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 <b>MATERIALS HANDLING MANUAL</b> AIR COMBAT SYSTEMS	SECTION <b>4</b>	SPECIFICATION NO. <b>P-7000</b>
	PAGE <b>1 of 32</b>	REV <b>H</b>
<b>PART PROTECTION SPECIFICATION</b> SPECIFICATION TITLE <b>PARTS PROTECTION STANDARDS; OFFSITE PACKAGING; AND SUPPLIER PACKAGING REQUIREMENTS</b>		EFFECTIVE <b>13 June, 2000</b>
		RELEASE DOCUMENT <b>F73994</b>
		SUPERSEDES <b>11 January, 1989</b>

## 1.0 **SCOPE**

- 1.1 This specification establishes and describes the minimum parts protection requirements applicable to aircraft parts, assemblies, and materials during fabrication, processing, and transportation at Northrop Grumman facilities.
- 1.2 This specification also establishes Northrop Grumman offsite packaging and supplier packaging requirements for shipment of parts and materials to and from suppliers.
- 1.3 The following provides an index to the various sections and subjects to aid users of this specification:
- | Para. | Subject  |
|-------|--|
| 3.1   | Parts Protection Standards at Northrop Grumman Facilities                |
| 3.2   | Northrop Grumman Offsite Packaging Requirements                          |
| 3.3   | Supplier Packaging Requirements for General Parts and Materials          |
| 3.4   | Supplier Packaging Requirements for Machined Parts and Sheet Metal Parts |

## 2.0 **APPLICABLE DOCUMENTS AND MATERIALS**

- 2.1 The following documents of the issue in effect on the date of issue of the purchase order form a part of this specification to the extent specified herein.
- |        |   |   |
|--------|---|---|
| 2.1.1  | ASTM D5118,<br>ASTM D1974   | Boxes, Shipping, Fiberboard   |
| 2.1.2  | MIL-H-46170B(2)   | Hydraulic Fluid, Rust Inhibited, Fire Resistant Synthetic Hydrocarbon Base                              |
| 2.1.3  | Rule 41   | Consolidated Freight Regulations  |
| 2.1.4  | LPS, No.3   | Corrosion Preventative Compound or Equivalent   |
| 2.1.5  | (Deleted)   |   |
| 2.1.6  | ASTM D3951-82   | Std. Practice for Commercial Packaging  |
| 2.1.7  | NAS 855   | Industrial Packaging Standard   |
| 2.1.8  | Uniform Freight Classification  |   |
|        | (Applications for copies should be addressed to Uniform Classification Committee, Room 1106, 222 S. Riverside Plaza, Chicago, Illinois 60606.)          |   |
| 2.1.9  | National Motor Freight Classification   |   |
|        | (Applications for copies should be addressed to American Trucking Association, Inc., Tariff Order Section, 1616 P Street N.W., Washington, D.C. 20036.) |   |
| 2.1.10 | P-430   | Preservation Requirements   |
| 2.1.11 | P-6882  | (Canceled)  |
| 2.1.12 | P-6883  | Canceled  |
| 2.1.13 | P-6950  | 2000 and 7000 Series Aluminum Alloy Material and Parts – Preservation, Packaging, Handling, and Storage |

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2.1.14	P-6968	2000 and 7000 Series Critical Aluminum Forgings – Preservation, Packaging, Handling, and Storage		
2.1.15	P-6969	2000 and 7000 Series Noncritical Aluminum Forgings – Preservation, Packaging, Handling, and Storage		
2.1.16	P-6970	Handling and Storage of Carbon/Epoxy Parts/Assemblies and Bulk Materials for F/A-18		
2.1.17	P-6975	F-5E, F-5F, F-5G, and T-38 Fatigue Critical Parts (FCP) – Preservation, Packaging, Handling, and Storage at Northrop Grumman and at Supplier		
2.1.18	P-6976	Preservation, Handling, Storage, and Protection of F-5E/F/G Fatigue Critical Assemblies		
2.1.19	P-6977	F-18A Fracture and Maintenance Critical Parts and Assemblies. Preservation, Packaging, Handling, and Storage at Northrop Grumman and at Supplier		
2.1.20	P-6978	(Canceled)		
2.1.21	(Deleted)			
2.1.22	(Deleted)			
2.1.23	(Deleted)			
2.1.24	(Deleted)			
2.1.25	MIL-STD-2073	DoD Material Procedures for Development and Application of Packaging Requirements		
2.2	Materials			
2.2.1	Felt Sheet 1/4 Inch			
2.2.2	Bag Paper Kraft	#2	(30 lb.	2-1/4 × 4-1/16)
2.2.3	Bag Paper Kraft	#4	(50 lb.	9-1/4 × 4-5/16)
2.2.4	Bag Paper Kraft	#6	(50 lb.	11 × 5-3/4)
2.2.5	Bag Paper Kraft	#10	(35 lb.	13-5/16 × 6-3/8)
2.2.6	Bag Paper Kraft	#20	(40 lb.	16-1/4 × 8-1/8)
2.2.7	Bag Paper Kraft	#25	(40 lb.	18-3/32 × 8-1/8)
2.2.8	Bag Polyethylene	4 × 6 × .0015		
2.2.9	Bag Polyethylene	6 × 8 × .0015		
2.2.10	Bag Polyethylene	10 × 15 × .002		
2.2.11	Bag Polyethylene	24 × 36 × .006		
2.2.12	Corrugated Fiberboard	24 in. × 250 ft.		
2.2.13	Corrugated Fiberboard	36 in. × 250 ft.		
2.2.14	Corrugated Fiberboard	48 in. × 250 ft.		
2.2.15	Paper Wrapping	24 in. wide, 36 #	roll	
2.2.16	Paper Wrapping	36 in. wide, 54 #	roll	
2.2.17	Paper Wrapping	60 in. wide, 90 #	roll	
2.2.18	Polyethylene Film	.006 × 20 ft. × 100 ft.		
2.2.19	Masking Tape	3/4 in. wide		
2.2.20	Masking Tape	2 in. wide		
2.2.21	Green Economy Tape	1/2 in. wide		

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2.2.22	Green Economy Tape	2 in. wide	
2.2.23	Steel Strapping	5/8 in. x .02	
2.2.24	Cellulose Cushion Kimpac	1/2 in. x 40 in. x 100 ft. roll	
2.2.25	Edge Pak	1 in. x 7/16 in. x 500 ft.	
2.2.26	Cap, Dust, Plastic	3/8 in.	
2.2.27	Cap, Dust, Plastic, Hex.	1/4 in., Ana	
2.2.28	Cap, Dust, Plastic, Hex.	5/16 in., "	
2.2.29	Cap, Dust, Plastic, Hex.	3/8 in., "	
2.2.30	Cap, Dust, Plastic, Hex.	1/2 in., "	
2.2.31	Cap, Dust, Plastic, Hex.	# ms-4	
2.2.32	Cap, Dust, Plastic, Hex.	# ms-6	
2.2.33	Cap, Dust, Plastic, Hex.	# ms-8	
2.2.34	Cap, Dust, Plastic, Hex	# ms-10	
2.2.35	Cap, Dust, Plastic, Hex.	# ms-12	
2.2.36	Cap, Dust, Plastic, Hex	# ms-16	
2.2.37	Polypropylene Strapping and Buckle	1/2 in. (Min 500# Test)	
2.2.38	Tubing, Polyethylene	.003	
2.2.39	Aircap (Bubble Pak)	36 in. wide	
2.2.40	Foam, Polyethylene	1/4 in. x 48 in. x 125 ft.	
2.2.41	Rubber, Neoprene	50 shore	
2.2.42	Corrugated Container	200 - 275 lbs.	
2.2.43	Container, Tri-wall		
2.2.44	Bag, Polyethylene	6 mil. 3 in. x 4 in.	
2.2.45	Bag, Polyethylene	6 mil. 4 in. x 6 in.	
2.2.46	Bag, Polyethylene	6 mil. 6 in. x 8 in.	
2.2.47	Bag, Polyethylene	6 mil. 9 in. x 12 in.	
2.2.48	Bag, Polyethylene	6 mil. 10 in. x 16 in.	
2.2.49	Bag, Polyethylene	6 mil. 12 in. x 20 in.	
2.2.50	Bag, Polyethylene	6 mil. 18 in. x 30 in.	
2.2.51	Bag, Polyethylene	6 mil. 24 in. x 36 in.	
2.2.52	Paper, Wrapping	12" Wide Roll MIL-P-17667D	

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### 3.0 **REQUIREMENTS**

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#### 3.1 Parts Protection Standards at Northrop Grumman Facilities

3.1.1 Detailed parts protection requirements specified on operation sheets shall take precedence over the general requirements noted herein.

3.1.2 Clean work areas, using the correct type and quantity of cleaning materials. Good handling practices shall be utilized.

3.1.3 Always store or transport in a manner that will protect parts and materials from rain, fog and other corrosive environments.

3.1.4 Steel strapping shall not be applied directly on corrugated boxes at any time.

3.1.5 All packages, bags, boxes or wraps shall be marked with the part number and the serial number, if applicable, on the outside of the package or have this information securely attached to the package. Multiple containers of the same part number shall have the quantity of containers marked; for example: 1 of 3.

3.1.6 The supplier package shall be reused providing it can be restored to its original condition.

3.1.7 All parts having exterior moldline finish surfaces shall be individually packaged in accordance with one of the methods specified herein.

3.1.8 Methods herein may be used for unfinished work-in-process parts as applicable; otherwise good material handling practices shall be exercised.

3.1.9 Work-in-process parts moving between machining operations within the same department do not require wrapping or interleaving protection provided the next operation will remove all nicks or scratches incurred during handling and transportation between stations.

Work in process small parts moving between manufacturing operations, when placed in tote boxes or on pantruck's such to minimize movement during transportation, do not require individual wrapping or interleaving.

Work in process parts moving between paint and process stations within the same department which will be moved only by hand-carry or hand pushing of carts or trailers, do not require wrapping, bagging or boxing of parts. This waiver does not apply to any parts that will be placed inside a vehicle or towed by any vehicle for movement to a station.

3.1.10 On an expedite basis, work-in-process parts and assemblies may be hand carried between stations or departments provided the weight and size of the item allows it to be easily handled by one or two persons and meets applicable safety standards. Extreme care shall be exercised during hand-carry operations to prevent bumping or dropping the item. Items need not be wrapped or packaged during this operation.

NOTE: Hand-carry is defined as transporting parts by person or persons from an originating department to a using department for immediate use. This does not include transporting parts by any vehicle. For normal expedite of parts, interfacility vehicular or transportation between buildings, the minimum parts protection of P-7000 will apply.

3.1.11 Dissimilar metals shall not be packaged in the same container.

3.1.12 Fatigue, fracture, maintenance and durability critical parts shall be protected per their applicable specification.

