

Scope: This presentation will provide definitions, references and guidance about Military Packing and exterior containers. MIL-STD-129P defines a case as an exterior container.

Purpose: After this training session, the student will be able to identify the most commonly used shipping containers specified in DoD contracts, and will be able to determine whether the contractor is meeting contractual Packing requirements.

- **Steps in the Military Preservation, Packaging, Packing & Marking Cycle**
- **Packing Levels**
- **Fiberboard Containers**
- **Wood Boxes & Crates**
- **Reusable Cushioned Containers**
- **Summary**
- **Quiz**



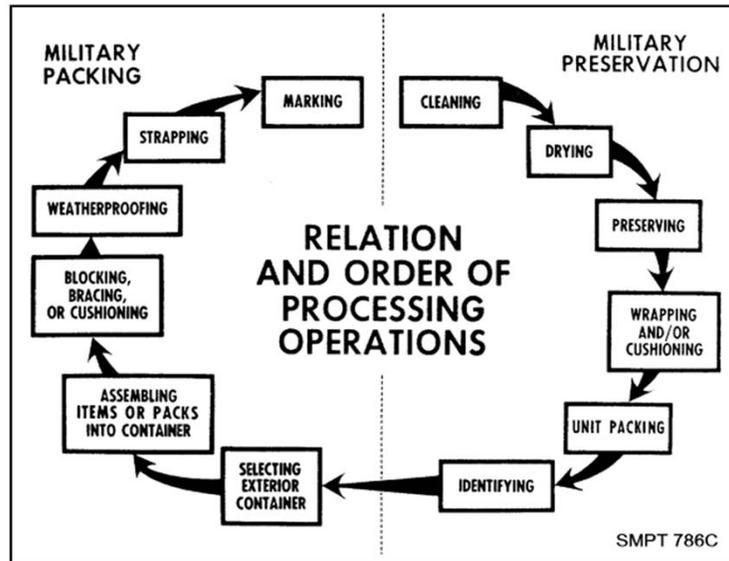
An illustration of the Steps in the PPP&M Cycle will indicate at what point the exterior container is selected.

It is important to understand the Packing Levels in order to select the correct exterior container.

Fiberboard and wood boxes will be discussed in detail.

There will be an introduction to reusable containers used to pack Depot Level Repairables followed by a Summary and brief Quiz.

Steps in the PPP&M Cycle



Cleaning, Drying, Preservative application, Wrap, Cushioning, Unit packing, and Identification are the steps in the Military Preservation process.

Consolidation of unit packs, or placement of a single pack into an exterior shipping container, cushioning, blocking, bracing, weatherproofing, strapping, and identification are the Military Packing steps.

Packing Levels

- **Level A:**
- **Protection required to meet the most severe conditions known, or anticipated, during shipment, handling & storage.**
- **Used for worldwide shipment & long term storage under possible adverse conditions.**
- **Overseas Style wood boxes meet Level A**
- **Most hard shell reusable containers meet Level A**



Level A Packing is most often specified for shipments going overseas by ship (vessel).

It may also be specified whenever the Buying Activity is most uncertain about the conditions to be encountered, since they believe it is better to overpack than to underpack.

Packing Levels

- **Level B:**
- **Protection required to meet moderate shipping, handling & storage conditions.**
- **Used for worldwide shipments of material not directly exposed to extremes of climate, or storage in favorable warehouse conditions.**
- **Weather resistant fiberboard, or domestic wood, boxes are the minimum required shipping containers used to meet Level B**



Level B Packing and weather-resistant fiberboard boxes are often used for FMS contracts or overseas shipments moving through the post office or by air.



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Packing Levels

- **Minimum Protection:**
- **Previously called Level C.**
- **Non-Military packing level describing protection required for known favorable shipping conditions with limited handling and short term storage.**
- **Sufficient protection is required to ensure material arrives safely at it's destination.**
- **Stored in favorable warehouse conditions.**



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2/09/2011

6

Minimal (old Level C) Packing is cited for the majority of contracts, since items will be shipped to a US location with storage at an enclosed depot location.

