

## CHAPTER 12

# AMMUNITION STORAGE AND HANDLING ASHORE

Ammunition storage ashore applies to the storage of explosives, ammunition, and ammunition components in two different types of environments and operational conditions. When ammunition is stored at permanently established storage locations, such as naval air stations, naval stations, or other ammunition activities, extensive safety and procedural requirements exist. However, strategic operations may necessitate the establishment of ammunition storage facilities at advanced bases. Although governing regulations exist for the storage of ammunition at advanced bases, they are not as extensive as those governing permanent storage requirements and regulations. The following text covers ammunition storage ashore and ammunition storage ashore for advanced bases.

### AMMUNITION STORAGE ASHORE

**LEARNING OBJECTIVE:** *Identify ammunition magazines used ashore. Recognize the explosive safety quantity-distance (ESQD) requirements. Recognize the hazards posed by various classes of ammunition. Identify storage capability groups and their use. Identify the facilities used to store ammunition at advanced bases.*

All units of the Naval Shore and Marine Corps Establishments that produce, store, ship, or otherwise handle ammunition, explosives, and other hazardous materials are under the management and control of NAVSEASYSKOM. Also, NAVSEASYSKOM manages and controls the technical aspects of assembling, maintaining, storing, issuing, shipping, and handling ammunition, explosives, or other hazardous materials.

### AMMUNITION IDENTIFICATION

Ammunition identification is an important part of ordnance handling and administration. Ammunition identification tells you the service/nonservice type of ammunition, class of explosive contained in the round, Mark (Mk) and modification (Mod) numbers, lot numbers, and color codes representing the explosive hazards.

### Service Ammunition

Ammunition intended for operational use is classified as service ammunition. The warhead contains explosives, pyrotechnics, or chemical agent filler. If required, the propellant is of service or reduced charge weight. Aircraft service ammunition is identified as either armament (kill stores) or ordnance (search stores).

### Nonservice Ammunition

Ammunition used for training personnel is classified as nonservice ammunition. This ammunition may be actual service (tactical) quality or may be specially modified or loaded practice ammunition, inert training, inert dummy/drill, or exercise/recoverable ammunition.

#### **PRACTICE/TRAINING AMMUNITION.—**

This ammunition is designed for training, practice, or systems testing purposes. It is actually launched, fired, or dropped. It may be a modification of service ammunition designed specifically for practice. Practice ammunition may or may not contain explosive or pyrotechnic materials. Practice ammunition may be either expendable or recoverable, depending upon the device involved.

#### **DUMMY DRILL/INERT AMMUNITION.—**

This ammunition is completely inert ammunition. It is used to represent the service ammunition for display purposes, testing weapons, and weapons handling operations. It is also used to develop assembly, testing, and handling proficiency of personnel without actually firing or launching the ammunition.

#### **EXERCISE/RECOVERABLE AMMUNITION.—**

This is service ammunition that is functional in all respects **except** for the explosive payload. The payload furnishes operational data by the substitution of recoverable exercise components. Pyrotechnics, dye marker, or explosive fittings may be attached to or incorporated in the ammunition.

**Table 12-1.—Ammunition Color Codes**

<b>COLOR</b>	<b>INTERPRETATION</b>
Yellow	(1) Identifies high explosives. (2) Indicates the presence of explosive, either, (a) sufficient to cause the ammunition to function as a high explosive, or (b) particularly hazardous to the user.
Brown	(1) Identifies rocket motors. (2) Indicates the presence of explosive, either, (a) sufficient to cause the ammunition to function as a low explosive, or (b) particularly hazardous to the user.
*Gray	(1) Identifies ammunition that contains irritant or toxic agents when used as an overall body color except for underwater ordnance.
Gray with Red Band(s)	(1) Indicates the ammunition contains an irritant (harassing) agent.
Gray with Dark Green Band(s)	(1) Indicates the ammunition contains a toxic agent.
*Black	(1) Identifies armor-defeating ammunition, except on underwater ordnance.
Silver/Aluminum	(1) Identifies countermeasure ammunition.
Light Green	(1) Identifies smoke or marker ammunition.
Light Red	(1) Identifies incendiary ammunition or indicates the presence of highly flammable material.
*White	(1) Indicates illuminating ammunition or ammunition producing a colored light; exceptions, underwater ordnance, guided missiles, and rocket motors.
Light Blue	(1) Identifies ammunition used for training or firing practice.
*Orange	(1) Identifies ammunition used for tracking or recovery.
Bronze	(1) Identifies Dummy/Drill/Inert ammunition used for handling and loading training.
<b>Nonsignificant Colors</b>	
Olive Drab	(1) All ammunition items.
Black	(1) For lettering.
White	(1) For lettering. (2) For guided missiles and rocket motors.
<p>*NOTES: The following colors when applied as stated have NO identification color coding significance:</p> <ul style="list-style-type: none"> <li>a. The colors GRAY, ORANGE, BLACK, WHITE, BRICK RED OR GREEN on underwater ordnance, such as mines and torpedoes, and the color WHITE on guided missiles or rocket motors.</li> <li>b. The colors BLACK and WHITE when used for lettering.</li> <li>c. The color WHITE when used in diamond shaped figures on ammunition.</li> </ul>	

## Painting

Painting (table 12-1) is the application of the final body coating to ammunition, ammunition components, or ammunition containers by authorized activities. Usually, paint color identifies the use or explosive hazards of the ammunition; however, sometimes it has no meaning.

## Marking

Marking is the application of colored spots, bands, or symbols on ammunition, ammunition components, or ammunition containers. Markings, by their color or shape, identify ammunition fillers or the presence of specific ammunition components.

Chemical filler ammunition, ammunition components, and ammunition containers are identified by bands that are color-coded (table 12-1). Marking symbols placed on a line parallel to the colored bands identifies chemical fillers.

## Lettering

Lettering is the use of letters, words, abbreviations, or numerals on ammunition, ammunition components, or ammunition containers. Lettering is put on ammunition by die stamping, stenciling, decals, etching, or rubber-stamping. Lettering identifies the type, mark and modification, ammunition lot number, and loading information of the ammunition item. Lettering applied in black or white has no color-code significance.

## Mark and Modification Designation

The Mk number is an Arabic numeral and represents a basic design. A modification (Mod) number to represent a less than major change in design follows it. For example, the mark/modification number assigned to a general-purpose bomb without a change to the basic design is Mk 82 Mod O. If a minor change to the basic design is incorporated, it is designated as Mk 82 Mod 1. If further changes are incorporated, the

modification designations are assigned in sequence, Mod 2, Mod 3, Mod 4, and so forth.

Some explosive devices and ordnance or armament (such as cluster weapons and bomblets used in cluster weapons) are designated by groups of letters and numbers. An example of this type designation is BLU-7A/B (table 12-2).

U.S. Army ammunition retains the Army identifier that uses a letter, numeral, and letter and numeral system. For example, the model is designated M23. The first modification of this model is designated M23A1, and subsequent modifications are designated by M23A2, M23A3, etc. If the Navy and Army jointly developed an item, the letters AN (Army/Navy) precedes the model identifying designation. For example, a model is designated AN-M173. The first modification of this model is designated AN-M173A1. Later modifications are designated as AN-M173A2, AN-M173A3, etc.

## Department of Defense Identification Code (DODIC) and Navy Ammunition Logistic Code (NALC)

The Department of Defense Identification Code (DODIC) is a four-digit code assigned by the Defense Logistics Services Center (DLSC). It identifies ammunition and explosive items (non-nuclear) within the supply system applicable to all the armed forces. The Navy Ammunition Logistic Code (NALC) is a four-digit code assigned by Ships Parts Control Center (SPCC). It identifies Navy-unique items of ordnance.

The DODIC and NALC are interchangeable terms and are included as part of the letter identification contained on ammunition and ammunition components. These codes are used specifically for logistic control and ammunition administration.

If an ammunition item or ammunition component has been modified, a DODIC/NALC code is assigned to the modified item. For example, Mk 105 Mod O is assigned code A811 and Mk 105 Mod 1 is assigned code A894. A complete listing of DODICs and NALCs

Table 12-2.—Item Identification Designations for Cluster Munitions

Bomb or Mine	BLU
Seventh Model and First Modification	7A
Unit Must Be Expended on Mission	/B

is contained in *Navy Ammunition Logistics Codes*, NAVAIR 11-1-116B/TW010-AA-ORD-030.

**Ammunition Lot Number**

An *ammunition lot* is a quantity of ammunition assembled from uniform components under similar

conditions. A lot is expected to function in a uniform manner. Each ammunition lot (table 12-3) is assigned a code number (ammunition lot number) that identifies **all** ammunition items assembled as part of that lot. For specific ammunition lot numbers, you should refer to *Identification of Ammunition*, NAVSEA SW010-AF-ORD-010/NAVAIR 11-1-117.

