Ammunition and Explosives Handler Safety Techniques

NOVEMBER 2016

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This publication supersedes ATP 4-35.1 dated 31 May 2013.

Headquarters Department of the Army
This publication is available at the Army Publishing Directorate site (http://www.apd.army.mil), and the Central Army Registry site (https://atiam.train.army.mil/catalog/dashboard)
# Ammunition and Explosives Handler Safety Techniques

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Preface

ATP 4-35.1 provides procedures and safety considerations for handling ammunition and explosives at all levels, regardless of military occupational specialty or type of unit.

The principle audience for ATP 4-35.1 is all members of the profession of arms. Commanders and staff of Army headquarters serving as joint task force or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10)

ATP 4-35.1 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

ATP 4-35.1 applies to the Active Army, Army National Guard / Army National Guard of the United States and United States Army Reserve unless otherwise stated.

The proponent for ATP 4-35.1 is the United States Army Ordnance School. The preparing agency is the United States Army Combined Arms Support Command, Training Support and Doctrine Directorate. Send comments and recommendations on Department of the Army (DA) Form 2028, Recommended Changes to Publications and Blank Forms, to Commander, United States Army Combined Arms Support Command, ATTN: ATCL-TS (ATP 4-35.1), 2221 A Avenue, Fort Lee, VA 23801; or submit an electronic DA Form 2028, by e-mail to: usarmy.lee.tradoc.mbx.lee-cascom-doctrine@mail.mil. In addition to submission on DA Form 2028, provide same comments and recommendations in MilWiki for rapid dissemination to doctrine authors and for universal review at https://www.milsuite.mil.
Introduction

Soldiers, civilians, and contractors that handle ammunition and explosives for the Army perform a vital role in keeping their units and Army personnel safe while maintaining and providing the effective ammunition and explosives needed to accomplish the mission. Ammunition and explosives handlers, as identified in this manual, include any person that plays a role in handling, storing, moving, and maintaining ammunition and explosives. This includes professional ammunition and explosives handlers such as ammunition officers, technicians, non-commissioned officers, and soldiers; quality assurance specialists (ammunition surveillance) (QASAS); civilian munition handlers or managers, and quality assurance / quality control (QA/QC) ammunition inspectors. It also includes any individual tasked to handle ammunition and explosives, regardless of branch or military occupational specialty (MOS).

This manual is intended to provide ammunition and explosives handlers the information necessary to safely perform ammunition and explosives operations and fully support the operational requirement. The primary focus of ammunition and explosives safety is to reduce the probability and limit the damage caused by unintended initiation. Safety, fire protection, prevention, and safety awareness during ammunition and explosives operations is every soldier’s responsibility. The guidelines in this publication should be followed as closely as possible within the constraints and restrictions of the operational or tactical environment.

ATP 4-35.1 contains five chapters.

Chapter 1 describes the role of ammunition and explosives operations within the framework of unified land operations and the sustainment warfighting function. It provides general ammunition and explosives safety principles, and identifies key personnel responsible for assisting units in implementing safety requirements.

Chapter 2 discusses safety considerations related to the transportation of ammunition and explosives. It addresses different considerations and requirements when transporting ammunition and explosives by air, land, or sea.

Chapter 3 discusses safety considerations related to the storage of ammunition and explosives. It addresses the planning considerations leaders should follow when designing and constructing ammunition and explosives storage facilities, as well as basic storage safety principles that leaders at all levels should follow as mission variables permit.

Chapter 4 discusses safety considerations related to the maintenance of ammunition and explosives. It addresses the planning considerations leaders should follow when renovating, modifying, preserving or packaging ammunition and explosives during military operations other than war, during contingency operating, and in times of war.

Chapter 5 discusses fire safety and prevention.
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Chapter 1

General Ammunition and Explosives Safety

Ammunition and explosives (AE) are a fundamental component of military operations. They enable commanders to discriminately apply lethal and non-lethal force against an adversary in support of decisive action and unified land operations. Because handling, storing, transporting, and maintaining AE is an inherently dangerous operation, leaders and soldiers at all levels, regardless of branch or MOS, must understand the basic tenants of AE safety.

SECTION I – FUNDAMENTALS OF AMMUNITION AND EXPLOSIVES (AE) SAFETY

1-1. _Unified land operations_ describes how the Army seizes, retains, and exploits the initiative to gain and maintain a position of advantage in sustained land operations through simultaneous offensive, defensive, and stability operations in order to prevent or deter conflict, prevail in war, and create the condition for favorable conflict resolution (ADP 3-0).

1-2. The ability to discriminately apply lethal force is fundamental to unified land operations, and is enabled through effective, synchronized, and safe AE operations. While AE operations are a component of the sustainment warfighting function, the safe and effective employment of AE is a shared responsibility of all soldiers, regardless of branch or MOS. For more information about the AE distribution system, refer to ATP 4-35, _Munitions Operations and Distribution Techniques._

GENERAL AE SAFETY

1-3. Safety is an inherent responsibility of commanders, leaders, soldiers, and Department of the Army civilians at all levels. Under the Army Safety Program, commanders have a specific responsibility to develop, implement, and ensure compliance with unit safety programs and all Department of Defense, federal, state, and local laws, regulations, and safety requirements. Leaders, supervisors, soldiers, and Department of the Army civilians share a general responsibility to maintain a safe workplace, employ risk management throughout the military operations process, and comply with laws, regulations, and unit safety programs.

1-4. AE safety is intended to protect Army personnel from injury or loss of life, and to protect Army property and equipment from damage or destruction. AR 385-10, _The Army Safety Program_ and DA Pam 385-64, _Ammunition and Explosive Safety Standards_ and ATP 4-35.1, _Munitions Handler Safety Techniques_ establishes safety standards for all units and personnel tasked with an AE or explosive mission, to include the production, transportation, storage, inspection, maintenance, handling, use, demilitarization, and disposal of AE. It is applicable to all Army personnel, both professional and non-professional AE handlers alike.

1-5. The stipulations of AR 385-10 and DA Pam 385-64 apply during peacetime, contingency operations, and times of war, but are not intended to restrict a unit’s ability to accomplish its mission. While authoritative, Army regulations allow commanders to accept prudent risk in deviating from established safety standards when mission variables prohibit strict adherence. When deviating from AE safety standards, commanders must weigh specific mission variables and the added risk to personnel, property, and equipment against the tactical, operational, or strategic reasons necessitating such deviations. Whenever possible, commanders must emphasize adherence to the highest standards of AE safety in order to minimize the risk to personnel, property, and equipment.
CARDINAL RULE OF AE SAFETY

1-6. All operations involving AE or explosives follow the cardinal rule of AE safety: expose the minimum number of people, for the minimum period of time, to the least amount of explosive required to perform safe and effective operations. Tasks not necessary to an operation must be prohibited. Personnel not required for an operation must be denied entry to the area during operations. Nonessential personnel must be prohibited from visiting the site. (This restriction does not prohibit official visits by safety, quality control (QC), management, inspection or other personnel authorized by the commander.) Established personnel limits must be observed at all times.

1-7. Although some AE operations can be performed by one individual, if the tactical situation permits, at least one additional person should be present to assist AE handlers in the event of an emergency. All operations must be supervised properly to ensure safety precautions are observed and enforced.

TEN PRINCIPLES OF AE SAFETY

1-8. While mission variables may limit a commander’s ability to strictly adhere to the specifications of AR 385-10 and DA Pam 385-64, the following ten principles should be adhered to during all AE operations, regardless of whether the unit is operating in peace, during contingency operations, or in war.

- Know your explosive safety responsibilities.
- Know your explosives safety points of contact and how to contact them.
- Train your personnel to properly perform their AE mission. Have policies and procedures in place that cover your AE requirements.
- Make sure all AE locations are properly sited and have current licenses; prepare deviation approval and risk acceptance document (DARAD) using DA Form 7632, Deviation Approval and Risk Acceptance Document to authorize any explosives storage safety deviations.
- Know where to find maps depicting AE locations with associated explosives safety quantity distance (ESQD) arcs, exclusion, and/or clear zones.
- Know the outcome of the most recent internal and higher headquarters explosives safety assessment and institute corrective measures as necessary.
- Be aware of any new construction or modification plans that impact your explosive safety clear zones.
- Know your local policies and procedures for the AE amnesty program including the location of collection points, responsibilities for collection, and frequency of collection.
- Know proper response procedures in the event of a munition mishap including notification and evacuation procedures, personnel accountability, unexploded explosive ordnance (UXO) or explosive ordnance disposal (EOD) support, accident reporting requirements, and malfunction reporting requirements.
- Learn what AE risks exist that could adversely affect your mission or capability and mitigate those risks. Communicate risks up the chain of command.

1-9. Figures 1-1 and 1-2, page 1-3 and figure 1-3, page 1-4 identify the effects of a AE explosive involving 8,818 pounds. (4,000 kilograms) net explosive weight (NEW) of explosives.
Figure 1-1. Un-barricaded blast effects based on quantity and distance

Figure 1-2. Barricaded blast effects based on quantity and distance
Chapter 1

EXPLOSIVES SITE LICENSES AND DEVIATIONS

1-10. Locations with AE and explosives must be site licensed. DA Pam 385-64 provides guidance for the standards, preparation, and authentication of explosives sites for licensing. While compliance with the explosive safety requirements in DA Pam 385-64 is preferred, mission variables during contingency operations and in war may prohibit strict adherence to regulation.

1-11. A DARAD is used to maintain the highest possible level of safety while deviating from established standards. The DARAD documents the identification of all pertinent hazards, establishment of mitigation control measures, and acceptance of the residual risk by the appropriate level of command.

1-12. A single DARAD may be used to address multiple risks if supported by accompanying documentation describing each hazard and its associated risk. Copies of the DARAD are filed with the unit’s higher headquarters, and safety offices at the Army command and Army service component command levels. An additional copy is filed with the United States (U.S.) Army Technical Center for Explosives Safety at Director, the U.S. Army Technical Center for Explosives Safety, Building 35, 1 C Tree Road, McAlester, OK 74501.

1-13. For more information on the DARAD, see DA Pam 385-30, Risk Management. For more information on the Munitions Risk Assessment utilized in the joint operating environment, see Chairman of the Joint Chiefs of Staff Instruction 4360.1A, Explosives Safety and Munitions Risk Management for Joint Operations, Planning, Training, and Execution.

JOINT AND MULTINATIONAL AE OPERATIONS

1-14. Whenever a commodity or service is common to two or more Services, the Department of Defense establishes an executive agent in order to assist in the development of common user logistics. The Department of the Army is the executive agent for explosive safety management.

Figure 1-3. Hazard severity to personnel
1-15. Within the Joint environment, AE management is a shared responsibility between the explosive hazards coordination cell (EHCC) and the joint munitions office (JMO).

1-16. Joint force commanders establish an EHCC to support the land component commander in predicting, tracking, and mitigating explosive hazards within the area of operations (AO). The EHCC tracks unexploded ordnance hazard areas such as mine fields and area with a historically high volume of improvised explosive device activity. The EHCC is the joint force commander’s proponent for munition risk assessment and mitigation.

1-17. The geographic combatant commander establishes the JMO to oversee planning and coordination of AE operations in support of Joint forces employed within the AO. The JMO typically consists of a mix of AE planners from each Service, and provides oversight of the joint force’s AE readiness, particularly of critical and precision AE essential to military operations in the AO. While the JMO does not have specific responsibility for overseeing AE safety programs within the AO, AE planners must always take compatibility and storage considerations into consideration when planning for the receipt, transportation, storage, maintenance, and use of AE.

1-18. For more information about the EHCC, refer to JP 3-34, Joint Engineer Operations and JP 3-15.1, Counter-Improvised Explosive Device Operations. For more information about the JMO, refer to JP 4-0, Joint Logistics. Chairman of the Joint Chiefs of Staff Instruction 4360.01A establishes policies and practices for integrating explosives safety and munition risk management in the joint operations planning process.

EXPLOSIVE SAFETY MANAGEMENT PROGRAMS

1-19. AR 385-10 requires that all Army commands, Army service component commands, direct reporting units, garrisons, installations, and units at and above the battalion level that have an AE mission develop and maintain written explosive safety management programs (ESMP). ESMPs are just one component of a unit’s overall safety program, and are intended to provide standard operating procedures for the safe production, transportation, storage, inspection, maintenance, handling, use, demilitarization, and disposal of AE.

SAFETY MANAGERS / SAFETY DIRECTORS

1-20. At and above the brigade level, the unit’s occupational safety and health manager is typically responsible for implementing the unit’s ESMP. Safety officers, managers, and directors are responsible for:

- Ensuring all commanders / directors are aware of requirements and maintaining the status of the unit’s ESMP.
- Identifying requirements for explosive licenses, explosive safety site plans, DARAD, waivers and exemptions, and certificates of compelling reason.
- Ensuring all potential explosion sites and exposed sites are indicated on approved explosive safety site plans.
- Ensuring plans for AE facilities are in compliance with safety standards.
- Ensuring personnel handling AE are adequately and appropriately trained.
- Ensuring safety inspections are conducted at least annually for all AE production, storage, and maintenance facilities.
- Monitoring AE transportation operations in order to ensure compliance with military, civilian, and when applicable, host nation laws and regulations.
- Investigating incidents involving AE.

UNIT SAFETY OFFICERS

1-21. At the company and battalion levels, responsibility for implementing the unit’s safety program is typically assigned to a safety officer, appointed in writing by the commander. Unit safety officers must complete a safety officer course and report directly to the commander on safety-related issues. The unit safety officer or non-commissioned officer:

- Integrates AE safety procedures into the unit’s safety program field safety standard operating procedures (SOP).
• Reviews regulations, doctrine, and technical manuals applicable to the unit. Recommends procedures for increasing safety in unit operations, including the receipt, handling, storage, transportation, and issue of AE.
• Recommends procedural changes to the commander that reduces accident risk, injury, and property loss.
• Organizes a safety committee, if needed, to assist with inspections and the formulation and recommendation of safety procedures.

LEADER AND INDIVIDUAL SOLDIER RESPONSIBILITIES

1-22. Leaders at all levels have a responsibility for risk management and must ensure soldiers who handle AE perform their duties safely. Leaders take the following proactive steps in reducing risk:

- Ensures subordinates are fully trained, certified, and licensed to handle AE in accordance with Army regulations.
- Receives explosive safety training in order to learn to properly supervise the receipt, handling, storage, transportation, and maintenance of AE.
- Ensures soldiers are fully aware of hazards throughout all operations.
- Halts unsafe actions when observed.
- Prevents accidents through proper planning and preparation.

1-23. Individual soldiers have a responsibility for their own personal safety, and for the safety of those around them. Soldiers assist in enforcing unit safety programs by:

- Becoming familiar with the Army’s general safety policies for AE and explosives.
- Learning the principles of how AE function, how to handle, store and transport AE safely, and how to safely operate materials handling equipment (MHE).

1-24. For more information about ESMPs or the responsibilities of safety officers, managers, directors, leaders, and soldiers refer to AR 385-10, The Army Safety Program and DA Pam 385-64, Ammunition and Explosive Safety Standards.

1-25. In accordance with AR 385-64, Army personnel who handle AE, whether by MOS or additional duty, are required to complete AMMO-45-DL (Introduction to Ammunition) and AMMO-68-DL (Military Munitions Rule) through the Defense Ammunition Center's website. Both courses are offered online as distance learning courses. AMMO-68-DL requires an annual refresher to remain current. It is also suggested that AE handlers complete the following distance learning courses to better improve their understanding and situational awareness of the hazards associated with AE handling.

- AMMO-31-DL (Environmental Considerations for Ammunition Personnel)
- AMMO-63-DL (U.S. Army Explosive Safety Familiarization)
- AMMO-78-DL (Ammunition Publications)
- AMMO-54-DL (Risk Management & Preparation of SOP for AE)
- AMMO-99-DL (Application of U.S. Army ESQD Principles)
- AMMO-107-DL (Introduction to Explosive Safety Management for Safety Professionals)
- AMMO-112-DL (Ammunition and Explosives Storage Safety)

1-26. All required and suggested courses outlined in AR 385-64 can be accessed through the Defense Ammunition Center's training website (see references).

STANDARD OPERATING PROCEDURES

1-27. Units that receive, transport, store, maintain, and handle AE in support of military operations must have written standard operating procedures (SOP). This document should be reviewed by the unit’s ammunition officer, and approved by the commander. The SOP should detail standards, expectations, and processes to be used by all unit personnel in all aspects of AE operations.

1-28. An external SOP addresses the procedures units receiving AE support from the supporting unit are required to follow. Typically, an external SOP contains:
1-29. An internal SOP addresses the procedures the supporting unit must follow in order to properly receive, account for, store, transport, maintain, and issue AE. Typically, an internal SOP contains:

- Commander’s approval signature.
- Risk assessment.
- Safety officer review and concurrence signature.
- Supervisor or persons-in-charge signature page.
- AE handlers and visitors signature page.
- AE issue and turn-in procedures.
- AE safety and environmental protection procedures.
- Emergency resupply procedures.
- Unit and wartime host nation support procedures.