3.1.13 Detail Requirements

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3.1.13.1 Parts protection methods I through XIV, listed below and described in paragraphs 3.1.13.2 through 3.1.13.15 shall be used to provide the minimum protection for parts and materials during in-plant and interplant fabrication, handling and transportation operations. Each method has specific uses and applies to certain groups of parts and materials. Some methods have multiple uses and may be used as applicable. The methods described herein are:

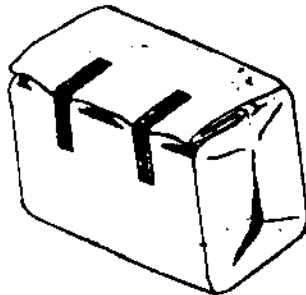
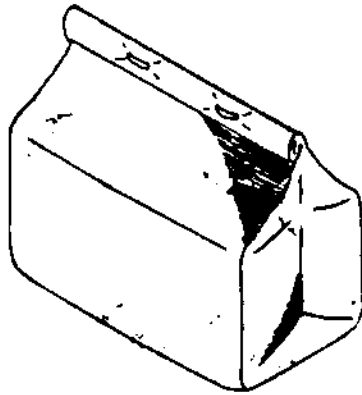
- I. Bags
- II. Tubing
- III. Wrap or Interleave
- IV. Pallets
- V. Bundling of Parts
- VI. Skid
- VII. Mobile Cart
- VIII. Mobile Rack
- IX. Tote Box
- X. Standard PK Container
- XI. Mercury Trailer
- XII. Special Tote Boxes
- XIII. End Caps, Thread and Edge Protection
- XIV. Mail Tubes

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3.1.13.2 Method I – Bag

A. Kraft Bag

1. Place small, lightweight, uncoiled parts such as shims, clips, angles, tees, etc., in a kraft bag and close with tape or staples. The maximum weight per bag is approximately 5 pounds.
2. Small irregular-shaped parts may be placed individually in kraft bags and taped or stapled closed.

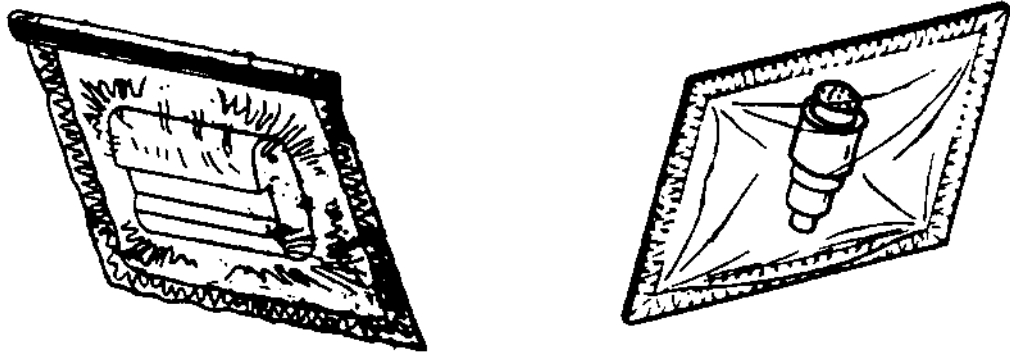


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3.1.13.2 Method I (Cont)

B. Polyethylene Bag - IS&E No. 01-37-02-0820 through 0880

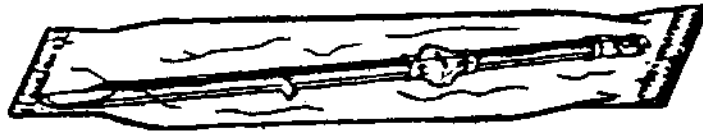
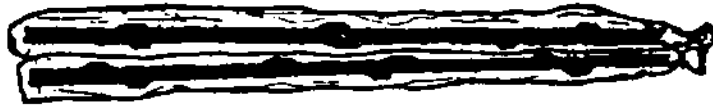
Place small electrical, machined parts having a surface finish of 63 R.M.S. or less, e.g., 32 R.M.S., 16 R.M.S., etc., or critical parts such as connectors, valves, plates, elbows, etc., individually in a polyethylene bag, and tape, staple or heat seal closed. The maximum weight per bag is approximately 3 pounds.



3.1.13.3 Method II – Tubing

Polyethylene Tubing

1. Place long finished parts or assemblies such as spars, longerons, wing hinges, etc., individually in tubing and close ends with tape or staples. These parts may also be individually wrapped in accordance with Method III A.
2. Bundle long parts such as angles, tubing, stringers, etc., and place in tubing and close ends with tape or staples.

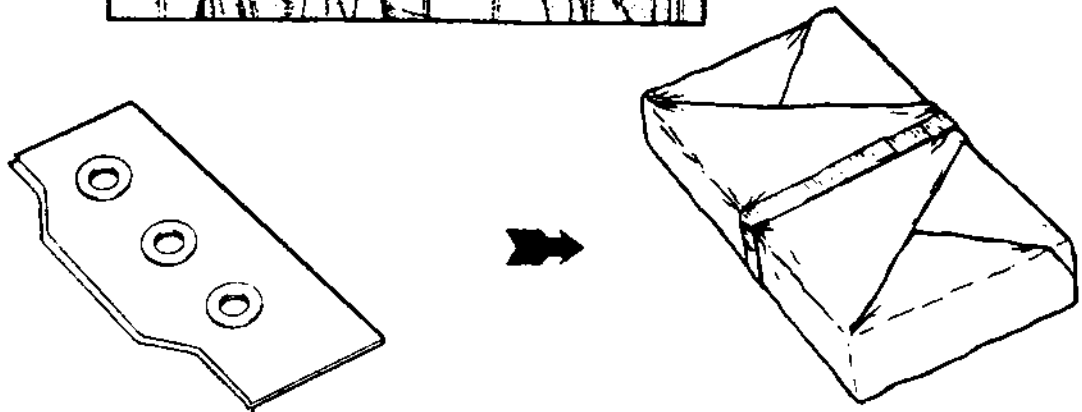
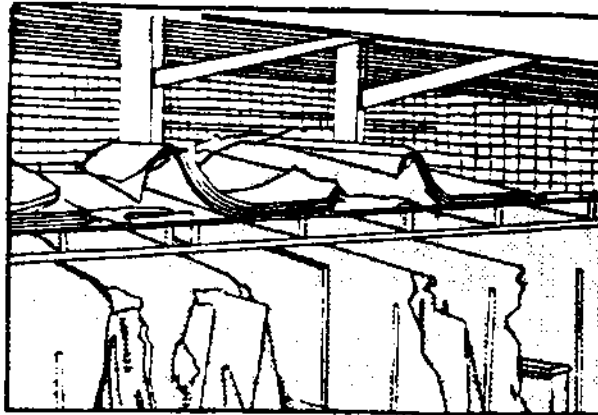
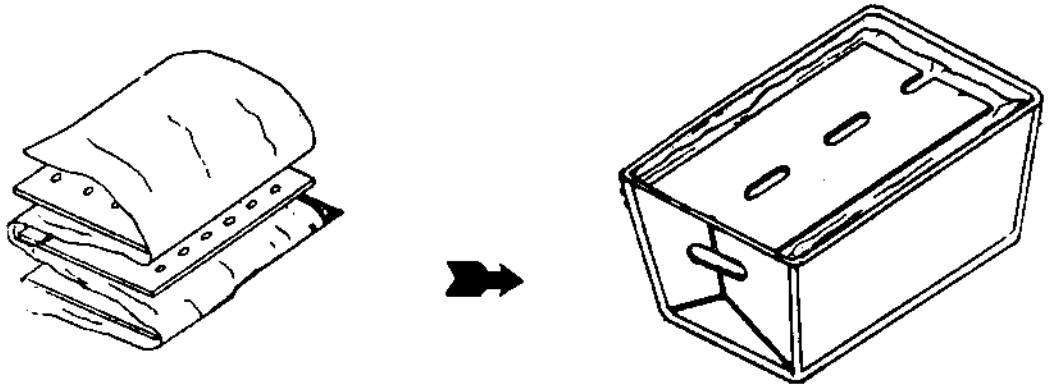


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3.1.13.4 Method III – Wrap or Interleave

A. Neutral Kraft Paper

1. Individually wrap parts that are not oiled or that do not have sharp projections or irregular shapes with kraft paper and secure with tape.
2. Interleave flat or contoured skins, plates, sheets, etc., with kraft paper.



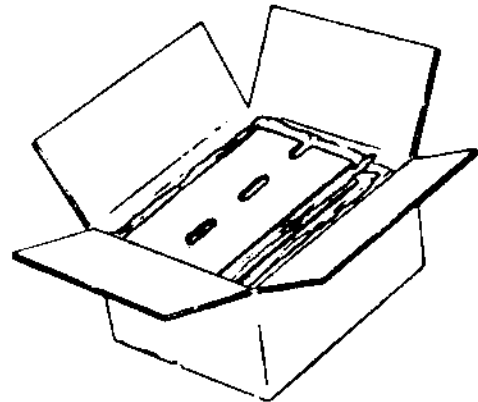
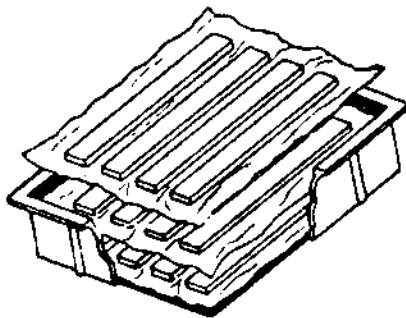
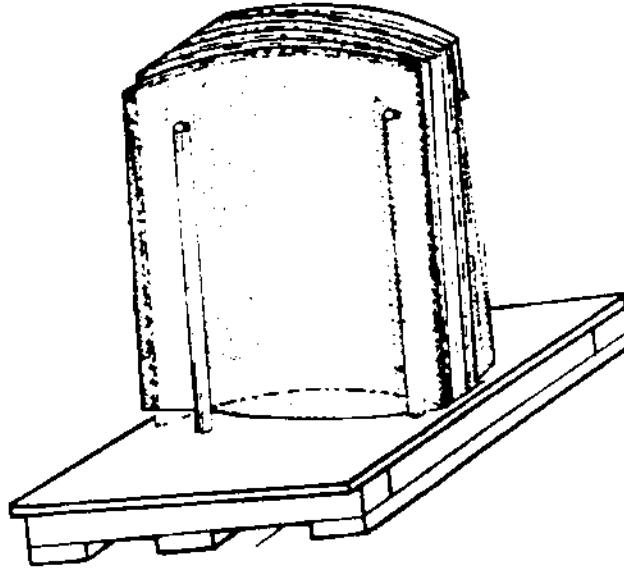


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3.1.13.4 Method III (Cont.)

B. Polyethylene Film (4 Mil)

Interleave flat or contoured skin, plates, etc., with polyethylene film.