**Table 12-3.—Derivation of Lot Number**

KEY	DEFINITION
a	Lot sequence number
b	Manufacturer's identification symbol
c	Month of production (two digit)
d	Year of production (two digit)
e	Month of production (single alpha)  JAN—A    MAY—E    SEP—J FEB—B    JUN—F    OCT—K MAR—C    JUL—G    NOV—L APR—D    AUG—H    DEC—M
f	Interfix number
g	Lot suffix (alpha)
<p>Example:</p> <p>Lot Number,            Method 1:    11        ABC        0588            Key:        (a)        (b)        (c)(d)</p> <p>(Note that (c) and (d) will be used to compute service life.)</p> <p>Example:</p> <p>Lot Number,            Method 2:    XYE        88        E        001-011A            Key:        (b)        (d)        (e)        (f)(a)(g)</p> <p>(Note that (d) and (e) will be used to compute service life.)</p>	

## MAGAZINES

Explosives and ammunition are stowed in magazines or areas designated for the specific materials. NAVSEASYS COM designs and designates all magazines or storage areas. The type and amount of material that may be stowed in any magazine depends on the type of magazine in relation to the explosive safety quantity-distance requirements.

### Types of Magazines

Magazines located at naval air stations and other naval installations are of various sizes, types of construction, and classes, depending upon the nature of the material to be stowed. Magazines are designated as high-explosive magazines, smokeless-powder magazines, and ready-service magazines according to their intended use. Magazines are further classified by type of design—surface, subsurface, arch-type, earth-covered, or barricaded.

Recently designed magazines used to store smokeless powder, pyrotechnics, loaded projectiles, fixed ammunition, small-arms ammunition, and other fire or missile hazard materials are of two general types—the rectangular, earth-covered magazine and the concrete, triple-arch, earth-covered magazine.

1. The rectangular, earth-covered magazine (50 feet by 100 feet) is constructed of reinforced concrete throughout.
2. The concrete, triple-arch, earth-covered magazine has three arches. The combined arches make up a single magazine; however, each arch is separated by a minimum of 10 feet at the door, and the space is filled with dirt. The standard floor size of each arch in the triple-arch construction is 25 feet by 80 feet. Each of the three arches may be used for a different type of compatible material.

Magazines constructed since 1928 that are used for storing high explosive, bomb-type ammunition, and other explosive hazard materials are made of reinforced concrete, single-arch, earth-covered type construction and they are barricaded at the entrance end. These magazines have been constructed in three sizes:

1. The 25 feet by 50 feet and the 25 feet by 40 feet sizes are suitable for the stowage of 250,000 pounds net weight of explosives.

2. The 25 feet by 80 feet size is suitable for the stowage of 500,000 pounds net weight of explosives.

Additionally, the following miscellaneous types of magazines may be found at certain establishments.

**KEYPORT** - The keyport magazine is earth-covered and arch-shaped with a prefabricated concrete construction. It has interior floor dimensions of 6 feet by 8 feet 8 inches. The height of the arch is approximately 6 feet.

**BOX** - A box magazine is of concrete construction, rectangular shape, and normally measures 12 feet by 17 feet.

**CORBETTA** - A corbetta magazine is of concrete construction and is shaped like a beehive or dome.

**GALLERY** - A gallery magazine is a tunnel or cave, and the dimensions will vary.

**MISCELLANEOUS OR NONSTANDARD** - The physical dimensions of the miscellaneous or nonstandard magazine depend on the type of stowed material and the location of the magazine.

**OPEN STORAGE** - The type and amount of explosives stowed in open stowage depend on the size and location of the storage area.

### Explosive Safety Quantity-Distance (ESQD) Requirements

Explosive Safety Quantity Distance (ESQD) requirements apply to the concentration of ammunition, explosives, and other hazardous materials at Naval Shore Establishments for development; manufacturing; test and maintenance; storage, loading and off-loading of vehicles, railcars and aircraft; disposal; and all related handling incidents.

Explosive Safety Quantity Distance (ESQD) requirements are based on records of actual fires and explosions involving ammunition and explosives. ESQD requirements safeguard personnel against possible serious injury or equipment destruction from possible fires or explosions. These requirements also protect the inhabitants of nearby communities, private and public property, and the Naval Shore Establishment personnel. These requirements keep the loss of valuable ammunition stores (including inert ordnance items) to a minimum if there were a fire or explosion.

The Department of Defense (DOD) ESQD hazard classification system is based on a system recommended for international use by the United Nations Organization (UNO). The UNO system has nine classes of hazardous material; but, DOD only uses three of the nine classes—Class 1, explosives; Class 2, Division 3, poison A; and Class 6, poisonous (toxic) and infectious substances. Table 12-4 identifies each of the nine classes.

In reviewing table 12-4, you can see that some items are placed in classes other than Class 1. Since DOD uses only Class 1 items for explosives, Class 1 assignments have been made. However, to maintain identity, DOD places these items in Class 1 for storage only until DOD implements other classes. As an AO, you are involved with the storage of Class 1 material; therefore, the information contained in this section only deal with Class 1 classifications.

DOD Hazard Class 1 is subdivided into divisions 1 through 5, based on the character and predominance of the associated hazards and the potential for causing personnel casualties or property damage. These subdivision are not based upon compatibility groups or

intended use. The division within Class 1 and the expected hazard for each division is listed in table 12-5.

**MASS-DETONATING HAZARD MATERIALS (CLASS 1, DIVISION 1).**—Damage from mass-detonating hazard materials is caused by concussion or blast or by sympathetic detonation. Prescribed distances between piles of these materials and between magazines containing these materials must be maintained to minimize the possibility of sympathetic detonation or propagation. Ammunition and explosives that are considered mass-detonating hazards are Hazard Class 1, Division 1.

**NON-MASS-DETONATING HAZARD, FRAGMENT-PRODUCING MATERIALS (CLASS 1, DIVISION 2).**—The principal hazards for items within this division are fragment and blast, either individually or in combination, depending on such factors as storage configuration, type of packing, and quantity. The designated minimum distances are based upon the limited range of fragments. These are the distances that must be used for protection of inhabited buildings and public traffic routes. Since fragment-producing materials can be grouped according to the

**Table 12-4.—United Nations Organization Hazard Classes**

<b>CLASS</b>	<b>TYPE OF HAZARDOUS MATERIAL</b>
1	Ammunition and explosives, DOT Classes A, B, and C; Blasting Agents
2*	Compressed gases, flammable and nonflammable, Poison gases (Poison A)
3	Flammable liquids
4	Flammable solids or substances
5	Oxidizing materials
6*	Poisonous substances (Poison B); Irritating materials; Etiological agents
7	Radioactive materials
8	Corrosive materials
9	Miscellaneous dangerous substances (other regulated materials)

\*Includes ammunition without explosive components which contain toxic chemical agents, and containers of toxic chemical agents in bulk. Formerly ESQD Class 8.

Table 12-5.—Hazard Class 1 Division Designators and Types of Hazards

DIVISION DESIGNATOR	TYPE OF HAZARD
1	MASS DETONATING
2	NON-MASS DETONATING, FRAGMENT PRODUCING
3	MASS FIRE
4	MODERATE FIRE, NO BLAST
5	VERY INSENSITIVE

range of the fragments produced, four fragment distance categories have been established. This permits flexibility of storage. Most fragments produced by incidents in this division will fall within one of four specified minimum distances—400, 800, 1,200, and 1,800 feet.

**MASS FIRE HAZARD MATERIALS (CLASS 1, DIVISION 3).**—Items in this division burn vigorously. There is little or no possibility for extinguishing them in a storage situation. Normally, explosions will be confined to pressure ruptures of containers and will not produce propagating shock waves or damaging blast overpressure beyond specified distances. A severe fire may result from the tossing about of burning container materials, propellant, or other flaming debris. Toxic effects, such as burning pyrotechnic items, will not normally extend beyond the inhabited building distances specified for this division.

**MODERATE FIRE HAZARD, NO BLAST MATERIALS (CLASS 1, DIVISION 4).**—Items in this division present a fire hazard with no blast hazard and virtually no fragmentation or toxic hazard beyond the fire hazard clearance specified for high-risk materials. However, separate facilities for storage and handling of this division should not be less than 100 feet from other facilities. However, if the facilities are of fire-resistive construction, they may be 50 feet from each other. If devices containing explosives are such that accidental ignition during storage or transport will not cause external damage to the devices, either by fire, smoke, heat, loud noise, or by visible damage to the outer packaging, they are not considered Class 1 items. These devices may be considered inert for storage purposes and marked **AMMUNITION NON-EXPLOSIVE** for transport purposes.

