

DEFENSE CONTRACT MANAGEMENT AGENCY



ACQUISITION INSIGHT  GLOBAL ENGAGEMENT


MIL-STD-2073-1 Standard Practice for Military Packaging

Presented By:

Richard Mast

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DEFENSE CONTRACT MANAGEMENT AGENCY

Agenda

- Review the organization and content of the MIL-STD-2073-1
 - 1. Scope** – Purpose and applicability
 - 2. Applicable Documents** - referenced in standard
 - 3. Definitions** – Key terminology
 - 4. General Requirements** – across the board
 - 5. Detailed Requirements** – apply to specific criteria
 - 6. Notes** - information of an explanatory nature
- Appendices A, B, C, D, E, F, G, & H,**
 - MIL-STD-2073-1 contains nine Appendices identified as A through J (Except I)
 - Appendix J will be covered separately



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SECTION 1

1. SCOPE

1.1 Purpose – outlines standard processes for the development and documentation of military packaging requirements

Covers methods of preservation

To protect materiel from environmentally induced corrosion and deterioration

Physical and mechanical damage

Other forms of degradation during storage, multiple handling and shipment

1.2 Applicability – requirements of this standard apply to items for which military packaging is required to meet operational demands

Wartime



Delivery at Sea



Reusable Containers



SECTION 2

2. APPLICABLE DOCUMENTS

- Included are documents listed in sections 3, 4 or 5
- Listed documents are grouped by:
 - Government Documents
 - Federal Specifications
 - Commercial item Descriptions
 - DoD Specifications
 - DoD Standards
 - Other Government documents, drawings and publications (CFR)
 - Non-Government publications (ASTM, SAE)
- **Order of precedence** – In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.



SECTION 3

3. DEFINITIONS

- 3.1 General – definitions of terms **unique to this standard** are listed below. Definitions of **other terms commonly** used in the packaging community may be found in **ASTM D 996** (Standard Terminology of Packaging and Distribution Environments).
- Some of the terms defined are:
 - **Categorization** – The process of evaluating an item by chemical and physical characteristics that are significant in determining the preservation requirements
 - **Military Packaging** – A means of specifying the military preservation and packing that a given item requires to ensure it is not degraded during shipment and storage



SECTION 3

3. DEFINITIONS (Continued)

- **Military Preservation** – Application of materials and/or methods designed to protect an item during shipment, handling, indeterminate storage and distribution to consignees worldwide.
- **Military Packing** – Application of any exterior protective methods, materials or devices to assure the integrity of the preserved item as follows:
 - **Level A** – Protection required to meet **the most severe** worldwide shipment, handling and storage conditions. Examples of containers used include, but are not limited to, overseas type wood boxes, plastic and metal reusable containers
 - **Level B** – Protection required to meet **moderate** worldwide shipment, handling and storage conditions. Examples of containers used include, but are not limited to, domestic wood boxes, weather-resistant fiberboard boxes and fast packs.



SECTION 4

4. GENERAL REQUIREMENTS.

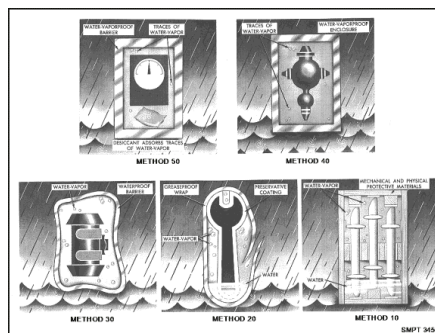
- Military Packaging developed I/A/W Appendix A.
- Hazardous Material packaged I/A/W applicable regulation.
- Quantity Per Unit Pack developed I/A/W Appendix B.
- Container selection I/A/W Appendix C.
- Kits packaged I/A/W Appendix D.
- Fragility determined using Table I.
- Loose Fill is prohibited in military packages except for hazardous materials that require their use for absorption.
- Shock & Vibration absorption shall be provided by cushioning materials or devices that protect the contents & packaging components from physical damage during handling, shipment & storage.