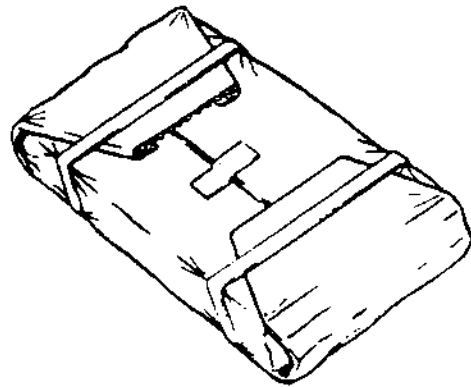
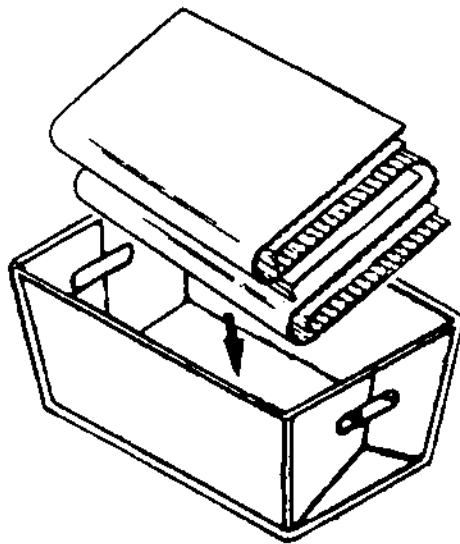
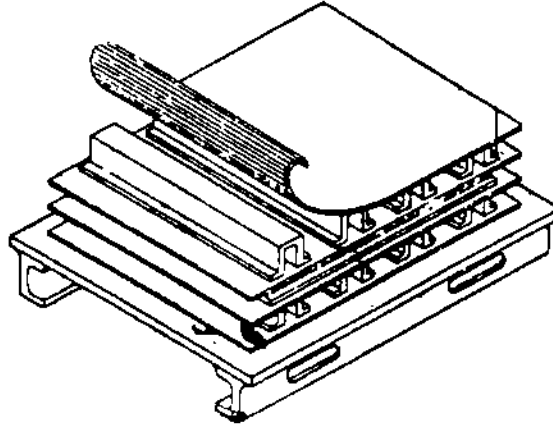


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3.1.13.4 Method III (Cont.)

C. Single-Face Corrugated Fiberboard

1. Wrap heavy or large parts that have sharp projections, irregular shapes, or machined surfaces with corrugated fiberboard and tape securely in place.
2. Interleave machined parts or flat skins, sheets, plates, etc., with corrugated fiberboard.

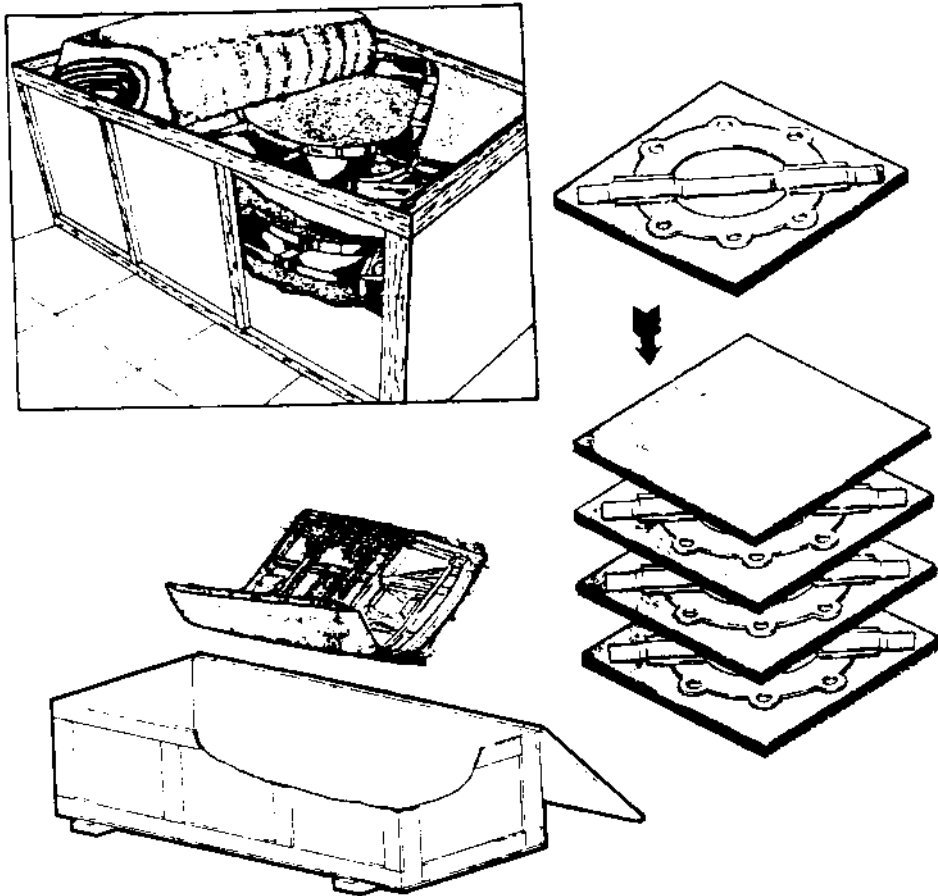


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3.1.13.4 Method III (Cont.)

D. Polyethylene Foam

1. Wrap fragile parts and assemblies, or heavy parts with sharp projections or irregular shapes, individually with polyethylene foam and tape securely in place.
2. Interleave, with polyethylene foam, heavy machined parts, assemblies or parts accumulated in containers or on pallets.

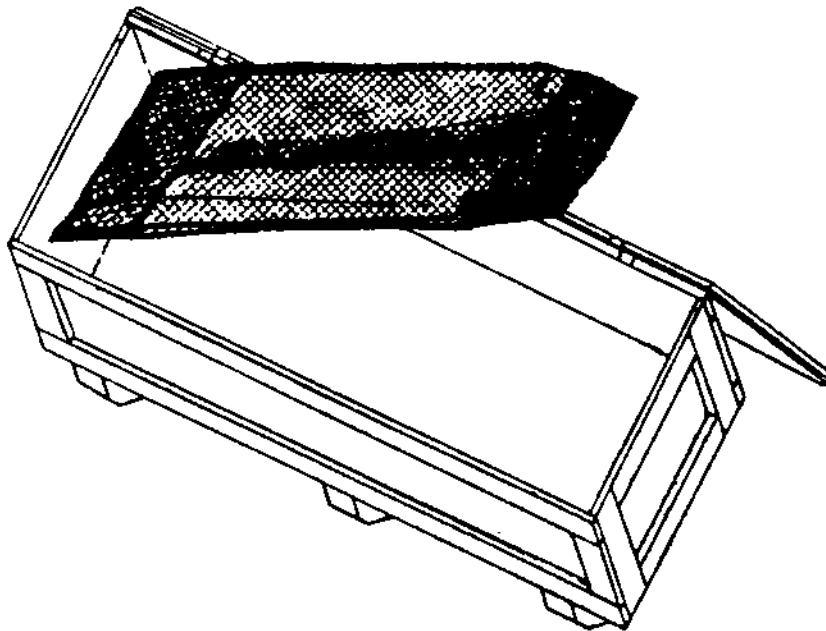
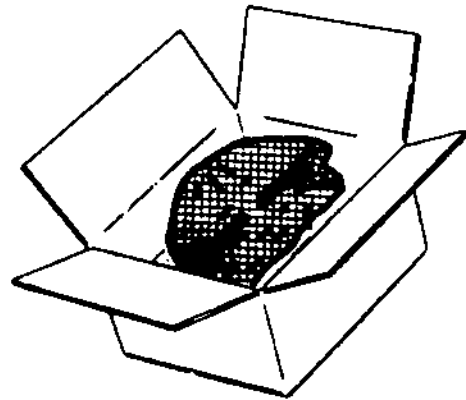
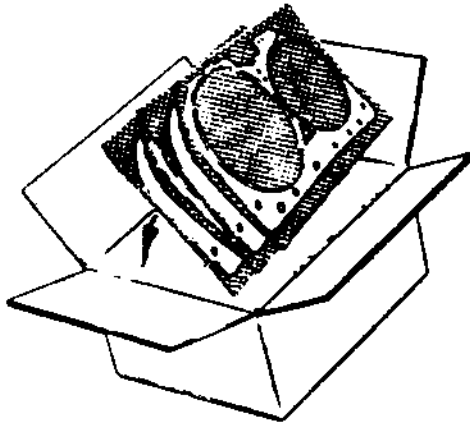


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3.1.13.4 Method III (Cont.)

E. Flexible Cellular Plastic Film (Aircap)

1. Wrap fragile parts and assemblies, heavy parts with sharp projections, irregular shapes, or parts having machined surfaces with aircap and tape securely in place.
2. Interleave with aircap, parts or assemblies accumulated in containers or on pallets.

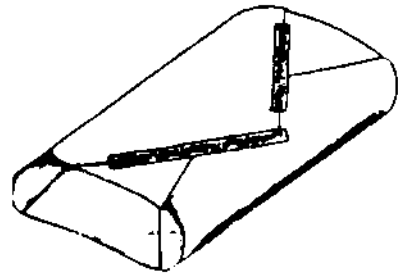
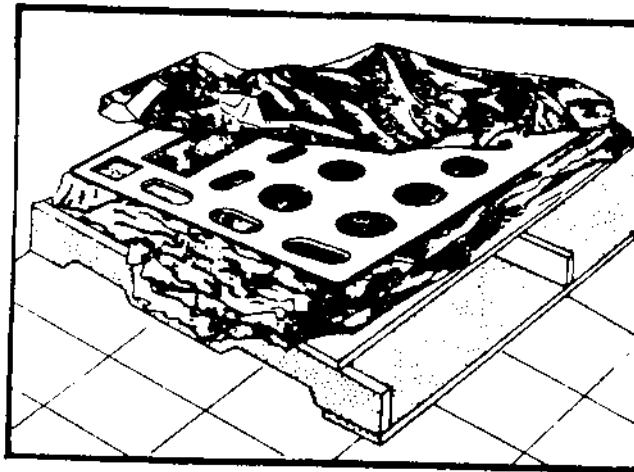
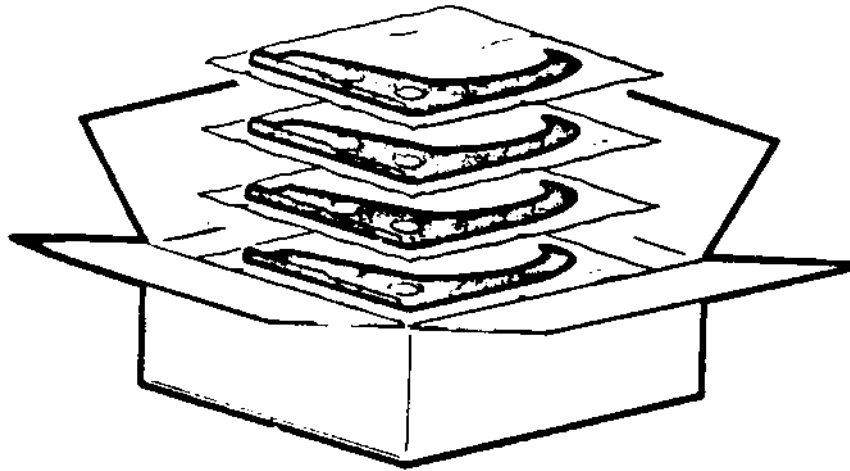


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3.1.13.4 Method III (Cont.)