Certain articles within the division that contain one ounce or less of explosives have (based on test results) been classified as Class 1, Division 4S. These articles may be considered inert for storage purposes, and they are not subject to explosive transportation regulations. Articles containing larger quantities of explosives, also classified as Class 1, Division 4S, may be considered inert for storage purposes. However, they must be reviewed on an individual basis to determine whether explosive transportation regulations are applicable.

**VERY INSENSITIVE EXPLOSIVE ITEM MATERIALS (CLASS 1, DIVISION 5).**—Items in this division are considered very insensitive when not stored or transported with other Class 1 materials. DOD considers these items to be the same as Class 1, Division 1, Compatibility Group D. There is very little probability of accidental explosion or transition from deflagration to detonation. The materials within this division are shipped as ESQD Hazard Class 1, Division 5. They are stored as Class 1, Division 1, Compatibility Group D.

Normally, technical manuals do not present the hazard class, division, and compatibility group as they are written in previous paragraphs. For example, an item classified as Class 1, Division 5, Compatibility Group D, is written as Class 1.5D; or for an item in Class 1, Division 4, Compatibility Group S is written as Class 1.4S.

**Storage Compatibility Groups**

Ammunition and explosives are assigned to one of twelve storage compatibility groups (A through H, J, K, L, and S).

**GROUP A** - Group A items are initiating explosives. These are bulk initiating explosives that have the necessary sensitivity to heat, friction, or percussion to make them suitable for use as initiating elements in an explosive train. Wet lead oxide, wet lead styphnate, wet mercury fulminate, wet tetracene, dry RDX, and dry PETN are examples of initiating explosives.

**GROUP B** - Group B items are detonators and similar initiating devices. These are items containing explosives that are designed to initiate or continue the functioning of an explosive train. Detonators, blasting caps, small arms primers, and fuzes without two or more safing features are examples of Group B items.

**GROUP C** - Group C items are bulk solid propellants, propelling charges, devices containing propellant with or without a means of ignition, and items that will deflagrate, explode or detonate upon initiation. Examples of Group C items are single-, double-, and triple-base propellants, composite propellants, rocket motors (solid propellant), and ammunition with inert projectiles.

**GROUP D** - Group D items are secondary detonating explosive substances or black powder or articles containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or articles containing a primary explosive substance and containing two or more effective protective features. Examples of these items are explosive switches or valves, and other ammunition items packaged to meet the criteria established for this group.

**GROUP E** - Group E items are ammunition that contains HE without its own means of initiation with a propulsive charge (other than one containing a flammable or hypergolic liquid). Examples of these items are artillery ammunition, rockets, and guided missiles.

**GROUP F** - Group F items are articles containing a secondary detonating explosive substance with its means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid) or without a propelling charge. Examples are items initiated by means of a bouchon-firing device, grenades, sounding devices, and similar items that have an in-line explosive train in the initiator.

**GROUP G** - Group G items is fireworks, and illuminating, incendiary, smoke (including HC) or tear-producing munitions other than those munitions that are water activated or contain white phosphorus,

flammable liquid or gel. This group includes ammunition that, upon functioning, results in an incendiary, illumination, lachrymatory, smoke, or sound effect. Examples of these items are flares, signals, incendiary or illuminating ammunition, and other smoke or tear-producing devices.

**GROUP H** - Group H items contains explosives and white phosphorus or other pyrophoric material. Ammunition in this group contains filler, which is spontaneously flammable when exposed to the atmosphere. Examples of these items are white phosphorus (WP), white phosphorus plasticized (PWP), or other ammunition containing pyrophoric material.

**GROUP J** - Ammunition in this group contains both explosives and flammable liquids or gels. This ammunition contains flammable liquids or gels other than those that are spontaneously flammable when exposed to water or to the atmosphere. Examples of these items are liquid- or gel-filled incendiary ammunition, fuel air explosive (FAE) devices, flammable-fueled missiles and torpedoes.

**GROUP K** - Ammunition in group K contains both explosives and toxic chemical agents. Ammunition in this group contains chemicals specifically designed for incapacitating effects that are more severe than lachrymation. Examples of these items are artillery or mortar ammunition (fuzed or unfuzed), grenades, and rockets or bombs filled with a lethal or incapacitating chemical agent.

**GROUP L** - Ammunition in-group L is not included in other compatibility groups. Ammunition in this group has characteristics that don't permit storage with other types of ammunition, explosives, or dissimilar ammunition within this group. Examples of these items are water-activated devices, prepackaged hypergolic liquid-fueled rocket engines, certain fuel-air-explosive (FAE) devices, TPA (thickened TEA), and damaged or suspect ammunition of any other group. Types of ammunition having similar hazards can be stored together but cannot be mixed with other groups.

**GROUP S** - Ammunition in this group presents no significant hazard. It is designed or packed so all the accidental functioning hazards are confined within the package, unless the package has been degraded by fire. In this case, all blast or projection effects are limited to the extent they will not significantly hinder fire-fighting operations. Examples of these items are thermal batteries, explosive switches or valves, and other

ammunition items that are packaged to meet the criteria established for this group.

Ammunition and explosives are assigned to compatibility groups. When stored within their assigned group, ammunition and explosives can be stored together without significantly increasing either

the probability of an accident or, for a given quantity, the magnitude of the effects of such an accident. The mixing of storage compatibility groups is permitted by NAVSEASYSKOM, as shown in figure 12-1. The mixing of storage compatibility groups other than those shown in figure 12-1 must be approved by NAVSEASYSKOM.

GROUPS	A	B	C	D	E	F	G	H	J	K	L	S
A	X	Z										Z
B	Z	X										X
C			X	Z	Z		Z					X
D			Z	X	X							X
E			Z	X	X							X
F						X						X
G			Z				X					X
H								X				X
J									X			X
K										Z		
L												
S	Z	X	X	X	X	X	X	X	X			X

NOTES:

- The marking "X" at an intersection of the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted per note 2 below.
- The marking "Z" at an intersection of the above chart indicates that, when warranted by operational considerations or magazine non-availability, and when safety is not sacrificed, logical mixed storage of limited quantities of some items of different groups may be combined in storage as approved by NAVSEASYSKOM. Approval is not to be considered a waiver. Combinations that violate the principles of paragraph 2-3.3 require justification by a waiver or exemption. Examples of acceptable combinations of Class 1 are:
  - Division 1, Group C bulk propellants with Division 1 bulk HE
  - Division 1, Group C rocket motors with Division 1, Group D bombs (HE) without their own means of initiation.
  - Group C rocket motors with Group E complete rocket systems having the same rocket motor.
  - Division 3 Group C bulk propellants or bagged propelling charges with Division 3, Group G pyrotechnics without their own means of initiation.
- Equal numbers of separately packaged components of complete rounds of any single type of ammunition may be stored together. When so stored, compatibility is that of the assembled round, i.e., WP filler in Group H, HE filler in groups D, E, or F, as appropriate.
- Ammunition designated "Practice" by NSN and nomenclature may be stored with the fully loaded ammunition it simulates.
- Mixing of compatibility groups (except items in groups A, B, & L) in limited quantities is authorized by NAVSEASYSKOM. Such mixed storage is not to exceed a total of 1,000 pounds net explosive weight and will be considered as the highest hazard division included.
- Group K requires not only separate storage from other groups, but may also require separate storage within the group. NAVSEASYSKOM shall determine which items in group K may be stored together and those which may be stored separately.
- Ammunition items without explosives which contain substances properly belonging to another hazard class may be assigned to the same compatibility group as items containing explosives and the same substance, and be stored with them.

17NP0323

Figure 12-1.—Storage compatibility mixture chart.

**Table 12-6.—Magazine Designators for Mass Detonating Hazard of High Explosives (Bulk, Depth Charges, Mines, Warheads, Bombs, etc.), Fuzes, Detonators, Exploders, and Black Powder**

<b>DIMENSIONS</b> (nominal)	<b>NORMAL USE</b>	<b>NORMAL EXPLOSIVE LIMIT</b>	<b>LETTER DESIGNATOR</b>
25' × 80' arch type (igloo)	High explosives	500,000 lb	A
25' × 50' arch type (igloo)	High explosives	250,000 lb	B
25' × 40' arch type (igloo)	High explosives	250,000 lb	B
39' × 44' or 32' × 44' (warhead type)	High explosives	500,000 lb	W
12' × 17' (box type)	Black powder	20,000 lb	E
Miscellaneous or nonstandard size	High explosives	Dependent upon size, location, construction	X
Open storage	High explosives	Dependent upon size, location	R
25' × 20' arch type (igloo)	Fuze and detonator	70,000 lb	F
52' dome (Corbetta type)	High explosives	500,000 lb	D
Dimensions vary (gallery or tunnel type)	High explosives	250,000 lb	G
10' × 14'	Fuze and detonator	15,000 lb	H
10' × 7'	Fuze and detonator	7,500 lb	H
6' × 8'8" (Keyport type)	High explosives	4,000 lb	K
52' × 97' (box type A)	High Explosives	500,000 lb	A
62' × 76' (box type B)	High Explosives	500,000 lb	A

## IDENTIFICATION OF FACILITIES

Buildings and magazines, including open storage sites that contain ammunition, explosives, or chemical and inert components, are marked according to a standard system of identification so you can rapidly identify the hazards associated with their contents. This identification and numbering system is used in addition to any other numbers on the buildings. **These standard identification markings are stamped out over other markings, if present.** The standard identification system consists of the magazine designator and the symbol indicator.

