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D-LM-008-001/SF-001

METHODS OF PACKAGING

(BILINGUAL)



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FOREWORD

1. D-LM-008-001/SF-001, Methods of Packaging, is issued on authority of the Chief of the Defence Staff.
2. D-LM-008-001/SF-001 is effective on receipt and supersedes D-LM-008-001/SF-001 dated 78-03-07.
3. Suggestions for changes shall be forwarded through normal channels to National Defence Headquarters, Attention Director Supply Resources and Operations (DSRO 3-2).

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METHODS OF PACKAGING

PART 1

SCOPE

PURPOSE

1. This specification covers methods of preservation to protect material against corrosion, physical and mechanical damage and other forms of deterioration. This specification also provides examination and test procedures to be employed in verifying conformance with the requirements contained herein.

CLASSIFICATION

2. Methods and submethods of preservation are classified as follows:

Basic Methods

Submethods

I	
IA	IA-5, IA-6, IA-8, IA-13, IA-14, IA-15, IA-16
IB	IB-1, IB-2
IC	IC-1, IC-2, IC-3, IC-4, IC-7, IC-9, IC-10
II	Ila, Ilb, Ilc, Ild, Ile, IIf
III	

CHARACTERISTICS

3. These methods and submethods and the significant differences in their construction are diagrammatically depicted in Figure 1-1. Submethods outline specific way for accomplishment of variations of the basic method.

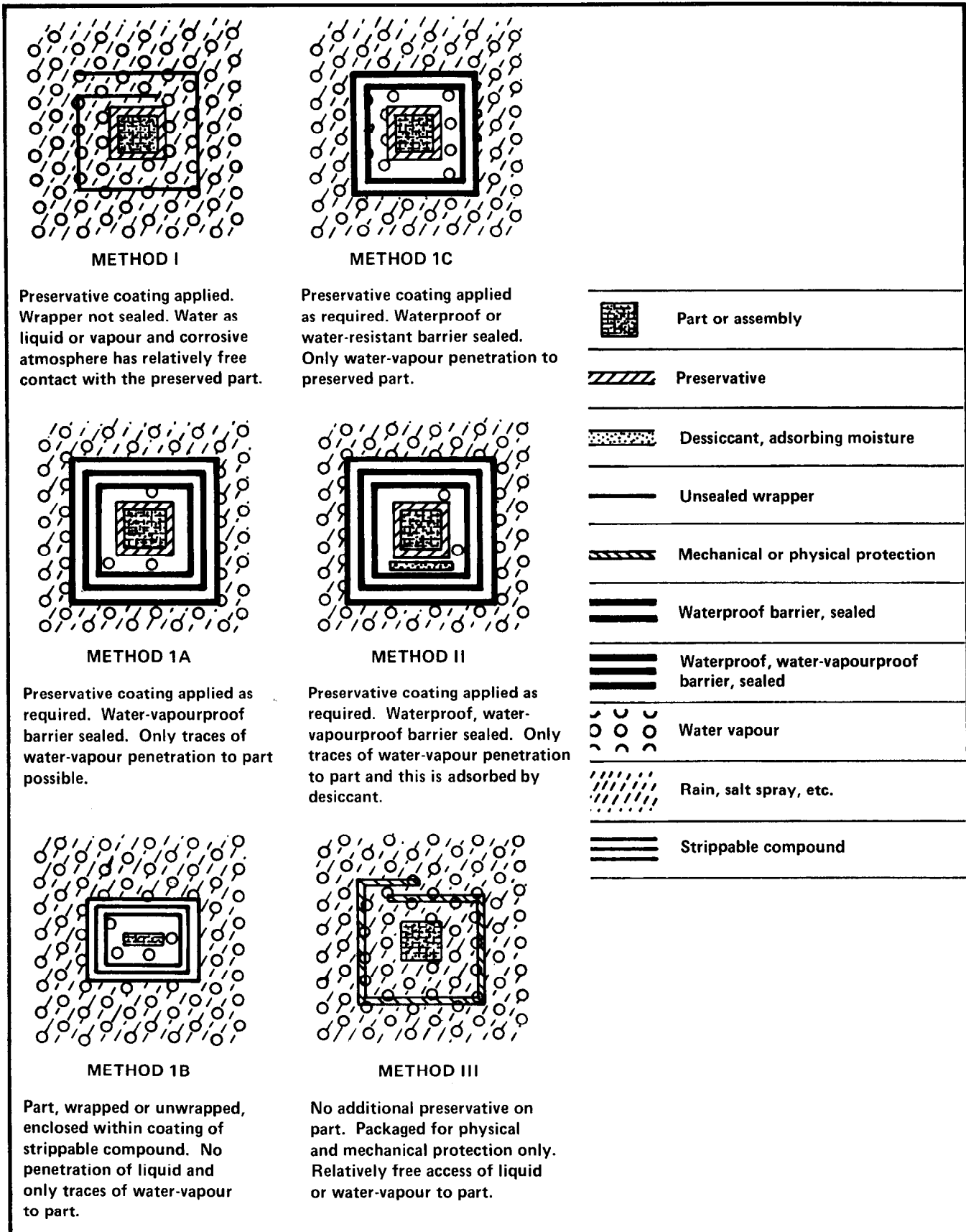


Figure 1-1 Characteristics of Basic Methods.

PART 2

APPLICABLE DOCUMENTS

GENERAL

1. The specifications listed herein, of the issue in effect on the date of invitation to tender, are approved for use as standard materials for the accomplishment of packaging. Specifications other than those listed herein may be used with prior approval of the inspecting authority.

CANADIAN FORCES PACKAGING SPECIFICATIONS

D-LM-008-002/SF-001	Marking for Storage and Shipment
D-LM-008-005/SF-000	Packaging, Batteries, Dry and Thermal
D-LM-008-010/SF-001	Marking of Dangerous Materials
D-LM-008-011/SF-001	Preparation and Use of Packaging Requirements Codes
D-LM-008-015/SF-000	Packaging for Piezoelectric Crystals
D-LM-008-017/SF-001	Cleated Panel and Boxes, Cleated Panel
D-LM-008-021/SF-001	Packaging of Batteries, Lead Acid
D-LM-008-022/SG-000	Standards for Packaging of Documentation
D-LM-008-023/SF-001	Demountable Boxes or Crates
D-LM-008-024/SF-001	Packaging, Marking Northern Shipments
D-LM-008-026/SF-001	Packaging, of Preformed Packings, Gaskets or Seals
D-LM-008-027/SF-001	Specification for Packaging of Small Arms Weapons
D-LM-008-030/SF-001	Specification for the Packaging of Hose, Rubber, Plastic, Fabric or Metal (Including Tubing) and Fittings, Nozzles and Strainers
D-LM-008-032/SF-001	Packaging and Marking of Lithium Batteries
D-LM-008-033/SF-000	Packaging of Bearings, Maritime, Matched Sets
D-LM-008-034/SF-000	Packaging of Electronic Circuit, Printed Circuit, Printed Wiring Board/Card
D-LM-008-035/SF-000	Packaging of Components, Higher Assemblies or Incorporated devices which are sensitive to Electrostatic Discharge
D-LM-008-036/SF-000	DND Minimum requirements for Manufacturers Standard Pack
D-LM-008-037/SF-000	Packaging of Bearings, Antifriction

CANADIAN GOVERNMENT SPECIFICATION BOARD

US EQUIVALENT

CAN2-3.3-M78	Kerosene	ANSI/ASTM D3699-78
CAN2-3.8-M78	Dry Cleaning Solvent	A-A-711
1-GP-131	Compound, Waterproofing, Electrical Ignition	MIL-V-13811
3-GP-662	Lubricating Oil, Exposed Gear, Medium	VV-L-751
3-GP-685	Grease, Automotive and Artillery	MIL-G-10924
4-GP-35	Felt, Sheet, Low Density	
9-GP-5	Paper, Unbleached Kraft, Wrapping	UU-P-268
9-GP-7	Paper, Tissue, Wrapping	UU-P-553
11-GP-3	Hardboard	
31-GP-1	Corrosion Preventive Compound, Cold Application, Hard Film	MIL-C-16173 GRADE 1
31-GP-3	Corrosion Preventive Compound, Cold Application, Soft Film	MIL-C-16173 GRADE 2
31-GP-4	Corrosion Preventive Compound, Cold Application Water Displacing Soft Film	MIL-C-16173 GRADE 3
31-GP-201	Cleaning Compound, High Pressure (Steam) Cleaner	P-C-437
31-GP-206	Cleaning Compound, Alkali Type	P-C-436
31-GP-210	Cleaning Compound, Capsule Form	
31-GP-213	1, 1, 1, — Trichlorethane, Technical Inhibited, Vapour Degreasing and Cold Cleaning	MIL-T-81533

31-GP-404	Blast Cleaning of Metal Surface	
31-GP-421	Sand, Sandblast	MIL-S-17726
43-GP-1	Tape, Paper, Gummed	A-A-1492A
43-GP-3	Tape, Adhesive, Pressure Sensitive Water Resistant	A-A-1586A
43-GP-14	Tape, Adhesive, Pressure Sensitive Filament Reinforced	PPP-T-97
43-GP-17	Boxes, Folding, Paperboard	PPP-B-566
43-GP-18	Boxes, Set Up, Paperboard	PPP-B-676
43-GP-20	Boxes, Metal Stayed, Paperboard	PPP-B-665
43-GP-21	Boxes, Fiberboard	PPP-B-636
43-GP-22	Standard for Corrugated Fiberboard Products	PPP-F-320
43-GP-23	Standard for Boxes, Wooden, Wirebound	PPP-B-585
43-GP-24	Strapping, Flat, Steel	QQ-S-781
43-GP-28	Tape, Paper, Gummed, Water Resistant, Filament Reinforced	A-A-1672A
43-GP-30	Standard for Film, Packaging, Low Density Polyethylene	L-P-378
43-GP-34	Standard for Strapping, Non-Metallic, Connectors and Connections	PPP-S-760
43-GP-46P	Boxes Nailed Wooden	PPP-B-621
43-GP-47P	Boxes Cleated Plywood	PPP-B-601
43-GP-148	Foil, Aluminum, Annealed	QQ-A-1876
71-GP-6	Adhesive, Label (Water Resistant)	MMM-A-178

CANADIAN STANDARDS ASSOCIATION

080S4-M-1983	Wood Preservation
0115-M-1982	Hardwood Plywood
0121-M-1978	Douglas Fir Plywood
0151-M-1978	Canadian Softwood Plywood
0153-M-1980	Poplar Plywood
Z102.10-1954	Skidding of Machinery for Shipment

