10 pounds or larger than 6 inches and keep in the lower center of the barricade. Compact and prepare the surface to keep structural integrity and control erosion.</p> <p>The following are effective artificial barricades:</p> <ul style="list-style-type: none"> • Earth, 20 feet or less in height, having a crest (berm) at least 3 feet wide. The slope will not be steeper than 1.5 horizontal to one vertical. Use slopes of two horizontal to one vertical for new facilities to reduce erosion and ease maintenance. • Earth more than 20 feet in height and at least 5 feet wide at the top. • Earth can be substituted by a retaining wall on one side. The slope and thickness of the retaining wall (preferably concrete) must ensure a wide enough top to hold the earth firmly in place.
Earth-filled, steel bin	<p>Earth filled, steel bin barricades, also known as Armco revetments, have been used to separate munitions awaiting processing; for example, munitions on flight lines associated with aircraft parking/loading operations, or the temporary positioning of munitions awaiting transfer to preferred, long-term storage. These barricades are also used to separate uploaded aircraft and help to prevent sympathetic detonation. These revetment barriers are constructed of Armco steel “bins” filled with compacted earth and erected in 10-foot-long sections. Consider Armco revetments only for preventing prompt detonation transfer, and that all munitions/assets in the series of cells are at risk of loss. In other words, although the revetments are effective in limiting the blast of adjacent exposed sites to that produced by the largest contents of a single cell, there is a significant probability that the contents of many cells will be damaged by the initial and subsequent fire and explosion.</p>

Place barricades as near to the potential explosive site (fig. 2-5) or exposed site as practical. That is, where they provide the most effective protection. They must not be farther than the distance required for operations, walking, or building maintenance.

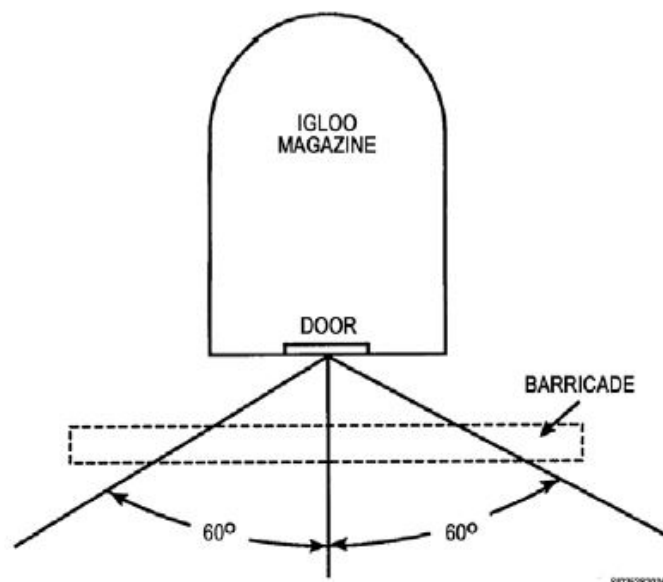


Figure 2-5. Barricade placement.

413. Hazards, symbols, and warning signs

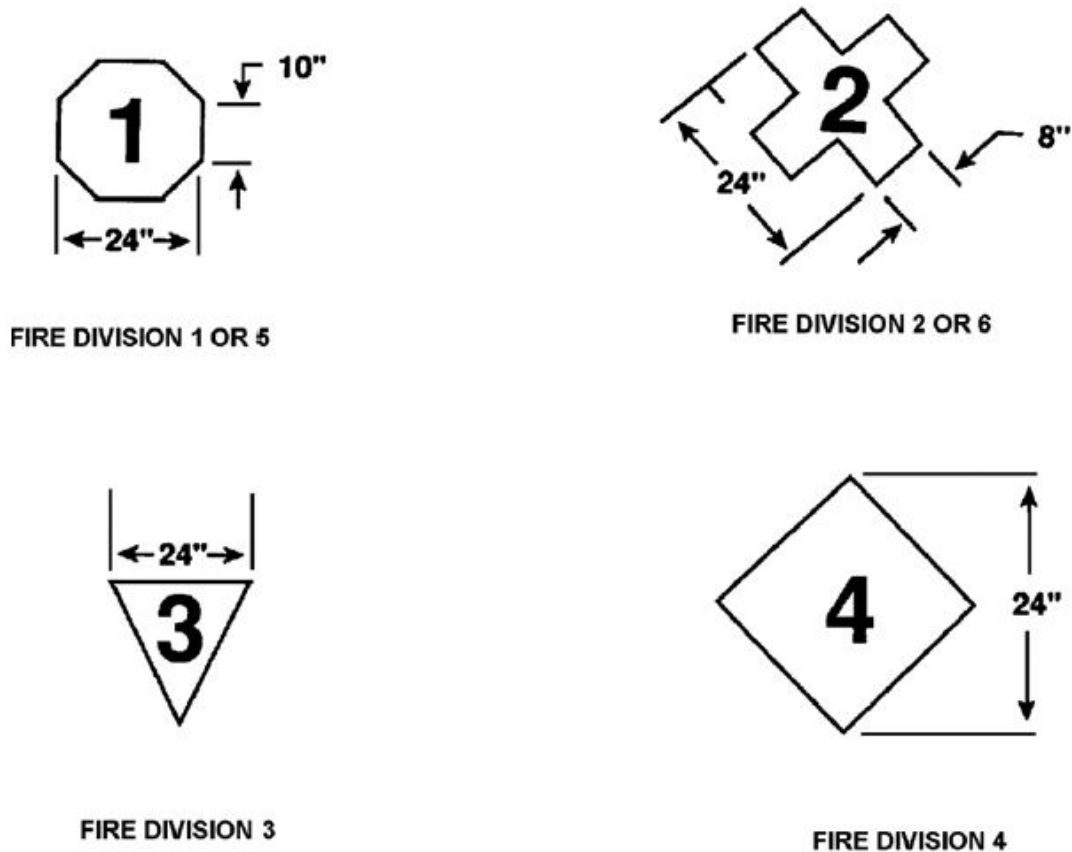
Fire and chemical warning signs are devices we use to caution and inform anyone who may have a need to enter an area, building, or room where munitions are present. We also use these signs and symbols to inform emergency response forces (fire department, security, medical) on the hazards they may encounter upon entering the area. When the fire department is responding to a fire involving munitions, the fire chief determines when, if ever, to try to extinguish the fire.

Posting symbols

Post the fire symbol that applies to the most hazardous item when more than one fire symbol/hazard division is present. Also, when all the munitions within a single storage area are covered by one fire symbol, that symbol may be posted at the entry control point or row entrance. However, post individual fire/chemical symbols on each door of a multicube storage magazine when the structure is sited as a multicube versus a single magazine. Always make sure that the signs/symbols are visible from all approach roads. The table below describes the four primary hazard division (HD) fire symbols and fire-fighting guidance.

FIRE SYMBOL	MATERIALS	HAZARD	ACTION/REMARKS
1	1.1 Explosives and certain liquid propellants and 1.5 munitions	Mass detonation	1. Do not fight fire unless rescue attempt is planned. 2. If there is suitable separation to symbol 1 materials and fire chief approves, fire fighting forces may attempt to extinguish the fire. 3. If personal safety is in doubt, take cover.
2	HD 1.2 and HD 1.6	Non-mass explosion, fragment producing	1. Give alarm; attempt to extinguish fire if in early stage. 2. Firefighting forces should fight fire. If not possible, prevent spread of fire. 3. Detonation of items could occur. Provide protection from fragments.
3	HD 1.3	Mass fire, no blast or fragment	1. May be fought if explosives not directly involved. 2. If WP munitions are involved, smoke is liberated. <ul style="list-style-type: none"> a. WP munitions may explode. b. Immerse Phosphorus in water or spray with water continuously. 3. For fires involving hexachlorophene and incendiaries, use dry sand or dry powder in early stage. 4. For fires involving pyrotechnics and magnesium incendiaries. <ul style="list-style-type: none"> a. Protect adjacent facilities and equipment. b. Do not use carbon dioxide, Halon extinguishers or water on or near munitions. c. Allow magnesium to cool unless upon flammable material. In this case, use a 2-in. layer of dry sand or powder on the floor and rake the burning material onto this layer and re-smother.
4	Moderate fire, no blast or fragment	Moderate fire, no blast or fragment	1. Fight these fires. 2. Expect minor explosions and hot fragments.