The magazine designator is a three-group symbol, composed of numbers and letters. It identifies a magazine by location of the magazine group, the number of the magazine within the group, and the type of magazine construction. The magazine group number, the type of magazine and capacity letter(s), and the magazine sequence number form the three-group symbol that makes up the magazine designator.

### Magazine Group Number

The magazine group number is the first number of the magazine designator symbol. It shows the magazine group in which the magazine is located. Each physically separated group of magazines or, at smaller stations, each noncontiguous magazine area is assigned a number, making it easy to identify the group. The group numbers begin with 1 and continue in ascending numerical order. If only one magazine group exists, the number 1 is used. For example, the numeral 4 in the first position of the magazine designator 4XTX4 indicates that this magazine is located within magazine group 4.

### Magazine Type and Capacity Letter(s)

The magazine type and capacity letter(s) shows the type and capacity of the magazine. For this reason, magazines of certain sizes are assigned a letter designation as indicated in tables 12-6, 12-7, 12-8, and 12-9. To show the type of magazine, for example, the letter T is added if the magazine is earth-covered and barricaded. If the magazine is earth-covered but not barricaded the letter C is added. If the magazine is not earth-covered but is barricaded, the letter S is added. Therefore, in the magazine designator 4XTX4, the letter X in the second position indicates that the magazine size is miscellaneous or nonstandard, and it is normally used for storing high explosives. Also, the

normal explosive storage limit depends on the magazine's size, location, and type of construction.

The explosive limits contained in tables 12-4 through 12-7 are maximum capacities. They are based on magazine design and construction characteristics. These limits are further subject to the ESQD considerations discussed previously. Additional limitations are shown in the magazine designator. When the ESQD relationship, as indicated in the tables, doesn't permit using the explosive capacity design of a standard magazine because of insufficient separating distances, the letter X, Y, or Z is added to the designator. These letters indicate the magazine contains mass detonation hazards, mass fire hazards, or fragment-producing hazards, respectively. For example, in the magazine designator 4XTX4, the letter X in the fourth position tells you that the magazine doesn't have a sufficient separating distance from other structures or magazines.

Before 1985, naval facilities used to store or maintain ammunition or explosives used a standard two-part system of identification—a color-hazard indicator and a magazine designator. **The color hazard indicator has been replaced by a system of fire, chemical hazard, and fire-fighting direction symbols.** When possible, mount placards at locations that are visible for a minimum distance of 500 feet in the daytime. Placards are placed on the road at distances of not less than 500 feet to indicate the magazine contents. This is required when vegetation or curves in the road obstruct visibility. When the contents of the magazine are changed or removed, the placards are also changed or removed. These placards are displayed to help fire fighters identify, from a safe distance, the type of hazards involved so they can determine the types of equipment and procedures to use.

### REVIEW NUMBER 1

- Q1. *Mandatory regulations governing the storage of ammunition ashore are found in \_\_\_\_\_.*
- Q2. *What prefabricated, concrete-constructed magazine is earth-covered and arch-shaped?*
- Q3. *What is the normal size of a box-type magazine?*
- Q4. *What concrete-constructed magazine is shaped like a beehive or dome?*
- Q5. *What magazine type consists of a tunnel or cave that has varied dimensions?*

**Table 12-7.—Magazine Designators for Fire Hazard of Powder (Bulk or Semifixed Ammunition), Pyrotechnics, Ignition Fuzes and Primers, Small Arms, Smoke Drums, and Explosive-Loaded Chemical Ammunition**

<b>DIMENSIONS</b> (nominal)	<b>NORMAL EXPLOSIVE LIMIT</b>	<b>LETTER DESIGNATOR</b>
50' × 100'	1,000,000 lb	L
25' × 80' triple-arch	1,000,000 lb	L
52' dome (Corbetta type)	1,000,000 lb	D
50' × 60'	300,000 lb	M
30' × 50'	125,000 lb	N
25' × 48'	125,000 lb	N
25' × 40'	125,000 lb	N
Miscellaneous or non- standard size	Dependent upon location, size, and construction	Y

**Table 12-8.—Magazine Designators for Fragment Hazard of Projectile and Fixed Ammunition**

<b>DIMENSIONS</b> (nominal)	<b>MAXIMUM EXPLOSIVE LIMIT</b>	<b>LETTER DESIGNATOR</b>
50' × 100'	500,000 lb	P
25' × 80' triple-arch	500,000 lb (total for three arches)	P
25' dome (Corbetta type)	500,000 lb	D
Miscellaneous or non- standard size	150,000 lb	Z

**Table 12-9.—Magazine Designators for Miscellaneous Magazines**

<b>DIMENSIONS</b> (nominal)	<b>TYPE</b>	<b>LETTER DESIGNATOR</b>
	All inert storehouses	SH

- Q6. What types of items are contained in storage compatibility Group B?
- Q7. Black powder belongs in compatibility storage group \_\_\_\_.
- Q8. What type of ammunition is found in compatibility Group S?
- Q9. The first number in a magazine designator symbol shows the \_\_\_\_\_.
- Q10. The letter T in the third position of a magazine designator indicates that the \_\_\_\_\_.

## AMMUNITION STORAGE ASHORE FOR ADVANCED BASES

**LEARNING OBJECTIVE:** *Identify ammunition storage ashore for advanced bases to include facilities, magazines, and handling requirements.*

*Advanced base* is the general term for a temporary base that is in or near a forward area outside the zone of the interior. The primary mission of an advanced base is to support wartime operations of the armed forces. Advanced bases are established to perform one or more of the following functions: to hold threatened strategic areas; to protect, or be part of, a line of communications and supply; to serve as a base for direct offensive operations; or to serve as a base for mounting or supporting further offensives.

If a valid reason for not complying with storage and handling regulations/instructions at advanced bases is not contained in NAVSEA OP 5, VOL 1, you need to refer to *Ammunition Ashore*, NAVSEA OP 5, VOL 3.

## AMMUNITION STORING AND HANDLING FACILITIES

When you establish an advanced base, divide the storing and handling facilities into areas. These areas should correspond to the functions required by the mission of the base, to make ordnance-handling operations easier and smoother, and to isolate hazards. Areas at advanced bases are designated as magazine, renovation, disposal, pier, enemy ammunition, and administration and personnel areas. These areas are discussed briefly in the following paragraphs.

**Magazine Areas.** Provide two or more magazine or storage areas for each advanced base. This allows you to disperse ammunition stows, and makes it easier to receive and issue ammunition. The primary objective in dispersing ammunition is to prevent the complete

loss of a single type of ammunition because of fire, accidental explosion, or hostile action. Ample provision should be made for expansion during the initial planning of magazine areas.

**Renovation Areas.** Some ammunition received at advanced bases would become unserviceable if it were improperly handled or exposed to the elements. This would make it require renovation. Since renovation operations may be performed at advanced bases, a suitable area must be provided for segregation, exterior maintenance, and modification operations.

**Disposal Areas.** Normally, an area unusable for other purposes is chosen for an ammunition disposal area. The disposal site should be **at least** 800 yards from the nearest ammunition storage site and any inhabited area of the base. The site should be cleared of all vegetation. A powder burning area, detonation pits, and a component popping pit should be included in the site. Provide a splinter proof or other suitable shelter to protect personnel during demolition operations. **Where facilities are available, ammunition may be destroyed by dumping at sea. Existing directives should be consulted for disposal procedures.**

**Pier Areas.** In the initial stages of construction of an ammunition storage area at an advanced base, an isolated and separate ammunition pier should be provided. Such a facility eliminates congestion, delay, and unnecessary hazards when loading and unloading general cargo, fuels, and ammunition.

**Enemy Ammunition Areas.** A separate area should be provided for storing captured enemy ammunition. This area should be **at least** 800 yards from the other storage areas.

**Administration and Personnel Areas.** Administration and personnel areas must be **at least** 800 yards from the ammunition storage and handling areas.

