

MIL-P-45449B (AR)

30 August 1984

SUPERSEDING

MIL-P-45449A (MU)

12 December 1968

## MILITARY SPECIFICATION

### PALLET, UNITS, WOOD, FOR SHIPMENT OF PROJECTILE METAL PARTS, AND PROJECTILE AMMUNITION

This specification is approved for use by the US Army Armament Munitions and Chemical Command, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers the material, construction and design of wood pallet units used for the movement and storage of ammunition projectiles with mechanical handling equipment.

#### 1.2 Classification.

1.2.1 Grade, type and style. This specification covers two grades, two types, and two styles of wood pallet units as follows:

##### Grade

- Grade A - Pallet units for domestic and overseas shipment of loaded projectiles for issue ammunition (see 6.11)
- Grade B - Pallet units for interplant shipment of inert projectiles, and non-issue ammunition components.

##### Types

- Type I - Cover and base assemblies with retaining holes as shown on figure 1.
- Type II - Cover and base assemblies without retaining holes.

FSC 8140

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, US Army Armament Research and Development Center, Attn DRSMC-QA, Dover, New Jersey 07801 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter

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## Styles

- Style A - With demountable sides and ends as shown on figure 3.  
 Style B - Without demountable sides and ends as shown on figure 2.

1.2.2 Size and weight. The length and width of the pallet units shall be as specified on applicable drawing or contractual document. Length shall be considered as the dimensions parallel to the skids. The maximum length shall not exceed 62 inches and the maximum width shall not exceed 48 inches. The maximum net weight to be contained by any pallet unit shall not exceed 2,000 pounds unless otherwise authorized by the contracting officer.

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standards. Unless otherwise specified (see 6.1) the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation, form a part of this specification to the extent specified herein.

## SPECIFICATIONS

## FEDERAL

- |           |   |   |
|-----------|---|---|
| FF-N-105  | - | Nails; Wire and Staples                                       |
| MMM-A-188 | - | Adhesive: Area-Resin-Type (Liquid and Powder)                 |
| QQ-S-781  | - | Steel Strapping, Flat   |
| TT-I-1795 | - | Ink, Marking Stencil, Opaque (Porous and Non-Porous Surfaces) |
| UU-T-81   | - | Tags, Shipping and Stock                                      |

## MILITARY

- |            |   |   |
|------------|---|---|
| MIL-A-2550 | - | Ammunition and Special Weapons, General Specification for |
|------------|---|---|

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## STANDARDS

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-109 - Quality Assurance Terms and Definitions
- MIL-STD-1235 - Single and Multilevel Continuous Sampling Procedures and Tables for Inspection by Attributes.

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of the specification to the extent specified herein.

## DRAWINGS

## US ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER

7548605 - Clip, Corner

(Copies of specification, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer).

2.2 Other publications. The following documents form a part of this Specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM-D2016 - Moisture Content of Wood, Standard Test Methods for

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

## 3. REQUIREMENTS

3.1 Material.

3.1.1 Wood species. Pallet units constructed in accordance with this specification shall be made from the species of woods specified in Tables I and II, unless further restricted by the procuring activity.

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TABLE I

Group of Wood Species Permitted  
for Construction of Pallet Units

<u>GROUP I Softwood</u>	<u>Group II Hardwoods</u>	<u>Group III Hardwoods</u>
Hemlock	Ash (Black)	Elm (all species)
Cypress	Butternut	Oak (all species)
Fir (Noble or White)	Cottonwood	Hackberry
Pine (all species)	Magnolia	Hickory
	Maple (Soft)	Ash (all species except Black)
Spruce (all species)	Poplar (Yellow)	Birch (all species except Paper)
	Birch (Paper)	Maple (all species except Soft)
	Aspen	Gum (all species)

TABLE II

<u>Pallet Units</u>	<u>Individual Species &amp; Wood Group (Table I)</u>	<u>Pallet Parts</u>
Grade A	Group I or II Group III Douglas Fir, Larch	All parts Skids only Skids only
Grade B	Groups I, II or III Douglas Fir Cedar Larch	All parts All parts All parts All parts

When the load on Grade A pallet units is anchored, blocked or braced by the use of metal fasteners or bolts, the bearing surface beneath the bolt head or fastener shall be Group II or Group III wood.

3.2 Moisture content

3.2.1 Grade A pallet units. Lumber for Grade A pallet units shall be seasoned to a moisture content of not less than ten percent nor more than eighteen percent.