Fire symbols come as stick-on decals and are affixed to a noncombustible surface. Make this backing material the same shape as the actual symbol itself (fig. 2-6). One reason for this is in case the symbol burns off in a fire, the backing showing the design of the symbol provides the response forces with the information needed to determine the hazards involved. Post symbols on the exterior of interior entrances to small rooms in buildings that are licensed for storing or holding quantities of munitions or explosives. Also, mark lockers or containers with the proper symbol.



COLOR - SYMBOLS ARE ORANGE WITH BLACK NUMERALS





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Figure 2-6. Fire symbols.

Post a chemical symbol (fig. 2-7) when an explosive has a secondary hazard. The Joint Hazard Classification System (JHCS) identifies this requirement by placing a letter (A-E) at the bottom of the JHCS query form next to the heading "Air Force Hazard Symbol Code" as applicable. Each of these letters refers to a different hazard symbol. They are described in the following table.

JHCS Air Force Hazard Symbol Code		
Code	Color	Meaning
A	Red	Wear full protective clothing, set 1.
B	Yellow	Wear full protective clothing, set 2.
C	White	Wear full protective clothing, set 3.
D		Wear breathing apparatus.
E		Apply no water.

Aircraft loaded with nonnuclear munitions must have symbols posted at each aircraft or shelter. If all aircraft in a parking area need the same symbol, post that symbol at the entrance to the parking area. When this is done, notify the fire alarm communication center when each aircraft is loaded or unloaded. Identify the aircraft by tail number, parking location, and type of explosive involved. When explosives are removed from the facility or location, the symbols are removed, covered, or reversed. The person in charge of the operation is responsible for posting or changing the symbol(s).

Chemical Symbol	Name of Chemical Family	Comp Group	Type Agent	Back-Ground Color	Bands	Hazard	Action or Remarks
	Hydrazine (MMH), (UDMH)	K	Fuel	None	None	Highly Toxic as aerosol/vapor	1. Withdraw upwind 2. If explosion does not occur, approach from upwind and extinguish fire. 3. Decontamination may be required.
	Nitrogen Tetroxide (N ₂ O ₄)	K	Oxidizer				
	Chloroacetophenone (CN)	G	Tear	Gray	Red	Toxic as aerosol/vapor	1. Withdraw upwind 2. Approach from upwind and extinguish fire. 3. Decontamination may be required.
	Liquid Chloroacetophenone (CN)	G	Tear	Gray	Red		
	O-Chlorobenzal-Malononitrile (CS), (CS1), (CS-2)	G	Tear	Gray	Red		
	Adamsite (DM)	G	Vomiting	Gray	Red		
	Combination CN and DM	G	Tear and Vomiting	Gray	Red		
	Diphenylchloroarsine (DA)	G	Vomiting	Gray	Red		
	Titanium Tetrachloride (FM)	G	Smoke	Li Green			
	Sulfur Trioxide Chlorosulfonic Acid (FS)	G	Smoke	Li Green			
	Hexachloroethane (HC)	G	Smoke	Li Green			
	White Phosphorus (WP)	H	Smoke	Li Green		Spontaneously flammable when exposed to air	1. Post fire guard until leaking phosphorus has been removed. 2. After removal of agents, post fire guard for two days for possible re-ignition.
	Plasticized White Phosphorus (PWP)	H	Smoke	Li Green			
	Triethyl-Aluminum (TEA)	L	Smoke	Li Green		Smoke, Burns at high temperature	1. Do not use water. 2. Do not look at burning material.
	Incendiary Mix (PT)	G	Incendiary	Li Red			
	Thermite (TH)	G	Incendiary	Li Red			
	Napalm (NP)	I	Incendiary	Olive Drab	Red	Burns at high temperature	1. Approach from upwind and extinguish fire.

Do Not Use Water	HC Smoke (G)	Smoke	1. Do not use water.
	Incendiary (G)	Burns with extremely high temperature	1. Do not use water. 2. Do not look at burning material
	TEA Smoke (L)	Spontaneously flammable	

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Figure 2-7. Chemical symbols.

Exceptions to posting symbols

The following list identified in AFMAN 91-201 provides guidance on when *not* to post warning symbols.

- When located in an area with aircraft having only exempted devices or installed class/division 1.4 explosives. This does not apply to explosives cargo.
- On missile sites with a single type of weapon.
- Locations with 1000 rounds or less of class/division 1.4 small arms ammunitions.
- When, by agreement, host nation symbols are used.
- For emergency security purposes, the responsible commander temporarily orders them removed.
- When location is storing special weapons or both nuclear and nonnuclear munitions.
- When explosives-laden aircraft are in a designated explosives parking area which is described in a local publication. This publication includes the class/division, governing symbol, emergency procedures, and the requirement to notify the fire department.
- For aircraft loaded with nuclear weapons, even when mixed with nonnuclear munitions.

Besides the exceptions noted above, fire symbols and chemical warning signs are always posted when munitions are present.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

411. Storage area requirements and magazine types

1. What is the definition of a munitions storage magazine?
2. What are the two general types of munitions storage magazines?
3. What are the major differences between standard and non-standard earth-covered magazines (ECMs)?
4. What is the most common type of munitions storage structure?
5. What device ensures the ventilator flap doors close when temperatures reach a maximum of 155 to 165 °F?
6. A firebreak of how many feet is required around ECM ventilators?
7. What is the ideal and most secure way of installing a hasp on a munitions facility?

8. To keep locks operating properly, how often should they be opened and closed?

412. Site planning principles

1. What is the source document for explosives capacities and controls for your facilities?
2. What is quantity-distance (QD)?
3. What are quantity-distance (QD) principles based on?
4. List instances when you would apply intraline distance (ILD) involving an explosives location.
5. What is inhabited building distance (IBD)?
6. What type barricade also known as an “Armco revetment”, can be temporarily positioned on the flightline for separating munitions?

413. Hazards, symbols, and warning signs

1. What is the main reason for posting fire and chemical warning signs?
2. If more than one fire symbol applies, which one should you use?
3. When would you attempt to fight a fire with fire symbol 1 assets involved?
4. Name one reason the backing of fire symbols is required to be made of a noncombustible material having the same design as the symbol.
5. According to AFMAN 91-201, what exception will be made with storing special weapons or nuclear munitions?

2-2. Warehousing

Now that you are aware of the different types of munitions magazines and the differing methods of storing and managing the stockpile, you need to learn how munitions are controlled within each facility. You must follow specific guidance when placing and recording munitions locations within a facility. In this section we discuss proper storage of munitions, compatibility, courtesy storage agreements, and special weapons storage principles.

414. General principles

In the preceding lessons we covered the different types of munitions storage magazines and some rules that apply to maintaining and constructing munitions facilities. In this lesson you will learn about the unique rules and procedures for arranging munitions within a magazine and some different terms used to identify different storage methods.

Creating and marking storage locations

Basic guidance for creating storage locations can be found in TO 11A-1-61-1, *Storage and Outloading Instructions for Conventional Ammunition (Igloo, Magazine, Military Van, Truckloading, and Carloading)*. This technical order dictates how to arrange munitions within a given storage structure. An 11-digit alphanumeric system is used to identify munitions location designators. This location designator becomes part of the munitions accountable record. A breakdown of a sample 11-digit identifying designator, 34A003C001E (fig. 2-8), is described in the following table.

Breakdown of Location Designator 34A003C001E	
34	This number is generally comprised of the last two digits of the actual building number. However, your local situation (that is, to avoid duplicate numbers) may dictate alternate methods.
A	The designated bay within a warehouse or separate storage area. This letter changes if you have a warehouse with separate bays or rooms, (that is, multicubes). This letter can also be used to differentiate between separate storage areas, as determined by local need.
003	These numbers represent the row. Odd numbers are on the left side and even numbers on the right side of the main aisle facing into the building from the door. Rows normally run from main aisle to the outer wall.
C	This letter represents the shelf level. This level is indicated by letter "A" as the floor, "B" as the next shelf up, and so on.
001	These numbers represent the position in the row. Each position is numbered from the aisle to outer wall starting with the number 1.
E	Location/pallet subdivision. This letter is used to subdivide a location or pallet into a maximum of 26 separate locations. If this space is not used for further subdivision of the location, leave it identified as an "A." This is especially helpful when many small items are stored on a single pallet or shelf. Subdivisions are from the front to the back and from the left to the right from the point of inventory.

