NATO STANDARD

APP-16

CARE OF SUPPLIES IN THE FIELD SUPPLY AREAS

Edition A Version 1

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NORTH ATLANTIC TREATY ORGANIZATION

ALLIED PROCEDURAL PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

06 June 2019

1. The enclosed Allied Procedural Publication APP-16, Edition A, Version 1, CARE OF SUPPLIES IN THE FIELD SUPPLY AREA, which has been approved by the nations in the MCLSB, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 2612.

2. APP-16, Edition A, Version 1, is effective upon receipt.

3.

4. This publication shall be handled in accordance with C-M(2002)60.

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
DEU	Chap 1, Para 1.3.2: Add the numeration with maps, ink-cartridges, print-out and plotter paper. Added example-materials usually need coverage against humidity and heat. They are not mentioned in STANAG 4280 and are delivered usually to a theatre-map-depot or a geospatial-cell, not directly to the end-user.
LVA	"Implementation of agreement will be achieved in the framework of allocated funding"

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

1.1. REFERENCES

All documents and publications that are referred to in this document are listed at Annex A.

1.2. PURPOSE

This publication provides guidance (includes techniques, procedures, etc.) to keep stored supplies in the field serviceable and to avoid spoiling supplies (excludes ammunition, bulk fuel, and medical supplies and equipment).
Nations may follow more detailed national regulations or guidance than contained within this publication.

1.2.1. CARE OF SUPPLIES DEFINITION

Care of supplies in the field is the complete set of measures that can or should be taken to avoid the spoiling of supplies deployed for an operation.

These are preventive measures taken in advance before the deployment and corrective or additional measures taken when supplies are deployed in order to keep them at the highest level of readiness. These measures have to be adapted to the condition in the field to face the actual conditions.

1.2.2. SCOPE OF THIS PUBLICATION

As STANAG 4280 (NATO PACKAGING AND PRESERVATION) provides guidance for packaging and preserving resource with a complete set of measures and tables. This document will focus on supplies which are not packed following the above mentioned STANAG; or items that were packed following these standards but for some reason were unpacked or their packaging is no longer compliant with the standards.

1.3. CARE OF SUPPLIES PROCESS

Generally materiel and/or supplies should be stored in covered space, whenever possible. If stored in open space, measures should be taken to ensure materiel readiness. Equipment in open storage should be given a visual inspection (usually every 30 days). Sampling techniques may be employed for serviceability inspection. Equipment will be rated based on the condition of the sample taken.

1.3.1. FIRST-IN-FIRST-OUT (FIFO) PRINCIPLE

Materiel will normally be issued/shipped on a FIFO basis and shall be the oldest within the condition code specified unless otherwise authorized. In order to issue the oldest materiel:

a. Non-extendible shelf-life items will be issued/shipped by the earliest date of expiration.

b. Extendible shelf-life items will be issued/shipped by the earliest date manufactured, earliest date cured, earliest date packed, or earliest date assembled (apply one, as appropriate).

c. Shelf-life materiel, which is approaching expiration or inspect/test dates, should be marketed for consumption and prevent disposal of materiel. This may include discounts and free issue to interested consumers or customers.

1.3.2. TYPES OF EQUIPMENT FOR COVERED STORAGE

Representative types of equipment for higher requirements for covered storage (or even Controlled Humidity (CH) storage include: vehicles and non-vehicle equipment having internal combustion engines, sensitive or delicate components, electrical or electronic components; artillery and small arms; electric and electronic equipment; tents, canvas, and leather items; instruments (optical, mechanical, and hydraulic); special protective equipment; Chemical, Biological, Radiological and Nuclear (CBRN) equipment and devices; and miscellaneous items, such as batteries, and basic issue items of a sensitive nature; audio-visual and photographic equipment; test, measurement, and diagnostic equipment; tool kits, etc.

Representative types of equipment with lesser requirements for covered storage include: trailers, such as ammunition, cargo, and semitrailers; towed, non-powered equipment, such as launchers and construction equipment; bridging; pipeline; storage tanks; fortification materials; and hand tools, such as picks and shovels.

1.4. PLANNING CONSIDERATIONS

During the planning phase of operations, the following provides basic considerations on the need to collect information on the Area of Responsibility (AOR). The information will aid in the care of supplies. The existing logistic support agreements and the possibilities for contracting have to be taken into account.

1.4.1. GEOGRAPHY

Collect information on climate and terrain in the AOR. Determine if current maps are available. Use this information to determine when various types of supplies, equipment, and field services and the storage requirements will be needed.

1.4.2. SUPPLY

Collect information on supply items that are readily available in the AOR. Determine which of these can be used in support of NATO forces. Subsistence items, bulk petroleum, and barrier materials are the most common. Collect information on the supply system of the armed forces of the supported country and determine if it is compatible with NATO forces.

1.4.3. FACILITIES

Collect information on existing warehousing and cold storage facilities, production and manufacturing plants, administrative facilities, etc. in the AOR.

1.4.4. TRANSPORTATION

Collect information on road networks, truck availability, rail networks, bridges, ports, cargo handlers, petroleum pipelines, and materials handling equipment. Also collect information on traffic flow, choke points, and control problems.

1.4.5. MAINTENANCE

Collect information on maintenance facilities that could support NATO forces equipment. Examine if there is a commonality in equipment and repair parts.

CHAPTER 2 OPERATIONAL ENVIRONMENTS

2.1. GENERAL

The environment can have a significant impact on care of supplies in the field. Cold and hot weather, desert, jungle, mountain, and CBRN environments create special problems.

Climatic extremes can have negative effects on materiel. These climatic extremes include temperature; humidity/moisture; dryness; air circulation; sunlight/ultraviolet rays, ozone gas, or ionizing radiation; pressure; rain, snow, or wind; dust, sand, or airborne contaminants; etc. Negative effect on materiel can be caused by improper storage, opening or removal of military packaging, etc. Most military supplies and equipment will deteriorate rapidly when exposed to certain elements. To prevent item deterioration, reduce the costs of initial and recurring care and extend the shelf life of items, supplies and equipment should be afforded protection during storage. Covered storage. space is a critical and a basic resource for the protection and care of supplies.
No publication can cover the effects of terrain and weather on every item of equipment and materiel; however this chapter offers certain guidance.
Generally, technical manuals give guidance on the storage of equipment. These kinds of manuals give information on preservation and maintaining readiness of the equipment. They also provide guidance to prevent damages through misuse or mishandling by the users.
Materiel should be protected from the same environmental elements that assets are protected from when they are shipped to NATO forces and soldiers for use. Information on NATO packaging and preservation is described in STANAG 4280.