3.2.2 Grade B pallet units. Lumber for Grade B pallet units shall be seasoned to a moisture content of not more than twenty-two percent.

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3.3 Thickness and width3.3.1 Grade A and Grade B pallets

3.3.1.1 Thickness. Occasional variations in thickness due to mismanufacture will be permitted provided that maximum variation on any piece does not exceed minus (-) 1/16 inch or plus (+) 1/8 inch for pieces 1 5/8 inches or thicker or does not exceed - 1/32 inch or + 1/16 inch for pieces 1 9/16 inches thick or less.

3.3.1.2 Width. Width of lumber shall be as specified on applicable drawings. Occasional variations will be permitted provided they do not exceed 1/8 inch. A piece of lumber shown on the applicable drawing shall be a single unjointed piece except Linderman-jointed pieces of lumber, fabricated as specified in 3.4, may be used. Pieces of lumber may be butt-jointed or tongue-and-groove-jointed to form an assembly. The type of joint used in the assembly shall conform to the applicable drawing or shall be as described on the invitation for bids or request for proposal. All joints shall be tight when fabrication of the assembly is completed. When the width of deck boards in the base or cover assembly of Grade B pallets is not specified in the applicable drawings, the width shall be the widest practicable for the assembly. Not more than one-third of the boards may have a minimum nominal width of four inches.

3.4 Quality

3.4.1 Linderman-jointed pieces. Individual pieces required in the construction of pallet units may be formed by Linderman-jointing narrow widths of lumber. The jointed pieces shall be inspected as required for individual pieces. Linderman joints shall have two dovetail-shaped projections (tongues) along the edge of one member that shall extend into corresponding recesses (grooves) in the edge of the adjoining member according to figure 4. Also, the tongues shall be tapered from one end of the board to the other and shall fit tightly into correspondingly tapered grooves. The assembled joints shall have the following dimensions: for 4/4 thick lumber, 3/32 inch deep by 3/16 inch wide; for 5/4 and 6/4 thick lumber, 1/8 inch deep by 5/16 inch wide; and for 8/4 thick lumber, 5/32 inch by 3/8 inch wide. A tolerance of + 1/32 inch in the above dimensions of the assembled joint shall be permitted. The glue used in Linderman joints shall be urea-resin glue conforming to MMM-A-188. In addition to these requirements, the joints for Grade A pallet shall be tight and shall pass the tests specified in paragraph 4.4.4.2 when in accordance with paragraph 4.5.2.

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3.4.1.1 Individual pieces. The individual pieces of lumber used to construct Grade A or Grade B pallets shall be free of the defects defined below:

- a. Presence of decay
- b. Warp, bowl, cup, or crook-pieces of lumber in an assembly which provides an uneven bearing surface or in themselves vary from a true or plane surface more than 1/8 inch per lineal foot.
- c. Divergence in the grain of a piece of lumber in a pallet assembly which exceeds one inch in ten inches or less.
- d. Wane more than 3/4 inch in width and more than 1/4 inch in thickness of the piece. Wane extending the entire length of the pieces will be acceptable if the above dimensions are not exceeded and the wane does not interfere with required marking.
- e. More than five worm holes in any one piece. Holes not exceeding 1/4 inch in diameter with one hole not more than 5/8 inch in diameter.
- f. Knots that interfere with nailing or drilling. Loose knots and knot holes greater than 1/2 inch in diameter. One or more sound knots more than 1/3 the width of the piece.
- g. Chipped or torn grain, or machine skip of more than 1/8 inch variation and more than the width of the piece in length.

3.4.1.2. Acceptable lumber imperfections. Small streaks or pockets of pitch, stain or machine burn which do not interfere with the marking surfaces of the pallet will be acceptable.

3.4.2 Pallet assemblies. The Grade A and Grade B pallet assemblies shall be free of the defects defined below:

- a. Dimensional requirements not in conformance with applicable drawings.
- b. Nailing requirements not in conformance with applicable drawings.
- c. Counterbores not as specified on applicable drawings as to size and location.
- d. Splits or season checks (Grade A pallet assemblies only).

(1) On skid. Extending in a straight plane the full length of the skid more than 1/8 inch wide or more than 1/3 the width or height of the lumber, or checks of various lengths on both sides of the skid extending at least 1/2 the length of the skid which may or may not extend in a straight plane, but whose combined depth as measured from each side of the skid would exceed 1/2 the thickness of the skid.

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(2) Base deck board. Split extending more than four inches in each direction from the nail or terminating at the edge of the board or a split extending from the end of a board into more than 1/2 the width of the circular cut-out.