## Ammunition Storage Facilities

Ammunition is stored at advanced bases in approved magazines, existing buildings, and in dry caves and tunnels. Ammunition may also be stored in the open, in quarries, pits, and similar areas. Don't put ammunition in caves, tunnels, quarries, or pits if there isn't adequate drainage. When possible, assign available magazines and buildings for storing the more fragile and perishable ammunition, such as pyrotechnics, ammunition containing smokeless powder, fuzes, and similar components. Store the more

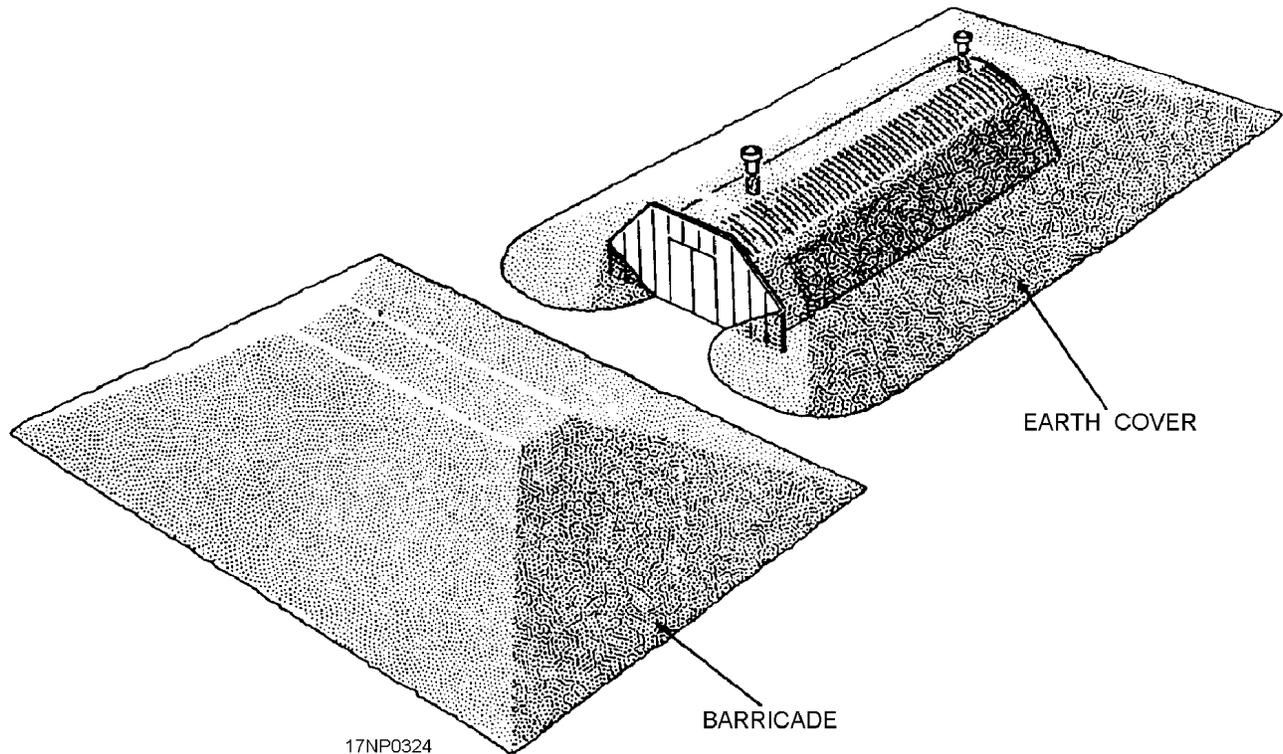


Figure 12-2.—Typical advanced base magazine.

durable ammunition, such as aircraft bombs and depth charges, in the open, provided it affords maximum protection against corrosion and deterioration.

**PREFABRICATED MAGAZINES.**—Advanced base magazines (fig. 12-2) are prefabricated, earth-covered, arch-type structures that are used to provide weatherproof storage for ammunition of all types.

The barrel of each advanced base magazine is an arch made of sheets of corrugated sheet metal bolted together to form a semicircular-arch roof. Two screened, sheet metal ventilators are mounted on top of the arch, one at the front of the magazine and one at the rear. The rear wall is constructed of corrugated sheet metal. The front wall is constructed of wide, heavy-gauge metal plates, which are reinforced with angles and channels. The front wall extends above and to each side of the outer limits of the magazine,

providing retaining walls for the earth fill. The ends of the plates that extend beyond the limits of the magazine are secured to the structure by turnbuckle rods. The magazine floor is a concrete slab placed on compacted gravel or broken stone fill. A pair of 8-foot, double-leaf doors is placed in the front wall of the magazine. Screened louvers are placed in each door for ventilation. Table 12-10 lists the available magazine sizes, maximum storage capacities, and the recommended separation distances between the magazines.

A barricade is placed opposite the front wall of each magazine used for the storage of high explosives or fuzes and detonators. The barricade extends to the height of the inside crown of the magazine arch. The barricade must be **at least** 3 feet wide at the crest and slope to a grade on the natural slope of the earth used as fill.

Table 12-10.—Prefabricated Advanced Base Magazines

MAGAZINE SIZE	MAXIMUM CAPACITY	QUANTITY-DISTANCE UNBARRICADED	QUANTITY-DISTANCE BARRICADED
16 × 36	50,000	200 feet	115 feet
25 × 48	150,000	290 feet	165 feet

**REVIEW NUMBER 1  
ANSWERS**

- A1. *Mandatory regulations governing the storage of ammunition ashore are found in OP 5 VOL 1.*
- A2. *The keyport magazine is a prefabricated, concrete-constructed magazine that is earth-covered and arch-shaped.*
- A3. *The normal size of a box-type magazine is 12 feet by 17 feet.*
- A4. *The Corbetta magazine is a concrete-constructed magazine shaped like a beehive or dome.*
- A5. *The Gallery magazine consists of a tunnel or cave that has varied dimensions.*
- A6. *Detonators and similar initiating devices are contained in storage compatibility Group B.*
- A7. *Black powder belongs in compatibility storage group D.*
- A8. *Ammunition that doesn't present any significant hazard is found in compatibility Group S.*
- A9. *The first number in a magazine designator symbol shows the magazine group number.*
- A10. *The letter T in the third position of a magazine designator indicates that the magazine is earth-covered and barricaded.*

**Identification of Magazines and Open Storage Sites**

When practicable, magazines, buildings used as magazines, and piles of ammunition stored in the open are marked according to the system of identification you have already read about. At advanced bases, the identification system consists of two parts—a group construction symbol and a symbol hazard indicator.

The group construction symbol is a three-group symbol that consists of the following:

1. A number indicating the group in which the magazine or open storage site is located,
2. A letter or group of letters designating the type and capacity of the magazine, and
3. A number designating the sequence of the magazine within the magazine group or area.

Letter designators for advanced base storage are indicated in table 12-11. To indicate the nature of the construction of the magazine, the letter *T* is added if the magazine is earth-covered and barricaded; the letter *C* is added if the magazine is earth-covered, but the door isn't barricaded. The letter *T* is also used to designate open storage. Advanced base magazines, buildings used as magazines, caves, tunnels, and open storage sites do not conform to the standard magazine sizes prescribed in NAVSEA OP 5, volume 1. Therefore, the letters *X*, *Y*, or *Z* that identify explosion hazard, fire hazard, or fragment hazard, respectively, are used in place of the standard letter designators. Accordingly, *XT* is applied to an earth-covered, barricaded, advanced base magazine that is used for storing high explosives.

**Table 12-11.—Letter Designators for Advanced Base Storage**

STORAGE	DESIGNATOR
Advanced base magazine:	
Explosion hazard	X
Fire hazard	Y
Fragment hazard	Z
Open storage	R
Caves and tunnels	G

In addition, the following information must be conspicuously posted on one door in each magazine or building that contains ammunition:

1. The hazard classification of ammunition (explosion, fire, or fragment) stored there.
2. The maximum quantities of ammunition in each hazard classification as determined from the explosive safety quantity-distance tables.
3. Safety precautions and regulations that pertain to the specific material presently stored in the magazine or building.

Post this information at each outside (open) ammunition storage site. Print the information on a card so it is protected from the weather. Then, put the card in a locally manufactured ammunition site sign and cardholder, as shown in figure 12-3.

Advanced base magazines are built in the most suitable location for storing one of the three hazard classifications—explosion, fire, or fragment. Since all advanced base magazines are of the same type of construction, all three-hazard classifications may be stored in them if they are within ESQD limitations. However, the group construction symbol designates the type of storage for which the magazine is most suitable. Don't change this symbol to show the magazine's present or new use, unless the change is permanent.