2.2. EFFECTS ON STORAGE AND HANDLING OF SUPPLIES

Nearly every weapon or piece of equipment familiar to the soldier is affected to some degree by the operational environment where it's used or stocked. In addition to honing skills, training must focus on the specific operational area and ways to overcome anticipated environmental impacts when using weapons and equipment and its effects on materiel. Guidelines for the storage and handling of supplies can be described for operations in certain environment areas.

No publication can cover the effects of terrain and weather on every weapon and item of equipment within NATO. Of these, the most important factor is the combined effects of the environment on the soldier and his subsequent ability to operate and maintain weapons and equipment. Increasingly sophisticated equipment requires soldiers that are mentally alert and physically capable. Failure to consider this important factor often results in severe injury, lowered weapons and equipment performance, and mission failure.

2.2.1. HUMAN ACTIONS

2.2.1.1. URBAN AREAS

Urban areas may have existing warehouses, sheds, and buildings to use for storing and securing supplies. Supply units may be able to use existing lines of communication and storage facilities as much as possible. This will reduce order ship time and reduces manpower and resources that would have been used to construct facilities.

2.2.1.2. NIGHT OPERATIONS

There are operational situations such that supplies must be delivered at night. Since the use of material handling equipment is limited by darkness, supplies should be prepared and loaded on trucks during the day for night delivery to forward supply points. The supply point external standard operating procedure should require supported units to send extra personnel to serve as walking guides and to help load supplies onto the trucks by hand. Blackout procedures may require personnel to take the following actions: use flashlights that have lens filters; black out doors and windows of storage buildings; block light from large tents with salvage tentage; use ponchos as blackout flaps on other tents; use blackout lights on vehicles and forklift trucks; and use of night vision optics.

2.2.1.3. CORRUPTION AND SABOTAGE

Not all material is subject to the same probability of misappropriation or sabotage.Some resources can be very attractive in an environment of scarcity (fuel and petroleum products, small equipment and food are resources that must be closely accounted for to prevent loss).
Some equipment, particularly equipment that is exposed may be vulnerable to deliberate sabotage. Communications, command facilities, power plants and fuel facilities are sensitive resources and the most vulnerable to sabotage.

2.2.2. WEATHER CONDITIONS

2.2.2.1. DESERT OPERATIONS

Limited concealment and cover in a desert environment make logistics facilities easy targets. Desert conditions put an extra strain on equipment and supplies.
Engines have a tendency to overheat. Plastics, lubricants, and rubber deteriorate. Filters require frequent replacement. Air and fluids expand and contract more rapidly due to the extreme temperature changes (hot during the day and cold during the night). Desert winds can be destructive to large pieces of equipment. Dust and sand add to these problems. The harsh environment requires that equipment be carefully maintained.
Concerning supplies, special attention may be paid to protect rations from overheating.

2.2.2.2. JUNGLE OPERATIONS

Jungle regions are potential operational areas. Climate, terrain, and vegetation vary with location. The jungle environment may include swamps, cultivated areas, grasslands, or densely forested areas. Dense vegetation, high temperatures, rain, and high humidity require adjustments in supply operations.
Equipment, particularly leather, canvas, and rubber, are subject to mold and have a tendency to wear out quickly in the jungle. High temperature and humidity may cause rot and aids the growth of bacteria. Some materiel may require daily cleaning.
Soldiers may use tarpaulins or wet weather poncho liners to protect equipment from the rain. Combat boots and socks seldom last long. Clothing may require treatment with fungicides and might have to be exchanged every five or six days. Extra stocks should be stored at supply points.
Screens and filters help keep insects from getting into equipment.

2.2.2.3. COLD WEATHER AND MOUNTAIN OPERATIONS

Cold weather and mountain operations pose special problems. Winter and mountain weather increase the time required to perform supply support. Mobility in mountain or cold weather areas is difficult. Effects on equipment include freezing and high altitude issues, etc. Some mountains, such as those found in desert regions, are dry and barren, with temperatures ranging from extreme heat in the summer to extreme cold in the winter.
No matter what form, mountains take, their common denominator is rugged terrain.
Within a given mountainous region, conditions change markedly with elevation, latitude, and exposure to atmospheric winds and air masses.

2.2.2.4. OCEAN CLIMATES

Oceans influence climates. Mountain ranges, like most other landforms in close proximity to oceans and other large bodies of water usually exhibit a maritime climate. Maritime climates generally produce milder temperatures, much larger amounts of rain and snow and potentially salt water damage. Their relatively mild winters produce heavy snowfalls, while their summer temperatures rarely get excessively hot. Winters in this type climate are often bitterly cold, while summers can be extremely hot. Annual rain- and snowfall here is far less than in a maritime climate and may be quite scarce for long periods. Relatively shallow snow-packs are normal during a continental climate's winter season.

2.2.3. ANIMAL IMPACTS

2.2.3.1. RODENTS

Rodents represent a double threat to stored resources and to personnel. The presence of rodents is an aggravating factor for personal hygiene. Food and clothing may be declared unfit for human consumption or unusable if it is found that rodents have been in contact with.
In addition to the direct threat to resources on which they feed rodents can also attract predators such as snakes. In cold temperate, the danger does not exist or low it is not the same as it does in more tropical or warmer latitudes. Snakes represent a real danger to personnel (Cobra, Mamba).

2.2.3.2. INSECTS

A great many resources are treated against bacteria and insects. Packaging protects them from external aggression, when so equipped. However, in some cases, contamination can occur during handling.
Food products are the most vulnerable to this type of danger. Strict hygiene must be observed throughout the food chain. Any doubt or suspicion must be investigated and addressed in order to maintain food quality. Lumber and wooden structures, in some regions may be attacked by insects (termites for example).