(3) On cover deck board. A split extending from the end or edge of the board into the first retaining hole or a split extending from hole to hole or a split extending more than 1/2 the length of a cover deck board.

(4) On cover cleat. A split extending more than 1/2 the length of the cleat.

(5) Repair of splits. On type I pallets, a split ending on the end of the board not more than eight inches in length may be repaired with at least one nail on either side of the split. Not more than two repairs permitted on a single assembly. On type II pallets, a split terminating on an edge of a deck board not exceeding four inches in length and not more than two for all deck boards in the assembly, and not more than one split to exceed one-half the length of a deck board, will be acceptable. Splits covered under (3) and (4) may be repaired by additional nailing provided not more than two repairs are made on one assembly.

### 3.5 Nails

3.5.1 Size and type. Nails shall be mechanically deformed screw shank, ring shank, drive screw type, or smooth cement coated or chemically etched sinker, corker, cooler, or box type as specified in FF-N-105. Bright nails may be used when the combined thickness of two or more pieces being nailed together does not exceed three inches and the nails are clinched a minimum of 1/4 inch. The size of nails used for jointing two or more pieces together, unless otherwise specified on the applicable drawing, when clinching is not required, shall be as specified on the following table. Pieces shall be predrilled, if necessary, to prevent splitting.

#### SIZE OF NAILS

Thickness of lumber against nail head (inches)	Group I & II	Group III
3/4 to 7/8	7d or 8d	6d or 7d
1 to 1-1/4	9d	8d
1-3/8 to 1-1/2	10d	10d
1-5/8 or over	16d	16d

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3.5.1.1 Spacing. Nails shall be arranged as specified on the applicable drawing. If not specifically described on a drawing, nailed joints shall be nailed in accordance with the following:

a. At least two for a nominal four inches in width or less, three for a nominal six inch width, four for a nominal eight inch width and at least five for a nominal ten and twelve inch width.

b. Nails, 8d or smaller, shall be driven not less than one inch from the edge or end of the piece.

c. Nails, 16d shall be driven not less than one inch from the edge or end of the piece.

In general, spacing of nails longitudinally into cleats shall not exceed six inches.

3.5.1.2 Driving. Nails shall be driven so that neither the head, the point, nor the clinched portion shall project above the surface of the wood. Occasional overdriving of nails shall be permitted, but shall be kept to a minimum. Where of necessity, a nail is driven into a partially drilled retainer hole, the nail head shall be countersunk at least 1/8 inch below the surface of the wood.

3.6 Metal fasteners

3.6.1 Corner irons. Corner irons fastened to the ends of skids and top surface of deck boards shall be at least six inches long and one inch wide. Hot or cold rolled commercial type steel or galvanized sheet steel, 15 or 16 gage, shall be used. The iron shall not protrude into a retainer hole and at least two nails shall be used to fasten each leg of the iron to the pallet, unless otherwise specified on the applicable drawing.

3.6.2 Corner clips. When specified on the applicable drawing or by the procuring activity, corner clips shall comply with the requirements of Drawing 7548605, or commercial type equivalent. The clips shall be fastened to the pallet with not less than two 4dcc nails through each leg, unless otherwise specified on the applicable drawing.

3.7 Construction. Grade A and Grade B pallets shall be dimensionally square and accurately formed. Holes shall be drilled clean and, unless otherwise specified, a plus or minus 1/16 inch tolerance on the diameter of the hole shall be permitted. A plus or minus 1/8 inch tolerance shall be permitted on all overall pallet dimensions except where minimum dimensions



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are specified. Deckboards and cleats shall not extend beyond the ends of the skids more than 1/8 inch. Cleats shall be flush with the ends or edges of the cover or base assembly. Pieces showing wane shall be positioned with the wane edge down.

3.7.1 Surfacing. Lumber shall be finished or dressed on two sides. Edges shall be straight and square with the surface of the lumber. Unless otherwise specified on applicable drawings or by the procuring agency, lumber may be finished on one side and resawn on the other side. The finished surface of resawn lumber shall always face the upper surface of the assembled pallet. The combined surface shall be level and comply with the requirements of paragraph 3.3.1.1 for thickness of individual pieces.

3.7.2 Wood treatment. Wood seals designed to prevent or retard the loss of moisture from seasoned lumber may be used provided that they do not affect the finish of the item to be packed.

3.7.3 Repair of pallets. The repair of splits or checks in Grade A pallets by the use of corrugated fasteners, metal staples, or strapping is not acceptable.