SECTION 5

5. DETAILED REQUIREMENTS

- Military packaging shall be of minimum cost consistent with required performance.
- There are five basic methods of preservation (MOP):
 - 10=Physical protection
 - 20= Physical protection with preservative coating
 - 30=Waterproof or waterproof-greaseproof with preservative as required
 - 40= Watervaporproof protection with preservative as required
 - 50=Watervaporproof protection with desiccant



SECTION 5

5. DETAILED REQUIREMENTS (Continued)

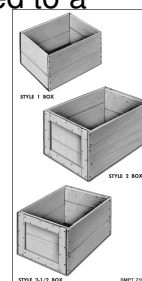
- Protection from physical damage is required for all methods of preservation
- Blunt corners & edges of fiberboard containers within bags.
- Remove trapped air from heat-sealed bags.
- **ESD preserved I/A/W Table J.Ia, code "GX".**
- Hazardous items shall be packaged in accordance with Table J.Ia, Code "HM"
- **Interior bags require unit container markings.**
- Choose shipping container I/A/W Table C.II.
- The contractor is responsible for performing all quality assurance requirements as specified in Appendix G.
- When a transparent unit pack is specified, the preliminary wrapping shall also be transparent.



SECTION 5

Level A and B Packing Requirements

- Intermediate containers shall be used when:
 - When the quantity to be shipped to a single destination permits the use of two or more intermediate containers in an exterior container
 - **When the exterior surface of the unit pack is a bag or wrap**
- When practicable, exterior containers being shipped to a single destination shall:
 - Contain items of the same National Stock Number
 - Contain identical quantities of the unit/intermediate pack
 - Contain items of the same contract
 - Contain items having the same lot number, cure, manufacture or expiration date
 - **Be cost effective and minimum cube to contain and protect the items**



SECTION 5

Container Selection

- Acceptable shipping containers for Levels A and B military packing are listed in table C-II
- Select the most economical container that provides the required protection for any given military packing application

Minimal Packing Requirements

When anticipated logistics paths indicate that items requiring military preservation, as outlined in this standard, will **not** be exposed to shipping environments **more severe** than those **normally encountered in the commercial distribution** system, military packing requirements need not be implemented. Acceptable minimal packing requirements for shipments of this nature are listed **in table J-IXb**



SECTION 5

Marking

- All unit, intermediate & exterior containers shall be marked I/A/W MIL-STD-129 & with additional marking as specified by the acquisition activity.
- Interior bags or containers, when enclosed within another container to complete a unit container shall also be marked as specified in MIL-STD-129 with unit container identification markings.

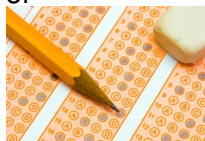


SECTION 5

Military Packaging Design Validation

The contractor shall be required to perform packaging design validation tests in accordance with Appendix F **unless:**

- Detailed packaging instructions or design are furnished by the acquisition activity
- Previous successful test records for the same or similar item
- Approved engineering data
- Multiapplication containers
- Contractor historical shipping data confirming adequate protection was provided to similar items using the same or equivalent packaging



SECTION 6

6. NOTES

- This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.
- Acquisition documents should specify
 - Title, number, revision and date of this standard
 - Level of packing required
- Three Tables
 - Approximate Fragility Factors
 - Method of Preservation vs appropriate MIL-DTL-117 bag designations and materials
 - Heat-sealable bag designator conversion chart (MIL-B-117 to MIL-DTL-117)



TABLE II. Method of preservation vs. appropriate MIL-DTL-117 bag designations and materials

Method Of Preservation	MIL-DTL-117			Container Bag Material				Tb1. J. VII Bag Code
	Type	Class	Style	Specification	Type	Class	Characteristics	
31 and 32	III	B	2	MIL-PRF-22191 or A-A-3174	III	1 or 2	Waterproof, transparent	BL
32 and 33	III	C	1	MIL-PRF-121	II	-	Waterproof, greaseproof, opaque	BV
33	II	C	1	MIL-PRF-121	I	-	Waterproof, greaseproof, opaque	BE
	II	C	2	MIL-PRF-22191	II	1 or 2	Waterproof, greaseproof, transparent	SD
	II	C	3	MIL-PRF-121 and MIL-PRF-22191	I	-	Waterproof, greaseproof, one side opaque, other side transparent	B2
	II	C	3	MIL-PRF-121 and MIL-PRF-22191	II	1 or 2	Waterproof, greaseproof, transparent	SD
41 and 51	I	E	1	MIL-PRF-131	-	1	Watervaporproof, greaseproof, opaque	BS
	I	E	2	MIL-PRF-22191	I	1 or 2	Watervaporproof, greaseproof, transparent	SE
	I	E	3	MIL-PRF-131 and MIL-PRF-22191	I	1 or 2	Watervaporproof, greaseproof, one side opaque, other side transparent	B3
	I	F	1	MIL-PRF-81705	I	1 or 2	Watervaporproof, electrostatic protective, electrostatic and electromagnetic shielding, opaque (Method 41 only)	B9
	II	E	1	MIL-PRF-131	-	2	Watervaporproof, greaseproof, opaque	SF
	IV	E	1	MIL-PRF-131	-	3	Watervaporproof, greaseproof, opaque	SK
42 and 52	I	E	1	MIL-PRF-131	-	1	Watervaporproof, greaseproof, opaque	BS
	II	E	1	MIL-PRF-131	-	2	Watervaporproof, greaseproof, opaque	SF
	IV	E	1	MIL-PRF-131	-	3	Watervaporproof, greaseproof, opaque	SK