Items packed to meet Minimum Protection must be packed in a manner that the carrier will accept. (Trucking company, post office, UPS, etc.)



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Fiberboard Specifications

- **ASTM D 4727**—Corrugated and Solid Fiberboard Sheet Stock & Cut Shapes
- **ASTM D 5118**—Fabrication of Fiberboard Shipping Boxes (replaced PPP-B-636)
- **ASTM D 1974**—Methods of Closing, Sealing, and Reinforcing Fiberboard Shipping Containers
- **ASTM D 5168**—Fabrication & Closure of Triple Wall Corrugated Fiberboard Containers (replaced PPP-B-640)
- **ASTM D 5486**—Pressure-Sensitive Tape for Packaging, Box Closure & Sealing (replaced PPP-T-60 & PPP-T-76)



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2/09/2011

7

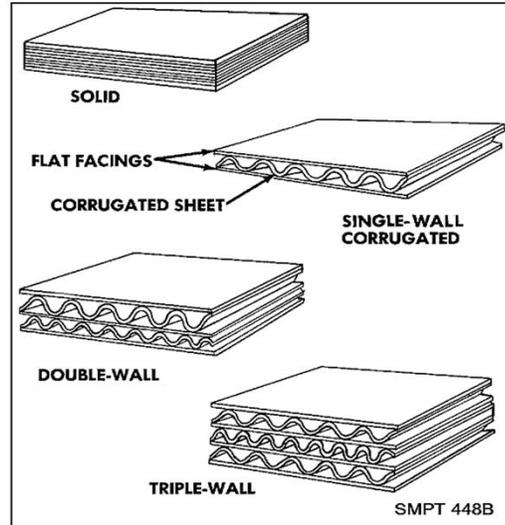
The correct terminology to describe a “cardboard” box is “fiberboard” box. “Cardboard” is used to make the backs of tablets or shoeboxes. Fiberboard is much stronger and used for unit and exterior shipping containers.

ASTM D 4727 is the specification for the fiberboard material to make boxes. Fiberboard comes in sheet stock (layers or sheets of flat fiberboard glued together) or corrugated stock (two layers of flat fiberboard with a center corrugated layer).

Corrugated fiberboard is stronger than sheet stock and is used more for containers. Sheet stock is used more as a liner or divider.

Fiberboard Containers

- **Two types:**
 - (SF) Solid Fiberboard
 - (CF) Corrugated Fiberboard
- **Three varieties of CF:**
 - Single-wall, double-wall, and triple-wall

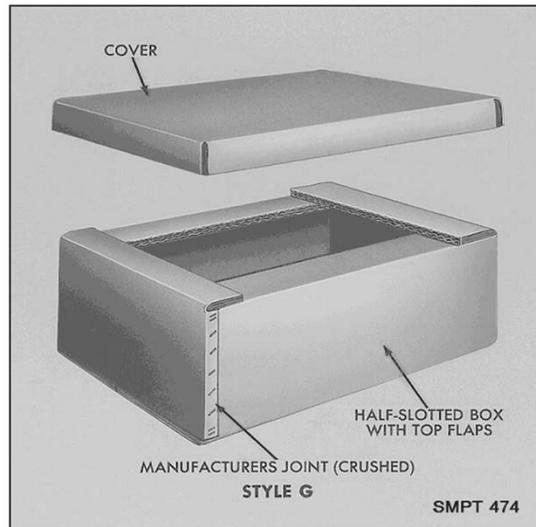


Single-wall, double-wall, and triple-wall describes the number of layers of corrugated fiberboard that are glued together to form the box material.