3.8 Preservative treatment. Grade A pallets, or the finished wood parts thereof shall be completely immersed for a minimum of one minute in a solution of wood preservative PQ56 reduced with water down to 1.8 percent copper-8-quinolinolate (see 6.4) or an emulsion of wood preservative M-GARD W550 (zinc naphthenate reduced with water down to 3 percent zinc as metal (see 6.5). Alternately, Grade A pallets or the finished wood parts thereof shall be completely flooded for a minimum of one minute in PQ56 or M-GARD emulsion as to inundate all interior and exterior surfaces (when finished wood parts are dipped). Care shall be exercised to assure complete coverage of all surfaces of the board. After the dip treatment, the pallets must be air dried (or dried for an appropriate time in a kiln or oven) for a period of 24 hours minimum in a well ventilated area allowing full air circulation around all surfaces of the wood pallet. The pallets must be dried prior to shipment.

The pallet manufacturer will be required to obtain and provide all available safety, health and environmental data i.e., EPA Hazard Data Sheets, OSHA Safety Data Sheets, etc. Of specific interest are the acute, subchronic and chronic toxicity data. Also the manufacturer will also obtain any safety, health and environmental information (apparatus and procedures) to be used throughout the treated pallet life and disposal.

3.8.1 Presence of PQ56 (copper-8-quinolinolate) preservative. When treated with PQ56, the pallet shall show evidence of discoloration when tested as specified in 4.5.3.

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3.8.2 Presence of M-GARD W550 (zinc naphthenate emulsifiable) preservative. When treated with M-GARD W550, the pallet shall show evidence of discoloration when treated as specified in 4.5.4.

3.9 Pallet identification. Each Grade A pallet shall be marked on the underside of the pallet base and cover assembly by the pallet manufacturer with one-half (1/2) inch min. letters, the manufacturer's name, address and month and year of manufacture. The letters "PA" shall be annotated on opposite sides of the outer face of the base assembly and cover assembly on all pallets subjected to the PQ56 (copper-8-quinolinolate) preservative treatment in accordance with 3.8.1. The letters "PB" shall be annotated on all pallets subjected to the M-GARD W550 (zinc naphthenate emulsifiable) preservative treatment in accordance with 3.8.2. The letters shall not be less than 1 inch in height and shall be separated from all other markings. When Government procured, Grade B (interplant reuseable) pallets shall have identification markings identical to Grade A pallets except the letters "PA" or "PB", as applicable, shall be omitted. Letters and figures shall be marked with black 37038 stencil ink, TT-I-1795.

3.10 First article inspection. This specification contains technical provisions for first article inspection. Requirements for the submission of first article samples by the contractor shall be as specified in the contract.

3.11 Workmanship. Pallets shall be free of imperfections which may affect their utility. In addition, the pallets shall be free of exposed splinters, metal projections, or sharp edges which may cause injury when manually handled. All required markings shall be neat and sharply defined.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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. Reference shall be made to MIL-STD-109 in order to define terms used herein. The provisions of MIL-A-2550 shall apply.

4.1.1 Certification. The contractor shall certify that the preservative treatment used is in full conformance to the requirements of 3.8.

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4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3)
- b. Quality conformance inspection (see 4.4)

4.3 First article inspection

4.3.1 Submission. The contractor shall submit a first article sample as designated by the contracting officer for evaluation in accordance with the provisions of 4.3.2. The first article sample shall consist of twelve (12) pallets of one grade, type and style and five (5) components (i.e., lumber) which have been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. All materials shall be obtained from the same sources of supply as will be used in regular production.

4.3.2 Inspection to be performed. Samples may be subjected by the Government to any or all of the examinations and tests specified in Table III and to any or all requirements of the applicable drawings.

4.3.3 Rejection. If any pallet or component fail to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate its inspection upon any failure of the sample to comply with any of the stated requirements.

TABLE III - First article inspection

## CLASSIFICATION OF DEFECTS &amp; TESTS

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PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER as indicated by CONTRACT NEXT HIGHER ASSEMBLY
		NO OF SAMPLE UNITS	REQUIREMENT PARAGRAPH	
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	PARAGRAPH REFERENCE / INSPECTION METHOD	
	Assemblies and components			
	Components (lumber prior to assembly)	5	3.4.1.1	4.4.2.1
	Assemblies	5	as applicable	4.4.2.2
	a) Examination for defects	4	3.2	4.5.1
	b) Moisture content	4	3.4.1	4.5.2
	c) Linderman-jointer pieces (as applicable)	4	3.8	4.5.3 or 4.5.4, as applicable
	d) Presence of preservative (as applicable)			

NOTE

DPSMC-0A (D) Form 160, 1 Aug 83 replaces edition of 1 Jul 77 which may be used until exhausted.