F. Cellulosic Cushion (Kimpac)

1. Wrap fragile parts or assemblies, large or heavy parts with sharp projections, irregular shapes or parts having machined surfaces with kimpac and securely tape in place.
2. Interleave skins, plates or assemblies, except those with bare metal surfaces, with kimpac.

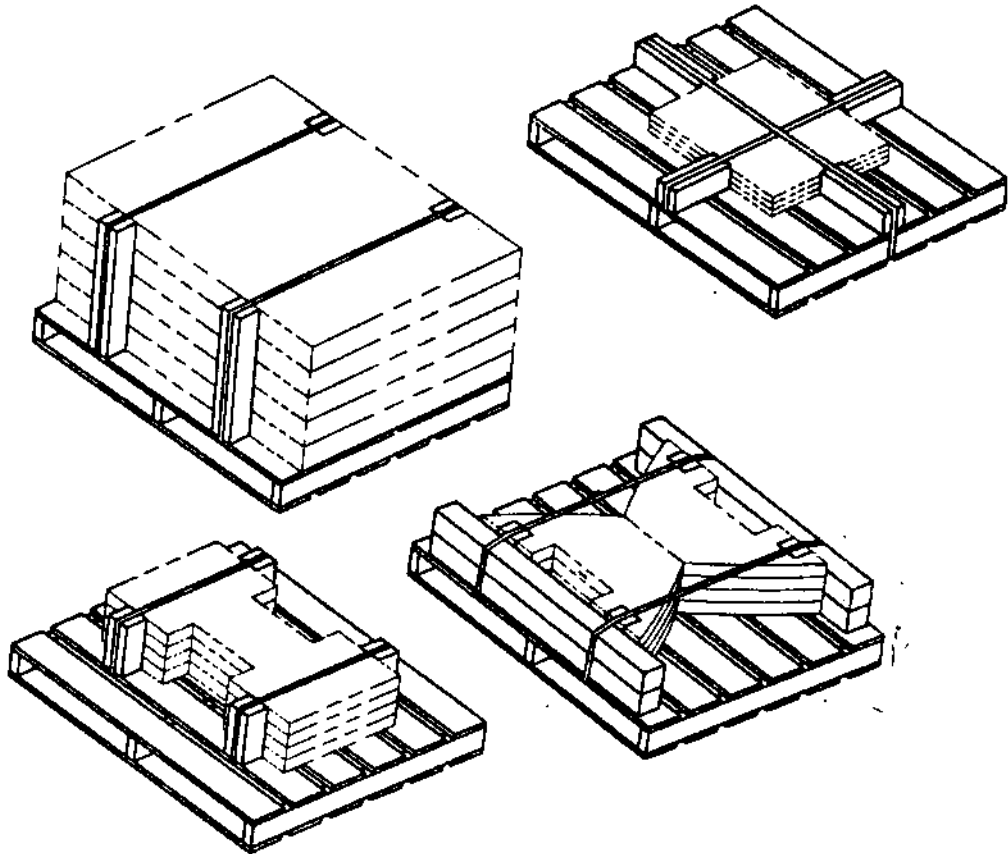


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### 3.1.13.5 Method IV – Pallets

Place heavy, bulky, irregular shaped parts such as forgings, castings, raw stock, etc., on pallets and secure with steel strapping. Accumulate containers on pallets and secure with stretch or shrink wrap, or steel or plastic strapping.

- NOTES:
1. Parts or boxes shall not extend beyond the edges of the pallet.
  2. Strapping shall not be applied directly on corrugated fiberboard containers but shall have edge protectors or wood slats under strapping to prevent crushing boxes.
  3. Weight on pallet shall not exceed 3000 pounds. When strapping loads that do not cover the entire surface of the pallet, blocking and bracing as shown below shall be provided to prevent damaging the pallet.
  4. Parts too large for standard pallets may be loaded on skids, PK22221-101 through -108. See Method VI.
  5. Parts over 60 lbs. shall have nominal 2X lumber placed between each part.

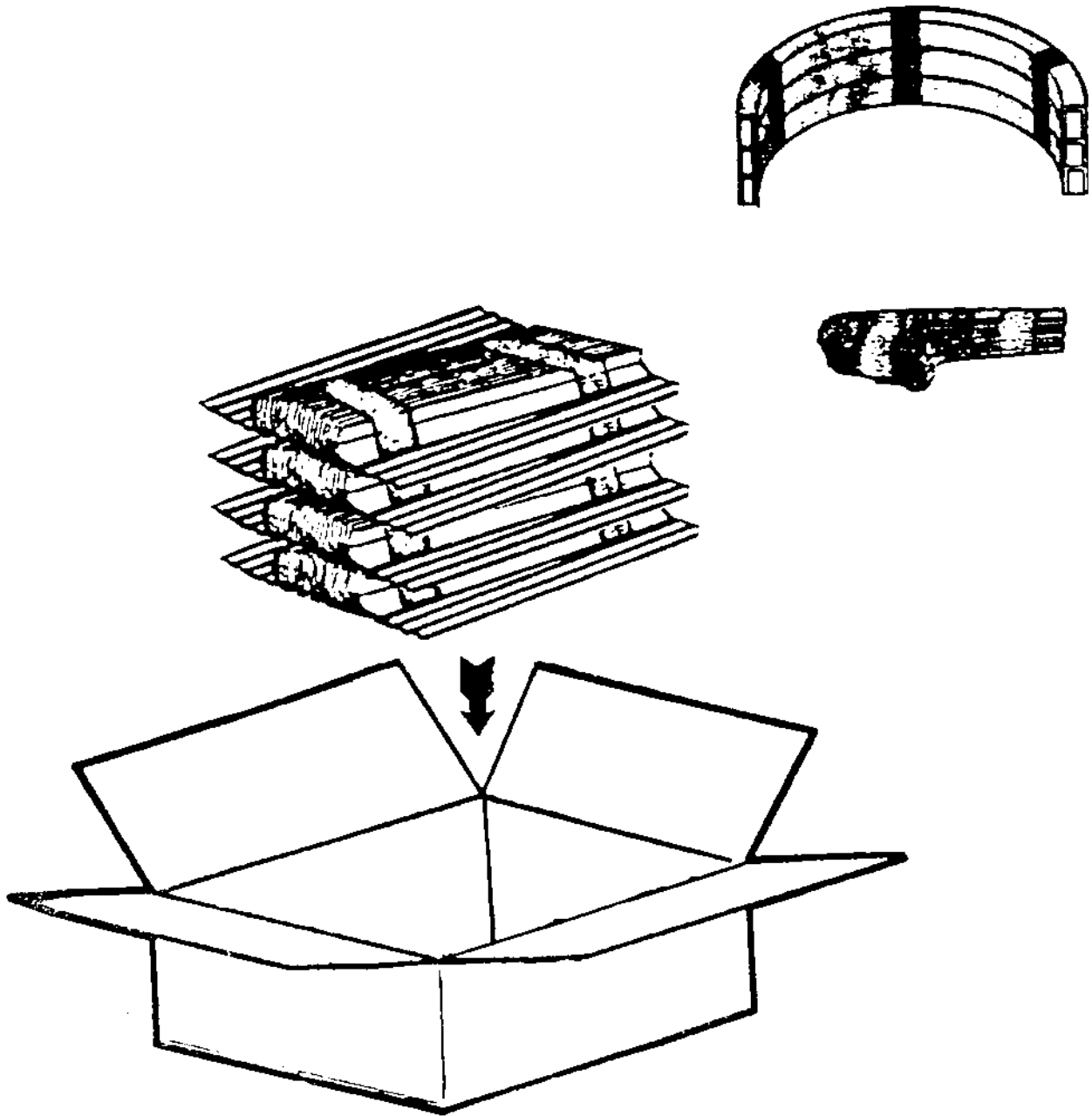


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3.1.13.6 Method V – Bundling of Parts

Parts that do not have exterior moldline surface finishes, are not machined, and are not irregularly shaped can be bundled and taped securely in at least two places with green economy tape so there is no movement between parts during normal transportation. When bundles are loaded into carts or containers, each bundle shall be interleaved with kimpac, corrugated fiberboard or polyethylene foam.

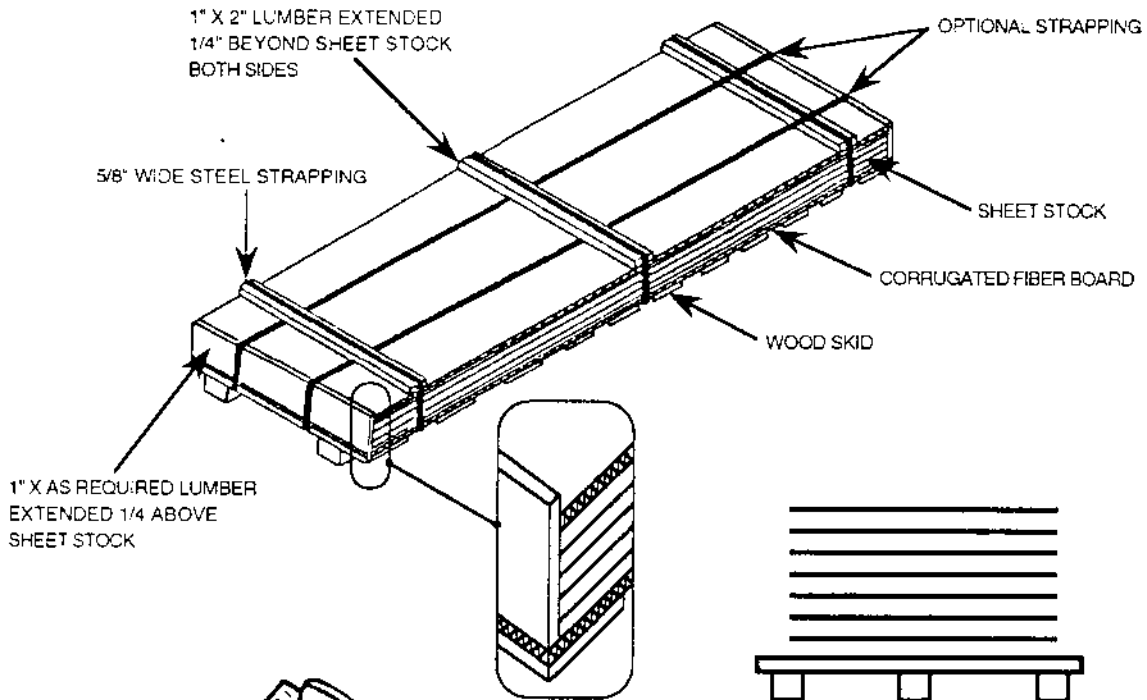
NOTE: Masking tape may be used in lieu of green economy tape provided paper is placed between the part and the masking tape.