## DISPERSION OF AMMUNITION

Ammunition disbursement is a main consideration in laying out an ammunition storage area at an advanced base. Each type of ammunition is stored in two widely separated areas. This prevents losing an entire supply of an ammunition item if there is a fire or explosion. Explosive stores are separated from other stores, as specified in the ESQD tables.

Group piles of ammunition stored in the open by categories. These groups are discussed in the following paragraphs. These groupings aren't compatibility groups; they are only used to ensure safe distances are maintained between piles and stacks of ammunition.

**CATEGORY A.** This category of material presents a fire hazard. It includes propelling charges, bag charges, rocket motors, pyrotechnics, and small arms ammunition. Category A material should be separated from materials in the other categories (B through E) by **at least 350 feet**.

**CATEGORY B.** This category of material presents fire and fragment or fragment and explosion hazards. It includes fixed ammunition, separate-loading projectiles, complete rockets (assembled or unassembled), grenades, and mortars. Category B material should be separated from materials in the other categories by **at least 300 feet**.

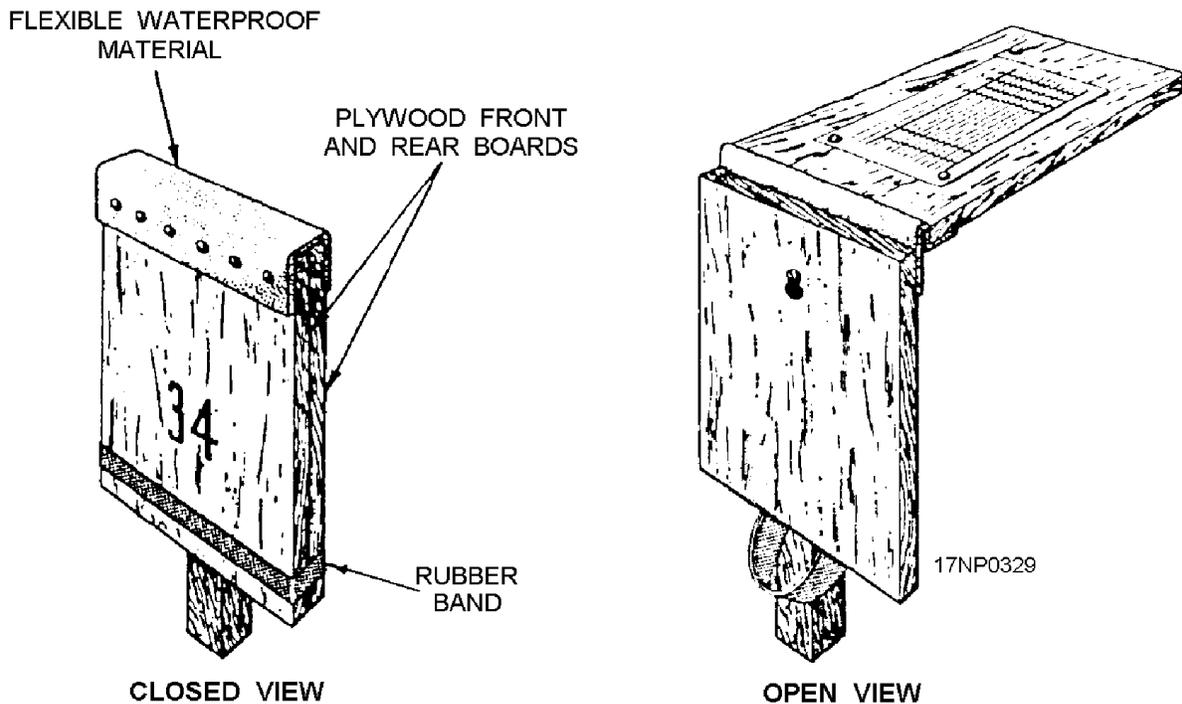


Figure 12-3.—Ammunition site sign and card holder.

**CATEGORY C.** This category of material presents an explosion hazard. This category includes bombs, warheads, depth charges, mines, demolition material, and bulk explosives. Category C material should be separated from materials in the other categories by **at least** 695 feet.

**CATEGORY D.** This category of material includes fuzes and detonators. Category D material should be separated from materials in the other categories by **at least** 200 feet.

**CATEGORY E.** This category of material includes chemical ammunition. Category E material should be separated from materials in the other categories by **at least** 400 feet.

## REVIEW NUMBER 2

- Q1. Describe the purpose of an advanced base.*
- Q2. What is the purpose of having at least two storage areas for each type of ammunition at an advanced base?*
- Q3. The disposal area at an advanced base should be a minimum of what distance from ammunition storage sites and inhabited areas?*
- Q4. List the characteristics of a prefabricated magazine at an advanced base.*
- Q5. At an advanced base, ammunition in Category A poses what sort of hazard?*

## MAGAZINE MAINTENANCE, STORAGE, AND HANDLING REQUIREMENTS

**LEARNING OBJECTIVE:** *Identify the types of procedures used for magazine maintenance, storage, and handling to include personnel requirements, lightning protection systems, magazine security, and ammunition handling and shipping.*

Proper explosives and ammunition storage facilities are only a part of the overall storage system. Among the most important aspects of the storage of ammunition is the proper maintenance of magazines and magazine areas.

## PERSONNEL REQUIREMENTS

Normally, all personnel engaged in operations that involve ammunition, explosives, and other hazardous

materials are trained and qualified to perform their assigned duties. In addition to being qualified and certified, personnel involved with hazardous explosive operations are certified by a physician as physically qualified. Personnel aren't knowingly permitted or required to work when their ability or alertness is impaired because of fatigue, illness, or other reasons. This would expose them and other personnel to injury.

Occasionally, manpower shortages cause a need for assistance by personnel from other Navy ratings to join working parties to handle or transport ammunition and explosives. These working parties are referred to as augmentation crews. Before using augmentation crews, try to make sure that personnel in the working party are trained so mistakes aren't made or safety factors violated. Furthermore, make sure enough qualified representatives, preferably officers or petty officers that are senior in rank to any member of the working party, are present to detect or prevent violations of safety orders and other unsafe practices. They should take whatever action is required to correct the situation.

## LIGHTNING PROTECTION SYSTEMS

Lightning protection is required for all ordnance handling buildings, storage facilities, and handling areas that have more than 5 days per year when thunderstorms occur.

There are two types of lightning protection systems—primary and secondary. The primary system prevents damage from direct lightning strikes by diverting the strike and providing a low-impedance path to ground. The secondary system maintains all metal objects within its system at the same electrical potential. This prevents the possibility of sparking between the objects.

### Primary Systems

There are two types of primary lightning protection systems acceptable to NAVSEASYSKOM—the separately mounted lightning mast system and the separately mounted overhead ground (aerial shield) wire system.

**LIGHTNING MAST SYSTEM.**—This type of primary system consists of lightning masts (freestanding air terminals) placed around a facility and connected to a buried primary girdle. A sufficient number of masts are used to protect the entire structure within the combined cones of the masts. The dimensions of the structure determine the number and

height of masts required to adequately protecting a structure.

**OVERHEAD GROUND (AERIAL SHIELD) WIRE SYSTEM.**—This system consists of overhead lightning protection conductors spanned between lightning masts above a facility. The conductors are connected to a buried ground girdle or to ground rods only, depending upon the type of installation.

### **Secondary System**

The secondary lightning protection system consists of a buried girdle to which all metal parts are connected at the lowest point. This implies that electrical access to all reinforced steel must be provided during construction. The normal wire ties are considered sufficient to provide electrical connection between the sections of reinforced steel that are in contact with each other.

### **MAGAZINE AND MAGAZINE AREA SECURITY**

Nonclimbable fences protect magazine areas. All the entrances are locked unless guards are posted. Post a sign at all the entrances to restricted areas. The sign indicates that every vehicle must stop, that each person must present proper credentials to the guard, and that all articles prohibited within the area must be given to the guard. The exact wording of the signs are left to the discretion of the commanding officer. However, the word *explosive* doesn't appear on the sign, and the sign isn't attached to the magazines.

Special precautions are taken to guard or patrol the areas that not protected by suitable fencing. Magazine and explosives areas where ammunition, explosives, and other items of high-security classification are stored must be adequately guarded at all times.

Don't let unauthorized personnel enter or remain in any magazine or explosives area. Personnel involved in ammunition handling operations are authorized in magazines or buildings that contain explosives only as required, and they must enter and leave explosives areas at designated points.

Additional information on the requirements for posting, fencing, unguarded facilities and vehicles, emergency events, and security alarm systems is found in *Department of the Navy Physical Security Instruction for Sensitive Conventional Arms, Ammunitions and Explosives (AA&E)*, OPNAVINST 5530.13.