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4.4 Quality conformance inspection

4.4.1 Inspection lot formation. The term "inspection lot" is defined as a homogeneous collection of units of product from which a representative sample is drawn or which is inspected 100 percent to determine conformance with applicable requirements. Units of product selected for inspection shall represent only the inspection lot from which drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. Homogeneity shall be considered to exist provided the inspection lot has been produced by one manufacturer in one unchanged process, using the same materials and methods, in accordance with the same drawings, same drawing revisions, same specifications and same specification revisions and complies with the provisions for submission of product as specified in MIL-STD-105. All material submitted for inspection in accordance with this specification shall comply with the homogeneity criteria specified herein, regardless of the type of inspection procedure which is being applied to determine conformance with requirements.

4.4.2 Examination. Inspection for critical defects (and major defects when so specified) shall be 100 percent. Unless otherwise specified in the Classification of Defects and Test Tables, sampling plans and procedures for major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II, except that continuous sampling plans in accordance with MIL-STD-1235 may be used if approved by the procuring activity.

4.4.2.1 Lumber, prior to assembly to Grade A and Grade B pallets (see drawing indicated by contract).

Categories	Defects	Method of Inspection
Critical:	Non defined	
Major:	Grade A - AQL 0.65 percent for each defect	
	Grade B - AQL 1.0 percent for each defect	
101.	Presence of decay	Visual (see 3.1.1)
102.	Non-conformance with Table I and Table II	Visual (see 3.4.1.1)
103.	Warp, bowl, cut or crooked pieces	Visual (see 3.4.1.1)
104.	Divergence in grain	Visual (see 3.4.1.1)
105.	Wane	Visual (see 3.4.1.1)
106.	Knot	Visual (see 3.4.1.1)

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Minor:	Grade A - AQL 1.0 percent for each defect	
	Grade A - AQL 1.5 percent for each defect	
201.	Thickness	SME (see 3.3.1.1)
202.	Width	SME (see 3.3.1.2)
203.	Worm holes	Visual (see 3.4.1.1)
204.	Chipped or torn grain or machine skips.	Visual (see 3.4.1.1)

## 4.4.2.2 Assembly, Pallet (see drawing indicated by Contract).

Categories	Defects	Method of Inspection
Major:	Grade A - AQL 0.65 percent for each defect	
	Grade A - AQL 1.0 percent for each defect	

101.	Dimensional requirements not in conformance with applicable drawings	SME (see 3.4.2)
102.	Not dimensionally square and accurately formed	SME (see 3.7)
103.	Size and location of counterbores	SME (see 3.4.2)
104.	Nailing requirements not in conformance with applicable drawings	Visual (see 3.4.2)
105.	Splits or season checks on base deckboard, cover deckboard and cover cleat	Visual (see 3.4.2)
106.	Size and type of nails incorrect	Visual (see 3.5.1)

Minor:	Grade A - AQL 1.0 percent for each defect
	Grade B - AQL 1.5 percent for each defect

201.	Splits or season checks on skid or in post	SME (see 3.4.2)
202.	Deckboards and cleats extending beyond ends of skids more than 1/8 inch	SME (See 3.7)
203.	Repair of splits incorrect	Visual (see 3.4.2)
204.	Spacing and driving of nails incorrect	Visual (see 3.5)
205.	Corner irons and corner clips incorrect	Visual (see 3.6)
206.	Cleats not flush with ends or edges of cover or base assembly	Visual ( 3.7)

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207.	Pieces of lumber showing wane not positioned with wane edge down	Visual (3.7)
208.	Lumber not finished correctly	Visual (see 3.7)
209.	Edges not straight and square with surface of lumber	Visual (see 3.7)
210.	Surface of pallet not level	Visual (see 3.7)
211.	Marking missing, misleading, or unidentifiable (see 3.9)	Visual
212.	Evidence of poor workmanship (see 3.11)	Visual

4.4.3 Assembly of pieces. Where two or more different defects occur in the same piece, neither of which are considered major, the combination of defects shall be considered as a major defect.

4.4.3.1 Grade A pallets. The cover or base assembly shall contain not more than one major defect. Side and end assemblies shall not contain any major defects; specifically large knots, loose knots, holes greater than 1/4 inch, divergent grain, splits, or any defect interfering with nailing or assembling.