2.2.3.3. BIRDS

Birds do not represent a real danger to the various resources stored either in warehouses or outdoors However, they can cause some discomfort during the retrieval of the resource. Indeed, some species (crows , pigeons , sparrows) exploit the opportunity presented by the covered areas to make their nests , or to spend the night. The presence of bird droppings or

corpses of dead birds may affect the quality of the resource. Some droppings are corrosive and attack paints, coating and packaging that form the outer layers of protection for materials.

To maintain resources that are clean and free from contamination, it is necessary to keep birds from taking advantage of covered storage areas.

CHAPTER 3 STORAGE OF MATERIEL

3.1. GENERAL

Storage of materiel can be either in covered storage space such as sheds or warehouses, controlled humidity, temperature controlled, refrigerated, secured (controlled areas), uncovered space (or open storage), open storage space can be on improved or unimproved surfaces, containers, etc.

Materiel in open storage should be adequately preserved to withstand exposure to the elements. Additional protection can be gained by the use of plastics, tarpaulins, or portable shelters over materiel.

Covered materiel will be elevated above the ground and adequately ventilated to evaporate condensed moisture. When covering materiel with tarpaulins or other such materials, a clearance of 305 mm to 457 mm (12 in to 18 in) should be maintained between the bottom of the covering and the ground. For unboxed materiel, the tarpaulin should not extend below the top of the dunnage on which the materiel is stored.

3.2. TYPES OF STORAGE

Types of storage can vary and include:

3.2.1. GENERAL USE

a. Shed space may be used for material slightly sensitive to moisture; extremely large and/or heavy equipment, etc…
b. Open storage space may be used for items which will derive little or no benefit from covered storage nor lose their serviceability when stored in open space or are slated for demilitarization, and for items which are impractical to be placed in covered storage due to item characteristics.
c. Temporary or short-term storage can include demountable structures, such as transitory shelters, which can be used to meet covered storage requirements.

3.2.2. SPECIALIZED USE

d. Controlled humidity (CH) storage would benefit sensitive or delicate components, electrical or electronic components, items subject to deterioration from mildew, corrosion, or rot, small arms, tents, instruments (optical, mechanical, and hydraulic), chemical warfare equipment and devices, medical supplies and equipment, etc.
   This kind of facility is used for the storage of equipment which need protection against excessive humidity.
e. Controlled temperature and refrigeration would benefit delicate components, short service live (class I) items etc…
   This kind of facility is used to store equipment which need to be protected from heat or great variation of temperature.

3.3. STORAGE IN ISO CONTAINERS

Containers are crucial to the success of operations. Containers, while primarily used for shipping, may be used in alternative ways (see AMovP-5). Containers are often used as permanent storage facilities, offices, bunkers/shelters, barriers and in many other creative ways.
ISO containers are large, demountable containers and are widely used for international transport (see ISO 668). Typically ISO containers will be 20 feet in length, are standardized to 8-foot widths and generally 8.5-foot heights, and are fabricated of different materials including steel, aluminum, wood, fiberglass, and combinations of these materials. They are compatible for global intermodal freight movement and are not part of packaging. They are used to consolidate shipments to one destination and are not meant to follow the materiel to point of consumption. Containers provide a secure means of transporting cargo, and are an effective means of in-transit storage as they prevent materiel from exposure to the weather. In an AOR, containers will be used from the port to as far forward as possible and must be managed (presently a national responsibility) while used in the AOR.

Containers are also used to support trans loading operations (see STANAG 2226 (AMovP-5) and STANAG 2468 (AMovP-4A)) and are the preferred category of container for long-term temporary storage in the AOR. Containers provide necessary storage until storage facilities are constructed and can be sent forward while establishing an AOR distribution system.

3.4. STORAGE AND HANDLING BY CLASSES OF SUPPLY

3.4.1. CLASS I

Class I are items which are consumed by personnel or animals such as rations and forages, etc. and may include items such as various non-military health, comfort, recreational, and personal demand items.

Units should reduce replenishment quantities and consume, redistribute, and/or transfer on-hand quantities to the maximum extent possible in order to prepare retrograde. The return of certain Class I materiel is generally discretionary due to health concerns.

3.4.1.1. DISPOSAL

Class I items, which are certified no longer fit for human consumption by medical or veterinary personnel, are surveyed in accordance with applicable procedures. The Disposition and Reutilization Service (DRS) or a similar service is able to assist in the disposal of packaged rations.

3.4.1.2. ENVIRONMENTAL AND HEALTH CONSIDERATIONS

Proper storage considerations must be ensured. Certain Class I items that are improperly stored or are spoiled pose a significant health threat to forces and Host Nation (HN) personnel. Generally food products have limited shelf life and are affected by heat, humidity, time, etc. Proper disposal procedures are required to prevent potential food poisoning or vector control problems. Proper disposal of the solid waste and residue must be ensured. These

considerations include disposal through the DRS or a similar service to prevent health hazards and ensure that disposal is in accordance with HN, international laws and national directives.

3.4.2. CLASS II

Class II includes items such as clothing, weapons, mechanics' tools, spare parts, vehicles, etc.

3.4.2.1. DISPOSAL

Certain Class II materiel will require demilitarization prior to acceptance by the DRS or a similar service for disposal. The disposition of unserviceable and non-repairable items such as tents, canvas, camouflage netting, etc… are normally coordinated through the DRS.

Pharmaceutical, medical, and surgical supplies and materiel, and medical equipment, including medical-specific repair parts, medical gases, blood, and blood products must be carefully monitored and coordinated with appropriate military health authorities. This is especially important because of the sensitivity and health risks associated with the materiel. For pharmaceuticals, safeguards are required to eliminate misuse of medications. Expired non-radioactive and unusable medical supplies should be properly disposed of through the DRS. Certain consumables items should be efficiently consumed in theatre to the maximum extent possible.