SECTION II – RISK MANAGEMENT IN AE OPERATIONS

1-30. Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk cost with mission benefits (JP 3-0). Risk management (RM) is especially important to AE operations, which are inherently dangerous regardless whether they occur during peacetime, contingency operations, or times of war. Leaders at all levels integrate RM into all phases of the operations process: planning, preparation, execution, and assessment.

1-31. ATP 5-19, Risk Management identifies the principles of RM:

- Integrate RM into all phases of missions and operations.
- Make risk decisions at the appropriate level.
- Accept no unnecessary risk.
- Apply RM cyclically and continuously.

1-32. When applying the principles of RM to AE operations, leaders adhere to the cardinal rule. They identify hazards and apply controls that expose the minimum number of people, for the minimum period of time, to the least amount of explosives required to perform safe and effective operations.

SAFE AE HANDLING PRINCIPLES

1-33. Whenever and wherever possible, follow the explosives safety standards outlined in this ATP and DA Pam 385-64. Only after assessing and documenting the risks of relaxation against the mission-imposed parameters should less restrictive guidance be implemented. When handling AE in the field, follow these general principles:

- Soldiers controlling or supervising the handling of AE must observe safety precautions. Place skilled, knowledgeable and trained personnel in charge of AE operations.
In field storage, distribute AE in such a way that an incident will not cause the total stock of any one type of AE to be lost.

Disperse AE to minimize loss in the event of fire, accidental explosion, or enemy action.

Take firefighting precautions and ensure firefighting equipment is serviceable. Some AE require special firefighting techniques and materials.

Prevent accumulations of trash between or under stacks or near any AE storage location.

Have EOD or EOD trained personnel examine, evaluate, and classify AE of unknown origin and captured AE. Store in a designated collection point.

Use the existing infrastructure and terrain features to prevent propagation and to reduce the risk of exposure to personnel, equipment, and facilities.

Store and transport AE containing white phosphorus in an upright position if AE surface temperatures are expected to exceed 111 degrees Fahrenheit. Ensure a water barrel or equivalent is on hand to completely submerge leaking white phosphorus items.

Take all measures to minimize the risk to personnel, material, and AE.

Segregate damaged AE.

Save and segregate packing material to use for safe transport and turn-in of unused AE.

HAZARDS ASSOCIATED WITH AE OPERATIONS

1-34. The following sections discuss general hazards associated with AE operations. Chapters 2 through 4 provide additional information about the hazards associated with transporting, storing, and maintaining AE.

GENERAL AE HANDLING HAZARDS

1-35. Identification systems assist leaders in identifying specific hazards associated with different types of AE. Appendix B explains in detail the methods for identifying AE using a national stock number (NSN), Department of Defense identification code (DODIC), lot numbers, and the AE color classification system.

1-36. AE and explosives must be handled carefully. Any improper, rough, or careless handling may cause unintentional detonation. AE and explosives are safe to handle when done so properly and according to specifications. Proper consideration should be given to the characteristics of each type of munition or explosive, how it is assembled, its operation, and normal safety precautions. All soldiers working with AE, regardless of MOS, should observe the following general safety precautions as a minimum:

- If a hazardous operation is observed, stop the action and report it immediately to a supervisor. Unsafe actions that are not absolutely essential to ongoing operations should be stopped immediately, and control measures should be implemented to eliminate the hazard or reduce its risk to personnel.

- Do not conduct AE operations without a risk assessment and approved SOP.

- Do not allow heat or fire producing items such as matches or lighters in storage areas or around AE during receipt, handling, transportation, and maintenance operations.

- Do not smoke in, around, or near AE or explosive storage sites.

- Ensure AE are handled by trained personnel who understand the hazards and risks associated with the types of AE handled. (See DOD 6055.09-M, AR 385-10, DA Pam 385-64, and SB 742-1.)

- Do not use bale hooks to handle AE.

- Do not tumble, drag, drop, throw, roll, or walk on containers storing AE or explosives.

- Do not tamper with, disassemble, or alter AE.

- AE should only be opened when required.

- Keep AE in containers as long as possible to prevent exposure to the elements. This is especially important for items packed in barrier bags or sealed metal containers, and on vehicles transporting AE.

- Open AE boxes carefully. Return all inner packaging material to the container, and close it to keep out the elements.

- Repack AE that are opened and not used.
Do not use familiarity or experience with AE as an excuse for carelessness.

Do not carry initiation devices in your pocket. Detonators, initiators, squibs, blasting caps, and other initiating devices must be carried in protective containers. The containers must prevent item-to-item contact. Mark containers to identify their contents.

Do not drive nails into shipping and storage containers containing AE.

Do not allow waste materials or litter to accumulate in storage areas.

Be familiar with fire and chemical symbols, the location of fire points, the fire plan, proper use of fire extinguishers, and location of firefighting crews. Apply RM in determining what types of fires to fight, and when to evacuate the area.

Ensure personnel are trained and familiar with the use of proper personal protective fire equipment required in the approved SOP.

Prohibit the use of cell phones or handheld radios within 100 feet of electronically initiated devices such as missiles, 2.75 inch rockets, and blasting caps.

**TOOLS AND EQUIPMENT**

1-37. Hand tools are widely used by AE handlers. Only tools made from non-sparking materials such as bronze, lead, beryllium, alloys, or polymers should be used when handling AE. Tools of lead or beryllium alloys that require sharpening should be sharpened outside of AE storage areas and in areas with adequate ventilation. Specialized materials, such as copper wool and nonflammable solvents, are often used with non-sparking tools. Only properly maintained non-sparking tools will be used around hazardous concentrations of flammable dust, gases, vapors, or exposed explosives.

1-38. If it is necessary to use ferrous metal hand tools because of their strength, the immediate area should be free from exposed explosives and other highly combustible materials except in specific operations approved by the commander and documented in the unit’s risk assessment and SOP.

**MATERIAL HANDLING EQUIPMENT**

1-39. MHE is of primary importance to AE handlers as it provides the means by which large and heavy packages of AE are moved quickly and efficiently. Various types of MHE include forklifts, towing tractors, cranes, pallet jacks, trucks, and conveyors.

1-40. MHE presents a number of hazards to AE handlers and other personnel that might be in the area. Constant movement both forward and backward in relatively confined spaces, the frequent lifting of extremely heavy loads to over-head levels, fork extensions with wide arcs of movement, and limited visibility must all be considered when operating MHE. Commanders, leaders, operators, maintenance, and safety personnel are all responsible for ensuring safe use of MHE.

1-41. Some primary safety considerations to consider when operating MHE include:

- Ensure all operators are properly trained and licensed on the MHE in use.
- Ensure all scheduled maintenance is performed to include load testing.
- Inspect MHE prior to use in accordance with (IAW) the appropriate technical manual, operator’s manual, or manufacturer’s manual and do not use faulty equipment.
- Use ground guides at all times, unless the tactical situation prohibits their use.
- Do not exceed the rated capacity of the equipment.
- Use proper lifting techniques IAW general industry lifting standards and Section VII, Chapter 1 of the Occupational Safety and Health Administration Technical Manual.
- Reduce transportation distances whenever possible.

**PALLETTIZED AE HAZARDS**

1-42. Before moving palletized or containerized AE, pallets and containers must be visually inspected for broken banding or damage. If the pallet or container is damaged, they should be repaired or replaced before being used for AE operations.
1-43. The United States Army Material Command has established several tools to assist units in ensuring AE are palletized safely and in accordance with regulations. Both Army Material Command Drawing 19-48-75-5 and the Conventional Ammunition Packaging and Unit Load Data Index provide technical drawings to ensure proper use of pallets and containers for AE operations. Both documents can be accessed from the Defense Ammunition Center website (common access card authentication required).

1-44. At a minimum, AE handlers should wear protective gloves, safety shoes, and eye protection. Repalletization and replacement of defective banding is authorized inside the storage magazine. However, if there is not enough space to work safely, the operation is permitted on the adjacent apron.

1-45. Except for the preservation and packaging of small arms AE, containers should not be opened or repaired in any ammunition support activity (ASA). DA Pam 385-64 provides required separation distances based on storage magazine types.

LIGHTNING AND ELECTRICAL HAZARDS

1-46. The fundamental principle for protecting life and property against lightning is to allow a lightning discharge to enter or leave the earth without resulting in damage or loss. Protection from lightning is another essential part of protecting soldiers, AE, and equipment involved in AE operations.

1-47. Units with an AE mission should establish an electrical storm evacuation plan for all AE areas. AE should be stored in areas that offer lightning protection to minimize or mitigate the risk of exposure to lightning. Field storage planning should consider the use of lightning protection and equipment requirement when possible.

1-48. When using electrical equipment around AE, soldiers must follow operating instructions precisely. Only approved electrical equipment should be used around AE. To prevent sparks, all electrical switches, sockets, plugs, and outlets must be of the standard explosion proof type. Use of electrical equipment in facilities containing explosives must comply with DA Pam 385-64 and the latest edition of National Fire Protection Standard 70.

1-49. For more information on protection systems, grounding, bonding, surge protection, testing, and warning systems, see DA Pam 385-64 and National Fire Protection Standard 780. National Fire Protection Standard 780 can be found on the organization’s website (see references).

STATIC ELECTRICITY HAZARDS

1-50. The generation of static electricity is not in itself a hazard. The hazard arises when static electricity is allowed to accumulate and discharge a spark in the presence of combustible materials, thus providing a source of ignition. This hazard can include sparks discharged from a person. Areas containing combustible dusts, flammable gases or vapors, or ignitable fibers are especially vulnerable to static electricity. Exposed explosives (primers, initiators, detonators, igniters, tracers, incendiary mixtures, and pyrotechnics) are also sensitive to static electricity. See DA Pam 385-64 for procedures to mitigate static electricity hazards.

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE

1-51. Transmitting equipment (such as radios, radar, electronic countermeasures, electronic counter-countermeasures, and ground penetrating radar) and other electromagnetic emitting devices can generate radiation of sufficient magnitude to exceed specified safety and/or reliability margins in electronically initiated devices (EID). EIDs are found in many types of ordnance and can cause radiation induced damage or degradation of performance in ordnance containing EIDs.

UNEXPLODED EXPLOSIVE ORDNANCE (UXO) HAZARDS

1-52. All soldiers must be able to recognize and react to UXO hazards. Reactions include avoiding the hazard if possible, securing and marking the site, and reporting the hazard through the chain of command. Under no circumstances should untrained soldiers approach, disturb, touch, or pick up UXOs, regardless of whether the ordnance is identified as U.S. or enemy. This rule is applicable during peacetime, contingency operations, and in war.
1-53. Reporting UXOs on the battlefield requires timely and accurate information. In accordance with ATP 4-32, *Explosive Ordnance Disposal Operations*, the UXO 9 Line report format is:

- **Line 1**: Date / Time group discovered.
- **Line 2**: Reporting activity and location (grid).
- **Line 3**: Contact method: radio frequency and call sign or telephone number.
- **Line 4**: Type of munition (dropped, placed, projected, or thrown).
- **Line 5**: Chemical, biological, radiological and nuclear contamination.
- **Line 6**: Resources threatened.
- **Line 7**: Impact on mission.
- **Line 8**: Protective measures taken.
- **Line 9**: Recommended priority (immediate, indirect, minor, or no threat).

**ACCIDENT AND INCIDENT CONTROL PLANS**

1-54. Every unit that handles or stores AE must develop plans for controlling accidents and incidents. These plans are part of the command accident / incident control plan, which includes procedures for the following:

- Reporting accidents or incidents.
- Getting assistance from supporting emergency forces.
- Supporting area military and civilian agencies.
- Establishing unit emergency technical escort teams.
- Radiation control.
- AE safety control.
- Reporting AE malfunctions.
- Quality Assurance Specialist (Ammunition Surveillance) (QASAS) or ammunition Logistics Assistance Representative (LAR) support.
- Munition handler, transported, and supervisor certification program.
- Disarmament.
- AE evacuation.
- Unit firefighting teams.
- Unit decontamination teams.

1-55. Training plans, including emergency exercises designed to maintain team efficiency and readiness, are part of the command accident / incident control plan. Such plans encourage personnel assigned to emergency response teams to remain proficient in individual and team duties. Accidents or incidents involving AE are reported and investigated IAW AR 385-10 and DA Pam 385-40. All personnel (supervisory and non-supervisory) who conduct AE related activities are required to receive periodic refresher training to help ensure the requisite level of knowledge of and competency in explosives safety. A list of training courses can be found in DA Pam 385-64.

**REPORTING AE MALFUNCTIONS**

1-56. A *munitions malfunction* is the failure of an AE item to function as expected when fired or launched, or explosive items that fail to function (AR 75-1). Malfunctions include hangfires, misfires, duds, abnormal functioning, and premature functioning of AE items under normal handling, maintenance, storage, transportation, and tactical deployment. Malfunctions do not include accidents or incidents resulting from negligence, vehicular system accidents, fires, and misuse.

1-57. An AE malfunction may have been caused by operator error, equipment failure, environmental conditions, or defect in the AE item. The following steps must be taken to determine the cause of the malfunction:

- User immediately secures the site, equipment, and AE. Soldiers should not move or disassemble weapon systems before the weapons LAR and QASAS are onsite unless for safety or security
reasons. Preserving the site will aid the investigation team in determining the cause of the malfunction.

- Commander of the using unit reports all facts through command channels.
- Higher headquarters may assemble a team to investigate the incident.
- The operational command may suspend use of the AE or equipment involved, dependent upon mission variables.

1-58. The investigating team determines the cause of the malfunction and provides disposition instructions for items involved. The team provides reports to higher headquarters IAW AR 75-1.
Chapter 2
Transportation Safety

The principles of safe transportation of AE and explosives are applicable at all levels of war; strategic, operational, and tactical. At the strategic level, the U.S. Transportation Command is the agency responsible for providing common user and commercial air, land, and sea transportation for AE. At the operational level, theater sustainment commands provide oversight of the inter-theater distribution networks used to deliver AE from port to tactical formations. Tactical transportation includes all units from the division to company level, and is the level of where violations of munition safety principles most commonly occur.

TRANSPORTATION OF HAZARDOUS MATERIAL

2-1. Chapter 204 of the Defense Transportation Regulation and Title 49 of the Code of Federal Regulations (CFR) outline the policies, procedures, and responsibilities for the movement and transportation of hazardous materials by Department of Defense personnel. These regulations are particularly important for the National Guard, and active component units tasked with a defense support to civil authorities mission inside the borders of the United States, such as the domestic chemical, biological, radiological, nuclear response force.

2-2. As with other explosive safety regulations, the requirements outlined in the Defense Transportation Regulation and Title 49 CFR apply to units in peacetime, during contingency operations, and in times of war. Deviation from established standards are made by responsible commanders after factoring the risk associated with such deviation with mission requirements.

2-3. Commanders are responsible for ensuring the safe and efficient transportation of AE. All personnel involved with the transportation of AE are required to attend training, and must be certified IAW Defense Transportation Regulation 4500.9-R and Department of Transportation regulations. Safety precautions during limited visibility must receive special emphasis.

SHIPMENT

2-4. The term, shipment, indicates the movement and transfer of AE stocks from one storage facility to another: either into, within, or out of the theater. It includes movement to an ammunition transfer holding point (ATHP) using transportation assets not organic to ammunition units. Also, it includes retrograde of serviceable and unserviceable AE to the theater rear or out of the theater. Normally, theater, corps, or host nation transportation assets are used for transportation. Shipments are not to be confused with issues.

2-5. In routine operations, AE shipments between storage facilities are directed by material release order only from the supporting theater sustainment command or expeditionary sustainment command distribution management center. These shipments are made up from operating stocks arriving in the theater or from those stored in the theater storage areas (TSA). Shipments out of the theater to support other contingencies may also be made when directed.

2-6. In most situations, shipments in the combat or stability and support operations zone are limited to highway transport. The Theater or Expeditionary Sustainment Command, through the Movement Control Battalion, assigns transportation missions to supporting sustainment brigades according to theater or corps priorities. Rail and port facilities may be used when available and if feasible. Aircraft are used only when absolutely necessary, usually for emergency resupply, or to resupply special operations units.

2-7. AE shipments to TSAs are mostly containerized or palletized in break-bulk and uploaded on trailers or flatracks. In most cases, only containerized AE arrive at the TSA where they are unstuffed, placed in a
storage area, or transported forward to ammunition supply points (ASPs) for further distribution. If the mission requires, and if transportation is available, AE are throughput as close to the using units as possible.

2-8. ATHP shipments from the ASP are either in mission configured loads, break-bulk, or single DODIC loads. See ATP 4-35 for more information on AE flow in the theater of operations.