US EQUIVALENT

TT-W-00571
NN-P-530
NN-P-530

US MILITARY SPECIFICATIONS AND STANDARDS

MIL-E-75	Electron Tubes, Preparation for Delivery of
MIL-C-104	Crate Wood Lumber and Plywood, Sheathed Nailed and Bolted
MIL-P-116	Preservation — Packaging Methods of
MIL-B-121	Barrier Material, Greaseproof, Waterproofed, Flexible
MIL-B-131	Barrier Materials, Water-Vaporproofed, Flexible Heat Sealable
MIL-P-149	Plastic Coating Compound, Strippable (Hot Dipping)
MIL-S-851	Steel Grit, Shot, and Cut Wire shot, and Iron Grit and shot-blast cleaning and peening
MIL-L-3150	Lubricating Oil, Preservative, Medium
MIL-P-3420	Packaging Material, Volatile Corrosion Inhibitor, Treated, Opaque
MIL-D-3464	Desiccant, Activated, Bagged, Packaging Use and a Static Dehumidification
MIL-C-3774	Crate, Wood, Open, 12,000 and 16,000 Pound Capacity
MIL-C-3955	Can, Fiber, Spirally Wound
MIL-C-4339	Corrosion Preventive, Soluble Oil, for Water Injection Systems
MIL-R-5001	Rubber, Cellular Sheet Molded and Hand Built Shapes, Latex Foam
MIL-C-5545	Corrosion Preventive, Aircraft Engine Heavy Oil Type
MIL-G-5634	Grain, Abrasive, Soft, for Carbon Removal

MIL-D-6054	Drum, Metal, Shipping and Storage
MIL-D-6055	Drum, Metal, Reusable, Shipping and Storage (CAP 88 to 510 cu. in.)
MIL-E-6060	Envelopes, Packaging, Water Vaporproof, Flexible
MIL-L-6085	Lubricating Oil, Instrument, Aircraft, Low Volatility
MIL-C-6529	Corrosion Preventive, Aircraft Engine
MIL-I-8574	Inhibitors, Corrosion, Volatile, Utilization of
MIL-I-8835	Indicator, Humidity Card, Chemically Impregnated
MIL-C-10382	Corrosion Preventive, Petrolatum, Spraying Application, for Food Handling Machinery and Equipment
MIL-W-48302	Window, Observation
MIL-G-10924	Grease, Automotive and Artillery
MIL-C-11133	Crate, Wood, Open, Wirebound
MIL-C-11796	Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-G-12803	Gasket Material, Non-Metallic
MIL-V-13811	Varnish, Waterproofing, Electrical Ignition
MIL-C-15074	Corrosion Preventive, Fingerprint Remover
MIL-C-16173	Corrosion Preventive Compound, Solvent Cutback, Cold Application
MIL-C-16555	Coating, Compound, Strippable, Sprayable
MIL-D-16791	Detergent, General Purpose (Liquid, Non-Ionic)
MIL-P-19644	Plastic Molding Material (Polystyrene Foam Expanded Bead)
MIL-L-21260	Lubricating Oil, Internal Combustion Engine, Preservative and Break-In
MIL-B-22019	Barrier Material Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor Treated
MIL-B-22020	Bag, Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor, Treated
MIL-I-22110	Inhibitors, Corrosion, Volatile, Crystalline
MIL-B-22191	Barrier Material Transparent, Flexible, Heat Sealable
MIL-I-23310	Inhibitors, Corrosion, Volatile, Oil Type
MIL-C-25731	Crate, Wood, for Domestic and Overseas Shipment of Airframe Components (2,000 lbs maximum net load)
MIL-C-43616	Cleaning Compound, Aircraft Surface
MIL-B-26195	Box, Wood Cleated, Skidded, Load Bearing Base
MIL-P-26514	Polyurethane Foam, Rigid or Plastic, for Packaging
MIL-I-26860	Indicator, Humidity, Plug, Color Change
MIL-C-26861	Cushioning Material, Resilient Type, General
MIL-P-46002	Preservative Oil, Contact and Volatile Corrosion Inhibited
MIL-G-81322	Grease, Aircraft, General Purpose, Wide Temperature Range
MIL-B-81705	Barrier Materials, Flexible, Electrostatic Free Water Vaporproof, Heat Sealable
MIL-B-81997	Pouches, Cushioned, Flexible, Electrostatic Free, Reclosable, Transparent
MS-20003	Indicator, Humidity Card, 3 Spot
MS-36253	Litmus Paper
MIL-HDBK-696	Plastic Coating Compound, Strippable, Hot and Cold Dip

US FEDERAL SPECIFICATIONS/STANDARDS

P-C-436	Cleaning Compound, Alkali Boiling VAT (Soak) on Hydrosteam
P-C-437	Cleaning Compound, High Pressure (Steam) Cleaning
P-C-444	Cleaning Compound Solvent, Grease Emulsifying
P-C-535	Cleaning Compound, Platers Electrocleaning, for Steel
VV-L-800	Lubricating Oil, General Purpose, Preservative (Water Displacing, Low Temperature)
VV-P-236	Petrolatum, Technical

MMM-A-250	Adhesive Water Resistant (for Sealing Fiberboard Boxes)
PPP-B-640	Box, Fiberboard, Corrugated Triple Wall
PPP-C-650	Crate, Wood, Open and Covered
PPP-D-723	Drum Fibre
PPP-C-795	Cushioning Material, Flexible, Cellular Plastic Film for Packaging Application
PPP-C-850	Cushioning Material, Polystyrene Expanded, Resilient (for Packaging Uses)
PPP-C-1120	Cushioning Material, Uncompressed Bound Fiber for Packaging
PPP-E-911	Excelsior, Wood

**FEDERAL STANDARD 101 PRESERVATION PACKAGING AND PACKING MATERIALS:
TEST PROCEDURES**

Publications	US Equivalent
A-LM-117-001/FP-001 The Transportation of Explosives and Other Dangerous Materials by Military Aircraft	AFM71-4
Commercial Products: Cushioning Material, Cellulose Wadding	

2. The following specifications are considered technically equivalent to this specification when applied in the country of origin:

USA	Preservation — Packaging Methods of MIL-P-116
UK	Ministry of Defense Specifications DEF 1234 (Full Standard)

3. Copies of the above specifications and publications may be obtained from the inspecting authority designated on the contract.

4. When used as a contractual document, questions, concerning this specification shall be referred to the inspecting authority.

PART 3
APPLICABLE DOCUMENTS

GENERAL

1. Items shall be processed in accordance with the appropriate method described herein (see Part 1, paragraph 2; Part 3, paragraph 17; and Figures 1-1 and 3-1). Methods shall be selected to adequately protect the item. Annex A can be used as a guide in the selection process. Methods described herein include cleaning, drying, preservative application and the use of wrapping, cushioning, dunnage and unit containers as required. Cleaning, drying, application of preservatives and sealing of barriers, should progress in an uninterrupted series of operations. When periods of interruption are necessary, temporary protection shall be provided to partially processed items, as required, to ensure against contamination.
2. Packages shall be so designed as to eliminate unnecessary weight and cube.
3. Items protected in accordance with the methods described herein shall be tested in accordance with the requirements as indicated in Figure 4-3 at the discretion of the inspecting authority.
4. Talc/Talcum when used in the packaging process, eg dusting, shall be asbestos free.

LEVELS OF PROTECTION (PRESERVATIVE/PACKAGING AND PACKING)

5. To help determine the extent of preservation, packaging and packing required to protect an item against specific hazards of storage, transportation and handling, three levels of preservation and packaging, and three levels of packing have been established. The levels of protection are based upon the degree of preservation, packaging and packing required to provide adequate protection against various conditions of transportation, storage and handling.
6. The main objective of these levels is to provide uniform, efficient and economical protection to supplies and equipment.
7. Levels of preservation and packaging comprise:
 - a. **Level A Full Military Package** - The preservation and packaging must afford adequate protection against corrosion, deterioration and physical damage during shipment, handling, indeterminate storage and worldwide redistribution.
 - b. **Level B Limited Military Package** — The preservation and packaging must afford adequate protection against known conditions which are less hazardous than those which Level A is designed to meet. The use of Level B should be based on firmly established knowledge of the shipment and storage conditions to be encountered, and a determination that monetary savings will result.
 - c. **Level C Minimum Military Package** — The preservation and packaging must afford adequate protection against corrosion deterioration, and physical damage during shipment from supply source to the first receiving activity. This level may conform to the supplier's commercial practice when such meets the requirements of this level.
8. Levels of packing comprise:
 - a. **Level A Full Military Pack** — The packing must afford adequate protection against damage during shipment, handling, indeterminate storage, and worldwide redistribution.

- b. **Level B Limited Military Pack** — The packing must afford adequate protection against damage during multiple shipments. These packs are designed to be shipped and handled undercover and stored in warehouses or other structures having equivalent protection from the weather.
- c. **Level C Minimum Military Pack** — The packing must afford adequate protection against damage during direct domestic shipment from supply source to the first receiving activity. This level in general will conform to applicable carrier rules and regulations and may be the supplier's commercial practice as defined in D-LM-008-036/SF-000 when such meets the requirements of this level.

CLEANING

9. Prior to packaging, assemblies and parts shall be free of corrosion, foreign matter and shall be capable of passing the test in Part 4, paragraph 9. In addition, surfaces of items to be protected by the application of a coating of plastic or preservative shall be clean when tested in accordance with Part 4, paragraph 9.

10. Critical functioning or close tolerance surfaces shall be cleaned to ensure removal of corrosion, oil, grease, residues and fingerprint perspiration of other acid and alkali residue and shall be capable of passing all tests in Part 4, paragraph 9.

11. Unless otherwise specified, disassembly of complex assemblies shall be limited to the degree necessary to assure that critical functioning surfaces are free of contamination. If practicable, internal parts of complex assemblies may be cleaned prior to assembly, and precautions shall be taken to avoid contamination thereafter. Pressure spray methods shall be used only for items of relatively simple construction, all surfaces of which can be reached by the spray.

12. **Selection of Method of Cleaning** — The required cleaning shall be accomplished by one or more of the following procedures, provided the process is not injurious to the item, and no cleaner residue remains on the item or is trapped therein.

- a. **C-1 Any Applicable Process** — Item(s) shall be cleaned by any process or combination of processes which will accomplish thorough cleaning without damage to the item(s). This process not to be restricted to the processes listed herein.
- b. **C-3 Solvent Cleaning** — Item(s) shall be cleaned initially in solvent and drained. The initial cleaning, when other than pressure spray is used, shall be followed by a secondary cleaning in another tank of clean solvent. Solvent shall conform to CAN2-3.8M 78. When solvent recirculating systems are used they shall be equipped with filters for removal of contamination. Initial cleaning shall be accomplished by complete immersion accompanied by such scrubbing and agitation as may be necessary to accomplish thorough cleaning; or by scrubbing or wiping with a clean brush or cloth soaked in solvent, accompanied by partial immersion when possible; or by pressure spray. The second cleaning shall be accomplished with clean solvent. This shall be accomplished by complete immersion, when possible.
- c. **C-5 Solvent Cleaning Followed by Fingerprint Remover** — Item(s) shall be cleaned in accordance with C-3 followed by C-8.
- d. **C-7 Vapour degreasing** — Cleaning shall be effected by subjecting the item(s) to vapours from the degreasing fluid or solvent trichlorethane, until no further condensation occurs. This process is applicable to items of comparatively simple construction when the contamination consists of oil, grease or other contaminants which are soluble in or readily removed by the solvent and when the temperature is not injurious to the item. This process

shall not be used on items containing fabric, rubber or other organic materials or for cleaning aluminum. Solvent shall conform to 31-GP-213.