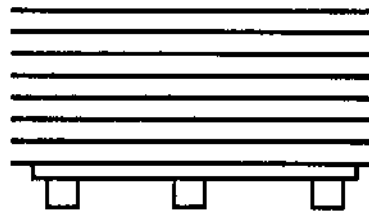
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3.1.13.7 Method VI – Skid

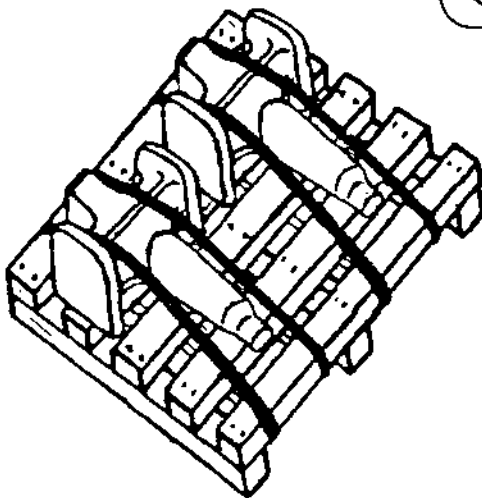
Large, heavy or long parts that exceed the size requirements of a pallet shall be placed on wooden skids, PK-22221-101 through -108, and secured with steel strapping.



**GOOD HANDLING PRACTICE**  
SIZE THE SKID TO THE PART



**POOR HANDLING PRACTICE**  
PARTS TOO LARGE FOR SKID

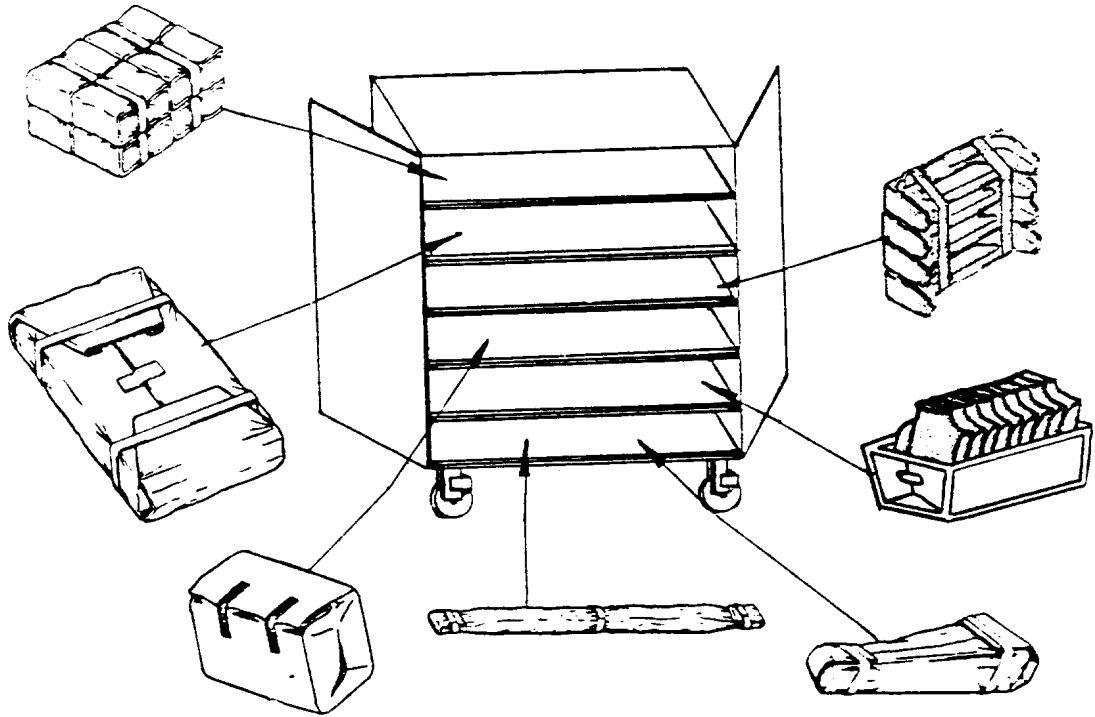




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3.1.13.8 Method VII – Mobile Cart (PK-22219)

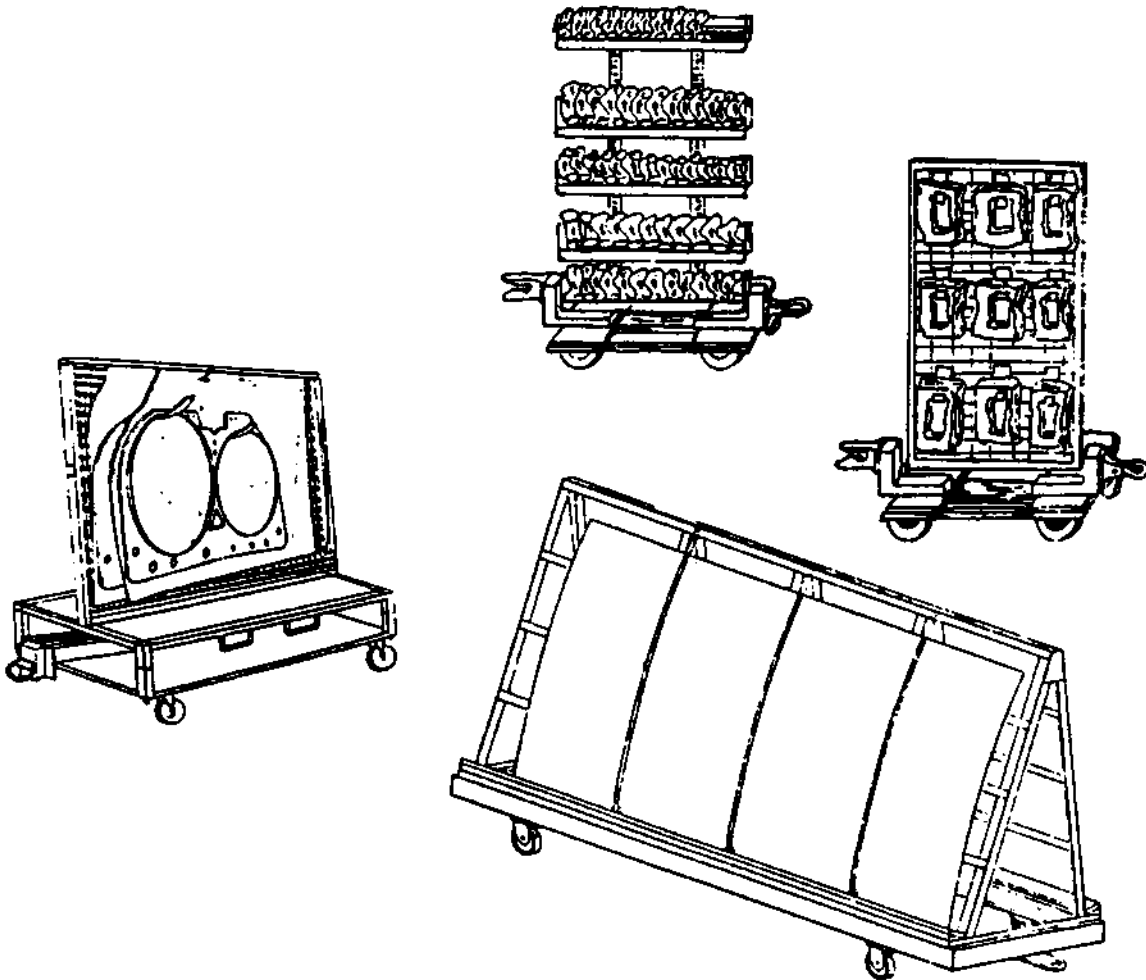
Individual parts, bundles of parts, tote boxes or containers can be placed in carts for interplant movement. The shelves of the carts shall be lined with polyethylene foam or corrugated fiberboard to protect parts and prevent movement of contents.



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3.1.13.9 Method VIII – Mobile Rack

1. Heavy machined parts, extrusions, stringers and frames may be placed on racks and secured for movement. Parts shall not contact the metal of the rack at any time. Corrugated fiberboard, polyethylene foam or kraft paper shall be placed between parts and the rack. All arms and hooks supporting parts shall be covered with 8-mil. polyethylene or an equivalent material.
2. Parts may overhang mobile carts provided an idler trailer (mercury type) is placed under the overhanging parts. Idler trailers may be loaded if the load does not interfere with the overhanging parts.

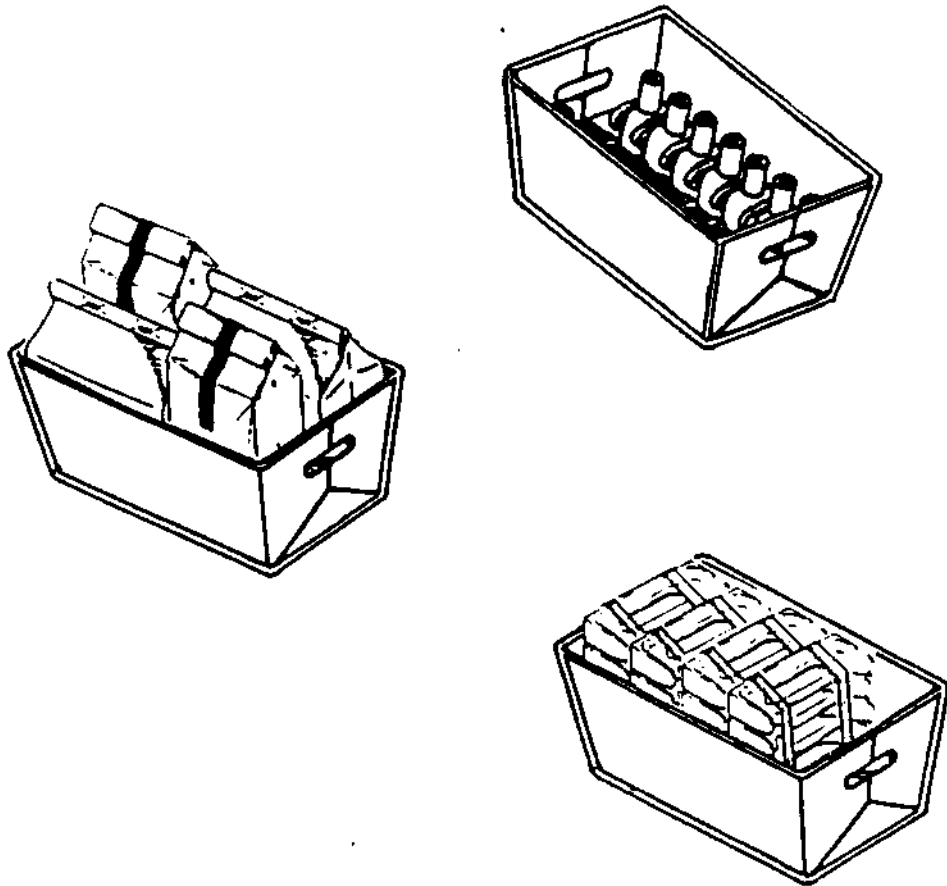


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### 3.1.13.10 Method IX – Tote Box

Small parts, bagged or bundled parts can be placed in tote boxes and cushioned to fit snugly for in-plant or interplant movement. The tote boxes must be placed in containers or mobile carts and cushioned to prevent movement for interplant shipments. Tote boxes can be placed on mercury trailers and secured as necessary for in-plant movement.