**SHIPMENT GUIDELINES**

2-9. The supply facility begins planning the mechanics of the specific shipment upon receipt of a material release order, shipping instructions, or other shipment authority. The thoroughness of advance planning largely determines the efficiency of any shipping operation. Plans vary depending on the tactical situation, operational environment, type of shipment, and existing workload. Most accidents involving Class V items occur during transportation, movement, and handling. A detailed, step-by-step SOP will make shipment activities safer and more effective. The following actions must be considered when planning a shipment:

- Verify availability of AE for shipment against on-hand assets.
- Select adequate loading points for the operation.
- Verify the condition code and any restrictions or suspension of the AE planned for shipment.
- Determine total gross weight, cube, and security risk classification of the AE.
- Determine AE compatibility for transportation IAW applicable motor vehicle/rail compatibility tables.
- Coordinate with supporting unit to ensure advance notice of AE shipments.
- Determine personnel necessary to complete the mission.
- Determine MHE required.
- Determine safety equipment, tools, packaging, and blocking and bracing materials required.
- Establish timeline for entire operation.
- Determine vehicle load plans and placarding requirements prior to start of operation.
- Ensure security of AE throughout entire operation.
- Risk assessment and unit SOP.

2-10. The responsible movement control battalion maintains liaison with local transportation agencies and designates a movement control team (MCT) to be the single point of contact for each shipping or receiving activity. The MCT is the link between the shipping activity and the transportation service organization. It receives transportation service requirements from the Movement Control Battalion and processes the requests. The MCT coordinates the activities of transportation operators and expedites movements of incoming and outgoing carriers.

2-11. The ammunition unit must coordinate with the MCT to ensure efficient transportation and AE service support. The unit must provide timely, accurate data on pending shipments. This way, the MCT can supply advance information on the mode of transportation, the time of arrival, and the positioning (spotting) of carriers. The MCT coordinates with the support sustainment brigade, who assigns the mission to a combat sustainment support battalion for execution. The MCT continues to track and monitor the shipment, ensuring de-confliction of routes.

2-12. The MCT notifies the receiving activity of the departure time, estimated time of arrival, transportation mode and number of transportation units involved, and other information needed to plan for receipt. Supporting transportation agencies should provide an SOP based on the policies and directives of the higher headquarters.

**SURFACE TRANSPORTATION**

2-13. The most common mode of transportation for AE is surface. Surface modes of transportation include movement by road, rail, and water. Each mode contains its own specific requirements, restrictions, and safety considerations.
ROAD TRANSPORTATION

2-14. Before loading AE on any motor vehicle, the vehicle must be inspected to ensure it meets standards for movement of AE. This includes ensuring MHE has been properly load tested, ensuring the brakes have been set before loading and unloading, ensuring wheels are properly chocked, and AE are properly prepared and packaged. Government owned motor vehicle inspections are required to be documented using DD Form 626, Motor Vehicle Inspection, or a similar local form. DA Pam 385-64, Motor Vehicle Inspection (Transporting Hazardous Materials), describes the safety requirements, inspection criteria, loading procedures, placarding requirements, and compatibility restrictions.

2-15. During contingency operations and in times of war, it may not be possible to use vehicles that meet peacetime standards for the transportation of AE. In such circumstances, commanders use RM principles to ensure the safe and efficient transportation of AE.

- If vehicles that meet peacetime standards are not available, choose vehicles that do not present a fire hazard. Vehicles with leaks, sticking brakes, holes in the floor of the cargo area, or exhaust problems increase the risk of fire and should not be used.
- Ammunition loads must be secured to prevent shifting and loss or damage during transport.
- Vehicles should be equipped with two dry chemical fire extinguishers to allow for fighting vehicles fires.
- Considerations of compatibility will not apply to the transport of combat configured loads or other configurations being transported in the direction of the forward line of troops. However, when mission variables permit, consideration should be given to transporting compatibility groups H, J, K, and L on separate vehicles.

RAIL TRANSPORTATION

2-16. Rail remains an important mode of transportation at the strategic and operational levels of war, and can facilitate the rapid movement of large quantities of AE from depot to port and from port to an intermediate staging base where it can be unloaded, stored, and issued to units in need. The use of railways to transport AE ultimately reduces the risk to soldiers, as a single train can move the same amount of AE as several large convoys.

2-17. While Title 49 CFR provides policies and procedures for the transportation of hazardous material on U.S. railways, it is unlikely that foreign railroads will be held to the same standards, or forced to conform to the same safety regulations as their U.S. counterparts. This substantially increases the risk associated with the use of foreign railways, which can only be mitigated through a deliberate RM process and coordination with host nation rail providers.

2-18. Physical security of AE during rail transportation operations is another concern not easily mitigated through U.S. regulations. When utilizing host nation rail services, rail security is the responsibility of the senior U.S. commander. Coordination with host nation and host nation rail services are typically coordinated through the Provost Marshal Office.

2-19. Railcar inspections are a critical part of shipping AE by rail. DTR 4500.9-R, DA Pam 385-64, and 49 CFR describe the safety inspection criteria, precautions, loading procedures, blocking and bracing techniques, and the certification and spotting of loaded railcars.

WATER TRANSPORTATION

2-20. While AE supply units may be required to provide technical assistance, Surface Deployment and Distribution Command and transportation units are responsible for loading and off-loading waterborne vessels in the theater of operations. See DA Pam 385–64 and CFR, Title 49 for more information. Coast Guard regulations govern the classification, compatibility, and stowage of AE aboard all waterborne vessels in waters under U.S. jurisdiction. The Coast Guard is usually responsible for the security and supervision of waterborne vessels, including barges.

2-21. The United States Coast Guard regulates transportation of AE by water under U.S. jurisdiction and in water transport vessels engaged in commercial use.
AIR TRANSPORTATION

2-22. Aircraft movements of AE require special procedures, packaging and different standards of compatibility than normal transportation operations. Units coordinate with Air Force loadmasters, movement units, and AE professionals before attempting to process or move AE by military or commercial air. Operational procedures for aircraft carrying hazardous materials can be found in AR 95-27, Operational Procedures for Aircraft Carrying Hazardous Materials.

2-23. Air shipments of AE may be made at U.S. Army and Air Force airfields, at heliports, and at AE sling-load areas. The Air Force controls air terminal operations at Air Force airfields. AE shipments into and out of Air Force facilities require careful coordination to prevent disruption of service. Airfields must have staging areas where documents may be prepared and bulk shipments can be received and prepared for shipment.

2-24. Air shipments are preplanned for each aircraft by weight, cube, and compatibility. When possible, the arrival of loaded vehicles will coincide with aircraft availability. Normally, Army/Air Force personnel escort vehicles to the aircraft. The aircraft commander, loadmaster, or crew chief is responsible for supervising the stacking and proper securing of the cargo.

2-25. The Class V storage facility is usually responsible for sling-load areas. Loaded cargo nets must be placed in the landing area so that helicopters can hover to pick them up. Cargo nets may be loaded at the airfield or at the AE supply facility and transported to the airfield.

2-26. A Hazardous Materials Declaration, or facsimile-formatted document, must be attached to each pallet of AE to be shipped by military or commercial aircraft. This document certifies that the shipment complies with the provisions of TM 38-250 or 49 CFR. An individual who has successfully completed the Special Handling Data/Certification Course must sign all copies of the form. For information on aircraft specifications, operating regulations, loading and unloading procedures, and special handling certification, see AR 95-27, DA Pam 385-64, TM 38-250, and 49 CFR.
Chapter 3
Storage Safety

The purpose of field storage is to provide safe AE storage in all operational areas. This chapter contains information on types of AE storage areas. Also, it discusses planning for and storing of AE, with emphasis on meeting safety and storage criteria to the maximum extent possible.

SECTION I – AMMUNITION SUPPORT ACTIVITIES

3-1. Unlike permanent AE storage areas, AE assets in a tactical ammunition support area (ASA), such as an ATHP or unit ammunition holding area are most often stored on the ground and on unimproved surfaces. AE are placed in storage compatibility categories separated from each other by the minimum ESQD. This is based on the individual item NEW, or total gross NEW per individual storage unit, depending on the storage system selected. AE are likely to be stored in one of four types of field storage areas: theater storage area (TSA), ammunition supply point (ASP), ATHP or unit storage. Unit storage is defined as AE issued to the battalion level down to the using unit, and often referred to as unit ammunition holding area storage. The different types of tactical ASA compatibility categories, ESQD standards, storage systems, and storage planning procedures are discussed later in this chapter.

THEATER STORAGE AREAS

3-2. The TSA is normally the theater’s central AE storage activity. Its mission is to receive, store, and ship containerized and break-bulk AE. It also issues, inspects, configures, manages and maintains theater reserve AE. The modular ammunition platoons generally operate the TSA. Area support to operating units will be provided by a separate ASP which may be co-located with a TSA.

3-3. To facilitate shipment, TSAs are located where there is direct access to airfields, railheads, ports, road networks, and facilities. If this is not feasible, the TSA should be located within a short local-haul distance of such facilities.

3-4. The TSA may be a permanent storage facility (for example, igloo, magazine, bunker, or other fixed or semi-fixed explosives storage building), however it may also be an outdoor open storage area with containers or consist of barricaded open storage cells with containers. Barricades and overhead protection is highly recommended for any open storage locations to reduce the loss of assets from indirect fire, fires, explosions, low angle high speed fragments and prompt propagation. Prompt propagation is defined as simultaneous detonations of two or more stacks of AE.

3-5. The area selected for the TSA should have as much hard surface as possible. Also, it must have adequate drainage and a road network capable of supporting heavy vehicle traffic. It should be designed to move break-bulk and containerized AE onto and off transports (i.e., railcars, line-haul vehicles, palletized loading systems). Other logistical units and engineering support may be available to assist AE units in conducting railhead and other transload operations.

3-6. The Army Service component command and variables such as mission, enemy, terrain and weather, troops, time available, and civil considerations (METT-TC) determine the stockage objective of TSAs. The TSA primarily receives its stockage objective from the port of debarkation.

3-7. AE arrive at the TSA on theater transportation assets. They are usually containerized but may include break-bulk or a combination of both. A high percentage of TSA receipts are containerized, AE and transportation personnel must manage containers to guarantee accountability and to retrograde, at a minimum, leased containers for reuse. See ATP 4-35 for a discussion of the flow of AE in the area of operations.
AMMUNITION SUPPLY POINT

3-8. The ASP is run by a modular ordnance company or platoon assigned to a sustainment brigade and provides support to the brigade combat team ATHPs and units not supported by an ATHP. ASPs receive, store, issue, and maintain a stockage objective of AE to meet a routine surge and emergency requirements for supported units. ASP stockage levels are based on tactical plans, availability of AE, threats to the resupply operations and is METT-TC dependent. During the ASP site selection process, commanders should focus on locations that minimize the need for engineer support and as far from inhabited areas as possible (security threats, number of personnel for security and space will dictate distances in theaters of operation). By regulation, a minimum of 1250 feet is required during non-contingency operations, and 1,146 feet during contingency operations and war. It should be located near an improved road network to ensure access by transportation assets when conditions allow.

3-9. The ASP location is METT-TC dependent and operated by an ammunition platoon from a modular ammunition company generally assigned to the sustainment brigade. The ASP provides Class V support units and ATHPs. The actual stock level of an ASP is dependent on a number of mission variables. The ASP can expand to five- or six square kilometers, or larger, depending on mission variables. Unlike the TSA, ASP stocks are most often stored on the ground on unimproved surfaces. ASPs can receive 100 percent of its requirements from a supporting TSA.

3-10. ASPs are temporary, open storage sites with barricading (i.e. earthen berms, HESCO barricades, steel bin barricades). Barricades and overhead protection is highly recommended for any open storage locations to reduce the loss of assets from indirect fire, fires, explosions, low angle high speed fragments and prompt propagation. ASPs are located near main supply routes and rails (if feasible) to allow easy access for theater and corps transportation assets. It is essential that ASPs have good road networks that can support heavy vehicle traffic.

SECTION II – AMMUNITION TRANSFER HOLDING POINT

3-11. The ATHP is located within the brigade support area and is manned and operated by the ATHP section of the brigade support battalion distribution company. The ATHP receives mission guidance and responds to the priorities established by the brigade ammunition officer who is responsible for all Class V requirements for units organic to the brigade. It provides AE support to brigade units and other units operating in the brigade’s AO. As conditions warrant the ATHP must be prepared to assist the forward support company Class V section with AE management tasks beyond its organic capability (for example, AE serviceability inspections, suspensions and restrictions).

3-12. Using either unit vehicles with MHE, flatracks or crops, or organic ATHP materials handling equipment, AE are transferred from echelon above brigade trailers or flatracks to vehicles organic to the using unit. Departing empty vehicles backhaul the empty trailers and flatracks.

3-13. The ATHP should be located near a main supply route or adequate road network to provide access for corps transportation assets and combat user vehicles when conditions allow. The ATHP must be on firm ground with good drainage and offer easy access for vehicles. Also, it must allow for easy recovery of pallets, trailers, and flatracks. The site must be large enough to allow MHE to maneuver. Flatracks and trailers must be placed so the MHE has adequate space to transfer AE. As with any other tactical site, good cover and concealment are extremely important. Barricades and overhead protection is highly recommended for any open storage locations to reduce the loss of assets from indirect fire, fires, explosions, low angle high speed fragments and prompt propagation.

SECTION III – STORAGE SAFETY PRINCIPLES

3-14. The highest degree of safety in AE storage will be achieved if each item is stored separately. However, this is not always feasible due to the security threat, lack of storage space or land available to properly store by storage compatibility groups. Observing the following principles will ensure safety of AE storage regardless of the type of facility:

- Balance safety, mission, and other factors when storing a mix of AE.
Do not store AE and explosives with flammable or combustible material, acids, or corrosives.

If compatible, different types of AE and explosives may be mixed in storage.

Do not store AE with an assembled initiating device as they present a significant storage risk. Exceptions include:

- If the device is packaged in a manner that eliminates risk of accidental detonation.
- If safety features prevent accidental initiation or detonation of the item.
- Do not store white phosphorus (WP) or like items with other AE, when possible.

Protect AE from the elements by storing in properly sealed shipping containers, providing appropriate dunnage, adequate shelter and ventilation. This practice reduces maintenance, ensures maximum serviceability and shelf life of stocks and accountability.

Place AE in appropriate storage compatibility groups (SCG) (when possible for tactical situations) and separate by minimum ESQD as determined by DA Pam 385-64. At a minimum in a tactical environment, ensure magazine distance is observed between AE storage locations to prevent prompt propagation. Magazine distance and intra-line distance exposures can be reduced through the use of barricades unless otherwise specified in DA Pam 385-64.

Separate AE into multiple smaller stacks when possible. This will aid in reducing the size of the explosion and aid in preserving other AE stocks.

STORAGE COMPATIBILITY GROUPS

3-15. All AE and explosives are assigned to an appropriate SCG for storage at Army activities. See Appendix C for more on SCGs.

3-16. Logistical considerations and combat situations may warrant more risk-taking. When warranted, the Army service component command commanding generals may authorize relaxation of storage compatibility requirements. This applies to a TSA, ASP or ATHP storage type areas. Compatibility requirements do not apply when storing unit configured basic loads in combat, contingency operation or military operations other than war type operations. Another safety element, hazard classification, further separates AE and explosives into hazard classes and divisions based on their hazards, physical properties, chemical characteristics and packaging.

EXPLOSIVES SAFETY QUANTITY DISTANCE

3-17. ESQD criteria are designed to protect personnel and property in areas adjacent to storage facilities, to limit the quantity of stocks that may be lost in an explosion, and to reduce the possibility of any explosion involving large quantities of explosives and AE.

3-18. ESQD relationships for specific classes of AE and explosives are based on levels of risk considered acceptable for that item. During peacetime, the ESQD tables set forth in DA Pam 385-64 must be strictly followed unless a deviation is obtained. The tables apply to exposures involving nonmilitary personnel, public traffic routes, inhabited buildings, and health and morale facilities.

3-19. During wartime, contingency operations and military operations other than war, military requirements may make full compliance with safety regulations difficult. Compliance with ESQD regulations is of great importance to commanders since their purpose is to minimize losses of personnel, facilities, equipment, stocks and to maintain the full operational capability of facilities. Normal explosives safety criteria, procedures, ESQD separations, and methods of application in DA Pam 385-64 apply except where risk based storage is approved at the appropriate level in the chain of command. Risk base storage will be documented on DD Form 2977, Deliberate Risk Assessment Worksheet (See ATP 5-19). If in non-compliance, the unit initiates a DA Form 7632 for deviation approval. Explosives safety ESQD in wartime, contingency operations and military operations other than war can be reduced based on certain stipulations, the storage configuration and NEW. See DA Pam 385-64. At a minimum in a wartime, contingency operations and military operations other than war environment, ensure inter-magazine distance is observed from AE storage location to AE storage location to prevent prompt propagation. Inter-magazine distance can be reduced through the use of barricades.
3-20. To meet readiness requirements, certain units may have their Class V uploaded on organic vehicles or stored near the unit. Park uploaded vehicles as far from personnel and inhabited facilities as possible. Placing barricades between uploaded vehicles aids in reducing the risk of damaging other assets in the area. Only store mission essential quantities in vehicles to meet mission needs. ESQD requirements are defined in DA Pam 385-64.