The point of inventory is defined as that position you take to read the nomenclature on the box. This is most often the same as the inspection aisle. Point of inventory is *not* from the doorway. If location lines are marked on the floor, they should be approximately 2 inches wide. An alternate method of marking is to use a numbered sign on the corner of each stack. These same location designators apply to outside storage of munitions as well.

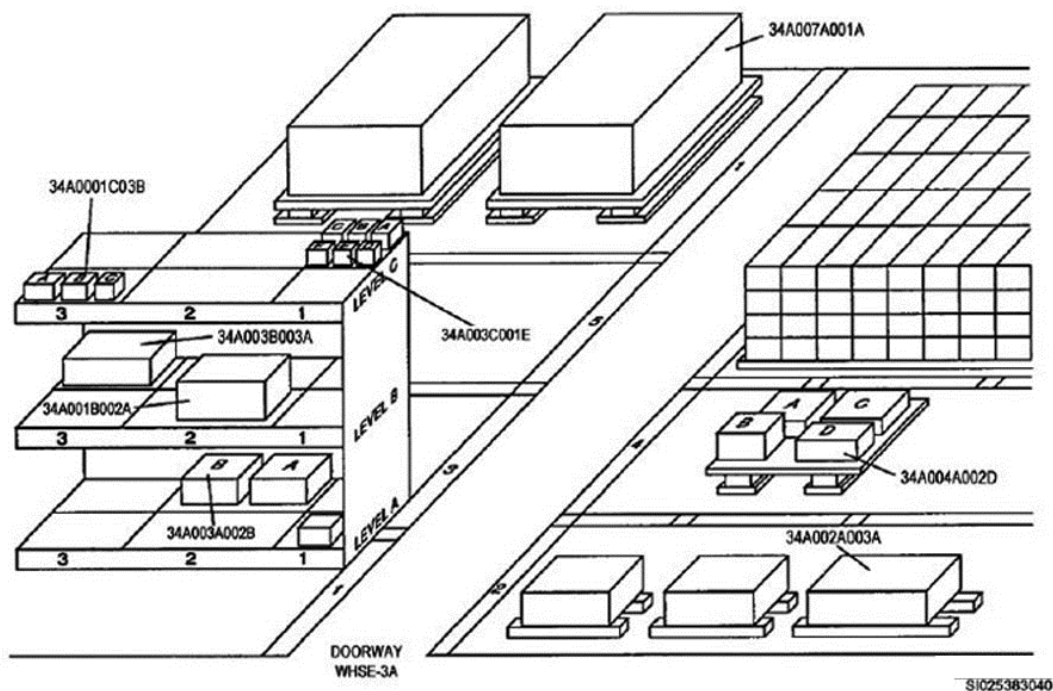


Figure 2-8. Example of location designator.

Movement control

Munitions movement control is a tool that allows us to better keep track of our munitions assets as we account, inspect, and maintain them while they are on our stock record account. Munitions movement control is not only important to the storage element; it is a vital part of ensuring accountability at each section. It eases our transition into inventory research during additional counts and allows us to have a snapshot of what movements are being made in our bomb dump.

Whenever munitions items are moved from one location to another, the movement must be documented in order to maintain accountability for all of our assets. The ultimate goal is for our movements and CAS updates to be done simultaneously. The lessons that we have learned over the last few contingencies is that it is extremely hard to maintain accurate, accountable records. Without using direct input methods we couldn't keep up. If we wait until the end of a shift or even the end of the day to do updates, we could be looking at hundreds of documents to update in CAS. Look at the potential for some of those documents being lost. It is important to understand that movement control is an important aspect of accountability and to remain vigilant with the idea and concept of accountability of munitions from receipt until disposition.

The munitions flight CC/OIC/chief establishes and publishes movement control procedures and directs us to use direct input methods or the AF IMT 4331, *Munitions Transaction Sheet*, to track all movement transactions. Storage crews may use a CAS structure Asset report in lieu of the AF IMT 4331 during rwarehousing activities.

Storage personnel must physically verify 10 percent of all movements weekly by taking a CAS report out to a location and verifying that they were done correctly. However, 100 percent of movements must be verified against the transaction history report to ensure accurate processing.

Compatibility of munitions

The compatibility of explosives was originally established through extensive testing of different types of munitions. These tests determined that certain types of explosives behave alike under all circumstances. These circumstances varied from intentional fires and detonations to the attempts to extinguish these fires. The difficulty encountered, the length of time the fire burned, and the degree and number of detonations were all noted.

Ammunition or explosives are considered compatible if they can be stored or transported together without significantly increasing either the probability of a mishap or, for a given quantity, the magnitude of the effects of such a mishap. They are assigned to compatibility groups for storage and transportation. Ideally, each type item or division should be separated, but this is generally not feasible. Therefore, a proper balance of safety and other factors may require combining various types of ammunition and explosives in storage and transportation. If different types of ammunition and explosives, by item and division, are compatible, they may be kept together.

Compatibility grouping only applies to storage and transportation. However, it does *not* apply during transportation of munitions to or from combat aircraft loading areas or flightline munitions holding areas. In developing the various compatibility groups, these following factors are considered:

- Chemical and physical properties.
- Design characteristics.
- Inner and outer packaging configurations.
- QD class and divisions.
- Net explosive weight (NEW).
- Rate of deterioration.
- Sensitivity to initiation.
- Effects of deflagration, explosion, or detonation.

Compatibility groups for certain ammunition and explosive items, components, and assembled weapons are given in the JHCS. To determine if two items can be stored together, you must first determine which compatibility group they are in. Then use the compatibility mixing chart in AFMAN 91-201.

Determining storage compatibility is one of the most important procedures that you, as a storage troop, will do. Always use AFMAN 91-201 in this process and read all the applicable notes the publication provides. If you happen to store noncompatible items, you create a definite safety hazard.

General munitions warehousing principles

Storage requirements for a specific munitions item are found in the applicable specific item technical order. Normally, the specific item's TO will provide information regarding specific requirements for inside and outside storage plus any temperature limitations that may apply to the item.

In addition to following the requirements of the specific item TO, follow the general rules found in AFMAN 91-201 and TO 11A-1-61-1. A few of those rules include the following:

- Do not mix lots (unless otherwise exempted) in the stack of like munitions items. Different condition codes of the same lot item are segregated in storage and properly marked.
- Never allow stored munitions or their containers to contact a wall of a magazine. You must provide for the mandatory clearance requirement.
- Never exceed the stack limit of a specific munitions item.
- If a munitions storage drawing identified in TO 11A-1-61-1 exceeds the explosive limit for a magazine, reduce the munitions storage pattern.
- Level all dunnage; if required, use shims or wedges to maintain a level stack.
- Always allow for the free circulation of air in and around the stacks of munitions.
- Ensure munitions containers are clean, dry, and properly marked before being placed in storage.
- There should only be one lite box per stock number, lot number, and condition code stored in one location. Assets of the same lot and condition code, with multiple service life dates can be stored as separate lots. The lite box should be located on the top and to the front of the stack. Custody accounts may have more than one lite box per lot and condition code for mobility purposes.

Safety principles

AFMAN 91-201 governs explosive safety standards and states some basic storage area requirements such as: sited explosives locations will comply with quantity distance (QD) criteria and lightning protection requirements; practice good housekeeping; construct barricades when required; maintain barricades in good repair; and provide adequate drainage for all access and internal roads. There are several possible hazards that can be controlled. You must keep the interior of storage structures containing explosives clean and free of prohibited articles and materiel. Some of the responsibilities in AFMAN 91-201 are listed below in the following list:

- Do *not* store powered lift trucks, dunnage, empty boxes, unused pallets, excess packing material or similar items in a magazine or other space containing explosives.
- Store noncombustible equipment required to support approved contingency plans in explosives facilities for ready use when required.
- Do *not* store flammable liquids in magazines or other locations where explosives are present.
- Inert or live explosives or munitions components may be stored together. However, training items must be physically separated from the live items they represent.