3.4.2.2. ENVIRONMENTAL AND HEALTH CONSIDERATIONS

Some Class II items may contain ingredients (such as solvents, pesticides, etc.) classed as hazardous or toxic by national, HN, and/or international authorities and require special handling, storage and documentation. They must be moved, used, or disposed of by proper procedures to prevent harm to human health and/or the environment.

a. Major end items may contain fuel, ammunition, or other hazardous materials when configured for operation. Storage and shipment of such items must consider these hazards and include the appropriate download and transfer of hazardous materials for authorized storage or disposition that may require special handling and documentation. In addition, certain items exposed to CBRN effects must be surveyed for residual contamination risks. This contamination risk could include potential vapor hazard and contact hazards. These risks increase as residually contaminated equipment is consolidated and personnel work around this equipment for prolonged periods of time. These considerations should include disposal through the DRS to prevent health hazards and ensure that disposal is in accordance with HN and international laws and national directives.
b. Medical related items have associated medical considerations to address as to ensure no impact is made on the environment. These considerations should include proper disposal through the DRS to prevent health hazards, eliminate any misuse, and ensure that disposal is in accordance with HN and international laws and national directives.
c. Most repair parts and components do not present environmental risk. However, the packaging (such as plastics) that contained this materiel must be addressed.

3.4.3. CLASS III

Class III includes bulk and packaged petroleum, oil, and lubricants; hydraulic and insulating oils; preservatives; bulk chemical products; solid fuels such as coal, coke, and wood; liquid and compressed gases; etc. will require specific safety and environmental requirements necessitated by particular products. Class III bulk is generally not retrograded and is usually consumed in the AOR.

3.4.3.1. DISPOSAL

Excess and waste or unserviceable Class III products require disposal by trained personnel. This task is normally performed in coordination with authorized disposal personnel, DRS or a similar service, and/or appropriate HN authorities.

3.4.3.2. ENVIRONMENTAL CONCERNS

Bulk and packaged Class III items can be problematic from an environmental and safety standpoint because of international, HN, and/or national legal requirements. Class III requires special handling and storage, as well as containment for spills. The majority of Class III products are liquids with varying degrees of flammability and must be stored in leakproof containers or tanks at all times. Spills of Class III products require environmental cleanup response. In addition, ozone depleting substances, such as certain bottled gases, are subject to special environmental restrictions.

3.4.4. CLASS IV

Class IV supplies include fortification and construction materials (e.g., lumber, wire, sandbags, etc.).

Usable construction materials generated as excess may be transferred to the HN, other multinational forces, or other recipients after being turned in by units.

3.4.4.1. ENVIRONMENTAL CONCERNS

Lumber that is under dry and high heat conditions, low cold temperatures, or unusual environmental conditions for an extended period of time may become unusable as building materials. Methods used for piling lumber must provide ventilation for air drying to prevent deterioration of the lumber.

3.4.5. CLASS V

Class V materiel consists of munitions of all types including bullets and projectiles, bombs, explosives, land mines, fuses, detonators, pyrotechnics, propellants, etc.

Class V items require routine maintenance and certification as ready for use. These actions are conducted at munitions storage sites, but may also be conducted by trained personnel in theatre. Class V should be redistributed nationally within theatre to the maximum extent

possible. Class V items are usually moved back to authorized storage facilities following contingency operations.

3.4.5.1. RECORDS

Records are to be maintained on theatre munitions requirements prior to redistribution, retrograde, or demilitarization. Units that need to turn in excess munitions generally turn in to their national ammunition transfer holding points or ammunition supply points. All munitions will be inspected, classified, and packed, and accounted for in accordance with national regulations, related STANAGs, and disposition instructions.

3.4.5.2. DISPOSAL

Class V disposal is subject to stringent safety and security restrictions including national demilitarization requirements. Demilitarization encompasses a wide range of processes including disassembly, resource recovery and reuse, and treatment of ordnance materiel for disposal. Munitions demilitarization is conducted at designated demilitarization sites.

3.4.5.3. ENVIRONMENTAL CONSIDERATIONS

Class V is a significant environmental hazard due to the explosive nature of the commodity and the physical and chemical properties of some munitions components. Ammunition has specific requirements for handling and storage. Only qualified personnel shall store, transport, and handle munitions using the appropriate equipment and following all applicable international and national directives and safety regulations.

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CHAPTER 4 SHELF LIFE (SL)

4.1. GENERAL

There are items of supply that require special handling due to certain deteriorative characteristics. These items are to be properly maintained to ensure that the customer is provided fresh, useable materiel. The purpose of this chapter is to provide information on SL and process, with special emphasis on those items having known deterioration characteristics, to mitigate the risk of shelf-life expiration and lapses of shelf-life items/materiel beyond their inspect/test dates. Information on marking of SL is described in STANAG 4281.

4.2. SCOPE

Shelf-life should not be confused with service life (see definitions listed in Annex B). The deteriorative nature of some items over time while in a storage environment results in their designation and identification as shelf-life items. These items require intensive controls in order to minimize materiel and financial losses to nations. Designation of items for shelf-life management are held to a minimum since these items require specialized management, handling and continuous surveillance, which often results in higher related costs. Items are not and will not be designated for shelf-life management merely to facilitate storage control.

Acquisition and procurement of principal, secondary, and consumable items of supply without shelf-life consideration prior to being placed into service may potentially have an adverse supportability and environmental impact. Excessive numeric storage objectives, improperly calculated economic order quantities, requisitioning incorrect units of issue, unavailability of specified unit packs, etc., are all contributing factors to ultimately causing materiel and financial losses.
Non-extendible shelf-life items allowed to expire while still in storage translate to materiel losses, re-procurement costs, and disposal costs.
Extendible shelf-life items whose inspection/test dates are allowed to lapse are often prematurely disposed of without further action to determine continued serviceability.
Materiel and financial losses are often compounded when shelf-life items, that are also dangerous goods, are allowed to enter the dangerous goods waste stream. Frequently, dangerous goods waste disposal is costlier than original procurement costs and/or laboratory testing for shelf-life extension purposes.

4.2.1. 85% SHELF-LIFE REMAINING REQUIREMENT

Normally acquisition/procurement documentation will specify that shelf-life items/materiel will have not less than 85 percent (allowing for rounding to whole months) of shelf-life remaining at time of receipt by the first supply activity. Any delivery from a contractor not having at least 85 percent shelf-life remaining should normally be considered non-conforming.

In supporting imminent use or consumption, the 85% shelf-life remaining on receipt by first national/NATO activity may be modified or adjusted as deemed prudent at the discretion of the supply units.

4.2.2. SHELF-LIFE VERSUS SERVICE LIFE

Service life is a general term used to quantify the average or standard life expectancy of an item or equipment while in use. When a shelf-life item is unpacked and introduced to mission requirements, installed into intended application, or merely left in storage, shelf-life management stops and service life begins.