Fiberboard Containers

- **Three Classes:**
 - Domestic
 - Weather-resistant
 - Water-vapor resistant

- **Box Styles:**
Describes how the body, flaps or cover are made



The three Classes describe the ability to withstand moisture:

Class 1- domestic, with standard moisture resistance

Class 2- weather resistant, where a resin has been added to the fiberboard during manufacture to make it withstand water. It is NOT “waterproof!”

Class 3- water and water-vapor resistant, where one layer of the fiberboard is laminated with polyethylene (plastic).

Note: Only Classes 1 and 2 are used for military applications.

The most common box Style is RSC (Regular Slotted Carton), where the top and bottom flaps meet in the center when closed.

Other types are Full Telescoping Carton (FTC) and One Piece Folder (OPF).

Fiberboard Containers

- **Grade Designation:**
- **Describes box strength & refers to Bursting Strength (not the weight a box will hold)**
- **Domestic grades are 200, 275 or 350 psi.**
- **Weather-resistant grades are V3c, W5c, etc.**
- **Gross weight & size limitations for each grade of box are shown in ASTM D 5118**



Definition of Bursting Strength - The pounds per square inch required to punch a hole in a sheet of fiberboard.

Domestic grade 200 psi refers to the pounds per square inch required to punch the hole.

Weather-resistant grades were first manufactured during WW II and were given names such as "Victory board." The V-board designations remain to this day.

Weather-resistant grades are equivalent to their domestic counterparts. For example, V3c and grade 275 have the same strength.

ASTM D 5118 contains box style descriptions with drawings.

Fiberboard Containers

- **Fiberboard Containers Box Certification:** Indicates the box manufacturer, strength test met (grade), max box size & gross weight limitations
- **Circular Marking:** Indicates compliance with the transportation freight classification rules.



This is the most common type of manufacturer’s box certification.

Note the gross weight to be placed in the container is the bottom number, not to be confused with the Bursting Strength above.

This certification marking is usually on the bottom of the container, but may also appear on any side.

- **Rectangular Marking: Indicates compliance with the new Edge Crush Test.**



This certification may also be in the circular form, but is usually shown in this rectangular manner.

Fiberboard Containers

- **Domestic Boxes** : No ASTM designation required
- **Weather-Resistant**: In addition to the box certification markings, these boxes must also be marked with the grade, date of manufacture & “Complies with ASTM D 5118”.



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Wood Boxes and Crates

- **Non-Manufactured Wood Products (NMWP):**
All NMWP (solid wood) must be certified free from bug infestation for all shipments to Europe by showing the American Lumber Standards Committee (ALSC) Heat Treatment (HT) certification stamp.
 - The stamp can only be applied by contractors who meet the standards of an accredited agency of the ALSC.
 - Plywood & particle board are examples of manufactured wood products.
 - Websites for WPM (Wood Packaging Materials)
<https://www.tarp.navicp.navy.mil/wpm>
<http://www.alsc.org/>



NMWP: You have to be careful of shipping containers made of plywood that have solid wood skid rails, inside corner posts, support beams, etc. The solid wood components must be certified by an authorized agency.

Wood Boxes and Crates

- **Common specifications:**
- ASTM D 6251 (old PPP-B-601) Cleated Plywood Box
- ASTM D 6880-05 (old PPP-B-621) Nailed Wood Box
- ASTM D 6256 (old MIL-B-26195) Wood Cleated, Skidded, Load Bearing Base Box
- MIL-C-104 Sheathed Wood Crate



PPP-B-601 was superseded by ASTM D 6251 in Feb 01

PPP-B-621 was cancelled in Dec 06. Use ASTM D 6880-05 instead.

Mil-B-26195 was superseded by ASTM D 6256.