MIL-STD-2073-1E
w/CHANGE 1



A. Development of Military Packaging Requirements.

This appendix provides direction for the development of detailed military packaging requirements in accordance with figure 1 decision chart.

The Appendix also provides information on:

- Categorization [Tables A-I, A-II, A-III](#)
- Predetermined packaging codes [Table A-IV](#)
- Formulas for material weight and size [Table A-V](#)
- Procedural packaging specifications [Table A-VI](#)
- [Figure A.1](#) shows the correct packaging code sequence.
- Packaging and marking of hazardous materials shall comply with the applicable hazmat regulation.



All material to be packaged can be classified into one of three groups of items: common, selective or special

Selective Items cannot use predetermined packaging data but can have packaging details specified by Appendix J codes, with brief supplemental instructions, if necessary



APPENDIX B

B. MILITARY PACKAGING QUP & ICQ

- Quantity per unit pack (QUP) of ONE:
Repairable, Items \$50 or more, Method 50 items,
irregular, delicate or fragile items, pairs, sets and kits.
- QUP more than ONE:
Formula A – Cost, weight, cube, replacement %
and method of preservation.
Formula B – Quantity per assembly, weight,
cube, replacement % and method of preservation.
- Intermediate Container Quantity (ICQ): Maximum of 100 unit packs, 40
pounds or 1.5 cubic feet with at least two dimensions not exceeding 16 Inches.



Note: See Table B.1 for ICQ guidance.



APPENDIX B

TABLE B-1. Guidance for establishing number of unit packs per
intermediate container (see Notes 1, 2 and 3)

Unit packs per int. container	Unit pack weight (lbs)	Unit pack cube (cu. ft.)
100	4	.0150
96	41	.0156
92	43	.0163
88	46	.0170
84	47	.0178
80	5	.0187
76	52	.0197
72	55	.0208
68	59	.0220
64	62	.0234
60	66	.0250
56	71	.0267
52	77	.0288
48	83	.0312
44	91	.0340
40	1.0	.0375
36	1.11	.0416
32	1.25	.0478
28	1.43	.0535
24	1.66	.0625
20	2.0	.0750
16	2.5	.0937
12	3.33	.1250
8	5	.1870
4	10	.3750

Note 1 Either the unit pack weight or unit pack cube, whichever is the bottommost entry in its respective column of the table, is the controlling factor in determining the number of unit packs per intermediate container. When the controlling factor falls between any two values listed in the appropriate column, the ICQ will be the lesser of the two corresponding quantities given in the table.

Note 2 The following examples illustrate correct use of the table:
a. If the unit pack weight is .60 pounds and the unit cube in feet is .0175, 64 units would be placed in the intermediate container.
b. If the unit pack weight is .49 pounds and the unit pack cube in feet is .0265, 56 unit packs would be placed in the intermediate container.

Note 3 Any unit pack that exceeds either ten pounds or 0.3750 cu. ft. shall not have an intermediate container.



C. CONTAINERS

- This appendix provides general requirements for containers used in military packaging, lists available containers that meet the requirements of this standard and provided information to assist in the selection of the most economical container
- **Table C-I** lists specifications for various **interior** containers
- **Table C-II** lists specifications for various **exterior** containers with their weight limitations and levels of protection for which their use is acceptable. Unit containers that also serve as shipping containers must be selected from this table.



TABLE C-I. Interior containers.