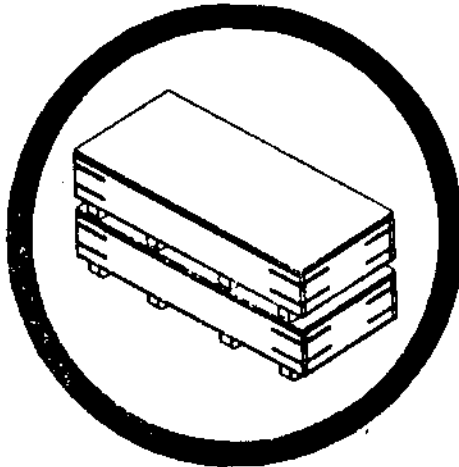
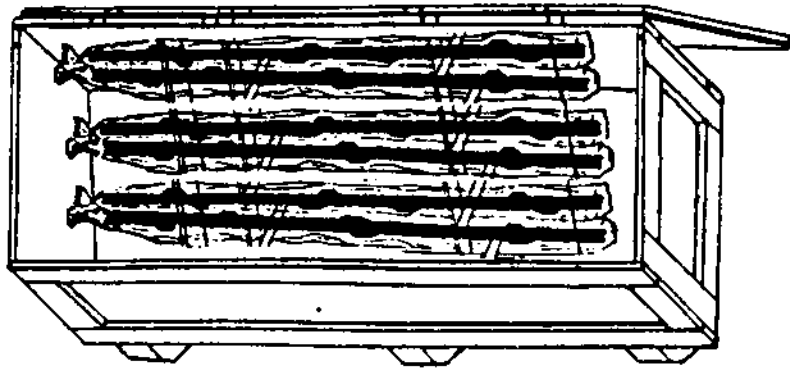
- NOTE:
1. There shall be no stacking of parts, tote boxes or containers on top of loaded tote boxes such that the stacked item comes in contact with the parts in the loaded tote box.
  2. Parts loaded in tote boxes shall not overhang the edges of the box.



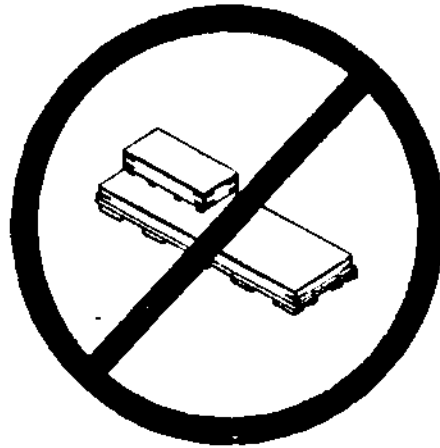
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3.1.13.11 Method X – Standard PK Containers (PK-22100-XXX)

1. Large, bulky or heavy parts, long extrusions or tubing, irregular shaped parts, skins or sheets can be placed in standard PK containers. Parts shall be wrapped, cushioned or interleaved as required with corrugated fiberboard, polyethylene foam, kimpac or aircap. Containers shall be closed with polypropylene or steel strapping, a minimum of two places, for movement between Northrop Grumman facilities.
2. Different part numbers (unless accumulated in boxes or bundled and wrapped) shall not be mixed in a single PK container.
3. Boxes shall not be placed on top of wrapped parts in the same container. Boxes and unboxed parts shall not be mixed.
4. Delicate parts shall not be commingled with rugged parts.
5. Only PK-containers of the same size and identification number shall be stacked during storage and transportation.



PROPER STACKING



IMPROPER STACKING

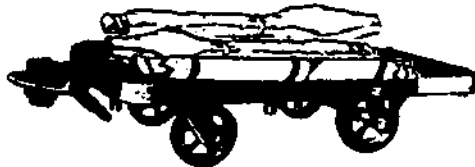
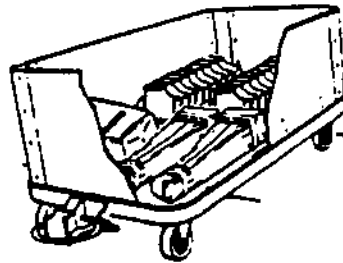
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3.1.13.12 Method XI – Mercury Trailer Moving Requirements

1. Parts shall not extend over the edges of flat or tub trailers except when idler trailers are placed under the parts that extend over the trailer. Containers may extend over sides and ends by approximately 1/4 the width of the container, and idler trailers are required fore and aft when overhang exceeds the 1/4 width.

NOTE: Trailers moved by hand do not require idler trailers.

2. The interior of tub trailers, where the metal brackets may contact parts, shall be padded with kimpac, polyethylene foam or equivalent material.
3. Loose parts shall be wrapped, boxed or skidded before placing on or in trailers.

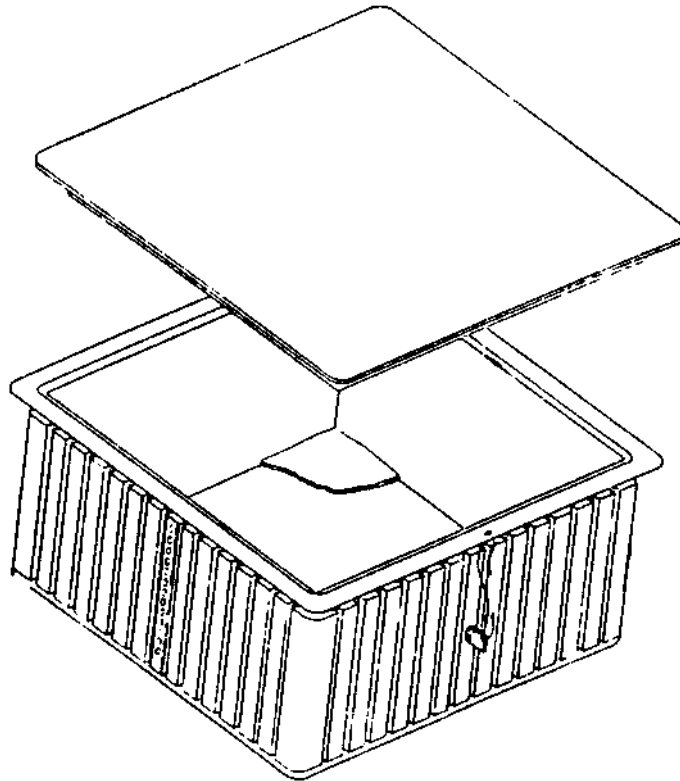


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3.1.13.13 Method XII – Special Tote Boxes

All F-18 fuel fittings shall be placed in PK-22659 during in-plant handling operations.

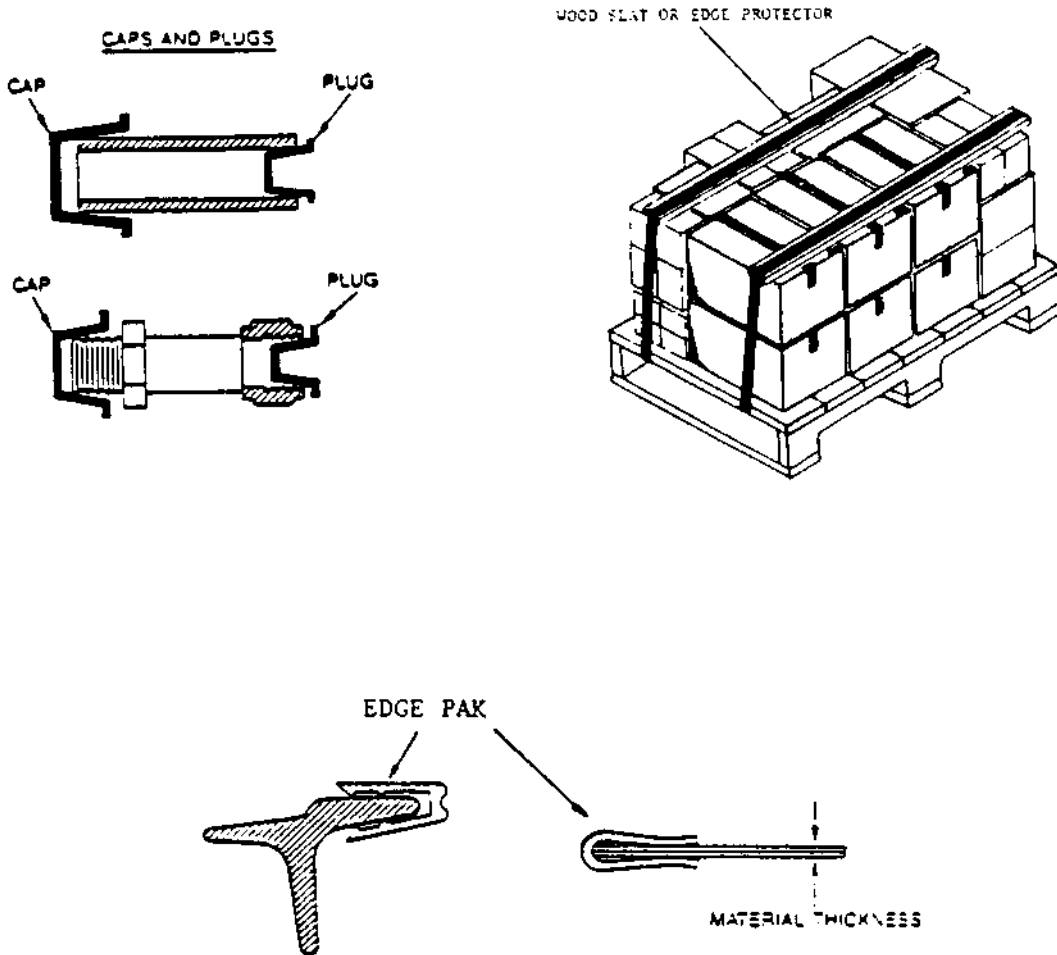
NOTE: All fuel cells not in PK-22659 shall have plastic caps on flanges and shall be placed in a rigid container and interleaved with kimpac or aircap.