While not required for all items, using pallets to stack and store most munitions containers is necessary to ensure stability, ventilation, and organization. As you can see in figure 2-9, there are many ways in which munitions containers can be stacked to provide stable storage stacks. Always remember to position containers so that the identifying markings are visible. This will also aid in inventorying the munitions later on.

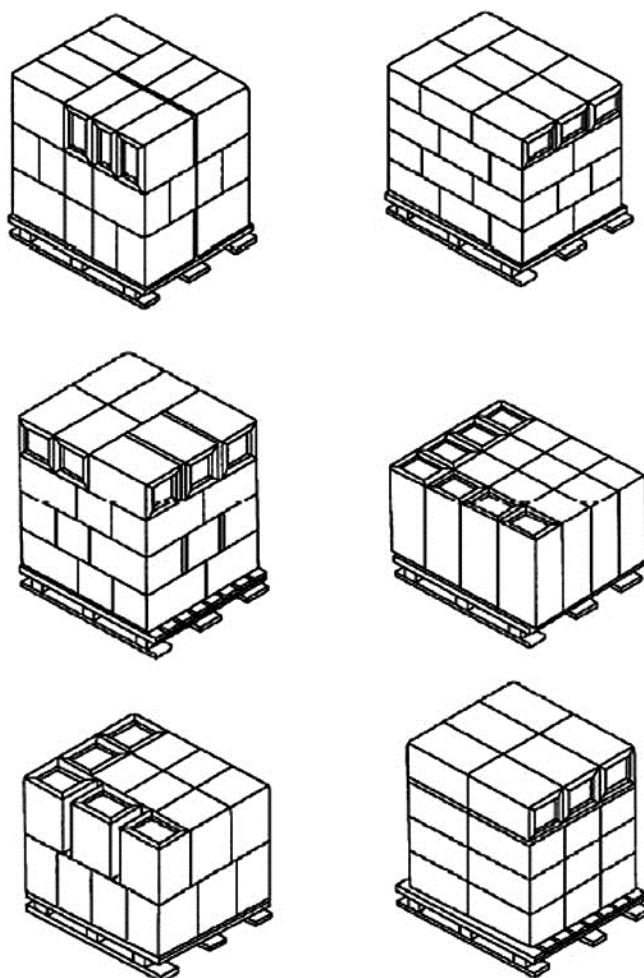


Figure 2-9. Examples of pallet stacks.

Courtesy storage

When organizations on a base have munitions allocated to them on a custody account, but they do not have an authorized place to store these munitions, their assets are stored under a courtesy storage agreement. The munitions storage area flight chief and the organizational commander authorize the storage of custody munitions with a written agreement. Each MAJCOM sets the minimum requirements for the courtesy storage agreement for units within its command. Normally this agreement requires that any repair, modification, or configuration change to munitions items are the responsibility of munitions personnel. The owning organization is responsible for accounting and reporting of custody account munitions. Additionally, most agreements include

- responsibility for the care and preservation of munitions and packaging materiel;
- names of individuals authorized to remove munitions/material other than those listed on the AF IMT 68;
- responsibility for annual review and renewal dates;
- provisions for notifying the munitions flight when access to the munitions/material is needed;
- the users' responsibility for transporting munitions; and
- NSN, nomenclature, and quantity of munitions to be stored, other than those assets listed on the annual approved allocation document.

These agreements are reviewed annually. If an item on a custody account is suspended for any reason, munitions personnel notify the custodian. Segregate munitions/material that is courtesy stored in the munitions storage area to ensure that the items are *not* mistaken for base stock assets.

Non-accountable storage

This program is used to manage and account for assets that are not required to be tracked on base stock or custody accountable records. Assets such as special packaging, static display munitions (SDM), empty containers, and temporary intransit/temporary duty (TDY) assets are applicable to non-accountable management. Empty containers that have assets removed for use, such as small arms containers, would be maintained on non-accountable records. SDMs are removed from accountable records when they are approved through the Global Ammunition Control Point (GACP); however, you are still required to account for and maintain these assets properly. Therefore, SDM management must be in the non-accountable program within the combat ammunition system (CAS). Assets stored temporarily, awaiting further movement would be stored in the munitions storage area, but not picked up on accountable records. In order to maintain net explosive weight (NEW), these assets are picked up on non-accountable records with all pertinent storage/safety data entered in CAS using the Non-Accountable (AM101A) program. Assets that are not authorized for non-accountable storage would be Air Force owned assets that are allocated, approved locally procured commercial-off-the-shelf (COTS) assets or custody account assets. Just like stock and custody assets, non-accountable assets are required to be inventoried. Non-accountable assets will be inventoried as prescribed in semi-annual and custody account inventories as applicable. Further information regarding non-accountable assets can be found in AFI 21-201, *Munitions Management*.

Methods for storing munitions

There are many requirements to consider when dealing with storing munitions. Our munitions stockpile and the rate of degradation is a direct result of how we store our assets. We store munitions differently based on mission requirements. This could mean what is stored and how each individual igloo is configured corresponds to an overall strategy of how to maximize the available storage facilities. Let's take a look at different methods of storing munitions.

Complete round storage

Complete round storage is the concept of storing enough munitions in a single igloo to provide the capability to build specific complete rounds. Depending on your unit's mission and the response time you have to work with, you may be required to keep certain first-strike munitions built up and loaded on munitions trailers in order to meet minimum warning requirements. Since built-up munitions on munitions handling trailers take up a lot of floor space, this requirement also takes considerable planning to ensure that the mission is accomplished.

Buffered storage

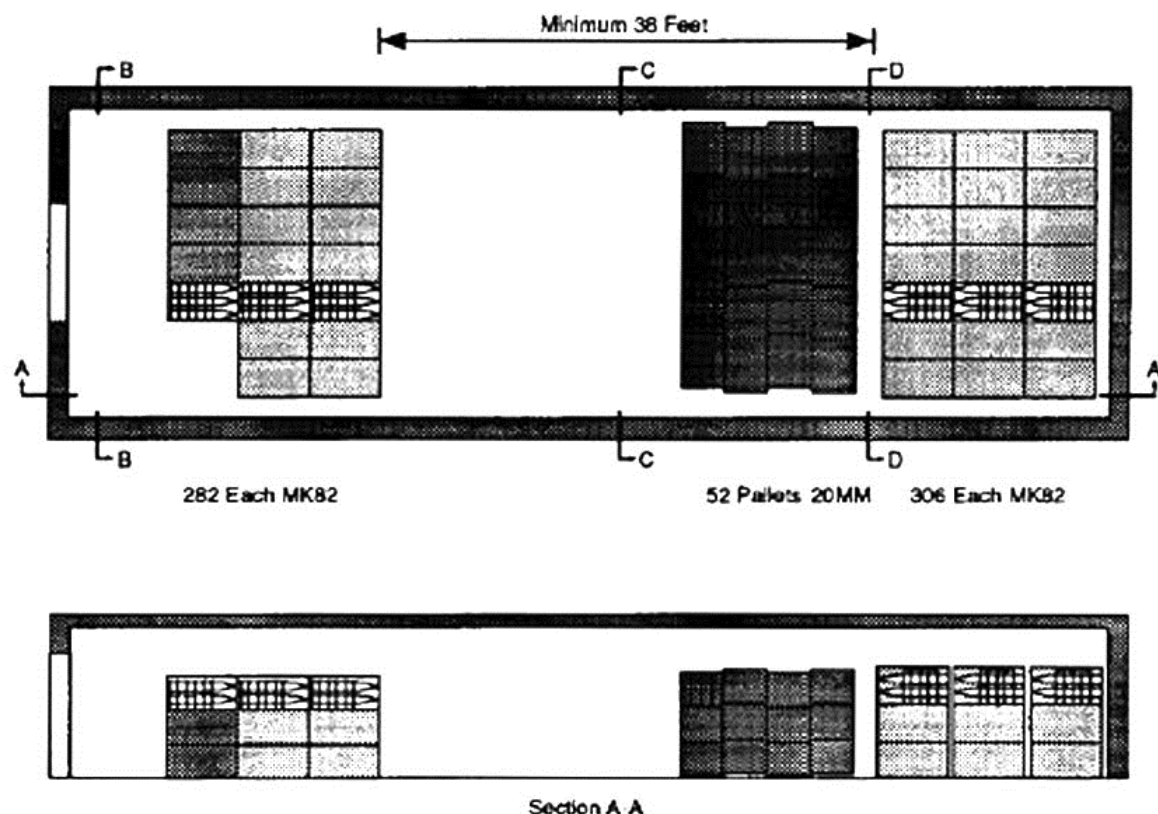
The USAF has many earth-covered magazines that are severely limited by available distance to exposed sites. Because of these limitations, the concept of buffered storage was designed and tested to increase the explosive storage capacity of limited NEW igloos, without increasing quantity distance (QD) separation requirements.