- e. **C-8 Perspiration and Fingerprint Removal** — Removal or neutralization of perspiration or fingerprint or similar residue shall be effected by immersing and agitating the item(s) for a minimum period of two minutes in fingerprint remover conforming to MIL-C-15074. Critical surfaces of large equipment not adaptable to immersion shall be cleaned with a clean cloth saturated with fingerprint remover. Items shall be thoroughly rinsed in clean petroleum solvent CAN 2.3.8-M 78 to remove residue of perspiration or fingerprint remover material. This process is applicable for critical functioning or close tolerance surfaces which may have traces of inorganic contamination or traces of acids which are not removed by petroleum or chlorinated solvent.
- f. **C-9 Alkaline Cleaning** — Cleaning shall be accomplished by immersion, soaking or subjecting the item(s) to a pressure spray of alkaline cleaner and rinsing in clean water above 180°F (83°C). Compound shall conform to 31-GP-206.
- g. **C-11 Electrocleaning** — Cleaning shall be effected by immersing the item(s) in a solution and making the item an element of an electrochemical cell. When alkaline electrocleaning is desired, compounds used in the solution shall conform to P-C-535. The electrocleaning process to be followed by a rinse in clean water above 180°F (83°C).
- h. **C-12 Emulsion Cleaning** — Cleaning shall be effected by subjecting the item(s) to a pressure spray of emulsion cleaners or by immersion in a room temperature solution of solvent emulsion, followed by an immersion rinse in clean water above 180°F (83°C). Compound shall conform to P-C-444.
- j. **C-14 Steam Cleaning** — Cleaning shall be effected by subjecting the item(s) to a stream of steam or a stream of steam with an added cleaning compound followed by steam alone. Cleaning compound shall conform to 31-GP-201 or 31-GP-210.
- k. **C-15 Abrasive Blast** — Cleaning shall be effected by subjecting the item(s) to a high velocity stream of abrasive material conforming to MIL-S-851.
- m. **C-16 Vapour Blast (Honing Process)** — Cleaning shall be effected by subjecting the item(s) to a high velocity stream of atomized water combined with a fine particle size abrasive and suitable corrosion inhibitor.
- n. **C-17 Soft Grip Blast** — Cleaning shall be effected by subjecting the item(s) to a high velocity stream of water containing a relatively soft abrasive, with or without a corrosion inhibitor as required. Abrasive shall conform to MIL-G-5634.
- p. **C-18 Vapour Degreasing Followed by Fingerprint Removal** — Item(s) shall be cleaned in accordance with C-7 followed by C-8.
- q. **C-19 Ultrasonic Cleaning** — Cleaning shall be effected by subjecting the item(s), suspended in a cleaning agent, to the force of high frequency sound waves (ultrasonic). Ultrasonic cleaning is applied to non-absorbent materials and electronic devices which require "clean room" standards and cleanliness.

DRYING PROCEDURES

13. Immediately after cleaning, item(s) shall be thoroughly dried to remove cleaning solutions or residual moisture. Unless otherwise specified, the required dryness shall be accomplished by one or more of the following procedures provided the procedure is not injurious to the item:

- a. **D-1 Prepared Compressed Air** — Drying shall be effected by subjecting the item(s) to a blast of prepared dry and clean compressed air.
- b. **D-2 Oven** — Drying shall be effected by exposing the item(s) to heated air within a properly ventilated and temperature controlled oven.
- c. **D-3 Infrared Lamps** — Drying shall be effected by exposing the item(s) to direct heat rays from infrared lamps.
- d. **D-4 Wiping** — Drying shall be effected by wiping the surfaces of the item(s) with clean, dry, lint-free cloths, or specifically prepared wiping papers.
- e. **D-5 Draining** — When the final step in cleaning involves a petroleum solvent, thorough draining of the solvent shall be permitted as a drying process. Unless otherwise specified, this procedure may be used only when cold application solvent cutback preservatives are to be used.

PRESERVATIVES

14. **Selection** — Unless otherwise specified, preservatives shall conform to Figures 3-1 and 3-2. The specified preservatives selected shall be at the option of the contractor. When such option is exercised, compounds shall be selected whose application, removal or use will not damage the mechanism, structure or function of the item(s). When contact preservatives or volatile corrosion inhibitors are required to protect an item, compatibility between item surfaces and specific preservative applied must be evaluated.

15. **Application of Preservatives** — After cleaning and drying, the required preservative shall be applied by one or more of the following procedures, which will permit the preservative to coat all surfaces:

- a. **Dipping** — By the complete submersion of the item(s) in a bath of preservative.
- b. **Flow Coating** — By coating the surfaces of item(s) by pouring preservative on surfaces to be preserved.
- c. **Slushing** — By pouring the preservative into the part to be preserved and rotating, agitating, or positioning to ensure complete coverage of all internal surfaces; excess preservatives shall be drained.
- d. **Brushing** — By coating the item(s) on surfaces to be preserved with preservative, by means of a brush.
- e. **Filling or Flushing** — By completely filling or flushing the item(s) with preservative until all interior surfaces are satisfactorily coated. For the item(s) to be left filled, space must be allowed for thermal expansion and all ports and openings sealed to prevent leakage.
- f. **Fogging** — By coating interior surfaces of item(s) such as tanks and chambers with preservative injected as a cloud or mist from an air atomizing gun until enclosed atmosphere is saturated.

- g. **Spraying** — By coating the surfaces (interior or exterior, as applicable) of the item(s) with preservative applied as spray.
16. **Application and Use of Volatile Corrosion Inhibitors** — The application and use of volatile corrosion inhibitors shall be in accordance with the requirements of MIL-I-8574.

METHODS

17. The method shall be as specified in the contract or order and in the absence of such a requirement shall be selected in accordance with Annex A, and shall be accomplished in a manner that will pass the test(s) specified in Figure 4-3 for the method. Where methods provide both transparent and opaque protection, transparent protection may be furnished at the option of the contractor, but is not required unless specifically called for in the contract or order. In the absence of a submethod designation by the procuring agency, the selection of the submethod shall be at the option of the contractor, subject to the considerations outlined herein. The selection of a submethod does not preclude the use of supplementary material to counteract field forces such as electrostatic, electromagnetic, magnetic and radioactive.

18. **General Precautions** — Unit packing for physical and mechanical protection, as prescribed in Method III and paragraph 17, is required for all methods of preservation in addition to the specific requirements of each method. If specific methods require using a bag or container, then preliminary wrapping, cushioning or dunnage materials shall be applied as necessary to prevent damage to the bag or to the container from projections and sharp edges of the item and to prevent free movement of the item within the bag or container (see paragraph 32). When methods are specified requiring fibreboard or chipboard containers within bags, the corners of the containers shall be blunted prior to insertion into bags. Methods requiring or permitting the use of bags may specify weight limitations. When transparent unit protection is specified, transparent material shall be used to cushion items to prevent puncture of transparent unit pack. Cushioning and dunnage shall be as clean and as dry as practicable to minimize contaminants. Specific materials, such as bags, wraps, cushioning, dunnage or containers, when required, are specified in the contract or order. Unless provided under the detailed method, the general requirements for materials in contact with item(s) shall apply to all methods herein.

19. **Surfaces Coated with Preservative** — Preliminary wrapping, cushioning and dunnage materials in contact with preservative coated surfaces shall conform to MIL-B-121, or Type I or II of MIL-B-22191, or 43-GP-148. Preliminary wraps applied solely to confine the contact preservative on surfaces are not necessary when a submethod requires a bag as the preliminary container and the bag is made of material conforming to MIL-B-121, MIL-B-131, or Type I or II of MIL-B-22191. In addition, materials conforming to MIL-B-22191 Type III or 43-GP-30 may be used as cushioning and dunnage when a bag made of material specified above is used as the preliminary container.

20. **Method I — Preservative Coating (with Greaseproof Wrap as Required)** — Method I requires the use of preservative compounds in accordance with paragraphs 14 and 15. The coated part or item shall be enclosed in a bag or wrap of barrier material conforming to MIL-B-121, or Type II of MIL-B-22191, or 43-GP-148. Flexible wrappers shall be loosely applied around the coated part or item and shall be secured by taping, tying or other suitable means. When only a part or parts attached to an item are preserved, the preserved part(s) shall be wrapped so as to protect the coated surfaces and such wrapper shall be attached in place by taping, tying or other suitable means. Parts and items coated with Preservative P-1 or Preservative P-19 and subsequently dried, are exempt from the wrapping specified herein. Projections, sharp edges or other features of the part or item which may damage the barrier, shall be cushioned in accordance with paragraph 18. The type of barrier material and cushioning used shall be commensurate with the size, weight and irregularities of the preserved part or item. Method I preservation shall be capable of passing the requirements specified in Figure 4-3.

21. **Method IA — Water Vapourproof Enclosure (with Preservative as Required)** — Items protected by this method shall be sealed in a water-vapourproof enclosure as required for the specified submethod. Projections, sharp edges or other features of the items, which may damage the water-vapourproof enclosure, shall be cushioned in accordance with paragraph 18. Included air volume shall be kept to a minimum. Submethods of IA shall be accomplished in a manner which will pass the tests specified in Figure 4-3 the selected submethod.

22. Submethods of Method IA are as follows:

- a. **Submethod IA-5 — Rigid Metal Container, Sealed** — Items wrapped and cushioned as required in paragraph 21 shall be snugly enclosed in a sealed, rigid, metal container. Any selected type of rigid, metal container with machine seamed closure or reusable gasketed closure may be used unless a specific type of container and closure is specified. When specified or when dictated by requirements of contents, the metal container shall be vacuum sealed. The part or item shall be enclosed or supported by rigid or resilient dunnage as required to ensure against free movement.
- b. **Submethod IA-6 — Rigid Container (Items Immersed in Preservative, Oil Type) Sealed** — Items shall be fully immersed in a preservative compound (oil type) within a sealed rigid container. Container shall be constructed of materials which are not affected by the preservative oil. Containers other than all metal must be approved by the procuring agency prior to use. In filling the container, a five to seven per cent void shall be provided to permit thermal expansion.
- c. **Submethod IA-8 — Water-Vapourproof Bag Sealed** — Items wrapped and cushioned as required in paragraph 21 shall be enclosed in a heat-sealed opaque bag fabricated from material conforming to MIL-B-81705 or MIL-B-131. When specified, bags shall be fabricated from transparent material conforming to Type I of MIL-B-22191.
- d. **Submethod IA-13 — Rigid Container Other Than All Metal, Sealed** — Items wrapped and cushioned as required in paragraph 21 shall be enclosed in a sealed, snug-fitting rigid container other than all metal. Fibre containers shall conform to Type I, Grade B style and class as applicable in MIL-C-3955. Other sealed rigid containers may be used when the sealed barrier provides a water-vapour transmission rate not exceeding 0.07 grams per 100 square inches per 24 hours when tested in accordance with Method 5021 of Federal Standard 101.
- e. **Submethod IA-14 — Container, Bag, Sealed** — Items wrapped and cushioned as required in paragraph 21 shall be enclosed in a snug-fitting carton or box as applicable, which shall be enclosed in a close-fitting heat-sealed bag fabricated from barrier material conforming to MIL-B-131 or a heat-sealed opaque bag fabricated from material conforming to MIL-B-81705 which shall be enclosed in a carton or box as applicable. The outer container shall be closed by adhesive, tape or other practicable means which will not permit the possibility of damage to the barrier material.

NOTE — The outer container shall be omitted or removed from sample packages selected for leak test. See Figure 4-3.

- f. **Submethod IA-15 — Container, Bag, Sealed** — Prepared the same as submethod IA-14 except that the outer container is omitted.

