



SAFETY SERVICES ORGANISATION



Session 4.3

Storage and Handling

**IATG Foundation Course:
Ammunition Storage & Operations Module**



Lesson Objectives

By the end of this lesson, you should be able to:

- Understand the safety and security requirements for ammunition storage facilities
- Understand some of the principal physical security requirements

Introduction

- Safety requirements for the storage and handling of ammunition and explosives are a part of the comprehensive approach to safety in an ammunition facility
- Provision of suitable infrastructure and effective control procedures enable a secure and safe environment
- Safe handling and storage further reduces the hazard

Handling of Ammunition

- You now know it is relatively easy to cause inadvertent initiation of ammunition and explosives, therefore safe handling is essential to minimise the likelihood of an incident
- There are a number of potential hazards of rough handling of ammunition and its consequences. What are they?

Handling of Ammunition

- Ammunition must be correctly classified in order that it can be stored in the safest possible manner
- HD aggregation and CG mixing rules must be applied
- Correct packaging and markings are essential

Handling of Ammunition

- **The criteria required by the national technical authorities in order to provide approval to store ammunition are:**
 - Appropriate safety clearances
 - Achievable and documented storage constraints and maintenance requirements
 - Approved packaging and palletisation configurations
 - Properly documented SSOW for storage, handling and movement

Handling of Ammunition

- Exercising great care in the handling and movement of ammunition to prevent damage occurring is absolutely essential
- Damaged packaging may indicate that the ammunition contained within has also been damaged
- Damaged packaging must be segregated pending inspection by technically qualified personnel

Stacking of Ammunition

- Ammunition packaging is an essential component of the safety system
- For logistical reasons, packaged ammunition is often palletised and stacked
- In order to maintain the integrity of the packaging (and the safety of the ammunition) any stacking of ammunition packages and pallets must be to an authorised scheme and carried out with care

Stacking of Ammunition

- **Criteria for stacking of ammunition:**
 - The surface must be level and firm
 - All ammunition, un-packaged, package and/or palletised must be clean, dry and in good condition
 - All markings should be easily accessible, to ensure that safety, aggregation and mixing rules are being complied with
 - Stacks should be built allowing sufficient space surrounding them to enable easy access for stock maintenance and issues



Stacking of Ammunition

- If MHE is used, aisles between stacks should be wide enough to enable easy access
- Unpalletised ammunition should be placed upon wooden battens to raise it off the floor enabling air to circulate
- Stacks should allow sufficient space above to enable air to circulate above
- Ammunition subject to constraints or bans should be segregated from other stocks and clearly marked
- Be aware that some ammunition natures may have specific storage requirements



Stacking of Ammunition

- Generally ammunition should be stored on pallets to facilitate easy handling in storage
- Sometimes quantities are such that loose-packages are stored
- In such cases there are additional storage considerations, to amplify the general criteria listed above
- Similarly, where unpackaged ammunition is stored, additional requirements are to be taken into consideration

Stacking of Ammunition

- **Some types of ammunition may have specific stacking and handling requirements, such as:**
 - Unboxed shells
 - Aircraft bombs
 - Ammunition containing White Phosphorus
 - Missile systems



Stacking of Ammunition

- Racking may be used to maximise the storage space available
- If used, the weight of ammunition stored must not exceed the load bearing capacity
- The racking shall be installed on a firm, level surface
- The racking shall be firmly fixed to prevent tipping

Stack Tally Cards and Pallet Contents Sheets

- Use of Stack Tally Cards and Pallet Content Sheets are essential parts of the accounting system
- Stack Tally Cards are placed on each stack of ammunition or explosives to show the contents of the stack at any moment in time
- Receipts and issues are to be recorded along with a running balance of the quantity on the stack
- Pallet Content Sheets may be used for the ease of location and positive identification of individual lots or batches in bulk stacks

Mechanical Handling Equipment (MHE)