Opening unit-of-issue containers of shelf-life items for routine partial issue, use or inspections is discouraged. Once the container (unit-of-issue) is opened, the shelf-life markings and dates are of little value for that specific container and shelf-life ceases. Opening the container negates shelf-life and triggers "service-life" for that specific container. Shelf-life and service-life are both reduced dramatically depending on how long the container is open and the storage conditions related to the open container. More frequent inspections are required for shelf-life items partially unused in previously opened containers, particularly if the application is critical, as the degradation or deterioration will inherently occur more rapidly. Acquiring the proper units of issue, unit packs, and ensuring that storage objectives are adjusted accordingly should preclude this occurrence.

4.2.3. FIFO

See paragraph 1.3.1.

4.2.4. EXCEPTIONS TO FIFO ISSUANCES OR LAST-IN-FIRST-OUT (LIFO)

When there is a need to replenish war ready materiel, the maximum shelf-life is required and LIFO practices may be used on an exception basis. Several adaptations have been developed for nations. They are:

a. Shelf-life management for dangerous goods follows the same procedures as those for any shelf-life items, except that dangerous goods should receive priority processing over non-dangerous goods.
b. When type 1 shelf-life items reach the expiration date, they can no longer be issued for use and are to be processed for reutilization, recycling, or disposal without delay to a national disposition and reutilization service (DRS) or a similar type of specialized unit.

CHAPTER 5 CARE OF SUPPLIES IN STORAGE (COSIS)

5.1. GENERAL

Materiel should be protected from the same environmental elements that assets are protected from when they are shipped to NATO forces and soldiers for use. Information on NATO packaging is described in STANAG 4280.

Care is defined as protection that is provided for the bare item to prevent deterioration from exposure due to atmospheric conditions during shipment and storage. The methods of care (item protection) are combinations of preservation steps taken for the prevention of deterioration of military supplies and equipment.

Information on NATO standard methods of preservation is described in STANAG 4280.

5.1.1. METHODS OF CARE

The basic methods of care include:

a. Physical and mechanical protection. Cushioning, blocking, or bolting to prevent movement within containers and physical damage due to shock and vibration accomplishes physical protection. Mechanical protection is generally provided to an item to prevent damage from any force that will impair the proper functioning of the item. It does not provide protection from the entry of water, water-vapor, gases or fumes, or the growth of microorganisms. No preservative is used on the items. Items usually packed by this method are of a noncritical nature made of corrosion resistant metals; nonmetals such as ceramics, and glass; items that are painted, prime coated, anodized or have other similar corrosion resistant finishes or coatings; or items that are so rugged that they will not corrode to a degree that would affect their form, fit, or function.
b. Physical and mechanical protection with a preservative coating. The preservative coating provides all the corrosion protection given to the item. This method may be used to protect metal items of a non-critical nature where either the removal of the preservative is not required before the item is used, or removal of the preservative can be accomplished without further disassembly or damage to the item. This method may use a hard drying preservative on the item; a soft film preservative on the item, plus a greaseproof wrap; or may use volatile corrosion inhibitors (VCI) treated barrier materials.
c. Waterproof protection. This method consists of enclosing the item in a snug fitting, greaseproof, waterproof container such as a heat-sealed bag, etc.
d. Water-vapor proof protection. This method consists of sealing the item in a water-vapor proof container such as a heat-sealed bag or solid metal or plastic box with a gasket.
e. Water-vapor proof enclosure with static or dynamic dehumidification, if requisite. This method provides the best possible protection in preservation. It is used for items of highly critical nature, mechanical, chemical, electrical, etc., which would normally not be coated with a preservative, and uses an absorbing material, known as desiccant, to absorb any moisture within the package. It must not be used on any item where the removal of moisture would cause damage to the item.

5.1.2. CLEANING

All contaminants and/or infestations must be removed. Each item being stored will need to be cleaned and inspected to the storage. Any contaminant left on an item may cause deterioration. The cleaning process must not harm the item. When required, limit the disassembly of the materiel to a point where reassembly can be easily done without special tools or skills. Possible methods of cleaning include:

a. Wire brushing to remove loose scales and light rust from items.
b. Vacuum cleaning for radios and electronic items to remove dust, lint particles, etc.
c. Jet spray washing using a high-pressure stream of water is best used on items that will not be harmed by the pressure or water.
d. Abrasive blasting uses a high velocity stream of an abrasive material against the surface of the item and should be used on surfaces where the abrasive action will not affect the function of the item such as rough castings, pintle hooks, etc.
e. Steam cleaning uses a stream of steam with an added cleaning compound followed by steam alone to remove heavy greases from automotive equipment, such as trucks.
f. Ultrasonic cleaning is used on nonabsorbent materials such as those found in electronic items.

5.1.3. DRYING

Immediately after cleaning using fluids, items must be thoroughly dried to remove any cleaning solutions or residual moisture. There are several methods for drying materiel, which include compressed air, ovens, infrared lamps, wiping, and/or draining[1].

5.1.4. CONTACT PRESERVATIVES

Contact preservatives are applied to items to protect them from deterioration due to exposure to adverse environmental conditions during storage. Most contact preservatives are physically oily or greasy and vary greatly in chemical composition and consistency; therefore, they cannot be used indiscriminately on all kinds of materials. Lubricating oils and greases can be used, but oils and greases designed for lubrication may be inadequate for the full protection desired. Selecting the right preservative should be as carefully considered as selecting the proper cleaning process. There are several preservative application methods including: dipping, flow coating, brushing, filling or flushing, fogging, spraying, etc.[2]

5.1.5. DESICCANT

Desiccant is a moisture-absorbing material that is mandatory for certain requirements. Its purpose is to absorb any moisture that may seep through the water-vapor proof barrier material. The following information is provided for storing, handling, and applying desiccant.

a. Apply a greaseproof wrap to items treated with contact preservative to segregate desiccant from incompatible elements.
b. Secure bag enclosures evenly around the item.
c. Apply humidity indicators to desiccated packs.