SECTION IV – STORAGE AREA PLANNING

3-21. After the site has been selected and the system of storage is known, a storage plan, risk assessment and SOPs must be written or updated for the operation. Good planning helps ensure that operations are safe and efficient. The following checklist will be used when developing the storage plan / concept of operations:

- What is the total stockage objective for the site?
- What is the total net explosives weight needed to meet current and future mission requirements?
- What hazard class and divisions will be stored?
- Will white phosphorous (WP) or similar items be stored?
- What is the functional level of support required of the storage area (i.e. TSA, ASP, ATHP or unit storage)? Is sufficient space available for possible future expansion if needed?
- What MHE support is needed to move AE on a frequent basis and will those assets remain at the storage area?
- What are the expected average daily receipts and issues?
- Will an explosives laden truck holding area be needed?
- How much time is available before the first AE shipment arrives?
- What is the expected lifetime of the storage area?
- What physical characteristics of the terrain can be used as natural barricades? What characteristics deny or restrict use of certain areas?
- What natural cover and concealment are available?
- What engineer construction and support are available or necessary and how much lead time is needed to obtain that support?
- Will indirect fire be likely to occur? (current and possible future threats)
- What special security requirements are needed for classified and sensitive items based on the controlled inventory item code? See the Federal Logistics Database or the Joint Hazard Classification System for a detailed explanation of controlled inventory item code and the controlled inventory item code for any AE item. The Joint Hazard Classification System can be accessed through the Munitions History Program at Redstone Arsenal. An account must be requested and approved before access is granted. To request an account use the web address above or send an e-mail to MHP Help Desk at usarmy.redstone.usamc.mbx.immc-mhp-helpdesk@mail.mil.
- How close are inhabited areas?
- How close are public traffic routes?
- Where is the fuel storage area and what type of fuel storage area is it, bulk fuel, operational or tactical fuel storage? Fuel supplies are required to be diked or placed downhill from the AE site. Required separation distance varies depending on type of fuel storage. See DA Pam 385-64 for additional information.

SITE SELECTION

3-22. Safety and efficiency must be top priorities when selecting a storage site. It is essential that subject matter experts (89B30/40 QA/QC, ammunition warrant officer, QASAS or ammunition LARs, Corps of Engineers) be involved early in the concept phase, but no later than 30 days into the design phase to preclude possible future disruptive, safety-driven relocations of established Class V facilities. All too often AE storage placement and explosives safety are an afterthought that needlessly places personnel, facilities and equipment at greater risks due to this occurrence.
3-23. A map and ground reconnaissance of the proposed sites should be made. Reconnaissance ensures that the sites are suitable for performing safe operations and providing efficient support to using units. A map recon provides information on the terrain and the possibility of natural cover and concealment. A ground recon supports the information gathered from the map recon and further reveals terrain features. Also, it reveals other conditions that may have changed or may not be identifiable on a map.

3-24. Based on reconnaissance information, site recommendations are submitted, when possible, to the U.S. Army Technical Center for Explosives Safety for review, and to higher headquarters for approval. The sites selected may not be approved for operational and/or tactical reasons. The selection process may have to be repeated, or higher headquarters may identify an area for the location of the storage area. Explosives safety personnel, such as ammunition warrant officers, should be consulted before the higher command selects a location.

ASSESSING TACTICAL REQUIREMENTS

3-25. Tactical conditions and METT-TC factors must be reviewed to reduce conflict between the tactical and safety requirements of an ideal site. Often, these requirements are not compatible, and defense risks must be weighed against the operational mission.

3-26. The tactical situation may require that procedures be modified or supplemented. The following considerations apply to all storage and supply sites:

- **Transportation.** Sites should be located near the main supply route and supported units to allow easy access when possible. The distance to supported units must be reduced in keeping with security constraints.
- **Sites should be easy to defend against ground attack using the fewest personnel and materials possible.** The site must be large enough to allow for dispersion of stocks and with the use of proper barricades and overhead protection will provide additional protection against heavy loss by indirect fire, fire or explosion. As with any other tactical site, good cover and concealment are critical.
- **Road network.** In addition to access and exit roads, sites must contain a good internal road network. Roads must easily allow large vehicle passage under all weather conditions and should require as little maintenance as possible. A one-way traffic pattern is preferred to minimize confusion and congestion.
- **Terrain.** Sites will be established on firm, level ground. Drainage patterns and soil conditions must be studied carefully. A level site that does not drain adequately during wet weather may result in unsafe and inefficient operations. The site must provide easy access for using unit vehicles and for recovery of palletized loading system flatracks, pallets, and trailers. Natural barriers at proper intervals are desirable to segregate field storage units and categories of AE. If captured enemy chemical AE are stored, downwind distances to populated areas must be considered. Do not store captured enemy AE or chemical AE with other stocks. Provide a separate location if possible, or at a minimum provide inter-magazine distance (refer to DA Pam 385-64).
- **Fire safety.** The site must be inspected for fire hazards. A low level of flammable vegetation and an adequate water supply are favorable considerations.
- Will WP or similar items be stored?
- What is the total net explosives weight needed to meet mission requirements and allow for sufficient time for resupply?

GENERAL LAYOUT

3-27. Fundamental rules apply to the layout of all types of AE supply and storage facilities. General safety procedures must be considered first in any site layout. Basic operating procedures are also very similar. Key differences between TSA field sites and ASP or ATHP sites are that the TSA generally has larger, more stable storage areas and better road networks.
3-28. All storage areas should be arranged into separate sections to enhance safety. The arrangement of stocks in each section should make receipt, issue, and inventory/re-warehousing/configuration as easy as possible.

3-29. Each section consists of a number of storage locations or modules, depending on the type of storage system used. Storage locations within each section are separated according to the ESQD requirements in DA Pam 385-64, METT-TC permitting.

3-30. The following guidelines should be observed to maintain efficient operations and prevent units from unnecessary waiting:

- Ensure signs are posted showing traffic direction, entrances, and exits.
- Draw maps of storage areas and provide copies to using units.
- Ensure there is enough dunnage near storage locations for shipment blocking and bracing or materials to prevent AE from being placed directly on the ground.
- Provide external SOP to using units that establishes issue and turn-in procedures, any forms required and form examples.
- Arrange for one-way traffic whenever possible; when not possible, provide turn-around points. Also ensure adequate space for vehicle holding and assembly areas.
- Ensure the use of ground guides is strictly enforced.

3-31. Layout requirements for each site vary according to the tactical situation, the terrain, the proximity to forward areas, and the type and amount of materiel handled. A good layout is one that achieves the following (see figure 3-1 on page 3-8):

- Provides as much distance as possible between AE storage and inhabited areas if ESQD cannot be met.
- Provides natural or manmade berms, barricades or barriers.
- Provides maximum protection to personnel, facilities, equipment and other AE assets stored. Tactical situation will dictate such as security threats, indirect/direct fire, security personnel availability, land availability. Note that when compliance cannot be achieved, units must initiate a DA Form 7632 through command channels to the U.S. Army Technical Center for Explosives Safety for review.
- Provides for easy, efficient work flow.
- Minimizes movement of AE, tools, and equipment.
- Permits easy entry and exit for heavy traffic.
- Provides effective control of unit operations.
- Permits defense of the area.

3-32. Other prime considerations for selected supply and storage sites include protecting AE storage areas from indirect fire with overhead cover, construction of defensive works and obstacles, organization of unit security and defense, and proper weapons positioning.

3-33. A map overlay will be prepared to include the defense plan and operational layout for the new area. If needed, a route overlay will also be prepared. The advance, main, and rear parties use overlays, and copies must be submitted to higher headquarters.

3-34. The operations office is the nerve center of a storage activity. It is normally the control section of an ordnance company or modular platoon. It should be located inside the main entrance where all incoming customers can reach it easily. Also, it should be located near the administrative section but a safe distance from the main ASA. Vehicle holding areas for inbound AE shipments and vehicle assembly areas for outbound AE vehicles will be within walking distance. The operations office must have adequate parking for customer and ordnance company vehicles.

3-35. Parking for inbound, AE-laden vehicles or unit vehicles scheduled for loading is provided in the vehicle holding area. It must have enough maneuver room for large vehicles, and its size must be sufficient to accommodate the largest convoy of vehicles that the site may expect to receive. It is a transit area, and vehicles remain only long enough to be processed for storage or issue.
3-36. The segregation area is a temporary storage area for segregating AE turn-ins and mixed AE shipments. It must be located near the salvage area to allow convenient storage or usage of packing materials. Ensure fire protection distances are sufficient between salvage materials and AE storage.

3-37. Non-explosive material, such as AE residue and salvage materiel, is stored in the inert salvage area. It should be located near the segregation area and the surveillance and maintenance area.

3-38. The demolition area is set aside for the destruction of unserviceable AE. A good access road is necessary to facilitate the delivery and unloading of AE. Because trailers and rough-terrain forklifts may be needed to conduct demolition operations, both the road network and the area must be able to support these vehicles. Land selected for the demolition area will not be used for other purposes. Also, it will have scarce vegetation to minimize the fire hazard. Demolition operations are to be conducted only after AE disposition instructions have been received from higher headquarters or AE items are unsafe to ship or store.

3-39. The vehicle assembly area provides parking for all outbound vehicles, including empty/loaded AE vehicles being assembled into a convoy. The assembly area must be within walking distance of the operations office and meet all requirements of the vehicle holding area. See truck holding area in DA Pam 385-64 for additional requirements.

3-40. Emergency AE resupply operations are conducted at the sling-load operations area. It will be located at least 1,800 feet or 550 meters from AE storage locations, working areas, and inhabited areas. Installation size, security and current threat will dictate in other than peacetime operations. When planning sling-load operations, the allowable gross weight for cargo or utility aircraft must be considered. Sling-load operations will be covered in unit SOPs/policies/procedures and in the risk assessment. See DA Pam 385-64 for sling-load operation requirements.

3-41. The bivouac area is the living area for personnel operating the site. It must be located nearby but outside the fragmentation and blast areas. When locating this site, personnel safety distances from the ASA and the physical security of the bivouac area will be the primary considerations. Tactical situations will dictate distances in other than peacetime operations. However, the minimum level of protection should be applied when possible (refer to DA Pam 385-64, chapter 9).

3-42. Unit vehicles and MHE are maintained in the maintenance area. A separate section within this area may be designated for refueling vehicles. When being refueled, vehicles and MHE will be at least 100 feet from structures or sites containing explosives. Generators supporting the storage area will be located at least 50 feet from the supported facility, and equipment should be located 50 feet or more from explosives but shall be no less than 25 feet from explosives operations or facilities. However fire protection distance is recommended between equipment and supported facilities.

3-43. The surveillance and maintenance area is used for performing AE inspection, repack, and maintenance. For efficiency, it should be located between the operations office and the storage areas. Surveillance operations and maintenance areas are required to be located separate from the storage area. During other than peacetime operations this distance may not be feasible to achieve.

3-44. Live AE are stored in the ammunition storage area.

3-45. The captured enemy ammunition (CEA) area is used to store all CEA turned into the storage facility. CEA is always stored separately; once identified and classified, it is stored using the same principles required for storing U.S. AE. At a minimum ensure the appropriate inter-magazine distance (preferably inhabited building distance) is applied to prevent the loss of U.S. stocks.

3-46. Figure 3-1 on page 3-8 can be used from a TSA level storage area down to unit level storage. Earth filled HESCO barricades are used to separate one cell from the adjacent cell. Cells can be reduced to accommodate fewer containers or with the use of no containers.

- The total NEW per cell cannot exceed 8,818 pounds or 4,000 kilograms.
- The barricade height must be line of sight plus one foot above AE stack to AE stack.
- Barricades must be a minimum of three feet wide at the crest.
- AE stacks can be no closer than three feet from the end of the crest of the wing-walls.

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3-7
LAYOUT CONSIDERATIONS

3-47. AE should be positioned far enough off the road to allow trucks to be loaded or unloaded without interfering with traffic. Containers must be stacked so that AE markings are visible and all containers can be accessed easily. AE positioned on an inadequate or unstable foundation may topple or sag. Inspectors should look for settling or shifting so that corrections can be made before damage results. See DA Pam 385-64 for more information.

3-48. Some units use a standard identification system to identify and locate AE. Such systems use lettered or numbered locations that always contain certain types of AE.

3-49. Whenever a site is established and similar stocks are required, they are placed in the same relative locations; however, ground features and NEWs may preclude this. When a standard identification system is used, a major road or prominent landmark may be referenced. If a road or landmark is not available, the system should follow a logical alphabetical or numerical progression as personnel enter and move through a specific section of the site.

3-50. The manufacturer identifies AE by lot. The lot number is vital for accountability, issue, and storage. Ensure individual lots are segregated in each storage location, clearly separated from other lots. Use DA Form 3020-R, Magazine Data Card to track lot numbers and accountability (gains and losses). Each lot number should have their own separate magazine data card and placed with that lot.

3-51. Climatic considerations such as adequate shelter, dunnage, good drainage and ventilation are necessary to protect stored AE. Tarpaulins can be used to protect AE from the effects of rain and intense sunlight. See DA Pam 385-64 for additional guidance.

3-52. In desert and tropical climates, AE should be stored out of direct sunlight. To minimize exposure to sunlight, position containers with long axes pointed in an east-west direction. Priority for shade is as follows:

- Guided missiles and rockets.
- Propelling charges.
- Fuses.
- Pyrotechnics.
• Projectiles.

3-53. When containers are used for storage, doors may be left open or opened periodically so that air can circulate. Blowing sand or debris should not be allowed to accumulate around containers or pallets.

3-54. The proper use of dunnage increases stack stability. Generally, stacks must be at least 4 to 6 inches off the ground to prevent AE from getting wet and to ensure adequate circulation. See DA Pam 385-64 for more information.

3-55. If drainage is a problem, ditches must be dug around stacks of AE. If propellant charges are stacked, lids will be turned down slightly so water does not seep in or accumulate.

3-56. Storage of guided missiles and rockets requires special care. Guided missile assemblies should be stored in permanent structures if possible because the missile bodies have delicate electronic components that must be protected. If stored in the open, protect the containers with tarps or other suitable cover. In either case, storage areas should have hard, level surfaces, and all humidity indicators must be accessible. Guided missiles and rockets should be stored with all nose ends pointing in the safest direction away from inhabited areas. If barricades are used, orient the nose ends toward the rear wall or side (wing) walls in addition to pointing the nose ends away from inhabited areas. See DA Pam 385-64, Storage of specific types of AE.

3-57. Guards and access control must be employed if classified or sensitive components are stored in the open. See AR 190-11 for more detailed security information.

3-58. Natural concealment must be used whenever possible to camouflage AE storage areas. Camouflage requirements may conflict with requirements for firebreaks and AE shelter. The use of camouflage must be consistent with explosive safety and AE storage procedures. See ATP 3-37.34 for general information on the use of camouflage.

3-59. Is overhead protection and barricading needed? Overhead protection and barricading increases survivability of AE stocks in the event of indirect or direct fire occurs. To provide adequate overhead protection a minimum of two feet of earth must be used. Sandbags, HESCO barricades or other similar materials can be used to provide adequate overhead protection. If overhead protection is to be placed directly on top of the container use figure 3-2 to prevent the container sides from buckling overtime due to the weight.

![Figure 3-2. Installation of roof support in an end opening container](image-url)
Chapter 3

UNSERVICABLE AE STORAGE

3-60. Unserviceable AE are those not safe for use; either manufactured with defects or rendered unserviceable during operations. Shipments of AE will be inspected for serviceability. Unit turn-ins not inspected at the time of receipt must be stored in a segregated area for later inspection. AE specialists must be trained to recognize indications of unserviceability and report them.

3-61. AE handlers segregate unserviceable AE from serviceable AE for safety reasons and to reduce re-handling. The AE must be segregated by DODIC and lot number, followed by serviceability classification. AE that cannot be positively identified by lot number are automatically classified as unserviceable. Exceptions may be made based on the type, quantity, and condition of the AE and METT-TC. It is recommended that a QASAS check for serviceability to ensure items are safe to use. Safety precautions and principles that apply to storage of serviceable AE also apply to storage of unserviceable AE. Proper records must be kept on all unserviceable items stored at a supply facility.

3-62. AE that require maintenance must be segregated and marked to prevent issue. While minor preservation and packaging are performed at field locations, extensive maintenance is usually performed at a depot storage facility. The unit performs the packaging and preservation functions if that is all that is required. Time permitting, repairable unserviceable AE are retrograded for repair.

3-63. AE abandoned by using units are treated as unserviceable until inspected. The procedures that apply to unit turn-ins also apply to abandoned AE. Unserviceable AE are reported through proper channels for disposition instructions. Unserviceable AE must be disposed of as quickly as possible to preclude further deterioration and potentially unsafe conditions. Hazardous unserviceable AE are reported immediately through proper channels to EOD detachments for destruction. A demolition area should be designated and cleared for the safe destruction of AE when possible (subject to environment, inhabited areas, and installation size). For emergency destruction see DA Pam 385-64, table 10-11 for quantity distance requirements using minimum separation and asset preservation criteria.

SUSPENDED AE STORAGE

3-64. Specific lots of AE and components are suspended from issue and use when they are suspected to be unsafe or otherwise defective. The problem may be the result of a manufacturing defect, a firing malfunction, an accident, exceed drop criteria (if applicable) or the deterioration of components. See Supply Bulletin (SB) 742-1 for drop criteria. Storing AE by lot number enables the rapid withdrawal from issue of those items that are unsafe, defective, or suspected of being defective.