4.4.3.2 Grade B pallets. The cover and base assembly shall not contain more than three major defects, if more than one major defect occurs, the defects shall not be of the same kind.

#### 4.4.4 Testing

4.4.4.1 Moisture content. Major defect. A sample of 15 pallets shall be selected at random and subjected to this test. If three or more pallets fail to comply with the applicable requirement, the lot shall be rejected.

4.4.4.1.1 Retest. If one or two pallets fail to comply with the requirement of 3.2, the lot shall be considered eligible for retest, if requested by the contractor. A sample of 15 additional pallets shall be selected and subjected to the test specified in 4.4.4.1. Failure of one or more pallets to comply with the applicable requirement shall be cause for rejection of the lot.

4.4.4.2 Test of Linderman-jointed pieces in Grade A pallets, Major defect. Three samples shall be cut from each of five

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pallets chosen at random from each lot of pallets. Two of the three samples shall be cut from the cover assembly and one from the base assembly. The samples shall be 2 inches, plus or minus 1/8 inch wide (parallel to the grain direction) by a length (perpendicular to the grain direction) equal to the width of the piece. Any sample that contains a nail hole or a visible split, shake or check across the entire width shall be discarded and a new sample shall be chosen to replace it. Samples shall be picked so that the joint to be tested is at least 2 5/8 inches from the edge of the board. Additional pallets shall be taken if necessary to secure fifteen satisfactory samples. Any break that is wholly or partially at the joint shall be recorded as joint failures. In order for the lot of pallets to pass this test, at least twelve of the Linderman-joint samples shall fail in the wood and below the joint.

4.4.4.3 Presence of PQ56 (copper-8-quinolinolate) preservative (see 3.8.1), Major defect. A sample of 15 Grade A pallets shall be selected at random for this test. Four members (two cover assemblies and two base assemblies) of the pallets selected, shall be subjected to the test specified in 4.5.3. If one or more members fail to meet the applicable requirement, additional members from the pallet shall be tested. The pallet will be considered acceptable when a total of four individual members (two cover assemblies and two base assemblies) meet the applicable requirements. Failure of any pallet to comply with the requirements shall be cause for rejection of the lot.

4.4.4.4 Presence of M-GARD W550 (zinc naphthenate emulsifiable) preservative (see 3.8.2), Major defect. A sample of 15 Grade A pallets shall be selected at random for this test. Four members (two cover assemblies and two base assemblies) of the pallets selected, shall be subjected to the test specified in 4.5.4. If one or more members fail to meet the applicable requirement, additional members from the pallet shall be tested. The pallet will be considered acceptable when a total of four individual members (two cover assemblies and two base assemblies) meet the applicable requirements. Failure of any pallet to comply with the requirements shall be cause for rejection of the lot.

4.4.5 Inspection equipment. The government reserves the right to inspect the contractor's equipment and determine that he has available and utilizes correctly, measuring and test equipment of the required accuracy and precision and that the instruments are of the proper type and range to make measurements of the required accuracy. Commercial inspection equipment shall be employed where applicable for all tests and examinations specified in 4.4.2 and 4.5. The contractor is responsible for assuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes (see 6.6).



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4.5 Methods of inspection. (see 6.7)

4.5.1 Moisture content. Moisture content of lumber for Grade A and Grade B pallets shall be determined in accordance with ASTM-D2016. Moisture content shall be as specified in 3.2.

4.5.2 Test of Linderman-jointed pieces in Grade A pallets. Samples selected as specified in 4.4.4.2 shall be tested as cantilever beams as shown in Figure 5. The length of the sample shall be placed perpendicular to the top edge of the vise. The size of the block and the position of the cleat shall be selected so that the lever is parallel to the sample. The lever shall be at least 30 inches long. The sample shall be positioned vertically so that the center of the joint is 0.4 times the clear span, L, above the top face of the vise. A slow, even pull shall be applied to the top of the level until the sample fails in bending. The position of the break with respect to the joint shall be recorded to determine compliance with 3.4.1.

4.5.3 Presence of PQ56 (copper-8-quinolinolate) preservative.4.5.3.1 Primary method.

4.5.3.1.1 Materials and equipment. The materials and equipment required are as follows:

a. PQ Check (indicator): The formulation contains 10 parts by weight of sodium diethyldithiocarbamate trihydrate (see 6.8) and 90 parts by weight of distilled water.

b. Dropper: An ordinary glass tube eye dropper may be used.