If in doubt about current status of any Military specifications, check in Assist Quick Search in the DAPS website to make that determination



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Reusable Cushioned Containers

- **Short life containers (fast packs):**
- **Designed by the Air Force**
- **Weather-resistant fiberboard**
- **Polyurethane bonded to the inside of container**
- **Four types:**
- **Type I – Vertical Star Pack, MIL-STD-2073-1D Code NR, used for electronic equipment**
- **Type II – Folding Convuluted Foam, Code NS, used mostly for circuit cards**
- **Type III – Telescoping Box, Code NV**
- **Type IV – Horizontal Star Pack, Code NW**



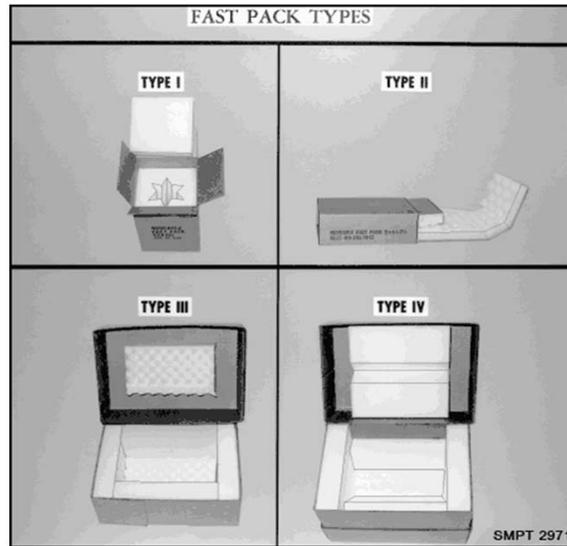
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2/09/2011

16

Fast Packs meet Level B Packing

FAST PACK CONTAINERS



This is an illustration of the four Types of Fast Pack containers:

Type I – Vertical Star Pack, MIL-STD-2073-1D Code NR, used for electronic equipment

Type II – Folding Convuluted Foam, Code NS, used mostly for circuit cards

Type III – Telescoping Box, Code NV

Type IV – Horizontal Star Pack, Code NW

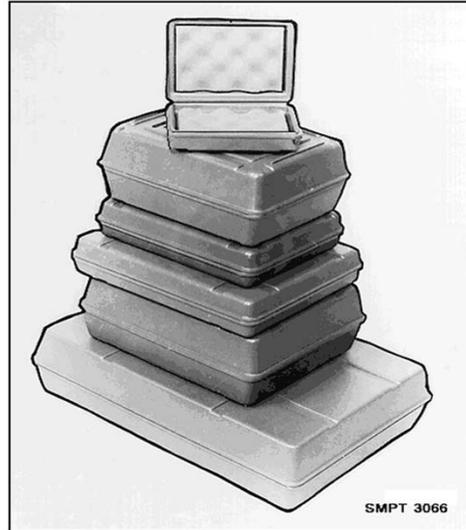
- **Long life containers:**
- **Designed by the Navy & Air Force**
- **Plastic with various cushioning, shock mounts, or suspension systems**

- **Five Types:**
- **Type VI – Plastic, Molded Clamshell Container, Code NY**
- **Type VII – Large Plastic Container with polyurethane cushioning which forms a cavity, Code NZ**
- **Type VIII – Plastic Container with coiled steel cable shock mounted platform, Code MY**
- **Type IX – Similar to Type VIII, but with elastomeric shock mounts, Code WY**
- **Type X – Similar to Type IX, Code RC**



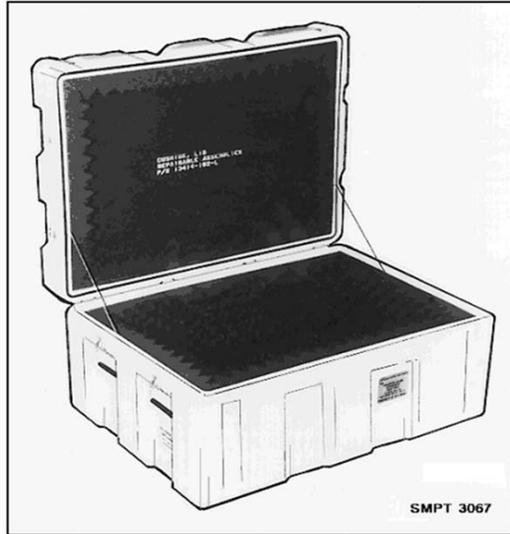
Long life containers meet Level A Packing.