3-65. The authority to suspend any lot of conventional AE is vested in the commander, Joint Munitions Command. The authority for missile item is the U.S. Army Aviation and Missile Command. Commanders made decisions about lot suspensions based on a technical inspection and recommendation by QASAS personnel. The local commander may place a local suspension on a suspect lot of AE. A preliminary report or Quality Deficiency Report for inspected AE are forwarded through the supporting sustainment headquarters to theater army headquarters. The AE remain in local suspension unless higher headquarters changes its status. See AR 75-1 for instructions for preparing suspension reports.

3-66. Additional notices of suspensions or restrictions are by updates to Munitions History Program. Unless the suspension notice orders it, AE lots that are stored and later placed under suspension need not be moved to a segregated area. However, stacks of suspended AE must be clearly marked on all sides using DD Form 1575, Suspended Tag-Materiel or facsimile-formatted documents (taped to the materiel), to show that the items have been suspended or restricted from issue. When foreign nationals are employed, bilingual tags should be produced locally. Suspended or restricted-issue items returned by the firing units, or items received from other supply facilities, must be segregated upon receipt.

CAPTURED ENEMY AMMUNITION STORAGE

3-67. CEA is defined as any or all AE products and components produced for or used by a foreign force that is hostile to the United States [that is or was engaged in combat against the United States] in the custody of a U.S. military force or under the control of a Department of Defense (DOD) component. The term includes
confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries. It includes bulk explosives, chemical warfare agents, chemical AE, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster AE and dispensers, demolition charges, and devices and components of the above. CEA can also include North Atlantic Treaty Organization or U.S. manufactured AE that may not have been under U.S. custody or control. When an enemy AE cache is secured for storage, it is first inspected to determine condition, type, and caliber. It is then analyzed and identified by EOD, QASAS, 89B30/40 QA/QC ammunition qualified military inspector, or technical intelligence specialists (when available) to ensure that it is safe to transport or retrograde to a rear storage area. Items of special interest are noted and quickly reported through intelligence channels. Enemy AE must be segregated and disposed of properly. U.S. Army policy for the handling of CEA is outlined in DA Pam 385-64.

3-68. All CEA must be considered extremely hazardous and a significant threat to Soldiers and military equipment. Safety is of utmost importance in handling any type of CEA. No CEA will be handled or moved until inspected by EOD to ensure the AE is safe for handling and/or movement.

3-69. Units that capture or discover enemy AE must immediately report the event to the next higher headquarters and request EOD support and disposition instructions for the AE. All Soldiers should understand the importance of adhering to CEA handling, reporting, and transportation requirements. Captured AE, regardless of nation of origin, will be segregated in a designated collection point until disposition instructions are received.

3-70. The disposition of CEA varies with the tactical situation. It can be destroyed, stored, issued to coalition partners, or retrograded to other AE storage activities. Units required to store CEA must clearly mark and segregate the CEA from other types of AE. The storage of CEA will adhere to all standard storage, quantity distance, and safety procedures that pertain to U.S. AE as outlined in this manual.

3-71. Certain types of CEA have high potential for intelligence value. When an enemy AE cache is secured for storage, it is first inspected to determine condition, type, and caliber. EOD is required to evaluate CAE that will require technical intelligence exploitation. This include first seen enemy ordnance and ordnance items of interest. EOD teams are able to conduct the first level of technical intelligence at the site. Items requiring further exploitation must be secured for transport and sent to the senior EOD headquarters within the theater or operations for level two exploitation. Intelligence gather from the scene is process through the EOD chain of command and disseminated to the intelligence community.

3-72. If the cache is retrograded, supporting AE managers are notified to provide QA/QC personnel and transportation assets to support the retrograde operation. These personnel go to the cache to load and transport it to the designated ASA. QA/QC personnel assist in segregating and loading the AE. The designated ASA places the cache into a designated secure area. CEA must not be stored with U.S. AE. If possible, it will be stored separately from all other AE. Information on the NEW for foreign AE can be obtained by coordinating with your supporting G-2/S-2. At a minimum, CEA will be stored at inter-magazine distance to prevent the loss of serviceable AE. If a distance greater than inter-magazine distance can be provided use the greater distance. The storage of CEA should also be as far away from inhabited areas as possible.

SALVAGE AND PACKAGING STORAGE

3-73. Salvage material includes such items as boxes, crates, and steel containers. Packaging material includes nose plugs, grommets, metal links, clips, cartridge cases, and brass.

3-74. Based on METT-TC, salvage material is normally collected at ASAs and shipped to designated points within the theater of operations for reuse or retrograde. However, if salvage material is turned in at the ATHP, the ATHP non-commissioned officer arranges to have it backhauled to an ASA via available transportation. Some salvage material may be used at field facilities to repack serviceable AE and components. Salvage material is inspected for explosives, recorded on stock records, and reported to the sustainment headquarters as directed by higher headquarters. The sustainment headquarters receives disposition and shipping instructions, and gives the instructions to the storage facility based on these reports. When inert salvage material is shipped from any AE facility, the senior inspector must certify the shipment to be free of explosives.
Chapter 4
Maintenance Safety and Surveillance

AE maintenance encompasses all actions necessary to ensure stocks are either serviceable, or that unserviceable stocks are restored to serviceable condition or disposed of properly. Maintenance responsibilities are assigned to ammunition units based on the unit’s primary mission and the availability of skilled personnel, time, tools, equipment, and supplies. This chapter discusses maintenance and surveillance operations, procedures, and functions.

SECTION I – AE MAINTENANCE

4-1. AE maintenance planning must be aligned closely with the operational needs of supported units. Maintenance planners must be realistic when considering the availability of supplies and maintenance resources. A reduction in AE maintenance increases the amount of AE taken from the supply system. Conversely, the inability of the supply system to replace unserviceable AE requires a greater maintenance effort. Proper handling, storage and maintenance of AE enhances readiness, reduces replacement requirements, and conserves resources. The maintenance planner must recognize the interdependence of maintenance and AE support.

MAINTENANCE OPERATIONS

4-2. Units need a constant supply of serviceable AE. AE maintenance is a vital task that must be performed to sustain readiness. Maintenance includes everything from minor packaging and preservation operations (i.e., cleaning, removing rust and corrosion, repairing boxes and crates) to major operations (i.e., complete renovation). Provisions must be made to conduct the specific maintenance authorized in the storage location in accordance with DA PM 385-64, Paragraph 3-2. In some cases, AE must be retrograded for maintenance. Since the movement of AE requires transportation and personnel assets, it is inefficient to adopt a maintenance program geared totally to retrograde. QA/QC for maintenance operations is performed by QASAS at echelons above brigade. AE maintenance is divided into field and sustainment categories.

FIELD MAINTENANCE

4-3. All activities that have AE on hand perform maintenance (generally packaging and preservation) to prevent deterioration from rough handling and exposure to the elements. Maintenance in the using unit is usually performed with the technical assistance of an ammunition unit. Ammunition companies perform limited maintenance and surveillance of stocks under their control. Limits are defined by the capability of the unit and METT-TC. Besides packaging and preservation, maintenance may include replacing readily removable external parts and components. Field maintenance is largely due to turned-in AE.

PRESERVATION AND PACKAGING

4-4. Care and preservation lines may be established, if METT-TC and capability permit, where loose or opened AE are visually inspected and properly identified. Containers are inspected to ensure that the contents match the information on the outside. Contents are inspected for serviceability, compatibility, and hazardous conditions. Serviceable items are palletized. Unserviceable but salvageable items are sent for repair. Disposition instructions must be requested for suspended and non-repairable items. Scrap material is placed in suitable containers and sent to a salvage area or reused when possible.

4-5. If inspection results in the need to repair or replace a container, the contents must be removed unless a new stencil or marking is all that is necessary. AE are returned to the container with enough filler material to
allow a tight fit. Stencils or markings identical to the originals are placed on the new container. Seals and bands are replaced (where required), and the container is ready for the palletizing area.

4-6. AE must be palletized IAW proper Army Material Command drawings and appendices. Generally, no more than one lot is permitted on any one pallet in storage. Once inspected, pallets are transferred to a storage or shipping area.

4-7. If an explosive hazard exists, the destruction of unserviceable AE and packaging is carried out only by, or under the supervision of, EOD personnel. Disposition instructions must be requested from higher headquarters prior to destruction. See DA PAM 385-64 for more information.

**SUSTAINMENT MAINTENANCE**

4-8. Sustainment (also known as depot level) maintenance will generally be performed by an Army Material Command AE activity. Under certain circumstances sustainment maintenance may be performed by an ammunition company with proper approval or authority. Sustainment maintenance includes all field maintenance tasks and includes, but is not limited to, the following:

- Removal of extensive rust/corrosion; painting and stenciling of Class V materiel; and fabrication of or major repairs to boxes, containers, and crates.
- Replacement of internal/external components that requires the use of operational shields or barricades.
- Demilitarization of AE, when directed.

4-9. Modular ammunition units with storage and issue missions are equipped to perform maintenance functions in accordance with METT-TC. The tools, equipment, and supplies needed to support maintenance at that particular level are included in each unit’s supply and equipment list. Generally maintenance is not performed where AE is stored. Exceptions may include such operations as opening and repacking boxes and metal containers of AE including, repacking of AE into serviceable boxes and fiber containers, spot painting projectiles. Explosives and AE will not be renovated, modified, or demilitarized within a magazine. See DA PAM 385-64 for a list of authorized exceptions.

**MAINTENANCE STANDING OPERATING PROCEDURES**

4-10. Before starting any maintenance operation involving AE, an adequate risk assessment and SOP will be developed and approved by the commander or his/her designated representative authorized to approve the SOP. Refer to chapter 1 for additional SOP development guidance.

**SECTION II – SURVEILLANCE OPERATIONS**

4-11. The commander is responsible for the surveillance program, and is executed under the guidance and advisement of the QASAS. AE surveillance is the observation, inspection, serviceability determination, and classification of AE and their components for movement, storage, and maintenance. Surveillance activities are conducted by all theater activities that store, maintain, dispose of, or ship AE and its components. Surveillance ends only when AE are expended or destroyed. Classification is performed by the QASAS or under the direct supervision of the QASAS.

**SURVEILLANCE FUNCTIONS**

4-12. Quality Assurance Specialists (Ammunition Surveillance) inspectors, personnel under the direction of a QASAS, military ammunition inspectors, and properly trained and designated civilian technicians are responsible for ensuring the reliability and serviceability of AE. The surveillance mission encompasses the following duties:

- Inspecting storage facilities, field storage, and all types of storage sites to ensure compliance with storage standards.
- Inspecting surrounding areas for fire hazards and other nonstandard conditions.
- Checking for conditions that could speed up deterioration of items in storage.
- Teaching surveillance and AE safety.
- Preparing and maintaining records and reports to cover all surveillance activities. (Surveillance records and reports are contained in SB 742-1.)
- Observing, inspecting, and investigating AE and components for serviceability.
- Monitoring storage, handling, and maintenance operations and recommending changes to enhance safety and operational effectiveness.
- Advising the commander on AE surveillance matters.
- Inspecting AE to determine quality, safety, and deterioration.
- Maintaining AE drawings and specifications files and indexes.
- Maintaining AE suspension, notifications and safety of use messages.
- Inspecting incoming and outgoing AE shipments for compliance with existing instructions and regulations.
- Providing technical advice to the commander and supported units on AE safety and compliance with AE regulations.
- Ensuring that surveillance functions are performed according to SB 742-1 and applicable TMs and SBs.
- Assist in planning, administering, and enforcing the explosives safety program.

4-13. AE inspectors provide an invaluable service to the commander and supported units. Inspectors assist in many activities including the following:
- Investigating AE malfunctions and accidents.
- Inspecting and testing lightning protection systems.
- Conducting unit AE inspections.
- Preparing licenses, site plans, and DARADs for storage facilities when the Safety Specialist needs assistance or lacks the knowledge.
- Planning construction of storage facilities.
- Planning field storage areas.
- Monitoring uploading/downloading of AE to/from combat vehicles.

4-14. QASAS/Ammunition LAR will provide technical assistance when requested to Safety Directors and Managers in the following areas:
- Development of explosives safety site plans/submissions and explosives licenses.
- Explosives DARAD requests and certificates of compelling reasons.
- Reviewing designs for explosive production, manufacture, testing, storage, surveillance, maintenance demilitarization, and disposal facilities for compliance with explosive safety standards.
- Conducting safety inspections of AE handling, storage, use, maintenance, and disposal areas at least annually.
- Monitoring AE uploads and other activities that involve the transportation and storage of AE in other than authorized and licensed storage areas to ensure that pertinent requirements are met.
- Reviewing risk assessments, SOPs, and directives for compliance with explosive safety requirements.
- Assisting in the master planning process and reviewing, annually, the master plan to ensure construction is not planned inside explosive safety arcs.
- Monitoring operations involving AE to ensure that Army units understand and comply with explosive safety standards.

SURVEILLANCE INSPECTIONS

4-15. The following inspections are performed by QASAS and/or military inspectors IAW SB 742-1:
- Receipt, including transfers, field returns, and CEA.
- Periodic (cyclic) (performed by or under the direct supervision of QASAS).
• Storage monitoring.
• Special.
• Pre-issue.
• Verification.

**Serviceability Standards**

4-16. The purpose of an inspection is to find deterioration and determine the serviceability of items. As a rule, AE must not have defects that alter their characteristics, make them unsafe, or prevent them from performing as designed. The inspector must be familiar with all information on the items, including components and packaging. The prime causes of unserviceable AE include heat, moisture, not stored in proper shipping containers and rough handling. Deterioration is faster when moisture is combined with a rise in temperature. Serviceability standards are contained in SB 742-1 or item specific references such as the Munitions History Program, TMs, SBs and drawings.

**Surveillance Records and Reports**

4-17. A technical history of each lot, serial number, or group of AE is kept by surveillance personnel in the Munition History Program. This history includes results of all inspections, tests, investigations, and any unusual or changing conditions affecting the items. These records are used to evaluate the serviceability and reliability of AE. The Munitions History Program contains the following information:

• Condition of the materiel.
• Quantity.
• Date of manufacture.
• Type of storage.
• Type of defects.
• Cause of defects.
• Results of tests.

4-18. SB 742-1 provides guidance for preparing the following records and reports:

• DA Form 984-R, Munitions Surveillance Report.
• DA Form 2415, Ammunition Condition Report.
• DA Form 3022-R, Army Depot Surveillance Record.
• DA Form 3023, Gage Record.
• DD Form 250, Materiel Inspection and Receiving Report.
• DD Form 1575, Suspended Tag-Materiel.
• DD Form 1575-1, Suspended Label-Materiel.
• DD Form 1650, Ammunition Data Card.
• SF 364, Report of Discrepancy (ROD).

SECTION III – EMERGENCY DESTRUCT OPERATIONS

4-19. Emergency destruction (ED) of AE is conducted to prevent enemy use, to prevent disclosure of information about classified AE, and for safety reasons. The object of ED is to render AE inoperable, destroy AE and documents of value to the enemy, and render what is left too hazardous to use.

**Approval Authority**

4-20. The authority to destroy AE must be established in a unit’s standard operating procedures. The applicable mission order or SOP must specify who in the chain of command is authorized to order the ED of ASA or ATHP stocks. Senior commanders may delegate this authority to subordinate commanders when the tactical situation demands. Commanders may also dictate when and how to conduct ASA or ATHP ED, including the types of items authorized for destruction and the destruction methods.
CONSIDERATIONS FOR EMERGENCY DESTRUCTION

4-21. The decision to destroy, the method used, and the items to be destroyed depends on operational and mission variables and command policy.

TIME AVAILABLE

4-22. The tactical situation will influence the decision for ED of AE, and the methods by which to accomplish ED. The time available to make a decision concerning the ED of AE may prevent the senior leader at the ATHP from requesting permission from a higher headquarters to conduct ED and prevent enemy capture and use.

AMOUNT OF AE TO BE DESTROYED

4-23. The amount of demolition resources and the time required to destroy a AE stockpile are directly related to the amount of AE to be destroyed and its degree of dispersion. ED by burning or demolition requires significant preparation, but is more effective whereas an artillery strike is quicker but less effective at ensuring complete destruction.

AE SECURITY CLASSIFICATION

4-24. Classified AE must be evacuated if at all possible. If not possible, classified AE will be the first to be destroyed. To ensure complete destruction, classified AE are destroyed by the most reliable demolition method.

AVAILABILITY OF MATERIAL AND TRAINED PERSONNEL

4-25. If the ASA or ATHP has no demolition or flammable material, destruction methods are limited. Only personnel trained in ED and thoroughly familiar with the unit ED standard operating procedures should be permitted to conduct demolition operations.

PLANNING FOR EMERGENCY DESTRUCTION

4-26. Planning for ED should begin as soon as a unit is assigned an AE mission, and must be documented in an ASA or ATHP internal SOP as an annex. To ensure the plan is complete and feasible, units should staff it through technically qualified personnel such as explosive ordnance disposal (EOD) qualified personnel.