Under certain conditions, propagation can be prevented between stacks of tritonal-filled MK-82 and MK-84 bombs (fig. 2-10). NEW for QD purposes is the explosive weight of the largest stack plus explosive weight of intervening buffer material. Buffered storage can be used in earth-covered magazines, aboveground magazines, or open stacks. Stacks are limited to 64 MK-84 or 312 MK-82 bombs. Combined stacks are limited to 60,500 pounds NEW.

Acceptable buffer materials are serviceable palletized 20 mm ammunition, palletized 30 mm ammunition, or CBU-58s packaged two per metal container. To use different configurations or buffer materials, units submit definitive drawings through their MAJCOM for approval. Buffer materials must be positioned between the two stacks of bombs to prevent line-of-sight exposure between stacks. Steel nose and tail plugs must be used in all bombs. Bombs are arranged so that the noses of the bombs in each stack are facing the buffer. Maintain a *minimum* of 38 feet between the nearest bombs of the separate stacks.

For bomb stacks of 24,000 pounds or less, 20 feet is acceptable. The stacks are arranged within a structure so that access is possible in order to verify the configuration. Only serviceable munitions may be used in the bomb stacks or the buffer stacks. Buffer material may be removed for periodic inspections without affecting sited capacities if it is returned within 24 hours.

Buffered storage is approved for use in the continental United States and overseas locations where US explosives safety standards are the only criteria applied. In Europe, or other locations where a host nation has established safety criteria, these principles must be accepted by the host nation before they can be applied.



NOTES:

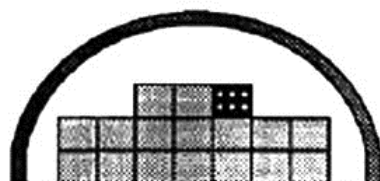
1. Install metal plugs in all MK82 bomb fuze wells.
2. Bombs rows nearest the buffer material must have nose end facing the buffer, bomb stacks must be separated by a minimum of 38 feet.
3. Buffer stack may be positioned anywhere within the space between bomb stacks.
4. Vertical offset of buffer rows must be with metal dunnage. Minimum offset is on the order of 2 to 4 inches or what ever is necessary to prevent line of sight.
5. The bottom row of 20MM ammunition used as buffer material must be on metal pallets.
6. No line-of-sight permitted from bomb stack to bomb stack through buffer.
7. The total NEW stored, for quantity distance purposes, will be computed upon the combined NEW of the largest stack of bombs and the total NEW of class 1 division 2 buffers. The NEW of class 1 division 4, 20 MM is not additive.
8. Buffer may be any configuration of 20 MM in standard pack metal cans.
9. Empty space can be used for inert items or additional buffer material specified in this or other approved drawings. Additional buffer materials shall not result in loading densities greater than 3.8 pounds per cubic foot.
10. Caution must be exercised to assure that the integrity of the buffer stack is not disturbed. Removal of any portion of the buffer stack will defeat the integrity of the buffer. The quantity distance requirements will then be based upon the total NEW stored in the facility.
11. Maximum load density for this arrangement is 3.8 pounds per cubic foot.
12. Storage arrangement and aisle spacing shown are based on use of a commercial 6,000 lb. forklift.
13. Aisle dimensions shown herein may be adjusted to suit local conditions and/or available Materials Handling Equipment (MHE).
14. Minimum distance from the walls will be as specified in appropriate technical orders.
15. Servicable munitions or munitions with only such defects that do not affect explosives safety may be used in the bomb stacks or buffers.



Section B-B



Section C-C



Section D-D

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Figure 2-10. Examples of buffered storage method.

415. Special weapons storage

Special weapons are stored in standard ECMs with the added security alarm and intrusion devices required to protect the specific weapon type. However, a unique type of storage system for protecting US special resources is in use throughout Europe today. The development of the Weapons Storage and Security System (WS3) is a way to ensure the protection of these vital resources. This system is an US Air Force/North Atlantic Treaty Organization (NATO) program designed to store and secure US tactical special weapons in hardened underground vaults. These vaults are located inside hardened aircraft shelters (HAS) at both US and allied European tactical bases. Using WS3 greatly reduces the weapon's exposure time by eliminating the need for massive convoys to get the weapons to the tactical aircraft.

System description

The WS3 is a combination of electrical and mechanical systems. The vaults are compatible with the handling equipment used by US and allied forces to load special weapons onto tactical aircraft. Each vault can store up to a maximum of four special weapons and has an adjustable delay feature. This security system is designed to give security forces time to respond to an unauthorized attempt to access a vault. As shown in figure 2-11, the WS3 is divided into the following four major groups:

1. Console group.
2. Monitor-indicator group.
3. Coder-transfer group.
4. Vault control group.

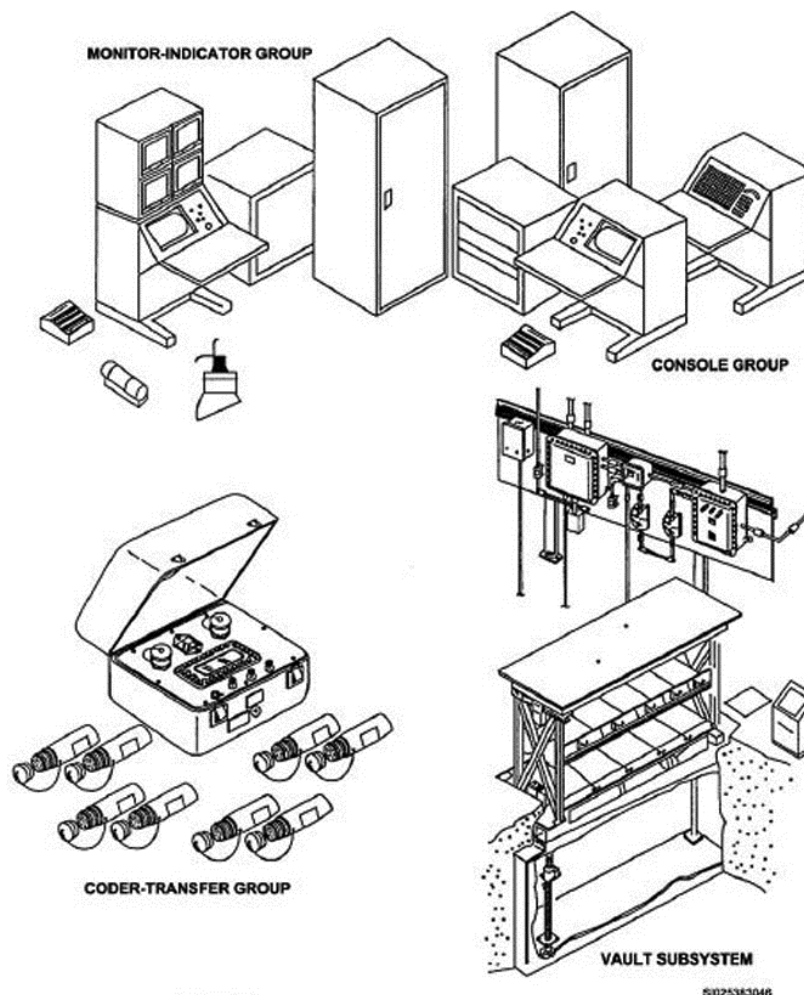


Figure 2-11. The four major groups of a WS3.