Specification	Description
PPP-B-566	Boxes, Folding, Paperboard: Variety 1, Process I or II Variety 2, Process I Variety 2, Process II
PPP-B-676	Boxes, Setup
PPP-C-96	Cans, Metal, 28 Gage and Lighter
PPP-T-495	Tubes, Mailing, and Filing
MIL-DTL-117	Bags, Heat-Sealable
MIL-DTL-6060	Bags, Watervaporproof, Heat-Sealable, Complex
MIL-DTL-22020	Bags, Transparent, Flexible, Sealable, VCI Treated
ASTM-D5118	Fiberboard Shipping Boxes: Class domestic



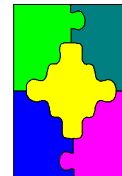
TABLE C-II Exterior shipping containers - selection by maximum weight of contents and level of packing.

Specification	Description	Weight of Contents (lbs., max)	Military Packing Level	Remarks
PPP-B-585	Boxes, Wood, Wirebound Class 1 Class 3	400 300	B A	
PPP-B-1672	Box, Shipping, Reusable with Cushioning		B	See table C-IV, Type I thru IV for weight and size restrictions
PPP-D-729	Drums, Shipping and Storage, Steel, 55-Gallon		A	
MIL-C-104	Crates, Wood: Lumber and Plywood Sheathed, Nailed, and Bolted	30,000	A	Size limitation: 30'Lx9'Wx10'H (unless otherwise specified)
MIL-DTL-2427	Box, Ammunition Packing: Wood, Nailed		A	Top opening or end opening with or without handles
MIL-C-3774	Crates, Wood, Open Type I Type II	12,000 16,000	A	Bolted or nailed assembly; size limitations: Type I-16'x8'x8' Type II-40'x8'x16'
MIL-DTL-6054	Drum, Metal-Shipping and Storage		A	MS27683: 16 to 80 gal capacity MS27684: 3 to 12 gal capacity



D. DEVELOPMENT OF MILITARY PACKAGING REQUIREMENTS FOR KITS

- This appendix covers the development of military packaging for kits
- Military preservation shall be applied to all items within the kit.
- Methods of preservation shall be I/A/W Appendix A.
- Hazardous Material can be packed in same container if compatible.
- Items of different physical characteristics can be consolidated within the same method of preservation (see D.3.1).
- Kit contents lists are required (MIL-STD-129P, 5.3.1.d. – Packing Lists)



APPENDIX E

E. MILITARY PACKAGING DATA FORMS

This appendix provides guidance and instructions for the preparation of required military packaging data.

DD Form 2326 – Preservation and Packing Data

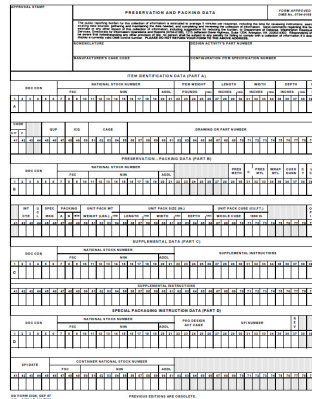
- Part A for Item Identification Data
- Part B for Preservation and Packing Data
- Part C for Supplemental Data
- Part D for Special Packaging Instruction Data

DD Form 2169 – Special Packaging Instruction (SPI)

Used for detailed PPP&M instructions with drawing
(Found in Revision D of MIL-STD-2073-1)

DD Form 2169C – Continuation Sheet for SPI

(Found in Revision D of MIL-STD-2073-1)




APPENDIX F

F. MILITARY PACKAGING DESIGN VALIDATION

This appendix is mandatory and outlines procedures for conducting tests to validate military packaging designs when such testing is required (see 5.6)

- Package performance tests ASTM D4169
 1. Performance tests & acceptance criteria apply
 2. Containers are subject to Distribution cycle 18 testing
 - a. Level A - Assurance Level 1
 - b. Level B - Assurance Level 2
- Preservation inspection of Appendix G
 1. Visual examination (Table G.I)
 2. Leakage and heat-sealed seam test (Table G.II)



Hazardous Materials Testing- Test in accordance with applicable regulation



APPENDIX G

G. QUALITY ASSURANCE PROVISIONS

This appendix is mandatory and outlines requirements for conducting quality conformance inspection tests on all military packages.