- g. **Submethod 1A-16 — Floating Bag, Sealed** — Items preserved, wrapped and cushioned as required in paragraph 21 shall be enclosed in a sealed bag conforming to MIL-B-131, MIL-B-81705, MIL-B-22191 or MIL-E-6060. The barrier shall be provided with gasketed holes to permit the installation of the barrier over and around the fasteners used to secure the items to interior supports or to one face of the container. Gaskets shall be attached to the barrier with adhesive. When specified, material for gaskets shall conform to MIL-G-12803. Material for gaskets shall not contain asbestos.

23. In addition to the submethod described above, supplementary material to counteract field forces such as electrostatic, electromagnetic, magnetic and radioactive may also be used.

24. **Field Force Protection (Shielding)** — Sensitive electronic devices and other items susceptible to environmental field force damage shall be protected, as specified, by one or more of the procedures specified, to prevent item damage from electrostatic, electromagnetic, magnetic or radioactive forces during handling, shipment and storage from time of manufacture until use.

- a. **Electrostatic Protection** — Electrostatic protection shall be accomplished by enclosing the sensitive items in bags (envelopes) or pouches conforming to MIL-B-81705, Type II, or MIL-B-81997. Sensitive electronic items (devices) requiring both electrostatic and electromagnetic protection shall be enclosed in bags conforming to MIL-B-81705, Type 1.
- b. **Electromagnetic Protection** — Electromagnetic protection shall be provided by enclosing the items in bags or envelopes conforming to MIL-B-81705 Type I. Sensitive electronic items (devices) requiring both electrostatic and electromagnetic protection shall be protected as specified in subparagraph a.
- c. **Magnetic Protection** — Protection from simple magnetic fields (as opposed to RF or electromagnetic radiation) shall be accomplished by completely enclosing the sensitive items in ferrous metals or ferritic compositions of sufficient thickness to provide the degree of protection required.
- d. **Radioactivity Protection** — Protection from radioactivity shall be accomplished by completely enclosing the items in lead or lead-filled compositions.

25. **Method IB — Strippable Compound Coating (Hot or Cold Dip)** — Items shall be directly or indirectly coated, as required by the specified submethod, with hot dipping compound conforming to MIL-P-149 or cold dipping compound in accordance with MIL-HDBK-696. Protection to the coating may be provided by means of greaseproof wraps, boxes, cartons or similar containers as required. Submethods of Method IB shall be accomplished in a manner which will pass the tests as specified in Figure 4-3.

NOTE — Coated items shall be arranged, separated or cushioned to avoid static load in excess of 30 pounds per square inch (2.1 kg cm²) bearing on the compound.

26. Submethods of Method IB are as follows:

- a. **Submethod IB-1 — Direct Application of Strippable Compound** — The compound shall be applied directly to the surface of the items in such a manner that upon removal no compound will be retained in crevices, holes or cavities. To facilitate application and removal, crevices, holes and cavities may be plugged or covered with non-corrosive material prior to application of the compound.
- b. **Submethod IB-2 — Aluminum Foil Wrap Strippable Compound** — Unless otherwise specified, Submethod IB-2 requires the application of preservative compounds in accordance

with paragraph 15. Prior to coating the items with strippable compound, the items shall be snugly enclosed in a conforming wrap of aluminum foil to 43-GP-148.

27. **Method IC — Waterproof or Waterproof, Greaseproof Enclosure (with Preservative as Required (see paragraphs 14 and 15 — Item(s) protected in accordance with Method IC shall be sealed in a waterproof, greaseproof enclosure as required for the submethod. Projections, sharp edges or other features of the item which may damage the enclosure shall be padded with cushioning material in accordance with paragraph 18. Included air volume shall be kept to a minimum. All submethods of Method IC shall be accomplished in a manner which will pass the tests specified in Figure 4-3.**

28. **Submethods — of Method IC are as follows:**

- a. **Submethod IC-1 — Greaseproof, Waterproof, Bag, Sealed —** Items preserved, wrapped and cushioned as required in paragraph 27 shall be enclosed in a sealed bag conforming to MIL-B-121.
- b. **Submethod IC-2 — Container, Bag, Sealed —** Items preserved, wrapped and cushioned as required in paragraph 27 shall be enclosed in a snug-fitting carton or box of selected material and construction, which shall be enclosed in a sealed bag conforming to MIL-B-121 or 43-GP-30.
- c. **Submethod IC-3 — Waterproof Bag, Sealed —** Item(s) preserved, wrapped and cushioned as required in paragraph 27 shall be enclosed in a sealed bag conforming to MIL-B-121 or 43-GP-30. When the bag is fabricated of material conforming to 43-GP-30, material shall be minimum nominal 102 microns thickness for items weighing 2.3 kg or less and 153 microns for items weighing more than 2.3 kg.
- d. **Submethod IC-4 — Rigid Container Other Than All Metal, Sealed —** Items preserved, wrapped and cushioned as required in paragraph 27 shall be enclosed in a sealed, rigid container other than all metal. Fibre containers shall conform to Type I or II, Grade B, style and class as applicable, of MIL-C-3955.
- e. **Submethod IC-7 — Blister Package, Single or Multiple Compartment, Individually Sealed —** Items preserved, wrapped and cushioned as required in paragraph 27 shall be placed in an individual compartment of a multiple compartment container reconstructed of plastic materials of cellulose acetate butyrate, cellulose acetate or cellulose propionate. The multiple compartment plastic containers shall be furnished with either perforations or tear lines.
- f. **Submethod IC-9 — Skin Package, Greaseproof, Waterproof, Vacuum Formed —** Items preserved, wrapped and cushioned as required in paragraph 27 shall be packaged in a vacuum formed transparent skin, package formed from cellulose acetate, cellulose acetate butyrate or cellulose propionate. The material shall be of sufficient thickness to contain the item and permit ease of reading and identifying item marking and visual examination of the exterior surfaces of the items. After draping the closure sheets, the transparent plastic package shall be sealed.
- g. **Submethod IC-10 — Skin Package, Waterproof, Vacuum Formed —** Items preserved, cushioned as required in paragraph 27 shall be packaged in a vacuum formed transparent skin package in the same manner as specified in Submethod IC-9 except any plastic film capable of being vacuum formed into a waterproof package may be used.

29. **Method II — Water-Vapourproof Enclosure with Desiccant (with Preservative as Required (see paragraph 15))** — Item(s) protected in accordance with Method II shall be sealed in a water-vapourproof enclosure as required for the specific submethod together with activated desiccant. Unless otherwise specified, all submethods shall be provided with humidity indicators. When the selected surfaces of the item ordinarily require application of contact preservative and for specific reasons the preservative is not to be applied, such will be stated by the acquiring agency. Metal cases or housings which are, in effect, sealed containers, may be used as enclosures within which the desiccant and humidity indicator shall be placed. However, precautions shall be prominently noted on the cases or housings that desiccants and indicators must be removed prior to placing the item in use. When bags are used, the edge of the bag which normally will be opened for inspection shall be of sufficient area to permit at least two subsequent sealings. Projections, sharp edges or other features of the item(s) which may damage the water-vapourproof bag shall be cushioned in accordance with paragraph 18. Included air volume shall be kept to a minimum.

30. When flexible barrier material is used, a sufficient vacuum shall be drawn to cause the flexible barrier to cling snugly to the enclosed item. Care shall be exercised to ensure that an excessive amount of vacuum is not applied which might cause puncture or rupture to the flexible barrier. All submethods of Method II shall be accomplished in a manner which will pass the tests indicated in Figure 4-3 for the specific submethod. The following material and formulas shall be used:

- a. **Desiccants (Activated)** — The desiccant (bagged) shall conform to MIL-D-3464. Desiccant shall be in bags of standard size and shall be positioned in the package at the locations most appropriate to expose all voids in the item and the package interior to the dehydrating action of the desiccant. Bags shall be secured by tying, by storage in specially provided baskets, by taping or otherwise secured so as to prevent movement, rupture of the bags or barrier and damage of the parts. Desiccant bags shall not be placed or permitted to come in contact with critical surfaces of the enclosed items. If it is necessary to mount bagged desiccant so that it comes in contact with a part coated with contact preservatives, the bagged desiccant shall be isolated by securing greaseproof barrier on the coated item. Time required to remove desiccant from the sealed desiccant container, secure and seal desiccant within the package shall be minimized to prevent deactivation of the desiccant.
- b. **Quantity of Desiccant** — The minimum quantity of desiccant for use per unit pack shall be determined in accordance with Formula I or Formula II (see paragraph 33) as applicable. The various values for X take into consideration cases where dunnage is composed of more than one type.
- c. **Humidity Indicators** — Humidity indicators shall conform to MS20003. Use of other indicators will be subject to approval by the acquiring agency. As applicable, the indicator shall be firmly secured directly behind inspection windows or immediately within the closing edge, face or cover of the barrier. When specified, externally mounted indicating elements or devices shall be installed in the barrier. Unless otherwise specified, externally mounted colour change humidity indicating devices shall conform to MIL-I-26860.

31. Submethods of Method II are as follows:

- a. **Submethod IIa — Floating Bag, Sealed** — Items preserved, wrapped and cushioned as required in paragraph 29 shall be enclosed in a sealed barrier conforming to MIL-B-131, or Type I of MIL-B-22191, or MIL-B-81705. The barrier shall be provided with gasketed holes to permit the installation of the barrier over and around the fasteners used to secure the items of interior supports, or to one face of the container. Gaskets shall be attached to the barrier with adhesive. Unless otherwise specified, material for gaskets shall conform to MIL-G-128003. Unless otherwise specified, a window of material conforming to MIL-W-48302 or MIL-B-22191 Type I applied in accordance with MIL-W-48302, shall be provided in MIL-B-131 barriers to permit inspection of the interior and reading of humidity indicator.

NOTE — The location of the window shall be planned to coincide with the location of a removable inspection port in the exterior container as otherwise provided.

- b. **Submethod IIb — Container, Bag Sealed, Container** — Items preserved, wrapped and cushioned as required in paragraph 29 shall be enclosed in a snug-fitting carton or box, as applicable, which shall be enclosed in a close-fitting heat-sealed bag fabricated from barrier material conforming to MIL-B-131 or MIL-B-22191 Type I which shall be enclosed in a close-fitting container. When fibreboard containers are specified for the exterior, they shall conform to 43-GP-21 or PPP-B-640. When wood-cleated plywood or nailed wood boxes are used as the outer container, the boxes shall be lined with fibreboard or heavy weight kraft paper to prevent chafing of the water vapourproofed barrier. Closure of the outer container shall not damage the barrier material.
- c. **Submethod IIc — Cushioned Item Bag** — Items preserved, wrapped and cushioned as required in paragraph 29 shall be enclosed in a heat-sealed bag fabricated from opaque material conforming to MIL-B-131 or transparent material conforming to MIL-B-22191 Type I.
- d. **Submethod IId — Rigid Metal Container, Sealed** — Items preserved, wrapped and cushioned as required in paragraph 29 shall be snugly enclosed in a sealed metal container. Any selected type of rigid, metal container with machine seamed closure or reusable gasketed closure may be used unless a specific type of container and closure is required. The item shall be enclosed or supported by rigid or resilient dunnage as required to prevent free movement.
- e. **Submethod IIe — Container, Barrier** — Same as Submethod IIb except that the outer container is omitted. When specified by the procuring agency, an overwrap of specified material shall be provided to protect the barrier material from abrasion. Overwrap shall be secured with tape, twine or other authorized means.
- f. **Submethod II f - Rigid Containers Other Than All Metal, Sealed** — Items preserved, wrapped and cushioned as required in paragraph 29 shall be snugly enclosed in a sealed rigid container (other than all metal). For contents not exceeding 9 kg, fibre containers shall conform to Grade B, Type I style and class, as applicable, of MIL-C-3955. For larger items, fibre containers when used shall conform to Type III, Grade A, Class 2 of PPP-D-723. All other containers shall be subject to approval by the procuring agency.