As stated earlier, the system is designed to store and secure special weapons. It is guarded electronically with tamper switches and sensors designed to activate alarms for any potential problem.

Vault control group

The vault control group provides physical storage and security for special weapons and related equipment. Two electrically independent operating systems provide redundant means for raising and lowering the internal vault structure.

Operating systems

The system rate of speed depends on the frequency of the supply voltage. Primary and alternate operating systems open the vault.

Primary

Primary power requirements may vary from one base to another. The primary operating system is controlled at the shelter control panel and energized by 3-phase power entered at the vault electrical support panel. The nominal value for the system in the *secure mode* is 230 volts, alternating current (VAC), 50 hertz (Hz), single phase; in *operate mode* it is 208 to 415 VAC, 50 Hz, three phase. Operating characteristics include a rated speed of 28 inches/minute and an adjustable access delay time when a maintenance or mass upload unlock code is used. There is no time delay when the universal release code is used. When we open the vault, the mid-level is reached in about 1.8 minutes at 50 Hz; moving from the mid-level to the fully opened position takes about 1.5 minutes at 50 Hz.

Alternate

The alternate operating system is controlled at the alternate controller and powered by either a single-phase portable generator or from another available power outlet. The system operates on 110 to 415 VAC, 50 or 60 Hz, single phase. When we use the alternate system to open the vault, the mid-level is reached in about 130 minutes at 50 Hz and 108 minutes at 60 Hz; mid-level to fully opened position is reached in approximately 107 minutes at 50 Hz and 90 minutes at 60 Hz. Operating characteristics include a rated speed of 0.38 inch/minute using 50 Hz and an adjustable access delay time.

These sensors and vault components send their signals to the console group, allowing it to monitor the entire system. Panels mounted inside the HAS or an alternate controller control power and provide a user interface with the vault structure. The vault subsystem is composed of the following five major elements:

- Vault electrical support panel (fig. 2-12).
- Shelter control panel (fig. 2-13).
- Vault processor.
- Vault assembly with sensors (fig. 2-14).
- Alternate controller.

Maintenance of the vault control group consists of an annual lubrication, physical inspections, various periodic functional checks, and troubleshooting, if problems should occur.

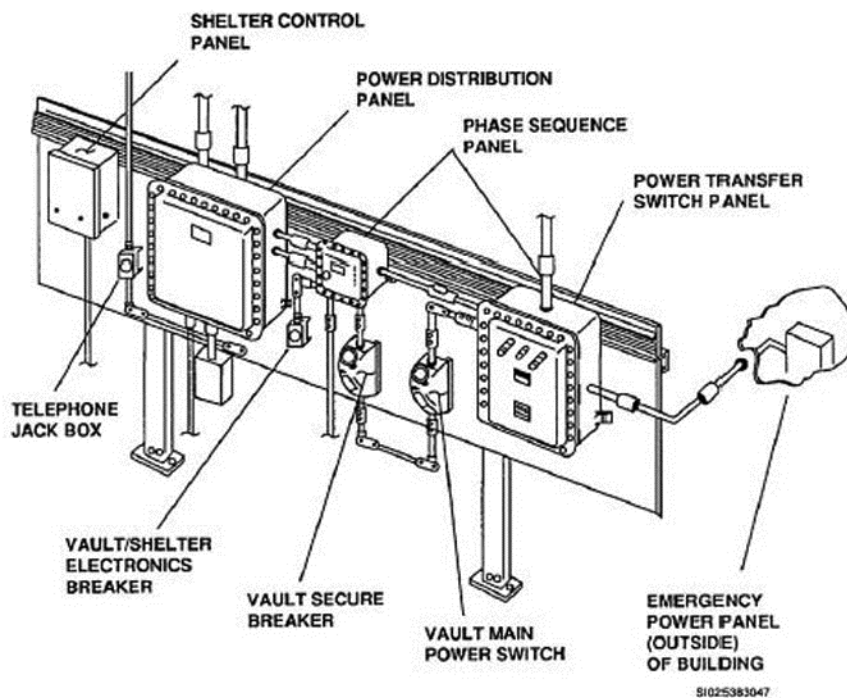


Figure 2-12. Vault electrical support panel.

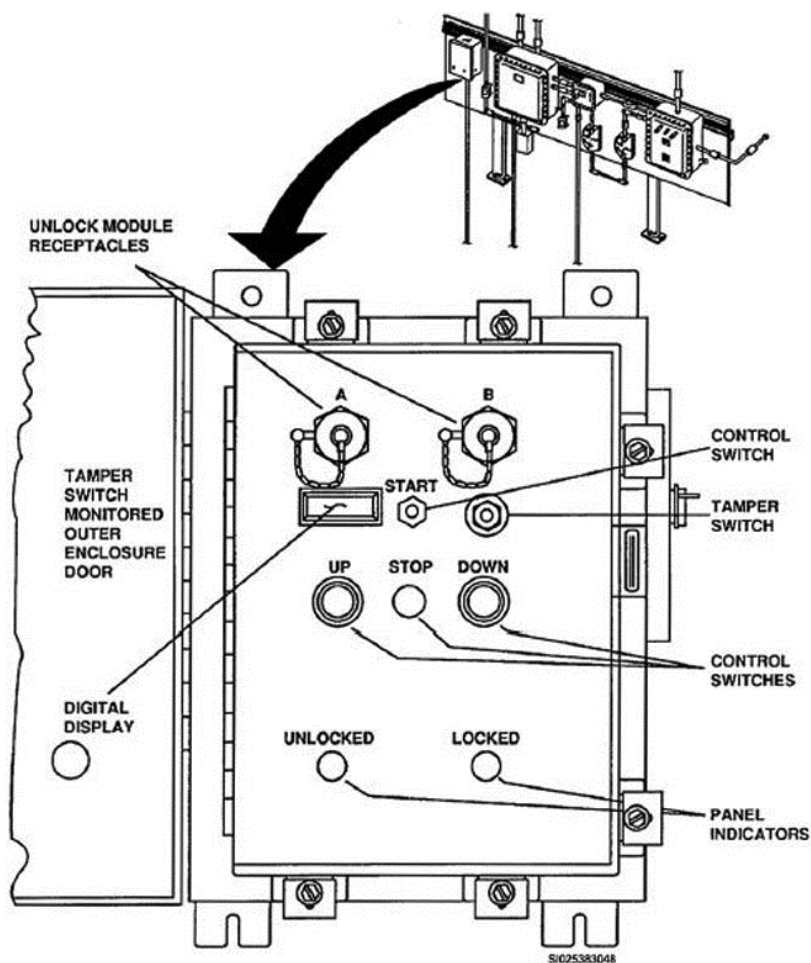


Figure 2-13. Shelter control panel.