- The contractor's quality system shall be as specified in the contract
- Quality assurance requirements shall be in accordance with the contract. In addition, **the applicable tests in G.4 and G.5 are mandatory**
 - **G.4 Preservation Inspections**
 - Visual preservation examinations
 - Leakage Test
 - Heat Sealed Seam Test
 - **G.5 Packing Inspections**



APPENDIX G

Table G-I Preservation inspection provisions

Criteria	Method of Inspection	Method														
		10	20	31	32	33	41	42	43	44	45	51	52	53	54	55
Cleaning materials not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cleaning material contaminated	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item not completely cleaned when tested in accordance with Note 1	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item damaged by action of cleaning process	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item contaminated by handling after cleaning	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item not completely dry	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item damaged by compressed air blast or overheating	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Contaminated compressed air used	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Contaminated wiping cloths used	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Preservative not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Incomplete or non-uniform coverage of preservative	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Excessive preservative	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item not thoroughly drained	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Wrap not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cushioning material not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cushioning thickness not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Projections and sharp edges of item not sufficiently cushioned to prevent damage to item or external media	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Improper application of cushioning, blocking, bracing or bolting	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bolting	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Improper amount of desiccant	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Desiccant improperly secured	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Desiccant contacting item	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Humidity indicator not properly placed	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Window or gaskets not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unit container not as specified	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Interior unit container corners not blunted	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Insufficient material for reclosure of flexible barriers	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Improper seal or closure of unit containers	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Excessive air within unit container	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Excessive looseness in unit container	Shake	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weight and dimensions of unit pack exceeds maximum	Weigh & measure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Incorrect QUP	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marking omitted, incorrect, or illegible 2/ 3/ 4/	Visual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



APPENDIX G

- **Cleaned**
- **Dried**
- **Preserved**
- **Wrap**
- **Cushioned**
 - **Specified Material**
 - **Specified Thickness**
- **Excessive Looseness**
- **Marking – omitted, incorrect or illegible**



APPENDIX G

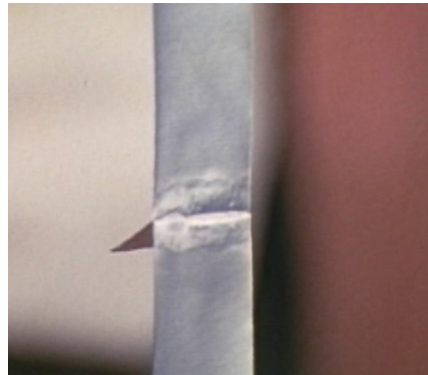
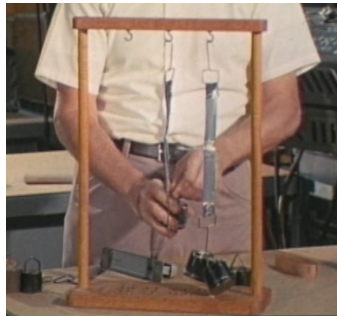
TABLE G-II. Leakage and heat-sealed seam test provisions.

<u>Method / Submethod</u>	<u>Leak Test</u>	<u>Heat-Sealed Seam Test</u>
31	Required	Required
32	Required	Required
33	Required	Required
41	Required	Required
42	Required	Required
43	Required	Required
44	Required	
45	Required	
51	Required	Required
52	Required	Required
53	Required	Required
54	Required	
55	Required	



Heat-Sealed Seam Test

- MIL-STD-3010 Method 2024
- Adequacy of heat-seals



Leakage Test

- MIL-STD-3010 Method 5009
- Leakage of air or liquids from sealed containers
- 5 Test Methods
 - Vacuum Retention
 - Submersion
 - Pneumatic Pressure
 - Hot Water
 - Squeeze



G.5 PACKING INSPECTIONS

- **Material(s)**
- **Construction**
- **Size / Weight**
- **Closure**
- **Markings (3 I's)**
 - **Incomplete.**
 - **Illegible**
 - **Incorrect**



H. CONTAINER DESIGN RETRIEVAL SYSTEM (CDRS)

CDRS services shall be solicited before initiating detailed engineering design of a needed container.

- The development activity (can be contractor) submits search to CDRS Management Office (MO), Eglin AFB FL.
- CDRS identifies suitable reusable specialized container and responds to requestor.
- The design activity checks on the availability of the container.
- The contractor interacts with Administrative and Acquiring Contracting Offices regarding contract terms.
- If response is negative, the design activity shall proceed with the design, testing, evaluation and documentation of the new specialized reusable container.

Don't Reinvent



The Wheel



APPENDIX J

J. Military Packaging Requirement Codes

Scope. This appendix **establishes and defines codes to be used in describing military packaging methods and materials** when developing packaging data as prescribed in Appendix E. This appendix is a mandatory part of this standard. The information contained herein is intended for compliance.



Questions