[1] Use caution to ensure the drying process does not harm the item

[2] Petroleum based preservatives can cause skin and eye irritation. Personnel should avoid direct contact by wearing appropriate safety equipment. When spraying or fogging, personnel should always wear goggles and a respirator

d. Do not use damaged or frayed unit bags; allow unit bags to be packed or stored near incompatible elements such as lubes, an oils; or remove desiccant bags from storage container until ready for use.
e. Attach bags of desiccant to item by means of tape or tying.
f. Care should be taken to prevent desiccant bags from touching critical or bare metal surfaces of the item.

5.1.6. BARRIER

Barrier materials protect the item by providing an environmental enclosure around the item. Some of the features to consider in selecting an appropriate barrier material are:

a. Greaseproof for use when you are also using a contact preservative.
b. Waterproof for use when the item could be affected by standing water.
c. Water-vapor proof for use to protect items which are susceptible to corrosion from atmospheric contaminants.
d. Heat sealable for use to close bags and provide a seal having the same waterproof or water-vapor proof properties as the barrier material itself. The factors affecting heat-sealing are: temperature, dwell time, and pressure.
e. Flame resistant material will not support combustion. Must be used for all supplies destined for shipboard use.
f. Transparent material allows for quick identification of the item or its condition.
g. Chemically neutral-material will not affect or contaminate item. Generally used for critical surfaces or items highly susceptible to acid etching.

5.1.7. CUSHIONING

Cushioning is the means of providing physical and mechanical protection to an item by controlling the movement of the item within the container. Cushioning materials come in many forms and are usually reusable. Sometimes they may be found and recovered from the waste stream. Cushioning materials can be made of paper, bound fiber, and plastic. In order for plastics to work, air must be trapped inside. Bubble wrap, various hard and soft foams, expanded polystyrene, and polyurethane foam are plastic-based cushioning materials. Cushion all sharp edges and corners of the item to protect barriers, as required. Units can successfully transport fragile items; they just need more cushioning to control the item’s movement inside the package. The amount of cushioning and cushioning type varies. If the packaging that the item was delivered in is available and the cushioning is intact, that is the easiest method to cushion an item under field conditions.

5.1.8. INTERIOR CONTAINERS

Interior containers can be any one of the following: fiberboard-shipping boxes, paperboard folding boxes, setup boxes, wooden boxes, etc. Metal reusable drums can also be used as interior containers and are made of aluminum or steel and furnished in various sizes. The drums are made with a fully removable cover secured by an exterior locking ring. This locking ring is generally held in place by a removable nut and bolt. If the container is supplied with a rubber gasket it can provide a barrier against water-vapor. The reusable container is mainly used for the packing of delicate instruments, electrical/electronic components, relays, small electric motors, etc.

Container Selection. To help select the proper container you should first determine the item characteristics, or more simply put, determine whether the item should be protected from vibration, shock, or stacking forces during shipment, handling, and storage. Items are preserved to protect them from deterioration from the elements and physical and mechanical forces. The items are then packed in an intermediate and/or shipping container for added protection during handling and transport. Some interior containers may be used as shipping containers and do not require further packing.

5.2. ITEM IDENTIFICATION

The final operation of care is the labeling of the unit pack with the correct identification and markings. Items that are not properly identified are useless to the soldiers and are a waste of time, money, and effort. Markings on unit and intermediate interior packs and unpacked items must be located as to allow the markings to be easily read when stored on shelves or stacked, and to ensure that the markings will not be destroyed when the pack is opened for inspection or until contents have been used. The marking surface of a unit pack must be the outermost wrap, bag, or container of the unit pack. When clear plastic containers are used for unit protection, the labels may be inserted or affixed inside the container if the label will not affect or be affected by the method of preservation and will not generally obscure more than 50 percent of one surface of the container.

a. NATO stock number (NSN), to include spaces or dashes and any prefix or suffix shown in the contract or requisition, in the clear and bar coded. If no NSN is assigned, then this line may be omitted.
b. Part number (PN). The PN should be indicated. If the item has no PN assigned to it or if no PN is required, then nothing is shown.
c. Military method and date of unit preservation. Include information on unit preservation, if applicable.
d. Pictorial symbols for marking. Containers should be marked with pictorial symbols to indicate special handling and storage needs, such as "DO NOT STACK, DO NOT DROP, FRAGILE, HANDLE WITH CARE, KEEP AWAY FROM HEAT, KEEP AWAY FROM COLD, ELECTROSTATIC DISCHARGE SENSITIVE, etc.” They may appear on a label or be printed directly on the package. Affirmative and negative symbols need not be framed by borderlines, but all negative symbols with "DO NOT..." should have borders with a slash mark across. Pictorial marking symbols and their application are illustrated in ISO 780.
e. Information on NATO standard Marking for shipment and storage is described in STANAG 4281.

ANNEX A REFERENCE PUBLICATIONS

This annex contains publications that are referred to in this document as well as others that are useful to logisticians at the operational level. NATO Allied Publications (APs) and Standardization Agreements (STANAGs) are available on the NATO Standardization Office protected web site http://nso.nato.int.

SHORT NAME	TITLE
AAP-6	NATO GLOSSARY OF TERMS AND DEFINITIONS
MC 319	NATO PRINCIPLES AND POLICIES FOR LOGISTICS
STANAG 2034	NATO STANDARD PROCEDURES FOR MUTUAL LOGISTIC ASSISTANCE
STANAG 2182	ALLIED JOINT LOGISTIC DOCTRINE (AJP-4)
STANAG 2234	ALLIED JOINT DOCTRINE FOR HOST NATION SUPPORT (AJP-4.5)
STANAG 2236	MULTIMODAL TRANSPORT ISSUES (AMP-5)
STANAG 2406	LAND FORCES LOGISTIC DOCTRINE (ALP-4.2)
STANAG 2613	RETROGRADE OF MATERIEL (APP-17)
STANAG 2827	MATERIALS HANDLING IN THE FIELD (APP-25)
STANAG 2828	MILITARY PALLETS, PACKAGES AND CONTAINERS (APP-22)
STANAG 2829	MATERIALS HANDLING EQUIPMENT (APP-23)
STANAG 2961	CLASSES OF SUPPLY OF NATO FORCES (APP-19)
STANAG 4280	NATO PACKAGING AND PRESERVATION (APP-21)
STANAG 4281 (AAITP-05)	NATO STANDARD MARKING FOR SHIPMENT AND STORAGE
STANAG 4398	NATO REQUIREMENTS FOR REUSABLE CONTAINERS (AEPP-1)
STANAG 4434	NATO STANDARD PACKAGING FOR MATERIEL SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (AEPP-2)