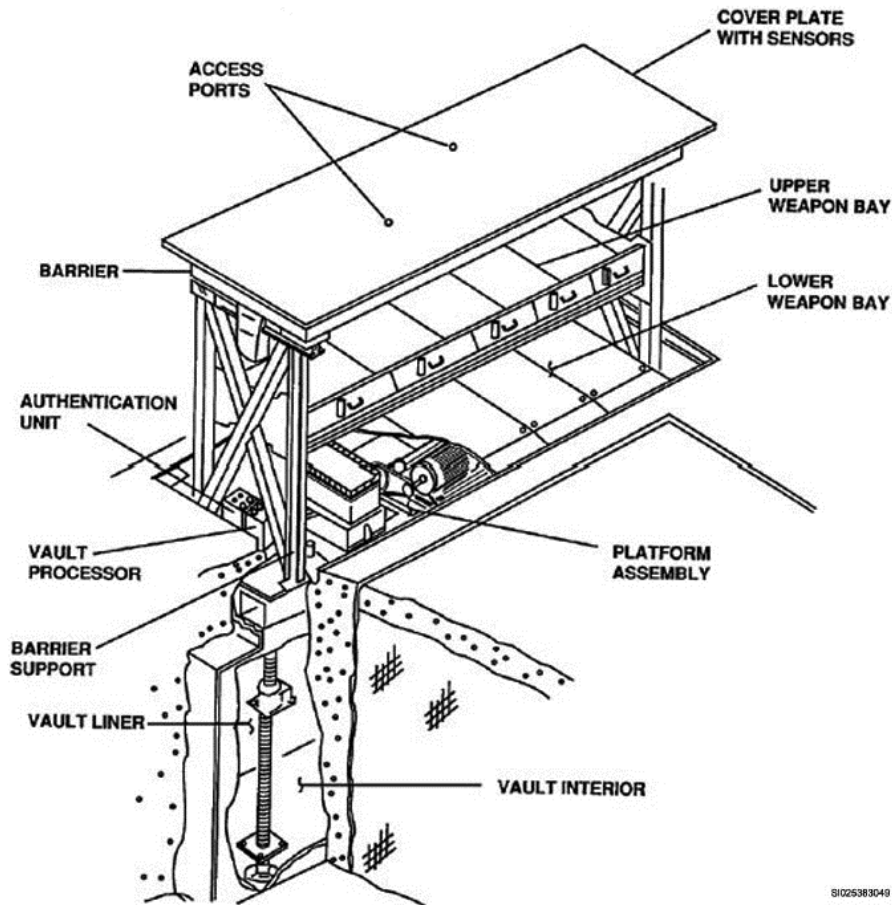


Figure 2-14. Vault assembly.

Console group

This group provides the communications and processing capabilities necessary to monitor the status of up to 80 vault subsystems. Data communications from the vault subsystem to the console group are encrypted to ensure validity. Data transmitted from the vault to the console group is routed back to the vault as a security measure. This ensures that the circuit is *not* compromised. Monitoring is done at the local monitoring facility or remote monitoring facility. The console group monitors the vault areas, splice closures, equipment cabinets, junction boxes, and cameras. It also provides voice communications between maintenance or security personnel at a hardened aircraft shelter (HAS) and the local monitoring facility or remote monitoring facility. The console group does *not* control entry to any of these areas or equipment. It merely allows monitoring facility operators to track of their status.

Monitor-indicator group

The monitor-indicator group provides the operator at the monitoring facility visual access to the control panels and each vault assembly. This group is a dedicated closed-circuit TV network that enables the monitoring facility operators at the local monitoring facility or remote monitoring facility to view the control panels and vault areas.

Coder-transfer group

This group uses portable modules to store and transfer encryption keys and unlock-codes. This group also permits modifying unlock-codes including vault-specific identification and time delay data. In other words, this group holds encryption keys and unlock-codes for opening the vault(s). The coder-transfer group is composed of five major elements (fig. 2-15).

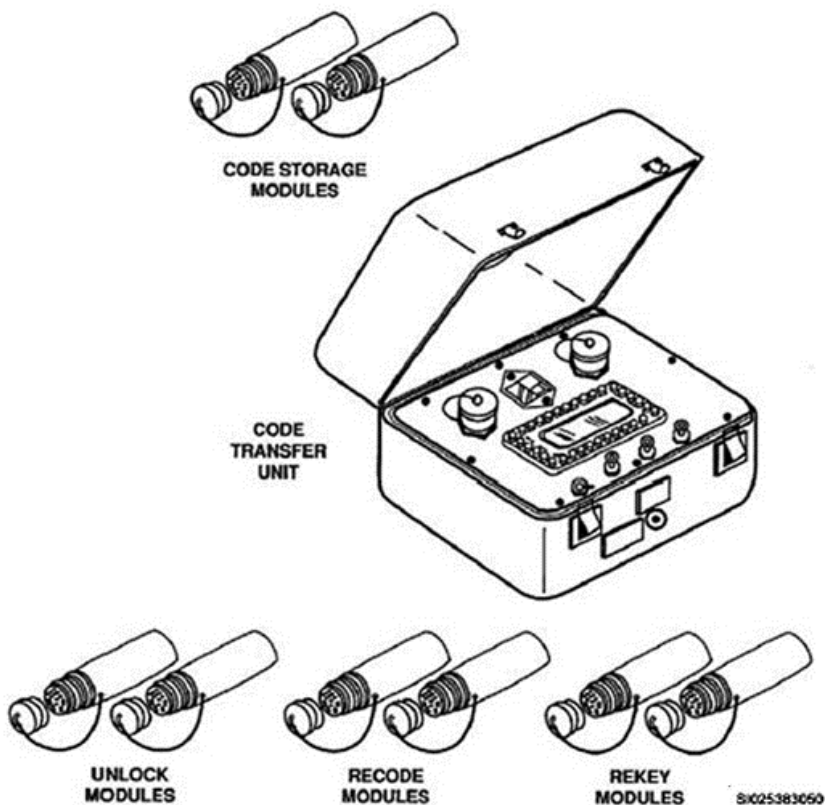


Figure 2-15. Modules and code transfer unit.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

414. General principles

1. Where is the basic guidance for creating storage locations identified?
2. What identifies the standard location designator for munitions?
3. When are munitions items considered compatible?
4. How many “lite” boxes are allowed in one storage location?
5. For what purpose was buffered storage designed and tested?

415. Special weapons storage

1. What is the maximum number of special weapons each vault can hold?
2. What are the four major groups of a weapons storage and security system (WS3)?
3. What is the purpose of the WS3 vault control group?
4. What major WS3 group provides communications and processing capabilities for up to 80 vault subsystems?

Answers to Self-Test Questions**411**

1. Any building or structure, except an operating building, used for the storage of explosives.
2. (1) Earth covered and (2) above ground.
3. Standard ECMs have reinforced concrete end walls and nonstandard ECMs are those igloos constructed with other than concrete or steel arches or with other than concrete end walls.
4. Standard earth-covered arch-type igloo.
5. A fusible link.
6. 5 feet.
7. Welding.
8. Once a month.

412

1. The explosive site plan.
2. Refers to the amount (quantity) of explosive material and the distances allowed between them and other facilities, roads, runways, buildings, and so forth, for given degrees of protection.
3. The construction and type of PES; the explosives content of the PES; the construction and type of ES; the distance separating the PES from the ES; and orientation of the PES and the ES in the case of igloos and modules.
4. Any two explosives operating locations.
 - (1) Explosives operating buildings from explosives storage locations.
 - (2) Activities that directly support the explosives operation or area.
5. The minimum allowable distance between a non-related inhabited building and an explosives location.
6. The earth filled, steel bin barricade.

413

1. To caution and inform anyone who may have a need to enter the area, building, or room with munitions present.
2. The symbol that applies to the most hazardous munitions in the facility.
3. Only when rescue attempt is planned, or if there is suitable separation to symbol 1 materials and fire chief approves. Stop fighting fire immediately once personal safety is threatened.

4. In case the symbol burns off in a fire, the backing showing the design of the symbol will provide the response forces with the information needed to determine the hazards involved.
5. Warning symbols will not be posted.

414

1. TO 11A-1-61-1.
2. An 11 digit alphanumeric system.
3. If they may be stored or transported together without significantly increasing either the probability of a mishap or, for given quantity, the magnitude of the effects for such a mishap.
4. Only one per stock number, lot number, per condition code, per storage location.
5. To increase the explosive storage capacity of limited NEW igloos, without increasing quantity distance separation requirements.