32. Method III — Packaged for Mechanical and Physical Protection Only — Method III is intended for items not susceptible to damage or deterioration from corrosion. Unpreserved items shall be bundled; secured by tying, taping or strapping or enclosed with wrappings, bags, cartons, boxes or other containers, as applicable, to the extent necessary to provide protection from hazards of contamination and physical damage encountered in handling, storage and issue. When bags, wraps, or other flexible barriers are used, cushioning shall be applied as required to protect the enclosing material. Items packaged in rigid containers shall be supported by rigid or resilient dunnage as necessary to prevent free movement. Material in contact with metal surfaces shall be clean and as dry as practicable.

33. The following formulae, referred to in paragraph 30b, shall be used to determine the minimum quantity of desiccant to be used per unit pack. Inner containers must be considered in dunnage calculations.

Formula I — To find units of desiccant for use within a container other than sealed, rigid, metal container:

$$U = CA + X1D + X2D + X3D + X4D$$

Formula II — To find units of desiccant for use within sealed rigid metal container:

$$U = KV + X1D + X2D + X3D + X4D$$

In the above formulae:

- U = Number of units of desiccant to be used.
- C = 0.011 when area of barrier is given in square inches.
- C = 1.6 when area of barrier is given in square feet.
- A = Area of container in square inches or square feet.
- K = 0.0007 when volume is given in cubic inches.
- K = 1.2 when volume is given in cubic feet.
- V = Volume within container in cubic inches or cubic feet.
- X₁ = 8 for cellulosic materiel (including wood) and other materiel not categorized below.
- X₂ = 3.6 for bound fibres (synthetic fibre or vegetable bound with rubber)
- X₃ = 2 for glass fibre.
- X₄ = 0.5 for synthetic foams and rubber.
- D = Pounds of dunnage.

Formula II may be used to determine units of desiccant required for sealed, rigid, containers (other than all metal) when the sealed barrier provides a water-vapour transmission rate not exceeding 0.001 grams per 24 hours per 100 square inches when tested in accordance with Method 5021 of Federal Test Method Standard No. 101.

WORKMANSHIP

34. Workmanship shall be such that the unit pack(s) will pass the inspection of Figure 4-3.

LEAKAGE

35. Unit packs whose enclosures have been prepared in accordance with submethods stipulating water-vapourproofness or waterproofness shall meet the following requirements when subjected to leakage tests:

- a. **Vacuum Chamber** — There shall not be a steady or recurring succession of bubbles from any surface or seam (see Part 4, paragraph 13).
- b. **Vacuum Retention Technique** — A loss of vacuum from the sealed system shall not exceed twenty-five per cent of the original vacuum after remaining undisturbed for ten minutes (see Part 4, paragraph 15).
- c. **Submersion (or Immersion) Techniques** — There shall be no evidence of moisture within the barrier (see Part 4, paragraph 16).
- d. **Pneumatic Pressure Technique** — During pneumatic pressure technique tests there shall be no loss of gauge pressure for a period of 30 minutes. When a water solution or immersion is used, there shall be no evidence of air leakage as indicated by soap bubbles increasing in size, or being blown away by escaping air, or evidence of a steady stream or a recurring succession of bubbles from any surface (see Part 4, paragraph 17).

- e. **Hot Water Technique** — There shall not be a steady stream or recurring succession of bubbles from any surface or seam (see Part 4, paragraph 18).
- f. **Squeeze Technique** — There shall not be a leak with a bubble-supporting film (see Part 4, paragraph 19).

SEALED SEAMS

36. The seams of unit packs whose enclosures include seals, shall not separate at the sealed area during the final three minutes of the sealed seam-strength test (see Part 4, paragraphs 20 to 22).

ROUGH HANDLING

37. Unit packs shall be subjected to the tests specified in Part 4, paragraph 23 unless:
- a. the same or a similar item has been successfully tested in the same or similarly designed unit pack;
 - b. approved engineering data is available which verifies that the proposed design will successfully meet the requirements; and
 - c. historical shipping data is available confirming adequate protection is provided using the same or an upgraded unit pack.
38. When testing is required, unit packs shall meet the following requirements:
- a. All materials and components comprising the method of preservation shall be free from damage or evidence of displacement of preservation that affect the utility of the unit pack.
 - b. The material within the method of preservation shall show no visible signs of damage.
 - c. When evidence of damage to the item cannot be determined solely by visual inspection, functional tests shall be conducted to ensure freedom from operational malfunction.

Figure 3-1 (Sheet 1 of 6) Table of Preservatives

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P1	31-GP-1	Corrosion Preventive Compound. Cold Application. Hard Film	A solvent dispersed rust preventive compound, black or brown in colour which dries to form a thin rough film removable with Solvent Dry Cleaning CAN2-3.8-M 78 or Kerosene CAN2-3.3-M 78. Flash point 100°F (38°C).	Dip, Spray, Brush, Room Temperature	Primarily for parts not having highly finished surfaces when a "dry to touch" film is preferred. Not satisfactory for parts damaged by solvent removal with scrubbing NOT FOR INTRICATE ASSEMBLIES. Can be used without overwrap. Generally utilized on parts where complete removal of the film is unnecessary.
P2	31-GP-3	Corrosion Preventive Compound. Cold Application. Soft Film	A solvent dispersed rust preventive compound, black or brown in colour which forms a thin, non-drying film. Residual film soluble in lubricating oil and readily removable with Solvent Dry Cleaning CAN2-3.8-M 78 or Kerosene CAN2-3.3-M 78. Flash point 100°F (38°C).	Dip, Spray, Brush, Room Temperature	For extended undercover protection of interior and exterior surfaces, with or without the use of barrier materials. Specially suited when easy removability is desired. Suitable for outdoor protection of material for limited periods when temperatures of metal do not reach levels which produce preservative "run-off". Will not resist abrasion and should be overwrapped.
P3	31-GP-4	Corrosion Preventive Compound. Cold Application. Water displacing. Soft Film	A solvent dispersed, water displacing, rust preventive compound, black or brown in colour which forms a thin non-drying film removable with Solvent Dry Cleaning CAN2-3.8-M 78 or Kerosene CAN2-3.3-M 78. Also removable in hot water. Flash point 100°F (38°C).	Dip, Spray, Brush, Room Temperature	For protection of previously wet parts by displacement of the water film. For protection of critical phosphated or parkerized surfaces for extended periods when packaged with satisfactory barrier materials. Examples of application are, radiators, boilers, and cooling systems.

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P6	MIL-C-11796 Class 3	Corrosion Preventive Compound. Soft Film, Petrolatum Hot Application	A petrolatum base corrosion preventive compound which forms a soft non-drying grease-like film removable with Solvent Dry Cleaning CAN2-3.8-M 78 or Kerosene CAN2-3.3-M 78. Maximum permissible application temperature 180°F (83°C) Flash Point 350°F (117°C).	Brush or Swab 80°F (26.4°C) to 100°F (38°C). Dip 135°F (57°C) to 180°F (83°C).	Protection of highly finished surfaces or machinery and other metal surfaces with or without the use of barrier materials. This compound is generally used on machine surfaces which require a protective compound that is brushable and easily removed at room temperature. Over-wrapping is necessary and the preservative must be removed before the item is placed into service.
P7	MIL-L-3150	Lubricating Oil, Preservative, Medium	A clear highly refined lubricating oil with additive inhibitors to impart corrosion protective qualities. Pour point is 115°F (46°C).	Brush, Dip, Spray Room Temperature	Protection of oil lubricated and similar operating parts. Must be removed prior to use. Should be supplemented by Methods IA or II. DO NOT USE FOR INTERNAL COMBUSTION ENGINES.
P9	VV-L-800	Lubricating Oil, General Purpose, Water Displacing, Low Temperature	A light-coloured lubricating oil with additive materials to impart corrosion protective qualities. Flash point 275°F (135°C). Maximum Pour point is -70°F (-56.6°C). Lighter in viscosity than SAE-10 motor oil.	Brush, Dip, Spray Room Temperature	Lubrication and protection of small assemblies and small arms. If used for permanent protection should be in conjunction with Methods IA or II.

Figure 3-1 (Sheet 2 of 6) Table of Preservatives

Figure 3-1 (Sheet 3 of 6) Table of Preservatives

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P10	MIL-L-21260	Lubricating Oil, Internal Combustion Engine, Preservative and Break-in	A thin film non-hardening blend of highly refined lubricating oil with corrosion preventive additives. Flash point 400°F (204°C) to 450°F (232°C).	Dip, Spray, Flow-Coat, Fog Brush, Room Temperature	For use in spark-ignition and diesel type engine internal surface preservation. Also used on complex parts or assemblies where a preservative with higher viscosity would be difficult to remove. Individual parts must be bagged, boxed or wrapped to prevent "running off" of the oil.
	OR				
	MIL-C-6529 Type 1	Corrosion Preventive Compound, Aircraft Engine	An additive concentrate designed to be added to oils equivalent to 3-GP-100.	1 part additive 3 parts oil. Dip, Spray, Flow-Coat, Brush, Room Temperature	For preservation of reciprocating or turbo-jet aircraft engines.
	OR				
	MIL-C-6529 Type II	Corrosion Preventive Compound, Aircraft Engine	A mixture of 1 part Type I (additive concentrate) to 3 parts oil equivalent to 3-GP-100.	Dip, Spray, Flow-Coat, Brush, Room Temperature	For preservation of reciprocating or turbo-jet aircraft engines.
MIL-C-6529 Type III	Corrosion Preventive Compound, Aircraft Engine	A mixture of 1 part Type 1 (additive concentrate) to 3 parts oil equivalent to MIL-O-6081 Grade 1010	Dip, Spray, Flow-Coat, Brush, Room Temperature	For preservation of reciprocating or turbo-jet aircraft engines.	