4-27. ASA and ATHP personnel must be trained in ED methods and procedures. All personnel must be thoroughly familiar with the unit ED standard operating procedures and methods of destruction.

4-28. Priorities for ED are based on the tactical situation and the types of AE stored at the ASA or ATHP. ED priorities should be established in the unit’s mission orders and SOPs. Priorities may change based on logistical and tactical requirements. AE vital to the defense of the unit should not be destroyed.

4-29. ED priorities include:

- Priority 1: Classified AE, associated manuals, records, reports, test sets, and equipment.
- Priority 2: AE that can be used in immediate retaliation and deployed without a weapon system such as grenades, mines, small rockets, and AE for which the enemy has weapon system capability.
- Priority 3: Casualty producing AE (high explosive and anti-personnel) not include in priorities 1 and 2.
- Priority 4: Non-casualty producing and pyrotechnic AE such as signals and illuminating projectiles.

SAFETY

4-30. Observance of safety precautions is mandatory regardless of the ED method used or the urgency of the situation. Only trained, experienced personnel should conduct ED operations. Safety requirements determine
the number of personnel engaged in ED of AE. It is always best to use the cardinal rules of AE handling when planning and executing ED operations; expose the minimum number of people, to the minimum amount of explosives, for the minimum amount of time consistent with safe and efficient operations. Safety considerations include the amount and type of AE being destroyed and the size of the ATHP. A minimum of two personnel should be present during ED operations.

4-31. Mission variables permitting, coordination with and warning of those units endangered by ED operations must be conducted to prevent or reduce casualties.

4-32. No matter the method used, special care must be taken when destroying improvised conventional AE, rockets, missiles, and ejection type AE. Improvised conventional AE and ejection type AE may expel their payload when detonated or burned. These sub-munitions must be treated as UXO. Rockets and missiles should be pointed away from friendly troops as they could be unintentionally ignited during ED operations and propelled in the direction pointed.

4-33. When using electrical or remote firing devices during ED operations, a minimum distance of 400 meters (1,312 feet) must be maintained from radio transmitters in order to prevent pre-mature detonation.

**METHODS OF DESTRUCTION**

4-34. Choose method of destruction that cause enough damage to the AE to ensure they are not restorable to a useable condition within the combat zone by repair or cannibalization. Destruction should be planned to impede enemy troop movement without creating hazards to friendly forces.

4-35. The actual method or methods used in a given situation depend on time, personnel, type of AE, and available means of ED. Method of destruction include:

- **Fire Support**: After expending as much AE on enemy positions as time allows, units request a fire mission on the ASA or ATHP location.
- ** Burning**: Although less time consuming, burning is not recommended for all types of AE because it rarely accomplishes total destruction. To facilitate a rapid fire, diesel fuel, gasoline, paint thinner, or other suitable combustible or flammable liquid should be used.
- **Demolition**: Properly executed demolition is extremely effective in the destruction of AE. ED teams must understand how and where to place demolition charges on different AE to achieve complete destruction or to make the AE unusable by the enemy. Quantity distance factors must be taken into consideration to reduce the risk to friendly forces.
Chapter 5

Fire Protection, Prevention, and Safety Awareness

This chapter discusses fire protection and prevention programs and procedures. Topics covered include fire divisions, hazard classifications and fire symbols, common safety violations and hazards, and characteristics of AE fires.

SECTION I – FIRE PROTECTION PROGRAM

5-1. Fire and excessive heat are two of the greatest hazards to explosives. Many AE items are extremely sensitive to heat and react at temperatures substantially lower than those required to ignite ordinary wood, paper, or fabrics. Direct heat generated by a fire could initiate a reaction and result in an explosion.

5-2. Every Army activity must have a fire protection program that includes fire protection training, fire suppression, and fire prevention. The program’s objective is to eliminate the causes of fire and reduce the potential for loss of life, injury, and property damage. Army policy prohibits fighting fires that involve AE. Fighting to prevent fire from engaging AE is authorized.

5-3. The commander’s awareness and involvement are the most critical component of an effective fire protection program. Preserving life and property is a fundamental duty of all levels of command and supervision.

FIRE PREVENTION

5-4. Each ASA, ATHP, and AHA must establish a well-planned fire prevention program that includes SOPs, risk assessments, fire prevention training, identification and elimination of hazards, enforcement of fire regulations, and adequate fire protection for facilities. This program requires strong command emphasis and support.

5-5. Frequent surveys and inspections help to establish the best standards and practices for preventing fires. AE fires are among the most feared because of the potential for casualties, destruction, and loss of property and equipment. Most fires involving AE are preventable. Thus, fire safety awareness and training in prevention practices are especially important.

STANDARD OPERATING PROCEDURES

5-6. The fire prevention procedures presented here are fundamental but not all-inclusive. They should be supplemented by additional standards the commander feels are necessary to protect the ASA. At a minimum, the unit SOP will contain the following rules and procedures that should be enforced by everyone working with and around AE.

- Strictly regulate and control smoking in areas where AE, highly combustible materials, or flammable items are kept. If smoking can be regulated safely, designate specific locations and post “authorized smoking area” signs. Smoking areas are certified by the commander or safety officer and equipped with proper receptacles for butts or smoking residue. At least one portable fire extinguisher with a 1A or greater rating should be provided at each designated smoking area.
- Smoking is prohibited in, on, or within 50 feet of any motor vehicle, trailer, railcar, or MHE loaded with explosive items.
- Locate the smoking area at least 50 feet from the area containing AE and explosives if noncombustible walls do not separate these two areas. Ensure at least one serviceable fire extinguisher is placed in the area. Do not permit anyone whose clothing is contaminated with explosive or hazardous material to use the smoking area.
Do not permit the use of matches or other flame, heat, or spark producing devices in any magazine area or field storage activity. The commander or unit safety officer should provide for exceptions to this in writing.

Use only flashlights or storage battery lamps approved by the U.S. Bureau of Mines or other recognized authority in structures that contain AE.

Locate parking areas; to include gasoline, diesel, and gas powered MHE parking, no closer than 100 feet outside ammunition storage areas. Control these areas to reduce fire hazards and provide easy access to firefighters.

Parking areas for fuel service vehicles should be located a minimum of 50 feet from explosives locations.

All MHE and any other gasoline, diesel, or gas equipment used in an AE area should be equipped with a fire extinguisher. For additional requirements, see DA Pam 385-64.

Gasoline and diesel-powered vehicles and equipment should be refueled at least 100 feet from structures or sites containing explosives.

Police areas on a daily basis for combustible materials left over from operations. Stack and properly dispose of these materials daily. See DA Pam 385-64 for stacking guidelines and distance requirements.

Control vegetation or undergrowth as much as the tactical situation permits.

PRE-FIRE PLAN

Any activity that stores or handles AE must have an effective safety program and plan to help prevent and fight fires. Pre-fire plans should be developed in accordance with AR 420-1. In addition to the requirements of AR 420-1, the overall plan will specify responsible individuals and alternates, their organizations and training, and include a description of the emergency function of each department or outside agency.

Details of the plan should describe the duties of personnel and will include:

- Reporting the fire.
- Directing orderly evacuation of non-essential personnel.
- Notifying nearby commands and locations of impending dangers.
- Activating means of extinguishing or controlling the fire.
- Communications plan and alarm signals.
- Meeting and advising the firefighters on the details of the fire up to the time of their arrival. Include the types of AE involved and associated hazards.
- When to fight a fire and when to evacuate to a safe distance.
- A rally point.

The pre-fire plan includes an installation map that identifies storage locations, the road network, and AE hazards at each location, including fire and chemical symbols. Details of the plan may vary depending on the tactical situation. See AR 420-1 for additional guidance.

TRAINING

Training is a vital part of the fire protection and prevention program. All personnel and firefighters involved with AE must be trained in the precautions and proper methods of fighting fires. Training will include an understanding of individual responsibilities as identified in the pre-fire plan. It should also include instruction in the following:

- A system for reporting fires.
- Procedures for sounding alarms.
- Evacuation procedures and rally point.
- Application and meaning of each type of fire and hazard symbol.
- Type and use of appropriate firefighting equipment.
5-11. Fire drills encourage and increase safety awareness. Instructions to supervisors and personnel will include steps that increase fire safety. All supervisors must be thoroughly familiar with fire hazards and what types of fire to fight, and from what fires to evacuate to a safe distance.

5-12. Fire drills are required to be held within the explosives areas at intervals of 6 months or less. See DA Pam 385-64, table 6-4 for withdrawal distances. Drills are conducted to train firefighting forces and ensure other personnel involved understand their duties and to evaluate fire alarm systems and firefighting equipment.

SAFETY VIOLATIONS

5-13. Serious consequences often result from the lack of training or failure to follow instructions and written safety regulations and procedures. The most common safety violations include:

- Smoking.
- Carrying and using matches and other flame or heat producing items in forbidden areas.
- Tampering or playing with AE, particularly grenades, demolition materials, and pyrotechnics.
- Deviating from approved SOPs and regulations.
- Picking up or mishandling unfamiliar or unknown ordnance.

COMMON HAZARDS

5-14. A fire in an AE storage area can start in any number of ways. Most often, fires begin in vegetation and accumulated waste materials, wastepaper, scrap lumber, dunnage, broken pallets, and boxes. Causes include the following:

- Unauthorized use of spark producing tools.
- Use of defective MHE and vehicles.
- Use of faulty or unapproved electrical equipment.
- Failure to provide proper barricades.
- Failure to provide firebreaks or proper firebreaks.
- Use of improper grounding techniques.
- Improper use/disposal of solvents.

PROCEDURES FOR AE – LADEN VEHICLES

5-15. When any part of a vehicle, other than its cargo, catches fire, try to get the vehicle to a clear, isolated area and use a handheld fire extinguisher to fight the fire. Fight the fire until the flames reach the cargo. At that point, evacuate all personnel and equipment to a safe distance. Smoking is prohibited in, on, or within 50 feet of any motor vehicle, trailer, railcar, or MHE loaded with AE.

AUXILIARY FIREFIGHTING EQUIPMENT

5-16. A small fire involving AE may rapidly become intense and lead to an explosion. Hand-held portable fire extinguishers can be used to fight small fires as long as the fire is outside of the magazine. All fire extinguishers must be easily accessible and maintained in good operating condition. A minimum of 2 fire extinguishers suitable for the hazards involved will be available for immediate use when explosives are being handled. While personnel must not be exposed to the hazards of an imminent explosion, it is vital to attack a small fire at once using authorized fire extinguishing equipment. See table 5-1, page 5-4 for more information about the types of firefighting agents that should be used on different types of fires.

WATER BARRELS AND SAND

5-17. Water barrels and pails, sand boxes, and shovels provide a recognized means of combating Class A fires in ASAs where the combustible material consists primarily of grass, wood, dunnage, boxes, and empty containers. Barrels must be covered to prevent insect breeding and evaporation and will be winterized as
necessary. At least 2 metal pails must be available for each barrel. Water barrels may not be needed with the ASA when it meets the following conditions:
- Vegetation control measures are adequate, and the area is monitored regularly.
- A pre-fire plan and an organized firefighting force with the equipment capable of combating grass and brush fires are in place.
- Updated fire maps are maintained at fire stations and storage areas. These maps indicate the location of each storage area and the hazard at each site.
- Storage area work crews are equipped with serviceable extinguishers.
- No storage of WP or like AE that require the use of water if a leak is discovered.

5-18. Rakes, shovels, picks, and other equipment needed to fight grass or vegetation fires must be in adequate supply. Plows, graders, and bulldozers should be used if available.

**Table 5-1. Fire extinguishing agents**

<table>
<thead>
<tr>
<th>CLASS</th>
<th>AGENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A – Combustible Materials such as wood, paper, rubbish.</td>
<td>Water.</td>
</tr>
<tr>
<td>Class B – Volatile Flammables Materials such as oil, gasoline, grease or paint.</td>
<td>Carbon dioxide, halon, foam or dry chemical.</td>
</tr>
<tr>
<td>Class C – Electrical Electrical equipment.</td>
<td>Carbon dioxide, halon, or dry chemical.</td>
</tr>
<tr>
<td>Class D – Combustible Metals Materials such as magnesium potassium.</td>
<td>Aqueous Film-Forming Foam.</td>
</tr>
</tbody>
</table>

**FIREBREAKS**

5-19. Firebreaks may be both artificial and specific. Artificial firebreaks include roads, highways, cleared manmade areas, survey lines, and transmission lines. Specific firebreaks are cut in advance and maintained to prevent the progress of any fire. It may not be possible or desirable to cut firebreaks during tactical operations due to METT-TC factors. General guidelines for firebreaks can be found in DA Pam 385-64, Chapter 6. A 50 foot firebreak will be maintained around any AE location, when possible.

**SECTION II – FIRE HAZARDS AND SYMBOLS**

5-20. Depending on the materials involved, fires that occur in buildings and magazines containing AE vary in intensity and outcome. Certain explosives ignite on contact with a spark or flame or when subjected to frictional heat or concussion. Some substances burn freely. Others, such as propellants, explode while burning or develop heat so intense that firefighting efforts are nearly futile.

5-21. Firefighters must be well acquainted with the hazards in each fire hazard group. They must know which methods of fighting fires are most effective for the materials under their protection. They must be proficient in using the personnel protective devices needed for fighting various types of fires. Remember, AE personnel do not fight fires involving AE.

**FIRE DIVISIONS AND CLASSES**

5-22. AE are separated into fire divisions based on the relative danger they present to firefighters. Each fire division has different protocols for fighting fires that may occur in and around AE. Table 5-2, page 5-5 outlines the various fire divisions used by the U.S. Army, the predominate hazard, and the hazard class for each type of AE. Table 5-3, page 5-5 provides information on the actions soldiers should take in fighting fires within each fire division. Table 5-4, page 5-6 provides information about emergency withdrawal distances for non-firefighting personnel.
### Table 5-2. Fire divisions and hazard classes

<table>
<thead>
<tr>
<th>FIRE DIVISION</th>
<th>PREDOMINATE HAZARD</th>
<th>HAZARD CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mass explosion</td>
<td>1.1 and 1.5</td>
</tr>
<tr>
<td>2</td>
<td>Non-mass explosion, fragment producing</td>
<td>1.2 and 1.6</td>
</tr>
<tr>
<td>3</td>
<td>Mass fire, minor blast, or fragment producing</td>
<td>1.3</td>
</tr>
<tr>
<td>4</td>
<td>Moderate fire, no blast or fragment</td>
<td>1.4</td>
</tr>
</tbody>
</table>

### Table 5-3. Fire symbol hazards and actions

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>MATERIALS</th>
<th>HAZARD</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| 1      | 1.1 Explosives, ammunition, and liquid propellants | Mass detonation | 1. Will not be fought unless a rescue attempt is being made.  
2. If there is suitable separation between non-explosive and symbol 1 material, and if approved by the fire chief, firefighting forces may attempt to extinguish the fire.  
3. If personal safety is in doubt, take suitable cover. |
| 2      | 1.2 Ammunition and explosives | Explosion with fragments | 1. Give the alarm and attempt to extinguish the fire if in the early stage.  
2. Firefighting forces should fight the fire, until the explosive material becomes involved in the fire or the fire chief determines the risk is too great. If not possible, prevent the fire from spreading.  
3. Detonating of items could occur. Provide protection from fragments. |
| 3      | 1.3 Ammunition and explosives | Mass fire | 1. May be fought if explosives are not directly involved.  
2. If WP munitions are involved, smoke is liberated from the munition. WP munitions may explode. WP should be immersed in water or sprayed with water continuously.  
3. For fire involving HC and incendiaries, water should not be used unless large quantities are available. Use dry sand or dry powder agent in the early stage.  
4. For fires involving pyrotechnics and magnesium incendiary, protect agent facilities and equipment. Do not use CO₂ or water on or near the munitions. Allow magnesium to cool unless upon flammable material. In this case, use a 2 inch layer of dry sand or powder on the floor and rake the burning material into this layer and smother. |
Table 5-3. Fire symbols and hazard class (continued)

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>MATERIALS</th>
<th>HAZARD</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| 4      | 1.4 Ammunition and explosives | Moderate fire | 1. Fight the fire.  
2. Expect minor explosions and hot fragments. |

Legend:
CO₂: Carbon Dioxide  
HC: High Concentrations  
WP: White Phosphorous

Table 5-4. Emergency withdrawal distances for nonessential personnel

<table>
<thead>
<tr>
<th>HAZARD CLASS</th>
<th>UNKNOWN NEW</th>
<th>KNOWN NEW</th>
<th>For transportation:</th>
</tr>
</thead>
</table>
| Unknown, located in facility, truck and / or tractor trailer               | 4,000 feet  | 4,000 feet| 1. Use 2,500 feet minimum distance for NEW > 500 pounds.  
2. Use 5,000 feet minimum distance for railcars with NEW < 500 pounds and 4,000 for feet for other modes.  
3. Use 4,000 feet minimum distance for bombs and projectiles with caliber 5 inch (127 millimeter) and greater. |
| Unknown, located in railcar                                                | 5,000 feet  | 5,000 feet| For facilities:  
1. Use 2,500 feet minimum distance for NEW > 15,000 pounds.  
2. Use 4,000 feet minimum distance for NEW > 15,000 pounds and 50,000 pounds or less.  
3. Above 50,000 pounds, use D=105 W₁/₃. |
| HD 1.1 (see note 1)                                                        | Same as unknown HD | For transportation:  
2. Use 5,000 feet minimum distance for railcars with NEW < 500 pounds and 4,000 for feet for other modes.  
3. Use 4,000 feet minimum distance for bombs and projectiles with caliber 5 inch (127 millimeter) and greater. |
| HD 1.2 (see note 1)                                                        | 2,500 feet  | 2,500 feet| For facilities:  
1. Use 2,500 feet minimum distance for NEW > 15,000 pounds.  
2. Use 4,000 feet minimum distance for NEW > 15,000 pounds and 50,000 pounds or less.  
3. Above 50,000 pounds, use D=105 W₁/₃. |
| HD 1.3 (see note 2 and 3)                                                  | 600 feet    | Twice the IBD distance with a minimum distance of 600 feet |
| HC 1.4                                                                      | 300 feet    | 300 feet  |

Notes:
1 For HD 1.1 and 1.2 items, if known, the maximum range fragments and debris will be thrown (including the interaction effects of stacks of items, but excluding lug, strong backs, and nose or tail plates) may be used to replace the withdrawal distances.  
2 For accidents involving propulsion units, it is unnecessary to specify emergency withdrawal distances based on the potential flight ranges of these items.  
3 Refer to DA Pam 385-64, Table 8-22.