- MHE is used for ease of lifting and moving heavy loads
- Its use should be authorised by the head of establishment following a suitable risk assessment
- MHE must be kept serviceable at all times and subject to a routine testing and maintenance programme for which records are to be maintained. These inspections and certifications should include confirmation of the safe working load (SWL)
- Unserviceable MHE shall not be permitted in an explosives area



Mechanical Handling Equipment (MHE)

- MHE should carry an appropriate fire extinguisher
- MHE operators are responsible for ensuring that their vehicle is serviceable and suitable for the task
- The operator is to ensure that all speed restrictions and other road use constraints are obeyed
- Ammunition should only be moved around a PES on the MHE forks.
- Any other movement around the site should be done on suitable depot transport



Lifting Equipment and Slings

- Ammunition and explosives should only be lifted in approved containers and using authorised equipment
- The safe working load of the equipment must not be exceeded
- The lifting equipment should be inspected periodically according to the manufacturer's instructions
- It must have a certificate stating its serviceability
- Before each use, the operator should make a physical inspection to ensure that the equipment has not been damaged

Lifting Equipment and Slings

- The SWL of the lifting equipment shall not be exceeded
- Palletised ammunition may be lifted if a slinging scheme has been authorised
- Multi-legged slings should be used with all legs attached
- Whenever possible non-ferrous slings should be used.
- Ferrous slings may give rise to sparks and should only be used in PES of electrical category C or D
- During lifting operations ammunition and explosives should be lifted to the minimum height necessary and for the minimum time required to safely achieve the task
- Slung loads should not be lifted above other explosives



Lifting Equipment and Slings

- Slung loads of ammunition and explosives should not be lifted above spigots and similar protrusions, due to the increased danger of impact on a sharp spigot in the event of an accident

Storage

- To reduce risk in storage to tolerable levels, ammunition and explosives should be stored in the best possible storage conditions
- This should normally be in purpose-built explosives storehouses (ESH), but in some circumstances may require other arrangements
- This may require climate-controlled storage

Storage

- **The allocation of ammunition to storage in purpose-built ESH, covered storage or open storage are governed by key principles:**
 - The best storage should be allocated to the ammunition that presents the greatest explosive hazard
 - Items designated as ACTO should be provided with additional security
 - Any items that may be more vulnerable to environmental deterioration should be considered for storage in ESH or covered storage

Storage

- Covered storage refers to the use of light-weight structures or shelters to provide some protection from the direct effects of the weather, in particular direct solar radiation
- Open storage refers to stacks of ammunition in the open with no physical structure to provide protection
- Stacks should be covered with waterproof sheets to provide some protection from the elements

Storage

- The waterproof sheeting should be non-static producing, as significant static may be generated during the movement or removal of large sheets
- Ideally the sheeting should be fire-resistant
- Both covered storage and open storage sites may be provided with additional protection in the form of barricades (traverses) to provide some mitigation of the hazards

Storage

- **Some items of ammunition and explosives require isolation or segregation in storage:**
 - Isolation requires that the ammunition is stored in a location away from any other ammunition or explosives
 - This includes any items that are considered to be unsafe, thus increasing the hazard to other ammunition
 - They should remain in isolated storage until they can be inspected and either repaired and returned to general storage, or they can be safely disposed of



Storage

- **Segregation is required for ammunition which cannot be mixed in storage with other items**
- **Segregation may be obtained by physical distance, internal compartmentalization in a PES**
- **Segregation may be required for:**
 - Ammunition of CGs that restrict or prohibit mixing
 - Ammunition that is faulty, banned or shelf-life expired, but is considered safe to store
 - Commercial explosives
 - Experimental explosives



Questions?

Lesson Objectives

You should now be able to:

- Understand how good storage and handling procedures contribute to an overall safety approach
- Apply the principles of safe handling of ammunition and explosives
- Understand how the use of approved packaging and correct stacking schemes and techniques supports ammunition and explosive safety
- Understand how proper completion of stack tally cards and pallet content sheets helps with the identification of ammunition stocks and supports accounting procedures
- Explain the main considerations for the use of MHE and other lifting equipment



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