415

1. Four.
2. (1) The console group, (2) monitor-indicator group, (3) coder-transfer group, and (4) the vault control group.
3. Provides physical storage and security for special weapons and related equipment.
4. The console group.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

45. (411) What are the two greatest dangers to munitions items?
 - a. Fire and sunlight.
 - b. Water and sunlight.
 - c. Fire and excessive heat.
 - d. Water and excessive heat.
46. (411) A munitions storage magazine is
 - a. a magazine published for munitions storage troops to read.
 - b. a building or structure primarily used for storing explosives.
 - c. any operational building used to temporarily store explosives.
 - d. used for holding rounds/cartridges for certain weapon systems.
47. (411) Earth-covered magazines have a firebreak around the ventilators; how many feet is the firebreak?
 - a. 20.
 - b. 15.
 - c. 10.
 - d. 5.
48. (411) Which munitions storage structure is used to store small quantities of explosives and is ideal for providing courtesy storage for custody accounts?
 - a. Multicube magazine.
 - b. Corbetta magazine.
 - c. Nonstandard igloo.
 - d. Standard igloo.
49. (411) Which type of facility is normally only used to store class/division 1.3 and 1.4 munitions?
 - a. Clay-tile storage warehouse.
 - b. Modular-constructed igloo.
 - c. Corbetta magazine.
 - d. Standard igloo.
50. (411) What is the *most* secure way of installing a hasp on the door of a munitions storage facility?
 - a. Bolts.
 - b. Rivets.
 - c. Screws.
 - d. Welding.
51. (411) If a lock will *not* open, what type of lubricant do you use after verifying that the keyway is clear?
 - a. Hydrogen dioxide.
 - b. Ammonium nitrate.
 - c. Molybdenum disulfide.
 - d. Hydrogen sulfurperoxide.

52. (411) How often should you put grease or oil into the lock cylinder when lubricating locks?
- a. Never.
 - b. Annually.
 - c. Semi-annually.
 - d. Monthly.
53. (412) The *minimum* distance between potential explosion sites to prevent one from simultaneously detonating the other is called the
- a. inhabited building distance.
 - b. intermagazine distance.
 - c. intraline distance.
 - d. quantity distance.
54. (412) The distance applied to any two explosives operating locations is called
- a. public traffic route (PTR).
 - b. inhabited building.
 - c. intermagazine.
 - d. intraline.
55. (412) The public traffic route distance for mass-detonating explosives is based on which *percentage* of the inhabited building distance?
- a. 30.
 - b. 60.
 - c. 75.
 - d. 90.
56. (412) Properly constructed or natural barricades provide protection against
- a. hazards.
 - b. weather.
 - c. fragments.
 - d. explosion.
57. (412) Which type of barricades uses a select cohesive earth fill, free from unhealthy organic matter, trash, debris, and frozen material?
- a. Natural.
 - b. Artificial.
 - c. Sling type.
 - d. Earth filled.
58. (412) Which type of barricade is used for munitions on flightlines associated with aircraft parking/loading operations?
- a. Natural.
 - b. Sling type.
 - c. Earth filled, steel bin.
 - d. Water filled, plastic bin.
59. (413) When *all* the munitions in a single storage area are covered by one symbol, the fire symbol is posted
- a. at the entry control point.
 - b. at the rear of structure.
 - c. on top of the facility.
 - d. inside each facility.

60. (413) Posting or changing the fire symbol is the responsibility of the
- munitions flight chief.
 - senior munitions inspector.
 - person-in-charge of the operation.
 - munitions accountable systems officer (MASO).
61. (414) Location designators for munitions consist of how many digits?
- 1.
 - 2.
 - 11.
 - 21.
62. (414) The “A” in location designator 34A003C001E represent the
- last two digits of the building number.
 - designated bay within a warehouse.
 - shelf level.
 - row.
63. (414) The “003” in location designator 34A003C001E, represents the
- last two digits of the building number.
 - bay within a warehouse.
 - shelf level.
 - row.
64. (414) When direct input methods are *not* used what AF IMT form is used to document munitions movements from one location to another?
- 68.
 - 102.
 - 2005.
 - 4331.
65. (414) Which statement is considered a general munitions warehousing principle?
- Never use dunnage in an igloo.
 - Never exceed the stack limit of a specific munitions item.
 - Store munitions and containers flush to the wall of a magazine.
 - Lot numbers can be mixed in the stack of like munitions items.
66. (414) How many lite boxes are allowed per stock/lot number and condition code in one base stock location?
- One.
 - Two.
 - Three.
 - Four.
67. (414) The lite box should be stored on the
- top and to the back of the stack.
 - top and to the front of the stack.
 - bottom and to the back of the stack.
 - bottom and to the front of the stack.
68. (414) Which of these regulatory guidance governs explosive safety standards?
- AFI 21-101.
 - AFI 21-201.
 - AFMAN 23-110.
 - AFMAN 91-201.

69. (414) Who approves the written agreement authorizing storage of custody assets?
- a. The custody account custodian and the organizational commander.
 - b. The munitions storage area flight chief and the custody account custodian.
 - c. The munitions storage area flight chief and the organizational commander.
 - d. The munitions accountable systems officer and the organizational commander.
70. (414) How often are courtesy storage agreements reviewed?
- a. Monthly.
 - b. Quarterly.
 - c. Semi-annually.
 - d. Annually.
71. (414) The storage method designed and tested to increase the explosive storage capacity of limited net explosive weight (NEW) igloos, without increasing quantity distance separation requirements is
- a. stuff-it.
 - b. buffered storage.
 - c. survive to operate.
 - d. complete round storage.
72. (415) The weapon storage and security system (WS3) was designed to store and secure which specific type of munitions?
- a. Missiles.
 - b. Small arms.
 - c. Conventional.
 - d. Special weapons.
73. (415) Which weapon storage and security system (WS3) group provides physical storage and security?
- a. Console.
 - b. Coder-transfer.
 - c. Monitor-indicator.
 - d. Vault control group.
74. (415) Which weapon storage and security system (WS3) group provides communications and processing capabilities for monitoring the status of up to 80 vault subsystems?
- a. Console.
 - b. Vault control.
 - c. Coder-transfer.
 - d. Monitor-indicator.
75. (415) Which weapon storage and security system (WS3) group uses portable modules to store and transfer encryption keys?
- a. Console.
 - b. Coder-transfer.
 - c. Monitor-indicator.
 - d. Vault control group.

Student Notes

Glossary of Abbreviations and Acronyms

AA&E	arms, ammunition, and explosives
ACP	ammunition control point
ADR	ammunition disposition request
AF IMT	Air Force information management tool
AFMAN	Air Force manual
AFQTP	USAF Qualification Training Package
ALC	Air Logistics Center
ASHS	assessment system for hazard reduction survey
CAA	competent approval authority
CADS	containerized ammunition distribution system
CAS	combat ammunition system
CFR	Code of Federal Regulation
CIIC	controlled inventory item code
CMRS	conventional munitions restricted or suspended
COE	certification of equivalency
COTS	commercial-off-the-shelf
DIFM	due-in for maintenance
DODAC	Department of Defense ammunition code
DODIC	Department of Defense identification code
DOT	Department of Transportation
DRIS	deficiency reporting and investigating system
DRMO	Defense Reutilization and Marketing Office
ECM	earth-covered magazine
ES	exposed site
ESP	explosives site plan
FSC	Federal Stock Class
GACP	Global Ammunition Control Point
HAS	hardened aircraft shelter
HAZMAT	hazardous material
HD	hazard division
Hz	hertz
IAW	in accordance with
IBD	inhabited building distance

ILD	intraline distance
IMD	intermagazine distance
ISO	International Organization for Standardization
JHCS	Joint Hazard Classification System
MAJCOM	major command
MASO	munitions accountable systems officer
MCE	maximum credible event
MSA	munitions storage area
NATO	National Atlantic Treaty Organization
NCOIC	noncommissioned officer in charge
NEW	net explosive weight
NSN	national stock number
OO-ALC	Ogden-Air Logistics Center
PES	potential explosion site
PI	periodic inspection
PII	pre-issue inspection
POL	petroleum, oil, and lubricant
POP	performance oriented packaging
PQDR	product quality deficiency report
QD	quantity distance
RI	receiving inspection
RMI	returned munitions inspection
ROD	report of discrepancy
SDM	static display munitions
SDR	supply discrepancy report
SF	standard form
SI	shipping inspection
SMI	storage monitoring inspection
SEI	special experience identifier
SPI	special inspection; special packaging instruction
TBA	Training Business Area
TCTO	time compliance technical order
TDR	transportation discrepancy report
TDY	temporary duty

TMO	transportation management office
TMRS	tactical missile reporting system
TO	technical order
VAC	volt, alternating current
WEBFLIS	Web Federal Logistics Information System
WS3	weapons storage and security system

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