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3.1.13.14 Method XIII – End Caps, Thread and Edge Protection

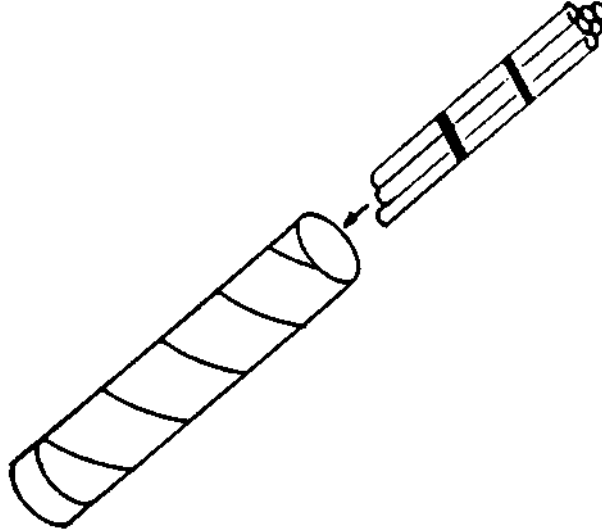
1. Seal or plug tubing or assembly openings with plastic caps to prevent the entry of moisture, dirt, and foreign matter prior to bundling, wrapping, bagging, tubing or interleaving and containerizing.
2. Critical threads or exposed threads on fuel or hydraulic lines shall be protected with end caps, plastic or corrugated fiberboard sleeving or stretchable plastic netting.
3. Protect sharp, protruding, delicate, or critical edges with plastic or corrugated fiberboard edge-pak.
4. Edge protectors or wood slats shall be placed between strapping and corrugated containers to protect the edges of the corrugated containers from being crushed.



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### 3.1.13.15 Method XIV – Mail Tubes

Place long fragile parts of assemblies in mail tubes, individually or bundled, and close ends with green economy tape, or caps.



### 3.1.14 Preservation Requirements

3.1.14.1 Table 1 describes protection requirements relative to the use of types of materials under different environments. Where more than one specification number appears in a block, they can be selected according to manufacturing circumstances.

3.1.14.2 Thoroughly clean skins, parts or assemblies free of any cutting oils, foaming oils, or lubricants prior to storage.

#### NOTES:

- a. Raw stock in original, unopened supplier containers requires no repackaging. Requirements shown are for opened containers or unpackaged materials.
- b. This applies to T-6 M. T. conditioned materials only. For all other materials, see "Bare Parts or Assemblies."
- c. Do not store outside. Interleave skins, sheets, etc., with neutral kraft paper and place in clean containers. Small parts may be protected by either Method I, V, or IX.



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**TABLE 1. PRESERVATION REQUIREMENTS**

Program	MATERIALS		NORTHROP FACILITIES					INTERPLANT Transportation
			Manufacturing	STORAGE				
	Indoor	COVERED		OUTDOOR				
		Up To 6 Months			Beyond 6 Months			
Aluminum	Condition							
Other	Raw Stock	Al Clad Sheet	None	None	P-430-3	P-430-11	Cover	
		Bare (S-B-T)	P-6950	P-6950	P-6950	P-430-11 P-430-12	(1)	
		Forging and Castings	P-6950 P-6968 P-6969	P-6950 P-6968 P-6969	P-430-11	P-430-11	P-6950 P-6968 Cover P-6969	
	Skins, Parts or Assemblies	Clad	None	None	P-430-3	P-430-3	Cover (1)	
		Machined or Bare	P-430-14 P-430-15	P-430-15 P-430-16	P-430-11 P-430-16 P-430-12	P-430-11 P-430-16 P-430-12	P-430-14 P-430-16 P-6950	
		Chem Treated Surfaces (E.G., Alodine, Anodized)	None	None	None	None	Plus Cover Cover	
	CRS, Beryllium, Copper, Bronze, Molybdenum		None	None	None	None	Cover	
	Carbon And Low Alloy Steels		P-430-14	P-430-14	P-430-11	P-430-11	P-430-11	
	Magnesium		P-6883	P-6883	P-6883	P-6883	P-6883	
	Rubber		P-6882	P-6882	P-6882	P-6882	P-6882	
	Titanium		(3)	(3)	(3)	(3)	Cover (3)	
	Painted Surfaces And Nonmetals		None	None	None	None	Cover	
	IVD (Ion Vapor Disposition)		Wrap Or Bag With Neutral Kraft Paper Or Polyethylene Film, 004 Min, And Place In Rigid Container					

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3.2 Northrop Grumman Offsite Packaging Requirements

3.2.1 All parts shall be cleaned free of dirt and other contaminants.

3.2.2 Bare metal parts shall be oiled with LPS, No.3, prior to shipment to offsite suppliers as follows:

NA = Not Applicable    Y = Oiled    N = Not Oiled

\* NOTE: Raw stock is material that will be machined 100% on all surfaces.

	2000, 7000 ALUMINUM	CARBON STEEL ALLOY	MAG- NESIUM	TITANIUM	INCONEL	17-4 PH STAINLESS STEEL
All Extrusions	Y	N/A	Y	N	N/A	N
All Sheet Stock	Y	Y	Y	N	N	N/A
All Machined Parts	Y	Y	Y	N	N	N
* Raw Stock (Plate, Bar, Castings or Forgings)	N	N	Y	N	N	N
Castings and Forgings That Are Not Raw Stock	Y	Y	Y	N	N	N

3.2.3 Materials, procedures and workmanship shall be of good commercial quality and practice and shall not cause deterioration, contamination or damage to parts.

3.2.4 Packaging requirement, except requirements for PK containers, stated on in-house Process Control Sheet (PCS) shall not apply to offsite packaging.

3.2.5 Exterior shipping containers shall be sturdy corrugated fiberboard, double wall, tri-wall, or wood/plywood containers. PK containers shall be used when specified.

3.2.6 No metal to metal contact shall occur between parts or between parts and container, except when nested and tightly bundled together so there is no movement between parts.

3.2.7 Raw Stock Slabs

3.2.7.1 Place heavy raw stock slabs on PK-22221 heavy duty skids. Strap raw stock to skid (four straps required – two straps each direction). Use 2-in. battens between parts weighing more than 60 lbs. each.

3.2.7.2 Vendor skids should be used if in good condition and able to support the weight of the slabs.

3.2.7.3 Wood or edge protectors must be used between straps and slabs.

3.2.7.4 Slabs must not overhang skids.

3.2.8 Large Raw Stock Sheets

3.2.8.1 Interleave with kraft paper or corrugated board. Use wood or edge protectors between steel straps and parts on skids. Use vendor skids or PK-22221 skids. Parts must not overhang skids.

3.2.9 Critical Surface Parts

3.2.9.1 Each part or its critical portions (external splines, threads, close-tolerance surfaces, etc.) shall be protected to prevent abrasion, contamination or damage.

3.2.9.2 Small critical parts shall have threads or critical portions capped with nonfraying plugs or caps and cushioned with aircap or kimpak as required, placed individually in a kraft or 6-mil. polyethylene bag, then placed into a container and cushioned to prevent movement.

3.2.10 External Openings

3.2.10.1 Openings to connecting or operating parts and chambers and to terminals shall be securely closed with nonfraying plugs or caps, or parts shall be placed individually in 6-mil. polyethylene bags and cushioned as required and then placed in containers for shipments.

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- 3.2.10.2 Cap or plug the ends of noncritical tubes with nonfraying caps or plugs, then bundle together and place in bags. These bags shall be placed in containers for shipment.
- 3.2.10.3 F-18 fuel fittings shall be individually packaged in 6-mil. polyethylene bags or have plastic caps placed over flanges. Parts shall then be placed in containers and interleaved with kimpak or aircap as required to protect parts .
- 3.2.11 Heavy Parts (Over 100 Lbs.)
- 3.2.11.1 Parts or sets of parts, not including raw stock slabs or sheet, shall be mounted on and secured to the platform of a box by blocking and bracing as required. Boxes shall have skids and be suitable for forklift truck handling.
- 3.2.11.2 These parts may be placed in tri-wall containers and cushioned or blocked and braced as required to prevent movement.
- 3.2.11.3 PK containers may be used when specified on PCS.
- 3.2.12 Longerons, Stringers, Frames
- 3.2.12.1 Wrap parts in either plastic tubing, kimpak, polyethylene foam or corrugated sheets, and tape closed. Place in PK container or wooden box with corrugated fiberboard or polyethylene foam between layers of parts, or place individually in corrugated cartons and place in a PK container or a wooden box. Cushion to immobilize part in boxes.
- 3.2.13 Small Parts
- 3.2.13.1 Small noncritical parts shall be placed in neutral paper bags, plastic bags or wrapped in kimpak, neutral kraft paper or bubblepak, taped closed and placed in wooded, corrugated or plastic containers. Cushion parts to prevent movement. Wooden containers shall be closed with steel strapping. Lids shall not be nailed closed.
- 3.2.14 Heat Treated Parts
- 3.2.14.1 Parts required to be maintained at freezing temperatures shall be placed in a refrigerated truck or in a freezer container packed with dry ice. Call Support Equipment and Transportability Engineering, Organization 7E80, for the appropriate PK container if not specified on the PCS.
- 3.2.15 Marking
- 3.2.15.1 Boxes shall be durably labeled or marked to show the applicable information listed below:
- “Number \_\_\_\_\_ of \_\_\_\_\_” (shipping containers)
  - “C” shipper number
  - Vendor’s name, mark or identification no.
  - Part numbers (standard, manufacturer, Northrop Grumman).
- 3.2.15.2 Precautionary and handling markings (FRAGILE, THIS SIDE UP, etc.) shall be applied as needed.
- 3.3 Supplier Packaging Requirements for General Parts and Materials
- 3.3.1 Materials, Procedures and Workmanship
- 3.3.1.1 Materials shall be of good commercial quality. Any material or constituent that contacts the part shall have no substance that can cause or promote part deterioration.
- 3.3.1.2 Newspapers and rags are not acceptable as wrapping material or dunnage.
- 3.3.1.3 Shredded paper or loose fill material such as polyethylene or polystyrene chips or chopped corrugated is not acceptable as dunnage or cushioning material.
- 3.3.2 Preservation and Protection
- 3.3.2.1 Cleaning, drying and preservation of each item shall be suitably performed by methods similar to those in specification MIL-STD-2073. All bare (uncoated or unpainted) metal parts that are not inherently corrosion resistant shall be preserved with LPS, No.3, oil or equivalent.
- 3.3.2.2 All parts preserved with grease or oil shall be wrapped with greaseproof material prior to placing in the container.
- 3.3.3 Packaging and Packing

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- 3.3.3.1 The packaging system shall be of adequate performance and minimum cost. Proper physical and chemical protection and cleanliness must be maintained. Existing or standard designs, methods, and sizes shall be used whenever practical and economical. Exposure conditions, both mechanical and physical, that create potential corrosion shall be anticipated through the transport, delivery, and acceptance phases and reflected in the protection system used.
- 3.3.3.2 Design and construction of any container shall permit nondestructive easy opening and removal of dunnage and, after part inspection, the repacking of the part(s).
- 3.3.3.3 All containers shall have lids securely attached to enclose contents within container.
- 3.3.3.4 All containers having a bottom surface area greater than 5 square feet or having contents of 50 pounds or more shall have a minimum of two skids (or runners) 2-1/2 inches thick on the bottom surface for forklift provisions.
- 3.3.3.5 Containers that have identification printing or logos other than that of the supplier that is supplying the parts to Northrop Grumman shall not be used.