### **REVIEW NUMBER 2 ANSWERS**

- A1. *An advanced base is a temporary base that is in or near a forward area outside the zone of the interior. Its primary mission is to support a wartime operation.*
- A2. *At least two storage areas for each type of ammunition is needed at an advanced base to prevent loss of a particular type of ammunition if there were a fire or explosion.*
- A3. *The disposal area at an advanced base should be a minimum of 800 yards from ammunition storage sites and inhabited areas?*
- A4. *A prefabricated magazine at an advanced base is an earth-covered, arch-type structure.*
- A5. *At an advanced base, ammunition in Category A poses a fire hazard.*

### **MAGAZINE/MAGAZINE AREA INSPECTIONS**

The commanding officer, or duly authorized representative, requires regular and frequent magazine inspections. These inspections include ready-service lockers, ready-service magazines, and magazine areas. Magazine inspections are conducted to make sure the following conditions are met:

- Ensure magazine repairs are made, if needed.
- Ensure that safety regulations, particularly those that involve cleanliness and elimination of fire hazards, are observed.
- Ensure that magazine contents are not deteriorating into an unsafe condition, and they are stored in an orderly, compatible, and approved manner.

The magazine area inspections are designed to make sure the following actions are being maintained:

- Firebreaks are being maintained.
- Fire protection equipment, when required, is available and serviceable.
- Roads are good and in usable condition.
- Fences are secure.

At times area inspections are performed more often than magazine inspections, particularly during seasons when grass or brush fires are most likely to occur.

## General Inspection Requirements

Some of the types of things you look for when conducting general magazine inspections are security, safety, cleanliness, atmosphere (temperature and humidity), identification of contents, and posting. A checklist covering all safety regulations and requirements of magazine operations is used when you conduct magazine inspections. This helps you make sure you don't overlook violations or hazards. The checklist provides an adequate and full description of any condition that is unsatisfactory and in violation of requirements. Make sure the checklist is properly authenticated and made a part of the magazine log.

## Frequency of Inspections

The inspection frequency is determined by the commanding officer or duly authorized representative. The frequency varies, depending on the number of magazines to be inspected, weather conditions, season of the year, number of magazines requiring special attention (for example, environmentally controlled), and security requirements of magazines/magazine areas. Inspections are conducted during daylight hours. Make sure there is enough light to see that any substandard condition that exists is seen and reported to the inspector. The exception to this procedure is security inspections; they are conducted during the day and at night.

## Temperature Control Considerations

The majority of the ordnance items in the Navy inventory are designed to withstand temperatures in the range of 130° to 160° Fahrenheit. Temperatures within conventional ordnance storage magazines seldom exceed 105° Fahrenheit. Therefore, you don't have to closely monitor the temperatures within these magazines. However, in the case of *special magazines*, such as certain missile/missile components, torpedoes, and mine magazines that require environmental control, control-system monitoring is still required.

## Report of Inspections

You must record the date and hour of each inspection in a magazine inspection log above the signature of the person who made the inspection. Promptly report substandard or abnormal conditions to the officer or supervisor in charge of correcting it. Then annotate the observed conditions in the log. Note satisfactory and normal conditions in the log by the

entry *normal*. Magazine inspection logs may be destroyed 1 year from the date of last entry.

## REVIEW NUMBER 3

- Q1. Describe the two types of primary lightning protection systems acceptable to NAVSEA-SYSCOM.
- Q2. Lightning masts are connected to a \_\_\_\_\_.
- Q3. To what instruction should you refer for specific requirements about the physical security of naval magazines?
- Q4. When are magazine inspections conducted?
- Q5. Describe the information recorded on the magazine inspection log above the signature of the person conducting the inspection.

## AMMUNITION HANDLING

The AO must be familiar with handling ammunition. It is a repetitious task, whether at a shore station or aboard ship. Repetitious work, no matter how dangerous, often becomes routine and leads to carelessness. Therefore, pay attention to what you are doing to prevent accidents in operations dealing with ammunition and explosives.

Whenever ammunition or explosives are received, transferred, or stowed, an officer or petty officer that knows the rules governing the care and handling of ammunition supervises the work. The supervisor makes sure that all work personnel are aware of the need to be careful when they handle ammunition and explosives.

Handling equipment is properly maintained and frequently inspected to make sure it is in safe working condition. Also, the handling equipment must be the right equipment for the purpose. Inspections are made before and during loading/unloading operations.

## AMMUNITION SHIPPING

Ammunition shipping is a phase of ammunition handling. Instructions for the preparation and shipment of naval ordnance material are contained in *Navy Transportation Safety Handbook for Ammunition, Explosives and Related Hazardous Materials*, NAVSEA SW020-AG-SAF-010. The instruction NAVSEA SW020-AG-SAF-010 cover the preparation, flow, and use of all the documents that are required to

ship, receive, and report shipments. Instructions for the use of ordnance transport equipment, materials to be transported, division of responsibility for carrying out inspections, and criteria for accepting or rejecting equipment are also contained in this publication. NAVSEA SW020-AG-SAF-010 contains the general information needed for you to safely perform the duties required when shipping ordnance materials.

**REVIEW NUMBER 3 ANSWERS**

- A1. *The two types of primary lightning protection systems acceptable to NAVSEASYSKOM are the sequentially mounted lightning system and the separately mounted overhead ground (aerial shield) wire system.*
- A2. *Lightning masts are connected to a buried primary girdle.*
- A3. *For specific requirements about the physical security of naval magazines, you should refer to OPNAVINST 5530.13.*
- A4. *Magazine inspections are conducted only during daylight hours.*
- A5. *The information recorded on the magazine inspection log above the signature of the person conducting the inspection includes the date and hour of each inspection as well as*

*abnormal or substandard conditions of the magazines, or the word "Normal" if conditions were satisfactory.*

**Explosives Driver**

An explosive driver is often an AO with an excellent safe driving record, and a person fully qualified according to *Motor Vehicle's Driver's Handbook Ammunition, Explosives, and Hazardous Materials*, NAVSEA OP 2239. To become a qualified explosive driver, you must meet the qualifications described below. If you meet these qualifications, you are certified to drive motor vehicles that transport hazardous materials (HM).

**STATE OPERATOR'S LICENSE.**—An explosives driver must hold a valid state operator's license, not necessarily issued by the state in which the activity is located. This applies to operation of vehicles both on- and off-station. This requirement is permanently waived for those personnel stationed outside the 50 states that would otherwise be eligible to obtain an explosive driver's permit.

**MEDICAL EXAMINERS CERTIFICATE.**—An explosives driver must undergo a explosive physical examination and, on the basis of such an examination, be certified by a licensed doctor of medicine or osteopathy to ensure that he/she meets applicable

<b>MEDICAL EXAMINER'S CERTIFICATE</b>		2-79
(I certify that I have examined)		
<b>John Jackson</b>		
[Driver's name (Print)]		
in accordance with the Motor Carrier Safety Regulations (49 CFR 391.41-391.49) and with the knowledge of his duties, I find him qualified under the regulations.		
<input type="checkbox"/> Qualified only when wearing corrective lenses <input type="checkbox"/> Qualified only when wearing a hearing aid		
A completed examination form for this period is on file in my office at		
<b>21 Oak St., Jamestown, ARK 71774</b>		
<b>2-2-82</b>	<b>M. McKenna</b>	
[Date of examination]	[Name of examining doctor (Print)]	
[Signature of examining doctor]		
<i>John Jackson</i>		
[Signature of driver]		
<b>42 Penn Rd., Monroe, ARK. 77772</b>		
[Address of driver]		
Reprinted by American Trucking Assns., Inc		
		17NP0330

Figure 12-4.—Medical Examiner's Certificate, ATA Form C0750.

requirements as stated in the *Federal Motor Carrier Safety Regulations*. Applicants who pass the prescribed explosive physical examination are issued a Medical Examiner's Certificate, ATA (American Trucking Association) Form C0750. (See fig. 12-4.) This certificate, in addition to the explosive driver's permit, must be on the operator's person while driving any vehicle transporting HM.

**EXPLOSIVES DRIVER PERMIT.**—An explosives driver must hold a U.S. Government Motor Vehicle Operator's Identification Card, Standard Form 46 (SF 46). (See fig. 12-5.) The card will be noted: "Explosives Driver (Must hold a current medical certificate)." The SF 46 is valid for 3 years and must be renewed prior to expiration. A yearly endorsement is not required. An individual's safety record and physical requirements will be considered prior to recertification as an explosive driver.

**AGE AND EXPERIENCE.**—An explosives driver must be 18 years of age or older to operate motor

vehicles transporting HM on-station and 21 years of age or over for off-station motor vehicle HM operations. The explosive driver must also have had considerable and varied driving experience with the type of equipment to be operated and have a safe driving record.