OTHER DOCUMENTS:

QSTAG 2019	COMMON CRITICAL PROCEDURES FOR THE STORAGE OF MATERIEL
ISO 68	SERIES 1 FREIGHT CONTAINERS -- CLASSIFICATION, DIMENSIONS AND RATINGS
ISPM No. 15	INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES NUMBER 15 REGULATION OF WOOD PACKAGING MATERIAL IN INTERNATIONAL TRADE, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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ANNEX B LEXICON OF TERMS AND DEFINITIONS

This annex contains terms and definitions used in this document. A comprehensive list of NATO terms and definitions is contained in AAP-6.

barrier material
A material that retards transmission or passage of solids, liquids, gases, or radiated energy. (AAP-23)

bracing
Materials or devices used as strengthening and/or locating constraints to hold articles and prevent shifting. (AAP-24)

classified matter
Official information or matter in any form or of any nature which requires protection in the interests of national security. Also known as a classified item. (AAP-06)

classes of supply
The five categories into which supplies are grouped in order to facilitate supply management and planning. (APP-19)

commercial packaging
The methods and materials employed by the supplier to satisfy the requirements of that supplier's distribution system. See also trade package. (AAP-23)

consumable item
An article or property consumed and/or disposed of by usage. (AAP-43)

containerization
1. A shipping method in which materiel is packaged together in one container.
2. The use of transport containers to unitize cargo for transportation supply and storage.
3. Containerization aids carriage of goods by one or more modes of transportation without the need for intermediate handling of the contents. (AAP-23)

controlled humidity warehouse
A facility used for the storage of items that require protection against damage and deterioration that can result from excessive humidity. It is particularly applicable for items that are to remain in storage for extended periods.

corrosion
The chemical reaction between a material, usually a metal(s), and its environment that produces a deterioration of the material and its properties. (AAP-23)

covered storage
Storage space that is within any roofed structure, used to store a wide variety of materiel.

cushioning
Protection of an item from physical damage by using materials designed to absorb shocks and vibrations by compression. (AAP-23)

dangerous cargo
Cargo which, because of its dangerous properties, is subject to special regulations for its transport. (AAP-06)

desiccant
A hygroscopic substance used to reduce and maintain a low relative humidity in a package or container. (AAP-23)

disposal
The end-of-life tasks and actions for residual materials resulting from demilitarization operations. (AOP-38)

disposition and reutilization service
A service that supports the soldier and protects the public by providing disposal management solutions such as the reuse, transfer, donation, sale or disposal of excess property in accordance with HN and international laws and national directives. (APP-17)

dunnage
Material used to block and brace cargo in an ISO or other container, or on any cargo carrying system. (AAP-24)

electrostatic discharge
A transfer of electrostatic charge between bodies of different electrostatic potentials through the air (air discharge) or through direct contact (contact discharge). (AAP-23)

excess property
The quantity of property in possession of any component of the military that exceeds the quantity required or authorized for retention by that component. (APP-17)

expiration date
A date beyond which shelf-life items are to be suspended from issue or use. (AAP-23)

exterior pack
Package or container containing a single item or a number of unit packs or intermediate packs ready for shipment and storage. (AAP-23)

flammable/hazardous materials warehouse
A facility built of noncombustible materials and compartmentalized with fire walls. The hazardous materials facility contains explosion proof lighting and spill containment with sloped floors and trenches. These facilities are used to store acids, flammables, oxidizers, alkalis, etc.

general purpose warehouse
A type of warehouse that may be heated or unheated and used to store a wide variety of items. The standard warehouse is a single-story structure with loading docks at truck and railcar bed level.

humidity indicator
A device which displays data on moisture content within a package. (AAP-23)

identification
The application of appropriate markings to ensure that the identity of an article or commodity is clearly indicated after preservation and at each stage of packing. (AAP-23)

inspection
The physical process of determining compliance with established control measures. The activity such as measuring, examining, or gauging one or more characteristics of an item and comparing results with specified requirements in order to establish whether conformity is achieved for each characteristic.

intermediate pack
1. A wrap, box, or bundle that contains two or more unit packs of identical items.
2. Inner packaging for tactical transportation. (AAP-23)

intermodal container
A container conforming to ISO specifications, and so designed to be transported as a container-on-flat-car; or secured to a wheeled chassis as a van trailer for motor transport or as a trailer-on-flat-car; or transported aboard ships as a container without chassis or in containerships having compartments specifically constructed for stacking containers.

label
A piece of paper or other material to be affixed to a package, container, or article, and on which is printed either information concerning the product or addressees. (AAP-23)

life cycle
The period of time that starts with the assessment of the requirement for a system, facility or product and ends with its final disposal. (AAP-31)

line of communications
A route, either land, water, and/or air, that connects an operating military force with a base of operations and along which supplies and military forces move.

marking
The application of numbers, letters, labels, tags, symbols, or colours to provide identification and instruction during shipping, handling, and storage. (AAP-23)

materiel
A generic term covering equipment, stores, and spares for military use. (AAP-23)

materiel condition
A classification of materiel that reflects its readiness for issue and use or to identify the action underway to change the status of materiel.

materiel maintenance
The function of sustaining materiel in an operational status, restoring it to a serviceable condition, or updating and upgrading its functional usefulness through modification or other alteration.

military packaging
Materials, methods, or procedures prescribed in NATO and nationally authorized documents such as standards, specifications, and drawings that are designed to provide the level of

packaging necessary to prevent damage and deterioration during required distribution and storage. (AAP-23)

nonwarehouse storage facilities
Facilities that have a roof but vary as to the number of walls and type of construction. Examples include sheds, magazines (above-ground and earth-covered or igloos), dry tanks, transitory shelters, and nontraditional storage structures.

open storage
Uncovered storage space that is used to store materiel for which there is little concern for damage due to the open environment or NBC contamination. The two types of open storage are improved (finished surface with adequate drainage) and unimproved (unsurfaced areas).