Legend:  
HD: Hazard Class / Division  
NEW: Net Explosive Weight
5-23. Fire Division 1 indicates the greatest hazard, with the hazard decreasing with each ascending number. Fire Divisions 1 through 4 correspond with Hazard Class / Division (HC/D) 1.1, 1.2, 1.5 and 1.6. See DA Pam 385-64 for further discussion of the Hazard Classification System.

5-24. Fire Divisions 1 and 2 include the AE in Hazard Classes 1.1 and 1.2. In a fire, these materials can be expected to detonate with moderate to severe fragmentation hazards. Make no attempt to fight fires involving Division 1 unless a rescue attempt is being made. Attempts to extinguish a Division 2 fire may be made if it is in an early stage, or to fight the fire until the risk becomes too great.

5-25. Fire Division 3 is comparable to Hazard Class 1.3 and presents a mass fire hazard. Personnel in the area will give the alarm and fight the fire if AE are not directly involved.

5-26. Fire Division 4 consists of AE that presents a moderate fire hazard. Fires that involve this type of AE will be fought by firefighters (not AE personnel) with remote streams and portable and mobile fire-extinguishing equipment until the fire is brought under control. See DA Pam 385-64 for more information on fighting fires.

**FIRE DIVISION SYMBOLS**

5-27. Each fire division is represented by a distinctive fire symbol. The shapes and dimensions for each symbol are identified in Figure 5-1. These symbols enable firefighters to recognize possible hazards as they approach the fire scene. The applicable fire division number is shown on the symbol. To facilitate long-range identification, these symbols have different shapes.

![Fire Division Symbols](image)

**POSTING FIRE SYMBOLS**

5-28. The fire symbol that applies to the most hazardous material present will be posted at or near explosive locations. Backing material for the symbols will be made from a noncombustible material of the same shape. Symbols must be visible from all approach roads. When all AE within the ASA are covered by one fire symbol, it may be posted at the entry control point.

5-29. When different HC/D of AE are stored in individual multi-cubicle bays or module cells, appropriate fire symbols will be posted on each bay or cell. Only one fire symbol should be displayed at the entrance of a row when AE requiring the same fire symbol are located in one row or on one service road.

5-30. Fire symbols must be placed on entrances to arms rooms that are licensed for holding and storing quantities of explosives. Also, the appropriate fire symbol must be displayed on a locker or similar type container where licensed explosive AE are stored. However, symbols are not required on the exterior of a building if the building is exempt from ESQD requirements contained in DA Pam 385-64.

5-31. It is not required to post fire symbols on locations having 1,000 rounds or less of HC/D 1.4 small arms ammunition (.50 caliber or less). Host Nations symbols will be used if required by agreement. The ASA
commander may remove fire symbols for security purposes. In this case, the commander must emphasize giving prompt and exact information to the firefighters regarding any changes in the status of explosives.

5-32. If vehicles and aircraft are parked in a designated explosives parking area, fire symbols need not be posted providing the area is identified on the installation master map and described in a local SOP or vehicle and/or aircraft parking plan.

SECTION III – CHEMICAL HAZARDS AND SYMBOLS

5-33. Chemically filled AE storage and operational facilities must be identified with appropriate hazard symbols as shown in Figure 5-2, page 5-8. The type of hazard symbol selected for this purpose depends not only on the type of chemical agent in the item of AE but also on the absence or presence of explosive components in the item. (During wartime and during certain contingency operations, chemical hazard symbols may not be required. AE personnel should consult their supporting AE activities or safety personnel for more information.)

5-34. Appropriate personal protective equipment are essential when fighting fires involving chemical agents. The protective clothing and apparatus in Figure 5-3 are for firefighting purposes and do not necessarily apply to normal operations. The symbols presented in this figure are described as follows:

SYMBOL 1, WEAR FULL PROTECTIVE CLOTHING

5-35. The following indicates protective clothing as identified.

• Set 1. Red rim and figure. Indicates the presence of highly toxic chemical agents that may cause death or serious damage to body functions. Includes authorized self-contained breathing apparatus, or approved equivalent; impermeable suit; hood; gloves; explosives handler’s coveralls; and protective footwear, as applicable. A fire blanket should also be available in case of a fire. (Typically for captured enemy AE).

• Set 2. Yellow rim and figure. Indicates the presence of harassing agents (riot control agents and smokes). Includes authorized protective mask or self-contained breathing apparatus, explosive handler’s coveralls, and protective gloves.

• Set 3. White rim and figure. Indicates the presence of white phosphorus and other spontaneously combustible material. Includes authorized protective mask or self-contained breathing apparatus, flame-resistant coveralls, and flame-resistant gloves.

SYMBOL 2, WEAR BREATHING APPARATUS

5-36. The statement “Wear breathing apparatus” indicates the presence of incendiary and readily flammable chemical agents that present an intense heat hazard. This hazard and sign may be present with any of the other fire or chemical hazards/symbols. Protective masks that prevent the inhalation of smoke from burning incendiary mixture will be used.

SYMBOL 3, APPLY NO WATER

5-37. Indicates a dangerous reaction will occur if water is used in an attempt to extinguish the fire. This symbol may be posted together with any of the other hazard symbols.

5-38. See DA Pam 385-64 for information on the types of chemical hazards associated with the symbols in Figure 5-2. Refer to Figure 5-3 to determine clothing and equipment required when dealing with specific chemicals and fillers.
5-39. When chemical or pyrotechnic AE are assembled with explosive components, chemical hazard and fire hazard symbols are used together. Chemical AE without explosive components are identified by chemical hazard symbols only.

5-40. Requirements for posting chemical symbols are similar to those for posting fire symbols. Chemical symbols must be removed, covered, or reversed as soon as chemical agents are removed from a location.
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Appendix A

Brass Conversion

The data and procedures contained in this appendix are used to compute the weight and/or quantity of expended cartridge cases. Refer to DA Pam 710-2-1 for items not listed.

TO FIGHT WEIGHT

A-1. Multiply the quantity of expended cartridge cases by the weight. Using the example, brass, short, expended-rounds, .22 caliber, work the formula as shown below.

FORMULA

A-2. Quantity of the item x weight = weight of expended cartridge cases.

COMPUTATION

A-3. 39,875 rounds x .0008 pounds = 31.9 pounds. Work to one decimal place and round down: 31 pounds expended. Table A-1 provides the standard weight for the most common classes of AE.

Table A-1. Brass conversion chart

<table>
<thead>
<tr>
<th>CLASS TYPE</th>
<th>WEIGHT (POUNDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.22 caliber, brass, short</td>
<td>.0008</td>
</tr>
<tr>
<td>.22 caliber, brass, long</td>
<td>.0014</td>
</tr>
<tr>
<td>.30 caliber, brass, all</td>
<td>.0286</td>
</tr>
<tr>
<td>.38 caliber, brass, all</td>
<td>.009</td>
</tr>
<tr>
<td>.45 caliber, brass, all</td>
<td>.0124</td>
</tr>
<tr>
<td>.45 caliber, steel, all</td>
<td>.012</td>
</tr>
<tr>
<td>.50 caliber, brass, all</td>
<td>.121</td>
</tr>
<tr>
<td>.50 caliber, steel all</td>
<td>.111</td>
</tr>
<tr>
<td>5.56 millimeter, brass, all</td>
<td>.0135</td>
</tr>
<tr>
<td>7.62 millimeter, brass, large</td>
<td>.026</td>
</tr>
<tr>
<td>9 millimeter parabellum</td>
<td>.009</td>
</tr>
<tr>
<td>20.0 millimeter, brass, small</td>
<td>.2</td>
</tr>
<tr>
<td>20.0 millimeter, brass, large</td>
<td>.25</td>
</tr>
<tr>
<td>25 millimeter, all</td>
<td>.48</td>
</tr>
<tr>
<td>Shotgun, brass, all</td>
<td>.036</td>
</tr>
</tbody>
</table>
Appendix B

AE Identification

AE is identified by markings and color-coding on the items themselves, the containers, and the packing boxes. The markings and standard nomenclature of each item, together with the lot number, Federal Supply Class (FSC), NSN, Department of Defense Identification Code (DODIC), and Department of Defense Ammunition Code (DODAC), completely identify each item and are used to maintain accountable records. This appendix gives a basic explanation of markings and color-coding. Because color-coding is a more ready means of identification, it is given greater emphasis here.

MARKINGS

B-1. Markings stenciled or stamped on AE items include all information needed for complete identification. Components in which all explosive, incendiary, or toxic materials have been simulated by substitution of inert material are identified by impressed INERT markings. Components in which all explosive, incendiary, or toxic materials have been omitted are identified by stamped EMPTY markings.

AE LOT NUMBER

B-2. Each item of AE is assigned a complete round or item lot number when it is manufactured or is at the logistics assistance program plant. See Military Standard (MIL-STD) 1168C for a description of the current system. Figure B-1 breaks down a typical AE lot number showing the new and old systems.

![Figure B-1. Typical lot number system.](image)
CONVENTIONAL AE FEDERAL SUPPLY CLASSES

B-3. Conventional AE is federal supply class (FSC) 13. Within this group, AE is further broken down by two more numbers that identify the general type or family in which the item falls. Table B-1 lists the FSCs.

Table B-1. FSC group 13 classes

<table>
<thead>
<tr>
<th>FSC GROUP 13</th>
<th>AMMUNITION AND EXPLOSIVES TYPE OR FAMILY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1305</td>
<td>Ammunition, through 30mm</td>
</tr>
<tr>
<td>1310</td>
<td>Ammunition, over 30mm up to 75mm</td>
</tr>
<tr>
<td>1315</td>
<td>Ammunition, 75mm through 125mm</td>
</tr>
<tr>
<td>1320</td>
<td>Ammunition, over 125mm</td>
</tr>
<tr>
<td>1330</td>
<td>Grenades</td>
</tr>
<tr>
<td>1340</td>
<td>Rockets and Rocket Ammunition</td>
</tr>
<tr>
<td>1345</td>
<td>Land Mines</td>
</tr>
<tr>
<td>1346</td>
<td>Remote Munitions</td>
</tr>
<tr>
<td>1365</td>
<td>Military Chemical Agents</td>
</tr>
<tr>
<td>1370</td>
<td>Pyrotechnics</td>
</tr>
<tr>
<td>1375</td>
<td>Demolition Materials</td>
</tr>
<tr>
<td>1376</td>
<td>Bulk Explosives</td>
</tr>
<tr>
<td>1377</td>
<td>Cartridge and Propellant actuated devices and components</td>
</tr>
<tr>
<td>1390</td>
<td>Fuses and Primers</td>
</tr>
<tr>
<td>1395</td>
<td>Miscellaneous ammunition</td>
</tr>
<tr>
<td>1398</td>
<td>Specialized ammunition handling and servicing equipment</td>
</tr>
<tr>
<td>1410/20/25/27</td>
<td>Guided Missiles</td>
</tr>
</tbody>
</table>

Note: There are other FSC groups, but they are for Class V materiel outside the U.S. Army ammunition inventory. (Look in any current copy of the DOD ammunition listing, volumes 1 through 3, for more information.)

Legend:
DOD: Department of Defense
FSC: Federal Supply Class
mm: millimeter
U.S.: United States

CONVENTIONAL AE NATIONAL STOCK CONTROL NUMBERING SYSTEM

B-4. Each complete round or item of conventional AE or associated explosive component is identified by its own NSN. The first four numbers of the NSN is the FSC. It is followed by the National Item Identification Number, or NIIN, which consists of a two-number code identifying the country of manufacture and a seven digit-number item identification.

DEPARTMENT OF DEFENSE IDENTIFICATION CODE

B-5. A DODIC is a four character alpha numeric code. It is attached at the end of all NSNs to denote interchangeability of the item. Communications between ammunition units often use an AE item DODIC. See figure B-2 on page B-3 for a conventional NSN with DODIC added, demonstrating interchangeability between various model numbers and the designators of an AE item.
Figure B-2. Sample Department of Defense Identification Code (DODIC)

DEPARTMENT OF DEFENSE AMMUNITION CODE

B-6. The DODAC includes the FSC of the AE and the DODIC. The code is used on all using unit DA Form 581s, Request for Issue and Turn-in of Ammunition, DA Form 3151-Rs, Ammunition Stores Slip, and most AE reports. The DODAC is used instead of the DODIC to reduce errors with AE transactions. See figure B-3 for an example DODAC.

Figure B-3. Example of a DODAC

COLOR CODING

B-7. The main reason AE are painted is to protect it from rust. However, the color of the protective coating and markings also makes AE easy to identify and provides some camouflage. AE 20mm and larger is color-coded IAW MIL-STD 709D (see table B-2, page B-3 and table B-3, page B-5).

B-8. Small arms AE is color-coded under MIL-STD 709D, Table 1 for Tier 1 AE. Either the small arms projectiles or the bullet tips are painted a distinctive color so they can be identified quickly. Table B-2 shows the color codes for types of small arms AE up to and including .50 caliber. For more information, see TM 9-1300-200. Significant features of the current color-coding standard are as follows:

- Olive drab. Olive drab with yellow markings indicates a high explosive (HE) round. However, olive drab is also being used as a basic color for certain new rounds such as the flechette antipersonnel round, and some new illumination rounds for specific field artillery weapons.
- Overpacking. AE overpacked in color-coded bombs, in unit dispensers, or in warheads, must not be color-coded.
- Standard DOD AE Color Code. MIL-STD-709D contains the standard AE color code for 20mm and larger AE. Be aware, though, that there is still AE coded as specified by MIL-STD-709C, MIL-STD-709B and MIL-STD-709A. If this is the case, see the appropriate MIL-STD or TM 9-1300-200.