**MENTAL REQUIREMENTS.**—Applicants, military and civilian, are required to pass a mental examination that is administered by the local command before they can be considered eligible to be explosives drivers.

**ALCOHOL AND DRUGS.**—An applicant for explosives driver certification found to be addicted to alcohol or drugs is rejected. Certification is revoked for an explosive driver found to be under the influence of alcohol or drugs while on duty or when showing evidence of addiction. Temporary revocation of HM certification may become necessary when the use of physician-prescribed drugs are likely to interfere with the driver's ability to operate a motor vehicle safely.

Standard Form 46 Revised Jan 1977 USCSC FPM Chapter 910		<b>U.S. Government Motor Vehicle Operator's Identification Card</b>		Card No <b>1345</b>
Name of Operator <b>J. Doe</b>		Sex <b>M</b>	Date Issued <b>1/15/80</b>	
Height <b>6'</b>	Weight <b>180</b>	Date of Birth <b>7/30/36</b>	Social Security No <b>XXX-XX XXXX</b>	Date Expires <b>1/15/83</b>
Color of Hair <b>Br.</b>	Eyes <b>Br.</b>	NOT TRANSFERABLE Card must be carried at all times when operating Govern- ment vehicles		
Name and Location of Issuing Unit <b>NWS Yorktown VA</b>		Signature of Operator ( <i>Not valid unless signed</i> ) <b>/s/John Doe</b>		
The holder of this card is qualified to operate U.S. Government vehicles and/or equipment specified. Subject to the restrictions set forth on the reverse of this card.		Signature and Title of Issuing Official <b>/s/M. T. Smith Qtr - Trans.</b>		
46-105				
Restrictions				
QUALIFIED TO OPERATE				
Type Vehicle and / or Equipment	Capacity	Qualifying Official		
<b>Tractor-Trailer</b>	<b>12T</b>	<b>MTS</b>		
<b>Pick-Up</b>	<b>1/2 T</b>	<b>OFK</b>		
<b>Van</b>	<b>5 T</b>	<b>FMT</b>		
OTHER RECORDS ( <i>Optional</i> )				
<b>Explosives Driver</b>				
<b>(Must hold a current medical certificate)</b>				
* GPO 1978 O - 281 - 547 (3336)				
17NP0331				

Figure 12-5.—U.S. Government Motor Vehicle Operator's Identification Card, SF 46.

**ABILITY TO READ AND UNDERSTAND REGULATIONS.**—An explosives driver must be able to read, write, and understand the English language, and to complete the various forms for which a driver is responsible. The driver is required to read and understand the regulations that pertain to the duties as prescribed in NAVSEA OP 2239.

In addition to these qualifications, if you apply for certification as an explosive driver, you are required to complete an explosive driver's training course and pass the tests given at the conclusion of the course. All explosive drivers receive at least 12 hours of instruction in the following activities:

- Driving trucks, truck-tractors with semi trailers, and other vehicles of appropriate types
- Handling and transporting hazardous materials
- Interpreting regulations and procedures pertaining to the transporting of hazardous materials
- Training and use of fire extinguishers
- Completing and filing required reports

When operating Navy-owned vehicles, you, as an operator, must comply with DOD regulations and all state and local traffic laws. You are also subject to fine or imprisonment when you violate these regulations and traffic laws.

#### REVIEW NUMBER 4

- Q1. To what publication should you refer for information about transporting hazardous materials?*
- Q2. What is the minimum age requirement for an explosive driver to transport explosives off-station?*

#### SAFETY PRECAUTIONS

Safety precautions prescribe the minimum requirements and regulations you should observe when handling ammunition. These regulations may be general in nature or step-by-step procedures. Regardless of the situation, safety precautions must NEVER be ignored or bypassed, even during the simplest ammunition-handling evolutions.

The general safety precautions listed below show some of the regulations contained in publications referred to in this chapter.

1. Properly stow all materials within a magazine and keep them in a safe condition. Never let trash resulting from decanning, depalletizing, or unpacking accumulate in a magazine. It presents a fire hazard and unsafe working conditions for personnel.
2. Don't use improvised tools, platforms, or ladders.
3. Before ammunition loading, explosives loading, or offloading operations, either at a shore activity or a ship underway, inspect all fire mains to make sure they operate properly and efficiently. Fire hoses must be laid out ready for use in the immediate area of operations. The hoses must be laid out so those damage control and fire boundaries are not crossed, using all risers available. Additionally, keep the valves controlling these fire hoses open so that water is readily available.
4. Flame, heat, or spark-producing devices aren't permitted where explosives or flammable materials, batteries, or battery charging lockers are located. Cigarette lighters, heaters, fires, welding tools, soldering irons, cutting torches, and uncovered lights are included in this category. When work requiring the use of flame, heat, or spark-producing devices is urgently required in or adjacent to an ammunition stowage space, follow the procedures outlined in OPNAVINST 8023.2 (series) and OPNAVINST 8023.21 (series).
5. Emphasize safety precautions applicable to in-service ammunition items or equipment by using applicable signs throughout the ship. Signs may be obtained as Cog I material. They are indexed in Section 13 of *Navy Stock List of Forms and Publications—Cognizance Symbol I*, NAVSUP Publication 2002, or when not listed in NAVSUP 2002, you may obtain them from a tender-type ship by submission of a work order.
6. Emergency drills requiring the use of the general alarm system, ship's bell or whistles aren't conducted aboard ship while moored to an ammunition-activity pier, unless specific approval for such drills has been granted by the commanding officer of the ammunition activity.

Similarly, such emergency drills aren't conducted by ships nested together or at a pier where

ammunition-handling operations are in progress, or by a ship underway during an ammunition handling evolution.

7. Ammunition evolutions involving direct contact with ammunition components are curtailed during local atmospheric disturbances, such as thunderstorms or high winds. Operations aren't resumed until non-hazardous conditions prevail.
8. Stowage of privately owned ammunition and small arms is permitted aboard ship if approved by the commanding officer. This type of stowage is subject to the security requirements of chapter 700 of the Naval Ships Technical Manual, *Ammunition Handling and Stowage*, NAVSEA S9086-XG-STM-000.
9. Ships and craft entering commercial or naval shipyards for periods longer than 6 weeks are completely offloaded of all ammunition, except the small arms ammunition that the commanding officer considers necessary for the maintenance of security aboard ship and inert ordnance items such as bomb fins.

If a ship is expected to remain in the yard for less than 6 weeks, the ship offloads, as a minimum, all ammunition or explosives that can't be stowed in sprinkler-protected or floodable spaces.

10. The number of personnel engaged in ammunition and explosive handling operations is limited to the minimum necessary for safe and efficient performance of the work. Unauthorized personnel aren't permitted in a magazine, missile handling or testing area, or at any handling operation involving explosives or ammunition. A responsible escort accompanies visiting personnel.
11. As a general rule, any pyrotechnic device that is armed and otherwise prepared for launching or activating but hasn't been used may be dearmed, restored to its original packing, and returned to stowage. The exceptions to this rule are Mk 25 and Mk 58 marine location markers, Mk 46 decoy flares, and aircraft parachute flares. If such devices can't be made safe beyond question, they must be stowed in

lockers or disposed of according to current directives.

12. When the temperature in a magazine containing gas generators, propelling charges, or fixed ammunition reaches 110°F or above, certain actions must be taken to preserve safety and stability of the explosives.

When the magazine temperature is between 110°F and 120°F, the magazine should be artificially cooled, as practical. The number of hours and the maximum temperature reached during each hour of exposure above 110°F, but less than 120°F, must be recorded. When the cumulative total number of hours of exposure to these temperatures reaches 500 hours, the ammunition must be expended or turned into an ammunition activity, stating the reason for return. If the ammunition was subjected to these temperatures for less than 500 hours, it should be expended during subsequent firings.

When the magazine temperature is between 120°F and 130°F, the magazine should be artificially cooled, as practical. A special record of the number of hours of exposure and the maximum temperature reached each hour should be made. When a cumulative total of 100 hours of exposure above 120°F is reached, prior to a cumulative total of 500 hours of exposure between 110°F and 130°F, the ammunition must have priority for expenditure or be turned in to an ammunition storage activity at the first opportunity.

At temperatures above 130°F, the ammunition should be removed from the magazine and turned in to the nearest ammunition activity. When there is no storage activity immediately available and the ship is in port, the ammunition may be retained on board in a segregated magazine or in a ready-service room or locker. All possible methods should be used to lower the temperature of the ammunition until the ship is able to turn it in to the nearest ammunition activity.

#### **REVIEW NUMBER 4 ANSWERS**

- A1. *For information about transporting hazardous materials, you should refer to NAVSEA SW020-AG-SAF-010.*
- A2. *To transport explosives off-station, the driver must be 21 years of age.*