open storage, improved
It is the amount of space in open storage, which has been graded and hard surfaced or prepared with topping of some suitable materials to permit effective materials handling operations.

open storage, unimproved
It is the amount of space in open areas which has not been surfaced or improved, but is used for storage purposes.

package
One or more articles or pieces contained or secured into a single unit. The product of a complete series of packaging operations. (AAP-23)

packaging
The operations involved in the preparation of materiel for distribution, transportation, storage, and delivery to the user. The term includes preservation, packing, marking, and utilization. (AAP-23)

packing
The selection or construction of the shipping container and assembling of items or packages therein. (AAP-23)

palletized unit load
Quantity of any item, packaged or unpackaged, which is arranged on a pallet in a specified manner and securely strapped or fastened thereto so that the whole is handled as a unit (AAP-06)

performance oriented packaging
Type of packaging based on the ability of packaging to perform to a specified level of integrity when subjected to performance tests. (AAP-23)

preservation
The application of protective measures to prevent deterioration including cleaning, drying and the use of preservatives barrier materials, cushioning, and containers, when necessary. (APP-17)

refrigerated warehouse
A warehouse that resembles a general purpose warehouse, although it is usually smaller, and is used to store items requiring refrigeration. The interior of the warehouse is normally divided into two parts. One part is designated as chill space in which the temperature can be controlled between 0° C and 10° C (32° F and 50° F). The other part is designated as freeze space in which the temperature can be controlled below 0°C (32°F).

reusable container
A shipping and storage container designed for reuse without impairment of its protective function and which may be repaired and/or refitted. (AAP-23)

retrograde
The return of materiel from a unit back through the distribution system to the source of supply or point of disposal. (APP-17)

retrograde shipping
Shipping used to return personnel, stores and equipment from a theatre of operations. (AAP-06)

seal
Means of securing a container to prevent undetected loss or deterioration of contents. (AAP-23)

service life
The time during which materiel, in specified storage conditions and when subsequently used in its specified operational and/or training conditions, may be expected to remain safe and serviceable.
1. Where environmental monitoring equipment is used, the service life will depend on the environmental influences to which the materiel has been exposed.
2. The service life does not include the elimination from service, e.g., disposal. (AOP-38)

shelf-life
The length of time during which an item of supply, subject to deterioration or having a limited life which cannot be renewed, is considered serviceable while stored. (AAP-06)

shelf-life item
An item of supply possessing deteriorative or unstable characteristics to the degree that a storage time period must be assigned to ensure that it will perform satisfactorily in service. There are two types of shelf-life items.

a. Type I. An item of supply having a definite (non-extendable) storage period terminating on an expiration date established by the manufacturer, experience, or technical test data.

b. Type II. An item of supply with an assigned storage time period, which may be extended after the completion of inspection/restorative action.

shipping container
A container which meets minimum carrier regulations and is of sufficient strength by reason of material, design, and construction to be shipped safely without further packing. (AAP-23)

stock readiness
Tasks needed to assure that the proper condition of materiel in storage is known and reported, that the condition is properly recorded, and that the materiel is properly provided with adequate packaging protection to prevent any degradation. Stock Readiness concerns itself with the in-storage inspection, minor repair, and packaging aspects associated with these efforts.

storage environment
The total set of all external natural and induced conditions to which a materiel is exposed during its storage life. (AOP-38)

storage life
The length of time for which an item of supply including explosives, given specific storage conditions, may be expected to remain serviceable and, if relevant, safe. Related term: shelf life. (AAP-06)

storage activity
The organizational element of a distribution system, which is assigned custodial responsibility for the physical handling of materiel during its receipt, storage, and issue.

stuffing
The placing of the cargo and cargo bracing materials (dunnage) or other methods of restraint, if required, into the container. (APP-17)

supplies
All materiel and items used in the equipment, support and maintenance of military forces. (AAP-6)

sustainment
The provision of logistics and personnel services required to maintain and prolong operations until successful mission accomplishment. (APP-17)

unit load
A load designed to be carried, stored and handled as a separate unit and able to withstand the conditions with the appropriate modes of transport. (AOP-38)

unit pack
The smallest marked package in which one supply item or several identical supply items packed together is supplied as a complete and identifiable pack. (AAP-23)

unitization
Assembly of exterior packs of one or more line items of supply into a single load so that the load can be handled as a unit through the distribution system. Unitization (unitized loads or unit loads) encompasses consolidation in a container, placement on a pallet or load base, or securely binding together. (APP-17)

volatile corrosion inhibitor
1. A material which slowly releases vapour that inhibits corrosion within a package by neutralizing the effects of moisture-laden air.
2. A material which evaporates or sublimes and then forms a thin corrosion resisting film on the surface of a part. (AAP-23)

waterproof
Impervious to penetration of water. (AAP-23)

wood packaging material
Wood or wood products (excluding paper products) used in supporting, protecting or carrying a commodity (includes dunnage). (APP-17)

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ANNEX C LIST OF ABBREVIATIONS

This list contains abbreviations used in this document. A comprehensive list of NATO abbreviations is contained in AAP-15.

ABBREVIATON	FULL MEANING
AOR	Area of Responsibility
CBRN	Chemical, Biological, Radiological and Nuclear
CH	Controlled humidity
COSIS	Care of Supplies in Storage
DRS	Disposition and Reutilization Service
ESD	Electrostatic Discharge
ESDS	Electrostatic Discharge Sensitive
FIFO	First-In-First-Out
GP	General Purpose
HAZMAT	Hazardous Materials
HN	Host Nation
IER	Information Exchange Requirements
ISPM	International Standards for Phytosanitary Measures
ISO	International Organization of Standardization
LIFO	Last-In–First-Out
LOC	Line of Communications
MHE	Materials Handling Equipment
MSDS	Material Safety Data Sheet
NGO	Non-Governmental Organization
NSN	NATO Stock Number
OLC	Operations Logistics Chains
OLCM	Operational Logistics Chain Management
OPS	Operations
OST	Order Ship Time
POL	Petroleum, Oil and Lubricants
QA	Quality Assurance
RFID	Radio Frequency Identification
SA	Storage Activity
SOFA	Status of Forces Agreement
STANAG	Standardization Agreement
WPM	Wood Packaging Material

APP-16(A)(1)