Table B-2. Ammunition color code, MIL-STD 709D

<table>
<thead>
<tr>
<th>COLOR (1,2)</th>
<th>FEDERAL STANDARD</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>33538</td>
<td>Indicates the presence of high explosives</td>
</tr>
</tbody>
</table>
Table B-2. Ammunition color code, MIL-STD 709D (continued)

<table>
<thead>
<tr>
<th>COLOR (1,2)</th>
<th>FEDERAL STANDARD</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>30117 or 30140</td>
<td>Identifies low explosive items or components or indicates the presence of a low explosive</td>
</tr>
<tr>
<td>Gray (3,4)</td>
<td>36231</td>
<td>Identifies ammunition that contain irritant, incapacitating or toxic agents when used as an overall body color except underwater ordnance</td>
</tr>
<tr>
<td>Gray with dark red band</td>
<td>36231 and 31136</td>
<td>Indicates the ammunition contains an irritant (riot control) agent</td>
</tr>
<tr>
<td>Gray with dark green band</td>
<td>36231 and 34108</td>
<td>Indicates the ammunition contains a toxic agent other than binary agents</td>
</tr>
<tr>
<td>Gray with broken dark green band</td>
<td>36231 and 34108</td>
<td>Indicates the ammunition contains a binary nerve agent</td>
</tr>
<tr>
<td>Gray with violet band</td>
<td>36231 and 17100</td>
<td>Identifies ammunition with an incapacitating agent</td>
</tr>
<tr>
<td>Black (3,5)</td>
<td>37038</td>
<td>Identifies armor defeating ammunition, except on underwater ordnance, dummy hand grenades and when used for lettering or marking</td>
</tr>
<tr>
<td>Silver/aluminum</td>
<td>17178</td>
<td>Identifies countermeasures ammunition</td>
</tr>
<tr>
<td>Light green</td>
<td>34558 or 34449</td>
<td>Identifies screening or marking smoke ammunition</td>
</tr>
<tr>
<td>Light red</td>
<td>31158</td>
<td>Identifies incendiary ammunition or indicates the presence of highly flammable material for producing damage by fire</td>
</tr>
<tr>
<td>White (3,5,6)</td>
<td>37875</td>
<td>Identifies illuminating ammunition or ammunition producing a colored light; exceptions are underwater ordnance, guided missiles, dispensers and rocket launchers and when used for lettering or marking</td>
</tr>
<tr>
<td>Light blue</td>
<td>35109</td>
<td>Identifies ammunition used for practice</td>
</tr>
<tr>
<td>Orange</td>
<td>32246</td>
<td></td>
</tr>
<tr>
<td>Bronze, gold and brass</td>
<td>17043</td>
<td>Identifies dummy/drill/inert ammunition not for firing but only used for handling, loading, assembly and testing, training and display. Some dummy hand grenades may be painted black</td>
</tr>
</tbody>
</table>

Footnote: The following have no color coding significance.

a. Colors specifically applied to identify the color of smoke ammunition or pyrotechnics
b. Unpainted or natural color ammunition
c. Gray black, green or white on underwater ammunition.
d. Gray on air launched missiles.
e. Black or white when used for lettering or special marking.
f. White on guided missiles, dispensers and rocket launchers.
### Table B-3. Application of color codes for particular ammunition items

<table>
<thead>
<tr>
<th>AMMUNITION</th>
<th>COLORS</th>
<th>BODY</th>
<th>MARKINGS</th>
<th>BANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>High explosive (HE), except 20mm</td>
<td>Olive drab</td>
<td>Yellow</td>
<td>Yellow^2,3,4,5</td>
<td></td>
</tr>
<tr>
<td>High explosive (HE), 20mm</td>
<td>Yellow</td>
<td>Black</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Explosive binary plastic (HEP)</td>
<td>Olive drab</td>
<td>Yellow</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>High explosive antitank (HEAT)</td>
<td>Black</td>
<td>Yellow</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Antipersonnel and antitank mines</td>
<td>Olive drab</td>
<td>Yellow</td>
<td>Yellow^3</td>
<td></td>
</tr>
<tr>
<td>Incendiary</td>
<td>Light red</td>
<td>Black</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>High explosive incendiary (API)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AP</td>
<td>Black</td>
<td>Yellow</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>With bursting charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without bursting charge</td>
<td>Black</td>
<td>White</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Canister</td>
<td>Olive drab</td>
<td>White</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Flechette –loaded</td>
<td>Olive drab</td>
<td>White</td>
<td>White^7</td>
<td>Yellow^8</td>
</tr>
<tr>
<td>Chemical</td>
<td>Gray</td>
<td>Dark Green</td>
<td>One broken dark green^3,10,11</td>
<td></td>
</tr>
<tr>
<td>Filled with toxic chemical binary nerve agent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illuminating</td>
<td>Olive drab</td>
<td>White</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>Fixed or semi fixed</td>
<td>White</td>
<td>Black</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With low explosive to indicate functioning</td>
<td></td>
<td></td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>With low explosive to indicate functioning</td>
<td></td>
<td></td>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>With low explosive to indicate functioning</td>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Screening or marking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke ammunition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filled with other than WP</td>
<td>Light green</td>
<td>Black</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Filled with WP</td>
<td>Light green</td>
<td>Light red</td>
<td>Yellow^9</td>
<td></td>
</tr>
<tr>
<td>Inert ammunition not designed to be delivered in a delivery system</td>
<td>Bronze</td>
<td>Black</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>Gray</td>
<td>Red</td>
<td>One red^9</td>
<td></td>
</tr>
<tr>
<td>Filled with a riot control agent</td>
<td>Gray</td>
<td>Violet</td>
<td>One violet^9</td>
<td></td>
</tr>
</tbody>
</table>
Table B-3. Application of color codes for particular ammunition items (continued)

<table>
<thead>
<tr>
<th>AMMUNITION</th>
<th>COLORS</th>
<th>BANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BODY</td>
<td>MARKINGS</td>
</tr>
<tr>
<td>Filled with a toxic chemical binary nerve agent</td>
<td>Gray</td>
<td>Dark Green</td>
</tr>
</tbody>
</table>

Footnotes:
1. Color of the letters and figures normally used for the main identification.
2. Circumferential band of yellow diamond shaped figures on semi-fixed and separate loading improved conventional munitions.
3. Circumferential band of yellow triangular shaped figures on mass scatterable mine and loaded semi-fixed and separate loading ammunition.
4. Separate loading ammunition for shipboard use has a circumferential yellow band besides yellow markings.
5. Bombs have one yellow band except thermally protected bombs, which have two yellow bands besides yellow markings.
6. Circumferential broken yellow band (1/2 inch segments with ½ inch gaps) on explosive binary munitions.
7. Circumferential band of white diamond shaped figures on ammunition containing flechettes.
8. Yellow band put on when the ammunition contains explosives used to fracture the projectile.
9. Yellow band put on to indicate HE burster.
10. Toxic chemical agent ammunition containing binary nerve agent filling shown by a broken dark green band (1/2 inch segments separated by ½ inch spaces).
11. Both color applications are standard. However, for land ammunition use, separate loading ammunition is olive drab for overall body color with a white band and main identification details marked white. Fixed and semi-fixed ammunition is white for overall body color with main identification details in black.
12. Separate loading ammunition for shipboard use has black markings and a light red band.

Legend:
HE: high explosive
HEAT: High explosive antitank
HEP: Explosive binary plastic
API: High explosive incendiary
Appendix C
Storage Compatibility Groups

AE are assigned to one of thirteen storage compatibility groups (SCGs) based on AE storage principles and mixed storage considerations. The SCGs are discussed in detail in this appendix.

COMPATIBILITY GROUP CRITERIA

C-1. Criteria used to assign AE to the appropriate SCG (i.e., A-H, J-L, N, or S) are given below. Descriptions include examples of the types of AE within each group. Certain locations within the United States, its territories, and possessions designated by the Army and with site approval from the Department of Defense Explosives Safety Board to store AE in rapid response configurations and basic load AE holding areas outside the United States are authorized to store AE without regard to compatibility. The maximum NEW at any of these locations storing mixed compatibility AE must not exceed 4000 kilograms (8818 pounds NEW) calculated in accordance with DA Pam 385-64. However storage of AE in rapid response configurations or basic load AE holding areas outside the U.S., when possible, should use storage compatibility to reduce risk. It is always recommended that, at a minimum, WP be stored separately from other AE.

GROUP A

C-2. Group A consists of bulk initiating explosives with sufficient sensitivity to heat, friction, or percussion to qualify them for use as initiating elements in an explosive train. Examples of initiating explosives are wet lead azide, wet lead styphnate, wet mercury fulminate, wet tetacene, and dry cyclotrimethylenetetranitramine and pentaerythritol tetranitrate.

GROUP B

C-3. Group B consists of detonators and similar initiating devices not containing two or more independent safety features. Examples include detonators, blasting caps, small arms primers, and fuzes.

GROUP C

C-4. Group C consists of bulk propellants, propelling charges, and devices containing propellant with or without means of ignition. Upon initiation, these items will deflagrate, explode, or detonate. They include single-, double-, and triple-base and composite propellants; rocket motors (solid propellants); and AE with inert projectiles.

GROUP D

C-5. Group D includes black powder, HE, and AE containing HE without its own means of initiation and without propelling charge, or a device containing an initiating explosive and containing two or more independent safety features. AE in this category can be expected to explode or detonate when any item or component is initiated except for devices containing initiating explosives with independent safety features. Examples include bulk trinitrotoluene, Composition B, black powder, and wet cyclotrimethylenetetranitramine or pentaerythritol tetranitrate, bombs, projectiles, cluster bomb units, depth charges, and torpedo warheads. Black powder saluting charges, torpedo warheads, and fuses with two or more safety features are also part of this group.
GROUP E
C-6. Group E consists of AE containing HE without its own means of initiating and with propelling charge. Examples include artillery AE, rockets, or guided missiles.

GROUP F
C-7. Group F consists of AE containing HE with its own means of initiation and with or without propelling charge. Examples are grenades, sounding devices, and similar items having an inline explosive train in the initiator.

GROUP G
C-8. Group G consists of fireworks; illuminating, incendiary, or smoke AE (including high concentration); or tear-producing, incendiary smoke, or sound effects. This category does not include AE that are water-actuated or that contain white phosphorus or flammable liquid or gel. Examples of Group G AE are flares, signals, incendiary or illuminating AE, and other smoke- or tear-producing devices.

GROUP H
C-9. Group H AE contain fillers that are spontaneously flammable when exposed to the atmosphere. These include white phosphorus, plasticized white phosphorus, or other pyrophoric material.

GROUP J
C-10. Group J AE contain both explosives and flammable liquids or gels other than those that are spontaneously flammable when exposed to water or the atmosphere. Examples include liquid-or gel-filled incendiary AE, AE devices, flammable liquid-fueled missiles, and torpedoes.

GROUP K
C-11. Group K AE contain both explosives and toxic chemical agents. Items in this category contain chemicals specifically designed for incapacitating effects more severe than lachrymation (i.e., excessive secretion of tears). They include artillery or mortar AE, fuzed or unfuzed; and grenades, rockets, or bombs filled with lethal or incapacitating chemical agents.

GROUP L
C-12. Group L is comprised of AE not included in other compatibility groups. Types presenting similar hazards may be stored together but not mixed with other groups. Examples include water-activated devices, prepackaged liquid-fueled rocket engines, AE, and damaged or suspect AE of any group.

GROUP N
C-13. Group N consists of AE containing only EIDs. Examples are bombs and warheads.

GROUP S
C-14. Group S contains AE that present no specific hazards. Included in this category is AE designed or packed to confine or contain any explosive effect to the item or package. If the package has been degraded by fire, all blasts will be limited to the extent that they do not significantly hinder firefighting. An incident may destroy all items in a single pack but must not be communicated to other packs so that all are destroyed. Examples of Group S AE are thermal batteries, explosive switches or valves, and other items packaged to meet group criteria.
MEANS OF INITIATION

C-15. An AE item with its “own means of initiation” is one that has a normal initiating device assembled to it. This configuration presents a significant risk during storage because detonation can occur during accidental functioning of the device. However, the term does not apply when the initiating device is packaged in such a way as to eliminate the risk of detonation or when fuzzed end items are configured and packaged to prevent arming. If safety features are in place to prevent initiation or detonation of the explosive filler, the initiating device may be assembled to AE.

MIXING COMPATIBILITY GROUPS

C-16. Table C-1 demonstrates how different SCGs can be mixed in storage. Groups that are intersected by an “X” (for example, A-A, B-B, B-S, C-S) may be combined in storage. Groups intersected by a “Z” indicates, when warranted by operational considerations or magazine non-availability and when safety is not sacrificed, mixed storage of limited quantities of some items from different groups may be approved in writing. Approval of such storage will be at a level consistent with the risk acceptance authority criteria of DA Pam 385–30, table 4–2. Approval of “Z” storage does not require documentation on a DA Form 7632. Documentation of this approval must be kept on hand by the installation or garrison safety office and the unit approved for mixed storage. U.S. Army Technical Center for Explosives Safety determines which items within Group K may be stored together and which must be stored separately. Group K requires not only separate storage from other groups but may also require separate storage within the group. Exceptions to the table are discussed in this section. Compatibility of explosives for transportation are not the same as storage compatibility mixing rules. See DA Pam 385-64, chapter 20 for transportation of AE.

Table C-1. Mixing compatibility groups

<table>
<thead>
<tr>
<th>Group</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X</td>
<td>Z</td>
<td></td>
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<tr>
<td>B</td>
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C-17. When evaluating storage compatibility criteria, consider the following points, if relevant:

- Compliance with compatibility criteria is not required for mission essential or operationally necessary quantities of explosives in HC/D 1.4 or 6.1 (excluding toxic chemical AE); up to 100 pounds NEW HC/D 1.3; and up to 50 pounds NEW HC/D (04)1.2. See DA Pam 385-64 for ESQD requirements.
- Equal numbers of separately packaged components of complete rounds of any single type of AE 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).
- AE that do not contain explosives but do contain substances properly belonging to another HC/D may be assigned to the same compatibility group as items containing explosives and the same substances. They may also be stored with them.
- DA may authorize AE items designated “Practice” by NSN and nomenclature to be stored with the fully loaded AE they simulate.
• The Army service component commanders may authorize the mixing of compatibility groups (except items in Groups A, K, and L) in quantities not exceeding 1,000 pounds NEW per storage site.
• For purposes of mixing, all items must be packaged in approved storage containers. Items must not be unpackaged at the storage location.
• Groups B and F AE will be segregated in storage from articles of other groups by means that effectively prevent propagation.
• If dissimilar HC/D 1.6, SCG N AE (such as MK 82 and MK 84 bombs) are mixed together and have not been tested to assure non-propagation, the mixed AE are considered to be HC/D 1.2, SCG D for purposes of transportation and storage. See DA Pam 385-64 about changing ESQD class/divisions when mixing SCG N AE with SCG B through G.
# Glossary

## SECTION I – ACRONYMS AND ABBREVIATIONS

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<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>AE</td>
<td>ammunition and explosives</td>
</tr>
<tr>
<td>AO</td>
<td>area of operations</td>
</tr>
<tr>
<td>ASA</td>
<td>ammunition support activity</td>
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<tr>
<td>ASP</td>
<td>ammunition supply point</td>
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<tr>
<td>ATHP</td>
<td>ammunition transfer holding point</td>
</tr>
<tr>
<td>CEA</td>
<td>captured enemy ammunition</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>DARAD</td>
<td>deviation approval and risk acceptance documents</td>
</tr>
<tr>
<td>DODAC</td>
<td>Department of Defense ammunition code</td>
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<tr>
<td>DODIC</td>
<td>Department of Defense identification code</td>
</tr>
<tr>
<td>ED</td>
<td>emergency destruction</td>
</tr>
<tr>
<td>EHCC</td>
<td>explosive hazards coordination cell</td>
</tr>
<tr>
<td>EID</td>
<td>electronically initiated device</td>
</tr>
<tr>
<td>EOD</td>
<td>explosive ordnance disposal</td>
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<tr>
<td>ESMP</td>
<td>explosive safety management program</td>
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<tr>
<td>ESQD</td>
<td>explosives safety quantity distance</td>
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<tr>
<td>FSC</td>
<td>federal supply class</td>
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<tr>
<td>HC/D</td>
<td>hazard class / division</td>
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<tr>
<td>HE</td>
<td>high explosive</td>
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<tr>
<td>JMO</td>
<td>joint munitions office</td>
</tr>
<tr>
<td>LAR</td>
<td>logistics assistance representative</td>
</tr>
<tr>
<td>MCT</td>
<td>movement control team</td>
</tr>
<tr>
<td>METT-TC</td>
<td>mission, enemy, terrain and weather, troops, time available, and civil considerations</td>
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<tr>
<td>MHE</td>
<td>materials handling equipment</td>
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<tr>
<td>MOS</td>
<td>military occupational specialty</td>
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<tr>
<td>NEW</td>
<td>net explosive weight</td>
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<tr>
<td>NSN</td>
<td>national stock number</td>
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<tr>
<td>QASAS</td>
<td>quality assurance specialist (ammunition surveillance)</td>
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<td>QA/QC</td>
<td>quality assurance/quality control</td>
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<td>RM</td>
<td>risk management</td>
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<tr>
<td>SCG</td>
<td>storage compatibility group</td>
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<tr>
<td>SOP</td>
<td>standard operating procedure</td>
</tr>
<tr>
<td>TSA</td>
<td>theater storage area</td>
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<tr>
<td>U.S.</td>
<td>United States</td>
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<tr>
<td>UXO</td>
<td>unexploded explosive ordnance</td>
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<td>WP</td>
<td>white phosphorous</td>
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References

REQUIRED PUBLICATIONS
These documents must be available to intended users of this publication.
ADRP 1-02, Terms and Military Symbols, 07 December 2015
JP 1-02, Department of Defense Dictionary of Military and Associated Terms, 08 November 2010

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**PRESCRIBED FORMS**

None

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DA Form 984-R, Munition Surveillance Report

DA Form 2028, Recommended Changes to Publications and Blank Forms

DA Form 2415, Ammunition Condition Report

DA Form 3020-R, Magazine Data Card

DA Form 3022-R, Army Depot Surveillance Record

DA Form 3023, Gage Record

DA Form 3151-R, Ammunition Stores Slip

DA Form 7632, Deviation Approval and Risk Acceptance Document (DARAD)


DD Form 250, Materiel Inspection and Receiving Report

DD Form 626, Motor Vehicle Inspection (Transporting Hazardous Materials)

DD Form 1575, Suspended Tag-Materiel (Available through normal forms supply channels)

DD Form 1575-1, Suspended Label-Materiel (Available through normal forms supply channels)

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DD Form 2977, Deliberate Risk Assessment Worksheet

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SF 364, Report of Discrepancy (ROD)
WEBSITES


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MARK A. MILLEY
General, United States Army
Chief of Staff

Official:

GERALD B. O'KEEFE
Administrative Assistant to the Secretary of the Army
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