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P11		Grease, Automotive and Artillery	A multi-purpose wide temperature range grease consisting of mineral oil and a suitable gelling agent with or without additives. Effective temperature range -65°F (-53.8°C) to 125°F (51.6°C).	Brush, Swab, Room Temperature	For all purpose lubrication of automotive and artillery equipment and as a corrosion preventive under limited storage conditions.
	OR MIL-G-81322	Grease Aircraft, General Purpose	A general purpose wide temperature range grease consisting of mineral oil, and gelling agent. Effective temperature range of -20°F (-28.8°C) to 150°F (65.5°C).	Brush, Swab, Room Temperature	For lubrication of plain, ball, roller bearings, and gear boxes.
P14	MIL-C-10382	Corrosion Preventive Compound, Food Handling Machinery	A solvent dispersed corrosion preventive compound for food handling machinery and equipment, removable with Hot Water Flash point 100°F (38°C).	Spray, Room Temperature	Protection of food handling machinery and equipment. Non-toxic, for preserving items when toxic materials cannot be tolerated.
P15			Hydraulic Preservative Oil		

Figure 3-1 (Sheet 4 of 6) Table of Preservatives

Figure 3-1 (Sheet 5 of 6) Table of Preservatives

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P17	MIL-L-6085	Lubricating Oil, Instrument, Aircraft, Low Volatility	A clear transparent lubricating instrument oil (low volatility) with additive materials to impart oxidation stability and corrosion preventive qualities. Flash point 365°F (185°C). Pour point -70°F (-56.6°C).	Dip, Spray, Brush, Room Temperature	To be used for aircraft instruments, electronic equipment and when a low evaporation oil is required for both high and low temperature application and when oxidation and corrosion resistance is required. If used for permanent protection, it should be used in conjunction with Method IA or II.
P18		Packaging Materials, Volatile Corrosion Inhibitor (VCI)	Packaging materials coated or impregnated with a corrosion inhibitor which will volatilize, and whose vapours prevent rusting of ferrous metal surfaces.	See MIL-1-8574	Intended for use in protection of ferrous metal parts and assemblies under control conditions of application and subject to the technical limitations detailed in US Specification MIL-P-8574-PRESERVATION AND PACKAGING PROCEDURES UTILIZING VCI MATERIALS.
P19	MIL-C-16173 GR-4	Thin Film Preservative (Transparent non-tacky)	Transparent during protective life. Solvent dispersed, amber coloured non-tacky film.	Dipping, Brushing at Room Temperature	General purpose indoor and limited outdoor preservation where a non-tacky coating is required. Where a transparent coating is required. Where ease of removal with petroleum solvent is required.

Preservative No.	Specification		General Information	Method and Temp of Application	Principal Uses
	No.	Title			
P20	MIL-L-46002 or MIL-I-23310	Lubricating Oil, Contact and Volatile Corrosion Inhibitor	A lubricating oil of light viscosity containing additive materials to give it volatile corrosion inhibiting characteristics.	Dip, Flow Brush or Immersion	For use in enclosed systems where the VCI provides protection above oil level. Also may be used as a contact preservative. Not for use as an operational oil or where magnesium, cadmium plated or rubber components are contacted.
P21	MIL-C-16173 Grade 5	Thin Film Preservative Water Displacing (Soft Film, Cold Application, Low Pressure Steam Removable)			Used in place of P3 where chemical Boil Out cannot be used for removal of the preservatives or where removal by hot water or steam is desired.
<p>NOTES — 1. Specifications for hydraulic preservative oils have not been listed because of variations in sytem requirements. Hydraulic preservatives used shall be subject to approval by the procuring agency.</p> <p>2. VCIs: MIL-P-3420 Opaque Treated Barrier; MIL-F-22019 and MIL-B-22020 Transparent Film Treated Barrier; MIL-I-22110 Crystalline Form.</p>					

Figure 3-1 (Sheet 6 of 6) Table of Preservatives

Specification		General Information	Methods and Temp of Application	Principal Uses
No.	Title			
3-GP-662	Lubricating Oil. Exposed Gear; Medium	A heavy type black oil consisting of mineral oil and bitumen. Flash point 375°F (190.5°C). Pour point 100°F (38°C).	Brush to 100°F (38°C) Swab, Room Temperature	The oil covered by this specification is intended for lubrication and protection of chains, wire ropes, large open gears, and other heavy equipment when specified.
VV-P-236	Petrolatum Technical	A pure refined petroleum product free from any other ingredient. Flash point 390°F (199°C).	Brush, Swab, Room Temperature	Protection of storage battery terminals and distributor cams.
MIL-G-81322	Grease, Aircraft, General Purpose Wide Temperature Range	Lubricating grease. Effective temperature range. -80°F (-62°C) to 350°F (177°C).	Brush, Swab, Room Temperature	Intended for use wherever low or high temperatures are encountered.
MIL-C-4339	Corrosion Preventive, Soluble Oil	A clear soluble mineral oil containing emulsifying and corrosion preventive materials. Pour point 30°F (-1.1°C).	Dip, Spray, Flow-coat, Brush, Room Temperature	Used to retard corrosion of the interior and exterior metal surfaces of coolant radiators for liquid cooled aircraft engines
1-GP-131	Compound: Water-proofing Electrical Ignition	A compound which produces a clear smooth glossy film when exposed to air. Flash point 75°F (23.8°C).	Brush, Swab, Room Temperature	Intended for use primarily on electrical circuits and engine parts of internal combustion engines for protection against moisture and corrosion.

Figure 3-2 Table of Lubricating Oils, Greases and Other Compounds

DELETED

PART 4

QUALITY ASSURANCE PROVISIONS

RESPONSIBILITY FOR INSPECTION

1. **General** — Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.
2. **Alternate Test Procedure Approval** — Where a test may necessitate an impossible or impractical manipulation of a mounted preserved item or where the overall size or weight of the item or unavailability of special test equipment obviates compliance with a specific test requirement of this specification, the contractor may, through the cognizant Government inspector, submit a request accompanied by detailed justification for approval of an alternate test procedure to the packaging activity of the acquiring agency.
3. **Unit pack design validation** — When unit pack design validation is required a sample unit pack, selected prior to or during initial production, shall be subjected to all applicable inspections and tests of Figures 4-1, 4-2 and 4-3. When additionally specified, cyclic exposure shall be performed. Cyclic exposure tests, when required, and rough handling tests shall be performed prior to the applicable leakage and preservative retention tests. Unit pack design validation testing shall be repeated when changes in materials, processes or designs have been made. Unit pack design validation samples shall consist of the same materials and shall be produced by the same methods and shall be fully representative of the planned production unit pack (see paragraph 23).
4. **Quality Conformance Inspection** — Quality conformance inspection consists of those inspections and tests required to be performed for acceptance under contract. The inspections shall be those in Figure 4-3. Unless otherwise specified applicable tests shall be as indicated in Figure 4-3 for the selected method. When necessary to perform inspection prior to application of preservatives, wraps or containers, when advantageous to the method of production or when performed in order to eliminate the need for destroying completed packages, applicable quality conformance examination and tests shall be performed at one or more appropriate stages in the actual processing of the item. However, the Government may perform verification inspection of the completed package or pack, as applicable, which may entail its destruction. Except as provided above, all the quality conformance examinations and tests of this specification are independent of each other to the extent that they may be performed on the same or on different sample units. Whether the examinations and tests are performed progressively during the stages of processing or accomplished upon completion of the pack, the results shall show that the method of preservation, as accomplished, has the capability of withstanding all applicable tests indicated in Figure 4-3 or in the contract for the selected method.
5. **Quality Control Program or Inspection System Requirements** — When contracts include provisions for the establishment by the contractor on a quality control program or an inspection system and the approved program or system includes random sampling and inspection requirements to ensure that the unit packs meet the requirements of this specification, that program or system shall be used.
6. **Rejection** — If any article or unit pack is found non-conforming in one or more respects, it shall be rejected whether or not the lot as a whole is accepted.

7. **Procedure in Case of Failure** — Rejected items may be reinspected for acceptance provided the contractor has removed all non-conforming materials, and has corrected his procedures, methods or workmanship as necessary. Rejected units shall be corrected or replaced with non-defective units. The contractor shall maintain detailed records of his inspections and indicate all corrective action taken.

TEST PROCEDURES

8. **General** — Tests of methods of preservation shall be made in accordance with the applicable tests specified hereinafter as indicated in contract and Figure 4-3. When a combination of methods is used for a specific item, tests applicable to the various methods employed shall be used.

9. **Determination of Cleanliness (Not Applicable to Items Subject to Clean Room Processing** — Items shall be examined or tested for cleanliness (see Part 3, paragraphs 9 and 10) in accordance with the following techniques of Method 4004 of Federal Test Method Standard No. 101, as applicable:

- a. Visual examination.
- b. Wipe test.
- c. Check for alkalies and acids.

10. **Determination of Preservative Compound Application and Retention** — The continuity of preservatives after application shall be determined visually. The retention of preservatives shall be determined by examination. The surfaces of items protected by the application of preservatives shall be rejected if the surface coatings are not uniform and show evidence of preservative decrements or corrosion at points of contact of item with barrier.

NOTE — Hard preservative films shall be examined closely for breaks in the coating.

LEAKAGE TESTS

11. **General** — Unit packs shall be tested for leaks in accordance with one of the following techniques (tests) of Method 5009, Federal Test Method Standard No. 101, that are required by Figure 4-3 for the applicable method of preservation. All samples shall be conditioned at ambient conditions for at least Four hours prior to performing the vacuum chamber test (paragraph 13) or the hot water test (paragraph 18). The time that the item and all processing materials have been maintained at ambient conditions prior to or during the processing period may be considered a part of the conditioning time.

12. **Wetting Agent** — As an alternative to the use of the aerosol solution recommended by Method 5009, Federal Test Method Standard No. 101, a solution of four grams of water-soluble detergent conforming to Type I of MIL-D-16791 per gallon of test water, may be used to release entrapped air to detect actual leakage of air through the barrier.

13. **Vacuum Chamber Technique** — Whenever the size of the package permits, the vacuum chamber technique shall be used to determine the presence of leaks. As a criterion for size, the limiting dimensions of a cylindrically shaped vacuum vessel should not be less than 250 mm inside diameter and 203 mm inside depth, and for a box-shaped vacuum vessel, the minimum inside length, width and depth should not be less than 216 mm by 216 mm by 203 mm respectively. Observation of evolution of air bubbles shall be made of the two positions of the sample. Bubbles which appear on the surface of the unit pack, but are not released or are released at a slowly decreasing rate, are not to be construed as indication of failure. (See Part 3, paragraph 35a.)

14. **Alternate Tests** — When the size or shape of the unit packs precludes the use of the vacuum vessel or when a vacuum vessel is not available, the hot water technique described in paragraph 18 may be requested in accordance with paragraph 2 with the exception of the following. When a vacuum chamber is not available for tests of IC-4 unit packs sealed with tape, the submersion test of paragraph 16 shall be used. When a vacuum chamber is not available for tests of methods IA-5, IA-3, IC-4 (other than taped seals), Ild or Ilf, the pneumatic pressure technique described in paragraph 17 shall be used. When the size or shape of all other unit packs precludes the use of the vacuum vessel or hot water technique or when specifically required by contract, the vacuum retention technique described in paragraph 15 shall be used.

15. **Vacuum Retention Technique** — When the air in the sealed system has been evacuated to a constant specified pressure, allow the sealed system to remain undisturbed for 10 minutes. Note the pressure on the vacuum pressure gauge. (See Part 3, paragraph 35b.)

16. **Submersion (or Immersion Techniques)** — After submersion and before opening the sealed system, carefully dry the outside. Open the sealed system and note whether leakage occurred. (See Part 3, paragraph 35c.)

17. **Pneumatic Pressure Technique** — When the sealed system is pressurized to a constant specified pressure and the line to the compressed air supply is closed, read and record the initial pressure. When required to pinpoint leaks, coat surfaces with a soap solution (see paragraph 14) or submerge the system under water and record the results. Read and record the final gauge pressure. Repeat the test if there is any loss in pressure and no leaks are detected. (See Part 3, paragraph 35d.)