4.5.3.1.2 Test procedure. Two drops of PQ Check (indicator) shall be applied to the wood surface. An immediate dark brown coloration and the spreading of the drops shall indicate PQ56 treatment.

4.5.3.2 Alternate method.

4.5.3.2.1 Materials and equipment. The material and equipment required are as follows:

a. Reagent. Dissolve 0.5 grams chrome azurol S concentrate (see 6.9) and 5.0 grams sodium acetate in 80 ml of distilled water and then dilute further to 500 ml total with distilled water.

b. Sprayer. A common manual (fly) sprayer type applicator should be used.

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4.5.3.2.2 Test Procedure: Spray solution evenly over surface of dried wood. A deep blue color reveals the presence of copper (from the copper - 8 - quinolinolate).

4.5.4 Presence of M-GARD W550 (zinc naphthenate emulsifiable) preservative.

4.5.4.1 Primary method.

4.5.4.1.1 Materials and equipment. The materials and equipment required are as follows:

a. Reagent. Dissolve 0.1 grams of dithizone (diphenylthiocarbazone) (see 6.10) in 100 ml of chloroform (Note: Solutions should be made up daily).

b. Sprayer. A common manual (fly) sprayer type applicator should be used.

4.5.4.1.2 Test procedure. Spray solution evenly over surface of dried wood. The indicator will turn pink when zinc (M-GARD W550) is present. The pink color fades with light.

4.5.4.2 Alternate method.

4.5.4.2.1 Materials and equipment. The materials and equipment required are as follows:

a. Reagents (Stock solutions)

(1) 1 gram of potassium ferricyanide dissolved in 100 ml of distilled water.

(2) 1 gram of potassium iodide dissolved in 100 ml of distilled water.

(3) Starch indicator solution. Make a paste of 1 gram of soluble starch in about 5 ml of distilled water, add 100 ml of distilled water and boil for 1 minute with constant stirring. Cool. Note: This solution is subject to biodegradation and therefore should not be used longer than 3 days before a new batch is prepared.

b. Sprayer: A DeVilbiss No. 30 atomizer or equivalent.

4.5.4.2.2 Test procedure: Mix 10 ml each of the three stock solutions and pour into the atomizer (sprayer). Spray mixture evenly over surface of dried wood. The solution will cause the treated wood to turn a deep blue instantly while the untreated part will retain its original color.

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## 5. PACKAGING

5.1 Packaging requirements. None required.

5.2 Packing.

5.2.1 Level A. Pallets shall be stacked and strapped together, 5 per stack in the following manner: Place a base assembly on the bottom. Place 2 lengths of strapping of sufficient length to encircle 5 covers and 4 bases, on top of the base pallet, approximately 4 inches from each end of the pallet base. Place a cover assembly on top of the strapping followed by a base assembly and cover assembly until 4 1/2 complete units (four base assemblies and five cover assemblies) are uniformly stacked on top of the bottom base assembly. Secure the 2 straps around the 4 1/2 pallet assemblies. Apply 2 additional straps under the base pallet parallel and adjacent to the inside surface of the base assembly runners and completely encircling the stack of 5 pallet bases and covers. Strapping shall be minimum 3/4 X .028, Type I or IV Class A or B, conforming to QQ-S-781 requirements.

5.2.2 Level C. Unless otherwise specified, pallet units shall be shipped either completely assembled or knocked down and securely strapped in bundles in quantities that permit easy loading and handling.

5.3 Marking.

5.3.1 Level A. In addition to any individual pallet marking required by the pallet drawing, each stack of pallets will have a waterproof paper tag stapled or tacked to the edge of a pallet base on the upper 1/3 of 2 sides of the pallet stack using a minimum of 2 staples or tacks. The following information shall be printed, stenciled, stamped or typed on the tag.

National Stock Number  
Quantity - Nomenclature  
Lot (Mfg's Symbol and Number)  
(Gross) WT Cube

Letters shall be upper case; size of markings minimum 1/4 inch. Stencil ink shall be black, TT-I-1795, or commercial waterproof ink, and tags shall conform to UU-T-81, Type B, Grade 15 WR, 20 WR, 15 JU, 15 SU or 20 SU approximately 5 x 8 inches in size.

5.3.2 Level C. The marking of pallet units for shipment shall be in accordance with the applicable drawing or as specified in the invitation for bids or request for proposal.