Example: ABC Milling Company shall not send parts to Northrop Grumman in Mrs. Tucker's Cooking Oil containers.

- 3.3.3.6 Different part numbers shall not be packed in the same unit container, except that items of different dash numbers that do not have any dimension greater than fifteen inches may be packed in the same container provided each group of items are wrapped or bagged and identified.
- 3.3.3.7 When more than one part is placed in a single container (multiple quantities), each part shall be wrapped, bagged or interleaved with acceptable material to prevent scratches or other damage to parts. The total quantity of parts shall not exceed the weight limitation of the container used and shall provide for ease in handling and storage. Quantity of parts in a single container shall be as follows:

Raw stock is exempt from quantity limits.

<u>Weight of Part</u>	<u>Size of Part</u>	<u>Max. Qty per Container</u>
Up to 1/2 pound	Up to 6 inches	100 parts
Up to 1 pound	Up to 18 inches	50 parts
Up to 2 pound	Up to 36 inches	25 parts
Up to 5 pound	Up to 60 inches	10 parts
Up to 10 pound	Up to 96 inches	5 parts
Over 10 pounds	Any size	1 part

- 3.3.3.8 The latest applicable public carrier rules and regulations shall be used including Uniform Freight and National Motor Freight Classifications.
- 3.3.3.9 The shipping container shall be able to withstand and adequately protect each part and package from rough handling and transportation to the procuring activity.

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- 3.3.3.10 Raw stock material, rough forgings, and rough castings may be shipped on pallets or skids in accordance with the following requirements:
- The load shall not extend beyond any edge of the pallet or skid.
  - The load shall be secured so there is no movement on the skid or pallet.
  - The weight of the load shall not damage the pallet or skid during handling and transportation.
  - Individual wrapping, bagging or interleaving is not required.
  - Individual pieces weighing over 50 lbs. shall be separated with minimum 2-inch nominal lumber, two places.
  - Steel strapping shall not be placed directly on parts. Corner protection and or blocking shall be used between strapping and parts.

3.3.3.11 Packaging Electronic and electrical parts must provide protection against physical and environmental damage during shipment and storage

3.3.3.11.1 Each part shall be individually packaged in a plastic bag, rigid container or other type of carrier. Protection of leads or terminal configuration shall be maintained as manufactured without causing damage to the part. Package shall permit item removal and replacement without damage. Carriers which provide multiple parts packaging of small electronic parts, e.g. resistors, diodes, integrated circuits etc., shall physically separate each part.

3.3.3.11.2 Individually packaged parts shall be placed in intermediate or shipping containers for delivery. A maximum quantity of 25 parts shall be accumulated into an intermediate container.

3.3.3.11.3 Cushioning and wrapping material shall prevent puncture or damage to part or container and shall be neutral and non-corrosive. Loose fill material is not acceptable.

3.3.3.11.4 Packaging of electrostatic sensitive parts shall be packaged per Material Handling Manual Specification P-003.

3.3.3.11.5 Suppliers standard package is acceptable provided it meets the requirements of this Specification.

3.3.3.11.6 Requirements noted on Drawings and Commodity Specification take precedence over this Specification

### 3.3.4 Marking

Containers shall be durably labeled or marked to show applicable items listed below:

Exterior (shipping) containers: Show items 1 through 5

Intermediate boxes: Show items 4 through 6

Unit containers: Show items 3 through 8

- "Number \_\_\_\_ of \_\_\_\_" (shipping containers)
- Northrop Grumman Purchase Order number and item (listing) number on P.O.
- Supplier's name, mark or identification number
- Quantity of items in container (over 1)
- Part numbers (standard, manufacturer, and Northrop Grumman)
- Part name or description
- Manufacture or assembly date (month/year)
- Rubber cure date (calendar quarter and year, i.e., 2Q 81).

3.3.4.1 Precautionary and handling markings (FRAGILE, THIS SIDE UP, etc.) shall be applied as needed. Restrictions against exposure to inclement weather shall be noted for applicable shipping containers.

3.4 Supplier Packaging Requirements for Machined Parts and Sheet Metal Parts

3.4.1 Newspaper and rags are not acceptable as wrapping material, cushioning or dunnage.

3.4.2 Containers shall be adequate, economical and of standard materials, sizes and designs.

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- 3.4.3 Materials, procedures and workmanship shall be good commercial quality and practice and shall not cause deterioration or contamination of the parts.
- 3.4.4 Shredded paper or loose fill material such as polyethylene or polystyrene chips or chopped corrugated is not acceptable as dunnage or cushioning material.
- 3.4.5 Commingling of different parts (items having different part numbers) or different sets (different groups of mating components) is not permitted for unit or intermediate containers.
- 3.4.6 Cleaning, Drying and Preservation
- 3.4.6.1 All bare metal machined parts except titanium, or inconel, or stainless steel shall be oiled with LPS, No.3.
- 3.4.6.2 Cleaning, drying and preservation shall be thorough and shall prevent corrosion of parts during shipment, receipt, inspection and for at least 90 days of indoor storage when retained in the original container without removal of preservation materials.
- 3.4.6.3 Hydraulic parts shall be flushed, completely fitted, then drained to drip-point using MIL-H-46170B(2) fluid that is 10-micronfilter clean.
- NOTE: Engineering drawing may require drain to about 95% fill for shipment.
- 3.4.7 Unit Packaging
- 3.4.7.1 Each part shall be packaged in a clean, transparent, flexible bag, or each part shall be wrapped or interleaved with greaseproof paper to prevent abrasion, contamination or damage. Bags shall be a minimum of 4 mil. for parts up to 5 lbs. and 6 mil. for parts over 5 lbs.
- 3.4.7.2 Bags shall be pressed-closed (zipped), stapled or taped closed. Wrapped parts shall be taped securely.
- 3.4.7.3 Unit package shall provide for safe removal, repackaging and storage of parts .
- 3.4.7.4 External openings to connecting or operating parts and chambers and to terminals shall be securely closed with nonfraying plugs or caps.
- 3.4.7.5 Accessory hardware shall be firmly assembled or attached to each part or grouped in sets for each part and secured with the bag.
- 3.4.8 Intermediate Packaging
- 3.4.8.1 Small-size unit bags, 2 lbs. or less, shall be boxed. The same quantity of either 15, 10 or 5 shall be loaded uniformly into a corrugated box (20 lbs. maximum). Any leftover units shall be packaged as an odd lot.
- 3.4.8.2 Box upper flaps shall be latched, interlocked or closed with tape.
- 3.4.8.3 Intermediate boxes that are taped closed and meet the requirements of paragraph 3.4.9.8 may be used as exterior shipping container.
- 3.4.9 Exterior Packaging

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3.4.9.1 Each bagged, wrapped part or intermediate box shall be placed in a container in accordance with Table II:

**TABLE II. CONTAINER REQUIREMENTS**

WEIGHT AND SIZE LIMITATIONS	CONTAINER
Up to 20 lbs. / Up to 30 Ins.	Corrugated Box, 200 # Test Double-Faced Corrugated
20 to 40 lbs. / 30 to 72 Ins.	Corrugated Box, 275 # Test Double-Faced Corrugated
Over 40 lbs. / Over 72 Ins.	Wood Box

3.4.9.2 More than one part per container is permitted with the following requirements:

1. Each part shall be cushioned or held apart as needed to prevent damage during handling and transporting to ACS.
2. Layers of parts shall be separated with sheets of corrugated or solid fiberboard. Sturdy, held-in-place shield supports, fillers and cushioning shall be positioned to prevent part damage or any pressure on sensitive or unsupported areas and projections (such as solder lugs, shafts and terminals).
3. Odd-shaped and contoured parts may be nested together if no permanent distortion results.

3.4.9.3 Corrugated boxes shall meet requirements of Consolidated Freight Regulation Rule 41 and ASTM D5118 and ASTM D1974.

3.4.9.4 Corrugated boxes shall be closed by taping (preferred) and/or staples so they may be reused for storage. Bottom flaps may be glued to keep boxes square and increase strength.

3.4.9.5 Wood containers shall be made of wood or plywood.

3.4.9.6 The type and strength of wood boxes shall be adequate for the contents, normal stacking and the concentrated loads of forklift truck handling. Construction shall be good commercial practice. All wood boxes shall have runners a minimum of 1-1/2 inch thickness for forklift entry.

3.4.9.7 All wood box covers shall be securely attached to the sides and ends of the container.

3.4.9.8 The exterior containers as packed shall protect each part and package during ordinary handling and shipment. They shall meet the minimum packaging requirements of the common carriers.

3.4.10 Marking

3.4.10.1 Containers shall be durably labeled or marked to show applicable items listed below:

- Exterior (shipping) containers: Show items 1 through 6
- Intermediate boxes: Show items 4 through 6
- Unit package: Show items 3 through 7

- (1) "Number \_\_\_\_\_ of \_\_\_\_\_" (shipping containers)
- (2) Northrop Grumman Purchase Order number and item (listing) number on P.O.
- (3) Supplier's name, mark or identification number
- (4) Quantity of items in container (over 1)
- (5) Part number
- (6) Part name or description
- (7) Manufacture or assembly date (month/year).

3.4.10.2 Precautionary and handling markings (FRAGILE, THIS SIDE UP, etc.) shall be applied as needed. Restrictions against exposure to inclement weather shall be noted for applicable shipping containers.

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- 3.5 Supplier Direct Shipment (direct to Northrop Grumman's customer)
- 3.5.1 Unless otherwise specified in the Purchase Order (P.O.) deliverable items shall be preserved &and packaged for supplier direct shipment per MIL-STD-2073.
- 3.5.2 Any deliverable item/items that require special or unique preservation and/or packaging instructions for supplier direct shipment shall be specified in the P.O.
- 3.5.3 If specified in the P.O., the supplier shall submit packaging Data per Northrop Grumman Air Combat Systems Materials Handling Manual Specification P-500 (ref. Para. 3.5)

#### **4.0** PRODUCT QUALITY

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- 4.1 Surveillance shall be maintained of the packaging, handling, and transportation covered by this specification to ensure compliance with the requirements specified herein.
- 4.2 Packages not conforming to the requirements herein may be rejected and returned to the supplier at his expense.

#### **5.0** PREPARATION FOR DELIVERY

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- 5.1 This section is not applicable to this specification.

#### **6.0** NOTES

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- 6.1 Information pertaining to, or additional copies of, this specification may be obtained from
- Northrop Grumman Corporation  
Air Combat Systems  
Support Equipment and Transportability Engineering  
Orgn 7E80/W2  
One Hornet Way  
El Segundo, CA 90245-2804