18. **Hot Water Technique** — Observe evolution of air bubbles at each position of the sample. Bubbles which appear on the surface of the unit pack, but are not released or are released at a slowly decreasing rate, are not to be construed as indication of failure. (See Part 3, paragraph 35c.)

19. **Squeeze Technique (Applicable Only to Flexible Specimens)** — During sealing as much air as possible is entrapped within the flexible container at ambient conditions as for shipment and then is squeezed to increase the internal air pressure as the container is observed to detect the leaks. (See Part 3, paragraph 35f.)

HEAT-SEALED SEAM TEST

20. **Sampling Procedure for Heat-Seal Test** — When heat seals are made on equipment designed to control the temperature, dwell time and pressure, samples may be prepared from specimen heat seals in lieu of taking samples from sealed unit packs. Specimen heat seals shall be prepared daily prior to production from sample(s) of each material sealed on each sealing device. Machine settings used in production shall be identical with the settings used in fabrication of the tested specimen. Additionally, tests of heat seals from actual unit packs shall be performed as necessary to assure that unit pack seals meet the requirements of paragraph 21.

21. **Performance of Heat-Sealed Seam-Strength Test** — The heat-sealed seam-strength test shall be performed in accordance with Method 2024 of Federal Test Method Standard No. 101 at normal room temperature and static load weight as specified therein, except that when bags are fabricated from materials conforming to MIL-B-121, the static load weight shall be 1020 g. When bags are fabricated from materials conforming to 43-GP-30, MIL-B-131 or MIL-B-22191, the static load shall be 1417 g. A five-percent reduction in static load is permitted when room temperature in test area exceeds 90°F (32.2°C).

22. **Interpretation of Results** — Partial separation of the heat seal is acceptable within the first two minutes of the test to allow areas of partial fusion, adjacent to the actual seal, to pull apart. (See Part 3, paragraph 36.)

ROUGH HANDLING TESTS

23. The unit pack (see Part 3, paragraph 37) subject to rough handling tests shall be tested in accordance with Federal Test Method Standard No. 101 using the methods specified in Figure 4-1. Unless otherwise specified, the drop and impact test heights of Figure 4-2 may be substituted for the data shown in the applicable Federal Test Method Standard No. 101. When required by the contract or order, test results shall be submitted to the designated activity for approval prior to production unit packing (see paragraph 3).

APPLICABILITY OF TESTS

24. **Small Containers** — Only free-fall drop tests and vibration tests shall apply to small containers; either one or both vibration tests shall be conducted at the option of the contractor (see Figure 4-1). Small containers are those having no one edge or diameter over 1524 mm, and a gross weight of 68 kg or less. Any container with skids shall be tested as a large container. Also, any container containing an item whose net weight exceeds 45 kg and which is secured to a base within or to the base of the container shall be tested as a large container (see Figure 4-1, Note 3).

25. **Large Containers** — All rough handling tests, except for free-fall tests, shall apply to large containers. Either one or both vibration tests shall be conducted at the option of the contractor. However, tipover tests will apply only when additionally specified. Anyone of the impact tests shall be conducted at the option of the contractor. Large shipping containers are those measuring more than 1524 mm on any one edge or diameter, those which, when loaded, have gross weight in excess of 68 kg, or those which have skids.

26. **Interpretation of Results** — Results of the rough handling tests shall comply with the requirements of Part 3, paragraph 37.

CYCLIC EXPOSURE TESTS

27. When specified the cyclic exposure test shall be performed on the complete unit packs packed as for shipment. The test specimens shall be subjected to the following cyclic exposure Test A or Test B before final acceptance. Cyclic exposure tests shall precede applicable leakage tests specified in Figure 4-3.

a. **Test A** — The following cyclic sequence applies —

Approximately 16 hours overnight at 49° to 54°C.
Two hours of water spray at 10° to 16°C.
Two hours at -23° to -18°C.
Two hours of water spray at 49° to 54°C.
Two hours of water spray at 10° to 16°C.
Approximately 16 hours overnight at 2° to 10°C.
Four hours at 49° to 54°C.
Two hours of water spray at 10° to 16°C.
Two hours at 2° to 10°C.
Approximately 16 hours overnight at 49° to 54°C.
Two hours of water spray at 10° to 16°C.
Two hours at -23° to -18°C.
Three hours at 2° to 10°C.
Approximately 16 hours overnight at 49° to 54°C.

b. **Test B** — The following cyclic sequence shall be repeated on three consecutive days. At the end of the three-day period the unit pack being tested shall then set overnight at 49° to 54°C.

Approximately 16 hours overnight at 49° to 54°C.
Two hours of water spray at 10° to 16°C.
Four hours at 49° to 54°C.
Two hours of water spray at 10° to 16°C.

28. Interpretation of Results — The tested unit pack when opened shall show no evidence of moisture nor shall the unit-packed item show corrosion.

29. Disposition of Samples after Inspection and Test - All samples used for examination and test shall be reprocessed as necessary. They may, after reprocessing in accordance with the original method of preservation, be considered a part of the original lot. When the unit-packed item may have been damaged as a result of testing, the item shall be inspected and tested as necessary to determine its acceptability.

Test	Methods of FED-STD-101	Special Requirements or Exceptions
Free-fall drop tests:	_____	See notes 1 and 3
Corner drop	5007 Procedure E	See note 2
Flat drop	5007 Procedure B	See note 2
Tipover	5018	See note 5
Rotational drop tests:	_____	See note 1
Edgewise	5008	
Cornerwise	5005	
Impact tests:	_____	See note 1
Pendulum	5012	
Incline	5023	
Superimposed load:	_____	See note 4
(stackability with dunnage	5016	
(uniformly distributed	5017	
without dunnage)		
Vibration:	_____	See note 1
Repetitive shock	5019	
Sinusoidal motion	5020	
<p>NOTES — 1. Unless otherwise specified, the contractor shall have the option as to what method is to be applied in accomplishing the free-fall, rotational, impact and vibration tests.</p> <p>2. Containers employing internal cushioning, blocking or bracing shall be subjected to both corner and flat drop tests.</p> <p>3. Items having a net weight exceeding 100 pounds (45 kg) and which are secured to a base within or to the base of a container shall be tested as indicated for larger containers (see paragraph 25).</p> <p>4. Unless otherwise specified both methods shall be applied.</p> <p>5. Not required unless specified.</p>		

Figure 4-1 Table of Rough Handling Tests

Gross Weight of Container and Contents	Edgewise drop (2 drops each end)	Cornerwise-drop Test (2 drops on each of 2 diagonally opposite corners of bottom)	Impact Tests (1 impact on each of 2 opposite ends) (Use either test)	
			Pendulum Impact (in/cm)	Incline Impact (ft/m)
Pounds/Kilograms	Height of Drop (in/cm)	Height of Drop (in/cm)		
150/67 to 250/113	30/76	30/76	14/36	7.0/2.1
Over 250/113 to 500/227	24/61	24/61	11/28	5.5/1.6
Over 500/227 to 1000/454	18/46	18/46	8/20	4.0/1.2
Over 1000/454	12/30	12/30	5/13	2.5/0.7
* Excludes Method 5007				

Figure 4-2 Table of Graduated Drop and Impact Test Heights*

Method or Sub-Method	Preservative Compound Application (See paragraph 10)	Leak Tests (Vacuum Chamber Test) (See paragraph 13)	Heat Seal Test (See paragraph 20)	Marking and Labelling (See Note 2)	Workmanship (See Note 4)
I	Required			Label on initial wrap and on container when used. (Identification not required on grease-proof wraps placed in snug containers where identification is on the container.)	Minimum air void inside package. No damage of preservative by excessively tight wrap. Cushioning or blocking as required.
IA-5	Required when preservative is specified	Required (see Note 8)		Markings applied directly on metal containers.	Minimum air void. If additional protection other than basic wrap is needed, cushioning or blocking should be used.
IA-6	Required	Required		Markings applied directly on metal containers	Container of appropriate size for item with room for expansion of preservative.
IA-8		Required (see Note 5)	Required	Markings applied on bag and on container when used. (See Note 11.)	Appropriate size bags. Minimum air void. Cushioning as required.
IA-13	Required when preservation is specified	Required (see Note 8)		Markings applied on container.	Minimum air void. If additional protection other than basic wrap is needed, cushioning or blocking should be used.

Figure 4-3 (Sheet 1 of 5) Table of Schedule of Quality Conformance Tests and Visual Inspection (See Note 1)

Figure 4-3 (Sheet 2 of 5) Table of Schedule of Quality Conformance Tests and Visual Inspection
(See Note 1)

Method or Sub-Method	Preservative Compound Application (See paragraph 10)	Leak Tests (Vacuum Chamber Test) (See paragraph 13)	Heat Seal Test (See paragraph 20)	Marking and Labelling (See Note 2)	Workmanship (See Note 4)
IA-14		Required (see Notes 7 and 9)		Markings applied on barrier and outer container.	Minimum air void. Cushioning or blocking as required. Corners of inner carton blunted.
IA-15		Required (see Notes 5, 7 and 10)		Markings applied on barrier and on outer wrap when used.	
IA-16		Required (see Notes 6 and 9)		Markings applied on barrier and on outer container.	Minimum air void. Cushioning or blocking as required.
IB-1				Markings applied on barrier and on overwrap or container when used.	Satisfactory thickness of coating 0.05 inch (1.27 mm) small part 0.025 inch (0.63 mm) minimum.
IB-2	Required			Markings applied on barrier and on overwrap or container when used.	Cords for dipping shall be sealed and treated. Coating shall be uniform, homogeneous and shall not stick to item on removal.
IC-1				Marking applied on bag and on container when used. (See Note 11.)	Approximate size bag. Minimum air void. Cushioning as required.

Method or Sub-Method	Preservative Compound Application (See paragraph 10)	Leak Tests (Vacuum Chamber Test) (See paragraph 13)	Heat Seal Test (See paragraph 20)	Marking and Labelling (See Note 2)	Workmanship (See Note 4)
IC-2	Required when preservation is specified	Required	Required	Markings applied on barrier and on outer container when used.	Minimum void. Cushioning or blocking as required. Corners of inner carton blunted.
IC-3		Required (see Notes 3 and 8)		Marking applied on bag and on container when used. (See Note 11.)	Appropriate size bag. Minimum air void. Cushioning as required.
IC-4				Markings applied on container.	Minimum air void. If protection other than basic wrap is required, cushioning or blocking should be used.
IC-7				Required (see Note 5)	
IC-9		Required (see Note 5)		Marking required on skin package. (See Note 11.)	Minimum air void. Item immobilized within package.
IC-10		Required (see Note 5)		Marking required on skin package. (See Note 11.)	Minimum air void. Item immobilized within package.
Ila		Required (see Notes 5, 6 and 9)		Markings applied on barrier and on outer container. (See Note 11.)	Minimum air void. Desiccant — proper amount used. See Formulae I and II (Part 3, paragraph 33).