- **Type VI:**
- **Clamshell Container**
- **Code NY**
- **Used for circuit card assemblies**



The Type VI is a popular reusable container used by the Navy.

- **Type VII:**
- **Polyurethane cushioning**
- **Code NZ**
- **Large repairable assemblies**



This container is fully lined with cushioning.

DCMA Reusable Cushioned Containers

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- **Type VIII**
- Plastic container with coiled steel cable shock mounted platform,
- Code MY
- Used for extremely fragile items, such as gyroscopes, inertial navigation units, etc.



The mounting platform enables the container to provide added protection from “G” forces.

- **Appendix C provides general container requirements**
- **Unit Container selected should not be too large—item & necessary cushioning should fill 80% of container volume (para. C.3.1)**
- **Unit containers may serve as shipping containers if they meet the Packing Level in the contract**



The 80% fill requirement is to keep contractors from using boxes which are way too large for the item.

Small voids can be filled by additional dunnage—however, loose fill is prohibited for military packages.



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TABLE C.II.

EXTERIOR CONTAINER SELECTION			
SPECIFICATION	DESCRIPTION	WEIGHT OF CONTENTS	PACKING LEVEL
ASTM-D-6251 (PPP-B-601)	PLYWOOD:		
	DOMESTIC	1,000 LBS.	B
	OVERSEAS	1,000 LBS.	A, B
ASTM-D-6880 (PPP-B-621)	NAILED WOOD:		
	OVERSEAS	1,000 LBS.	A, B
	DOMESTIC	600 LBS.	B
ASTM D-5118	FIBERBOARD, WEATHER- RESISTANT	SEE TABLE IN THE SPEC	B



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2/09/2011

23

This table is used when Packing Code “Q” is specified.

Use the Level of Packing specified in the contract (either A or B) and select a container that will meet the required Packing Levels and is adequate to hold the weight being packaged.

Note that Level C (minimal) Packing requirements are no longer shown on this table, which is for military applications only.

- **Packing is the consolidation of unit packs or placement of a single pack into an exterior shipping container.**
- **There are three Levels of Packing; Level A, B, & Minimal.**
- **The Military uses Class 1, Domestic & Class 2, Weather-resistant fiberboard containers.**
- **Non-manufactured wood products must be bug free certified.**
- **There are Short-Life & Long-Life reusable containers.**
- **MIL-STD-2073-1, Table C.II, lists the Level of Packing for exterior shipping containers.**

1. What Commercial specification has replaced PPP-B-636?

- a) ASTM D 3951
- b) ASTM D 5118
- c) ASTM D 636
- d) ASTM D 0129



Answer: b) ASTM D 5118

2. What two Classes of fiberboard boxes are specified in military contracts?

- a) domestic & weather-resistant
- b) weather-resistant & insect proof
- c) double wall & solid fiberboard
- d) solid fiberboard & weatherproof

Answer: a) domestic and weather-resistant

3. What is the maximum gross weight permitted for box grade 275?

- a) 80 lbs
- b) 90 lbs
- c) 120 lbs
- d) 85 lbs

Answer: b) 90 lbs

4. Where can a list of Packing Level B exterior shipping containers be found in MIL-STD-2073-1D?

- a) Appendix G
- b) Appendix H
- c) Table JIa
- d) Table C.II

Answer: d) Table C.II

**5. What is required of wood boxes over
200 pounds gross weight?**

- a) Staples**
- b) End caps**
- c) Stretch wrap**
- d) Minimum least 2 skids**

Answer: d) at least 2 skids