Figure 4-3 (Sheet 3 of 5) Table of Schedule of Quality Conformance Tests and Visual Inspection (See Note 1)

Figure 4-3 (Sheet 4 of 5) Table of Schedule of Quality Conformance Tests and Visual Inspection
4-11 (See Note 1)

Method or Sub-Method	Preservative Compound Application (See paragraph 10)	Leak Tests (Vacuum Chamber Test) (See paragraph 13)	Heat Seal Test (See paragraph 20)	Marking and Labelling (See Note 2)	Workmanship (See Note 4)
IIb	Required when preservation is specified	Required (see Notes 5, 7 and 9)	Required	Markings applied on barrier and on outer container.	Humidity indicator properly placed. Humidity indicator window when required. With flexible barrier, sufficient material provided at closure edge. Cushioning and blocking as required. Corners of inner carton blunted for submethods IIb and IIe. Dunnage and wrapping of container, as applicable, to prevent contamination and physical damage in storage (See Part 3, paragraph 18).
IIc		Required (see Note 5)		Marking applied on bag and on container when used. (See Note 11.)	
IIId		Required (see Note 8)		Markings applied directly on metal container.	
IIe		Required (see Notes 5, 7 and 9)	Required	Markings applied on barrier and on outer wrap, when used.	
IIIf		Required (see Note 8)		Markings applied on container.	
III				Markings on wrap and container when used. (See Note 11.) (Identification not required on wraps placed in snug containers when identification is on the container.)	
<p>NOTES — 1. Determination of cleanliness required for all basic methods and submethods.</p> <p>2. When a container for a unit or multiple unit package is also used as an exterior shipping container, the marking applicable to shipping containers as specified in D-LM-008-002/SF-001 shall be used in lieu of package markings. Identification is not required on wraps placed in snug containers where identification is on the container.</p>					

Method or Sub-Method	Preservative Compound Application (See paragraph 10)	Leak Tests (Vacuum Chamber Test) (See paragraph 13)	Heat Seal Test (See paragraph 20)	Marking and Labelling (See Note 2)	Workmanship (See Note 4)
<p>NOTES — (cont)</p> <ol style="list-style-type: none"> 3. The submersion test (paragraph 16) may be used in lieu of the vacuum chamber test (paragraph 13) for rigid containers sealed with tape. 4. Materials for preservation packaging shall be as required for the specific method and as specified in the contract or order. 5. When size or shape of the package precludes the use of the vacuum chamber test, the hot water technique (paragraph 18) or vacuum retention test (paragraph 15) may be used in lieu of the vacuum chamber test (paragraph 13). When vacuum chamber test equipment is not available, the foregoing options may be used. 6. Vacuum retention test (paragraph 15) may be used in lieu of the vacuum chamber test (paragraph 13). 7. When specified by the procuring agency, the vacuum retention test (paragraph 15) shall be used on specified items in lieu of the vacuum chamber test (paragraph 13). 8. Pneumatic pressure test (paragraph 17) may be used in lieu of the vacuum chamber test (paragraph 13). MIL-C-3955 cans may be tested by the submersion test (paragraph 16) in lieu of the vacuum chamber test (paragraph 13). 9. Remove outer container prior to testing. 10. Outer wrap, when used, shall be removed prior to testing. 11. Transparent or opaque labels may be inserted in transparent unit containers when the label can be placed in a stationary position and will not affect or be affected by the method of preservation. Opaque labels shall not obscure more than 50 per cent of one surface of transparent unit containers. 					

Figure 4-3 (Sheet 5 of 5) Table of Schedule of Quality Conformance Tests and Visual Inspection (See Note 1)

PART 5
PREPARATION FOR DELIVERY
(Not applicable)

PART 6

NOTES

TEST AND UNIT PACKAGING FACILITIES

1. Invitations for bids shall include requirements stating the bidder indicates that he has the necessary facilities to clean, preserve, unit pack and test (or facilities in part, indicating which), or that he will sublet to a commercial packing concern with the necessary facilities.

NEUTRAL WRAPS

2. When greaseproofness is not a requirement, neutral materiel conforming to 43-GP-30 meets the compatibility requirements of this specification and is available at lower cost. This materiel is intended as an initial wrap where a non-corrosive, dust protective wrap is required prior to or as part of unit packing wherein a greaseproof wrap is not required.

OCCUPATIONAL AND HEALTH HAZARD

3. Any cleaning materiel or process must be selected and used in order to conform with applicable health or environmental regulations in force in the geographic and industrial areas where cleaning is performed.

SELECTION OF PRESERVATION AND PACKAGING METHODS

SCOPE

1. This annex provides the technical guidance for selection of methods and details for packaging of military supplies. Basic determination of an item's characteristics pertinent to its packaging requirements necessitates knowledge concerning significant features of that item. These are the construction (composition and surface chemistry), criticality of the surface, compatibility with contact preservatives, and such physical factors as size, weight and fragility.

CATEGORY CODE

2. It is intended to limit this annex to the selection processes necessary to obtain the data so that an adequate package to protect the item can be achieved. Information contained relates to the following principal categories:

- a. **First Category** — The chemical and physical characteristics of an item to be considered in the selection of a method of preservation.
- b. **Second Category** — The weight and fragility characteristics of an item to be considered in the selection of a submethod of preservation.
- c. **Third Category** — Preservative requirements for the item.

APPLICATION

3. The requirements of this annex are applicable to all items in the military supply system.

GROUP CATEGORIZATION

4. Group categorization is the process of evaluating an item for the purpose of identifying and classifying certain chemical and physical characteristics that are significant in determining the preservation requirements. By establishing criteria for defining and identifying these characteristics, a means is provided so that items with the same features can be identified to a specific group for which required packaging can be standardized.

- a. **Common Group Items** — Items that can be appropriately categorized by the designation of chemical, physical and other characteristics.
- b. **Unique Group Items** — Items that cannot appropriately use packaging developed by common group technique, yet do not require a drawing, sketch, illustration or narrative type instruction to specify packaging details.
- c. **Special Group Items** — Items that because peculiar characteristics such as weight, configuration, complexity, fragility or other consideration, prevent the use of common or unique groupings. An item is considered special if drawings, sketches, illustrations or narrative type instructions that identify the item are required to specify packaging details.

ITEM CATEGORIZATION

5. Items shall be categorized by the identification of their chemical, physical and other characteristics to the appropriate division of each of the categories.

ITEM CHARACTERISTICS

6. Categories represent the summation of pertinent chemical, physical and other characteristics that significantly influence the packaging required for adequate protection of items. Items, which may be dissimilar in their function, have the same characteristics and therefore require the same degree of protection.

FIRST CATEGORY

7. The first category encompasses the determination of those characteristics that directly influence the method of packaging III, I, IC, IA or II needed to afford the protection required. These are:

- a. composition — condition;
- b. critical — non-critical; and
- c. preservative

CHARACTERISTIC CONSIDERATION

8. Before packaging requirements can be determined, the characteristics of the item must be examined. Tangible considerations include:

- a. surface chemistry;
- b. surface mechanical (finish)
- c. fragility; and
- d. size and weight

These determinations are made by physical examination of the item and, as necessary, research of the background data. Other considerations require a thorough knowledge of the item that includes physical composition, structure, operational application and function. With this knowledge, the determinations of preservative compatibility, sensitivity to shock, vibration or distortion and the importance of reliability, can be established. All of these characteristics shall be considered to determine the appropriate division of each category that most accurately describes the item.

CRITICAL, NON-CRITICAL AND PRESERVATIVE APPLICABILITY

9. The determination of the appropriate classification, ie critical, non-critical, and preservative applicability is dependent upon the following considerations:

- a. Degree of machining performed on item surface or surfaces.
- b. Item function and relative importance in the operation of the assembly or end item.
- c. Requirement for high reliability where failure of the item could result in total loss of equipment and operating personnel.
- d. Receptivity of the item to preservative application without damaging the item or causing potential malfunction during operation.

Critical Group Items

10. Items shall be classified critical if it has been determined that their characteristics meet one or more of the following conditions:

- a. The metallic surface(s) of the item is machined to close tolerances and/or high finish. The surface is prepared for close fit and intimate contact, when assembled, with the surface(s) of a mating part. Operationally, these surfaces —
 - (1) are subject to significant motion in relation to mating parts such as on driving and driving gears, bushings, shafts, bearings, etc,
 - (2) are secured to the surface of a mating part to obtain a seal, metal to metal, and
 - (3) are threaded with closely controlled dimensions and geometry; items are used in the control variable movements of components, of assemblies for adjustment, calibration, etc;
- b. Metallic or non-metallic compositions are worked by grinding or polishing to attain highly polished surfaces as in optical and reflective devices;
- c. Preservation of the item is prohibited for one of the following reasons —
 - (1) preservative application would damage the item,
 - (2) preservative applied would be excessively difficult to remove and
 - (3) presence of any residual preservative would be incompatible with operational fluids, oils or greases and would potentially cause malfunction during operation; and
- d. Items whose functions in assembly and during operations are considered relatively more significant than brackets, hardware, castings, wiring, etc.

NON-CRITICAL, GROUP ITEMS

11. Non-critical items are those that do not meet the criteria established for critical group items in paragraph 10.

PRESERVATION PERMITTED OR PROHIBITED

12. The determination of whether or not a preservative shall be applied is guided by:
- a. criteria established in paragraph 10c;
 - b. the fact that items with chemical compositions that are resistant to deterioration do not require a preservative to assure appropriate protection whereas items, such as iron and steel, that are susceptible to deterioration do require a preservative, unless prohibited by other factors.

SECOND CATEGORY — WEIGHT/FRAGILITY

13. This category is divided to establish definitive controls for weight/fragility grouping of items. These divisions determine the preservation submethod and cushioning for the item and, therefore, have direct influence on the container that will be used. It provides a means of separating those items

which will permit the use of a bag-type container from those requiring containers of greater strength or other desired qualities.

STURDY ITEMS

14. A sturdy item is so constructed physically that force must be exerted to change its design configuration in any way and as a result would permanently damage the item.

FRAGILE ITEMS

15. Fragility is the physical characteristic of some items to fracture or shatter when subjected to moderate impact forces. The more susceptible an item is to breakage, the less impact force is required to cause the damage. For the purposes of this annex, the forces are limited to those normally encountered during shipment and handling of military supplies. Examples of fragile items include glass, plastics, and low tensile brittle metals that are present in relatively thin cross sections. If the cushioning prescribed is determined to be inadequate to protect the item from breakage, the item shall be classified either unique, if a packaging code can be used to furnish adequate packaging, or special, if drawing, sketches, etc are necessary to describe the packaging. This will necessitate coding the category/weight fragility with a "Z".

DELICATE ITEMS

16. A delicate item is so constructed that moderate forces will either distort, displace or deform elements or portions of the item to the extent that malfunction or misfit of the item occurs. Example of delicate items include finely balanced mechanisms, such as gyroscope equipment, time-and dimension-measuring devices, etc. The cushioning provided in the pre-determined standard packaging sheets for delicate items shall be more than that provided for the fragile items and if found to be inadequate, the item shall be classified unique or special.

DETERMINATION OF COMMON, UNIQUE AND SPECIAL

17. As specified in paragraphs above, the items on "an item for item basis" are to be separated in accordance with the definition.

PILOT PACKAGING AND TESTING OF UNIQUE AND SPECIAL GROUP ITEMS

18. When specified by the responsible technical activity, packaging data prepared for unique and special group items shall be supported by pilot packaging and testing of each package design developed. Complete reports of the test results shall be prepared and submitted in accordance with the instructions of the responsible technical activity.