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## 6. NOTES

6.1 Ordering data. Procurement documents shall specify the following:

6.1.1 Procurement requirements.

- a. Title, number and date of this specification.
- b. Type, grade and style of pallet.
- c. Quantity required and delivery schedules.
- d. Serialization requirements, if applicable.
- e. Quality conformance inspection, if other than specified in Section 4 of this specification.
- f. First Article Sample requirements, if other than specified in Section 4 of this specification.
- g. Packaging requirements, if other than specified in Section 5 of this specification.
- h. Certificates of conformance for each lot or shipment of product.

6.1.2 Contract data requirements. Contract data requirements for inspection equipment designs (conforming to Data Item Description DI-R-1714 tailored) (See 6.6).

6.2 Storage. The acceptable condition of pallet units cannot be maintained during storage unless proper precautions are observed. Pallet units should be stored under cover. High temperatures, extremes of humidity, and excessive dampness should be avoided (dampness will promote rot, mold, and fungus growth). Hot, dry conditions dry the wood, causing checking, warping, and splitting.

6.3 Decay is disintegration of wood due to action of fungi. In the shop, decay can best be detected and differentiated from harmless stains and discoloration by use of the pick test. The pick test is performed with the knife or chisel by lifting up some of the grain or fibers in suspicious looking areas. If the material is more punky or more brash (break without splintering) than healthy wood of the same species, it is probably decayed. Suspicious areas are usually abnormally brown, bleached-looking, or mottled, and indicated by the absence of luster that is present in wood.

6.4 PQ-56, for the 1.8 percent solution, may be obtained from the Chapman Chemical Company, P.O. Box 9158, Memphis, TN 38019 or equivalent facility.

6.5 M-GARD W550 (zinc hydronap) for the 3 percent zinc as metal solution, may be obtained from the Mooney Chemicals Inc., 2301 Scranton Road, Cleveland, Ohio 44113-9988 or equivalent facility.

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6.6 Inspection equipment designs. Design responsibility for inspection equipment is assigned to the contractor.

6.6.1 Contractor designs. Contractor designs are required for all inspection equipment and may include commercial equipment which the contractor proposes to use. (Commercial equipment is defined as unmodified equipment which is cataloged and available for purchase by the general public). Contractor designs shall include appropriate operating instructions, calibration procedures and maintenance procedures. Commercial equipment shall be fully described by catalog listings or other means which provide sufficient information to permit identification and evaluation by the Government and may include illustrations and engineering data. Designs shall be prepared for any special fixture(s) required to be used with commercial equipment. Designs shall be of the category and form (per MIL-D-1000) specified in the Contract Data Requirements Lists (DD Form 1423). The item detail specification number, paragraph number, and defect number from Section 4 shall be referenced on each contractor design together with the component or assembly drawing number, revision letter and date to which the specific design applies.

6.6.2 Submission of designs for approval. Contractor designs shall be approved by the Government prior to fabricating or procuring the equipment. Designs shall be submitted for approval in accordance with the stipulations, time frame and distribution specified in the Contract Data Requirements Lists (DD Form 1423) or in the contract. Partial submission of inspection equipment designs is permissible and encouraged. However, the completion date for design review will be based on the date of the final submission of designs and the required delivery schedule as stipulated in the contract. The specific segment of the U.S. Army Armament Munitions and Chemical Command to which the contractor designs shall be sent will be specified in the item detail specification. When the contractor submits inspection equipment designs to the Government for approval he shall give the following information in his letter of transmittal:

- a. The contract number.
- b. The contract item (Name, model number, etc.)
- c. The designs remaining to be submitted and the expected date of submittal.

Submit equipment designs, as required, to Commander, U.S. Army Armament, Research and Development Center (ARDC), ATTN: AMSMC-QAR-I(D), Dover, New Jersey 07801-5001.

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6.7 Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted through the Contracting Officer to: Commander, U.S. Army Armament, Research and Development Center (ARDC), ATTN: AMSMC-QAR-Q(D), Dover, New Jersey 07801-5001. This description should include but not be limited to the accuracy and precision of the method, test data demonstrating the accuracy and precision and drawings of any special equipment required.

6.8 Sodium Diethyldithiocarbamate Trihydrate may be obtained from J.T. Baker Chemical Co., Phillipsburg, New Jersey 08865 or equivalent facility.

6.9 Chrome azurol "S" may be obtained from Eastman Chemical Co., Rochester, New York or equivalent facility.

6.10 Dithizone (diphenylthiocarbazon) may be obtained from Matheson, Coleman and Bell Co., Cincinnati, Ohio or equivalent facility.

6.11 Pallets for shipment of projectile metal parts and reuse with projectile, loaded, are included as Grade A pallets (see 1.2.1).

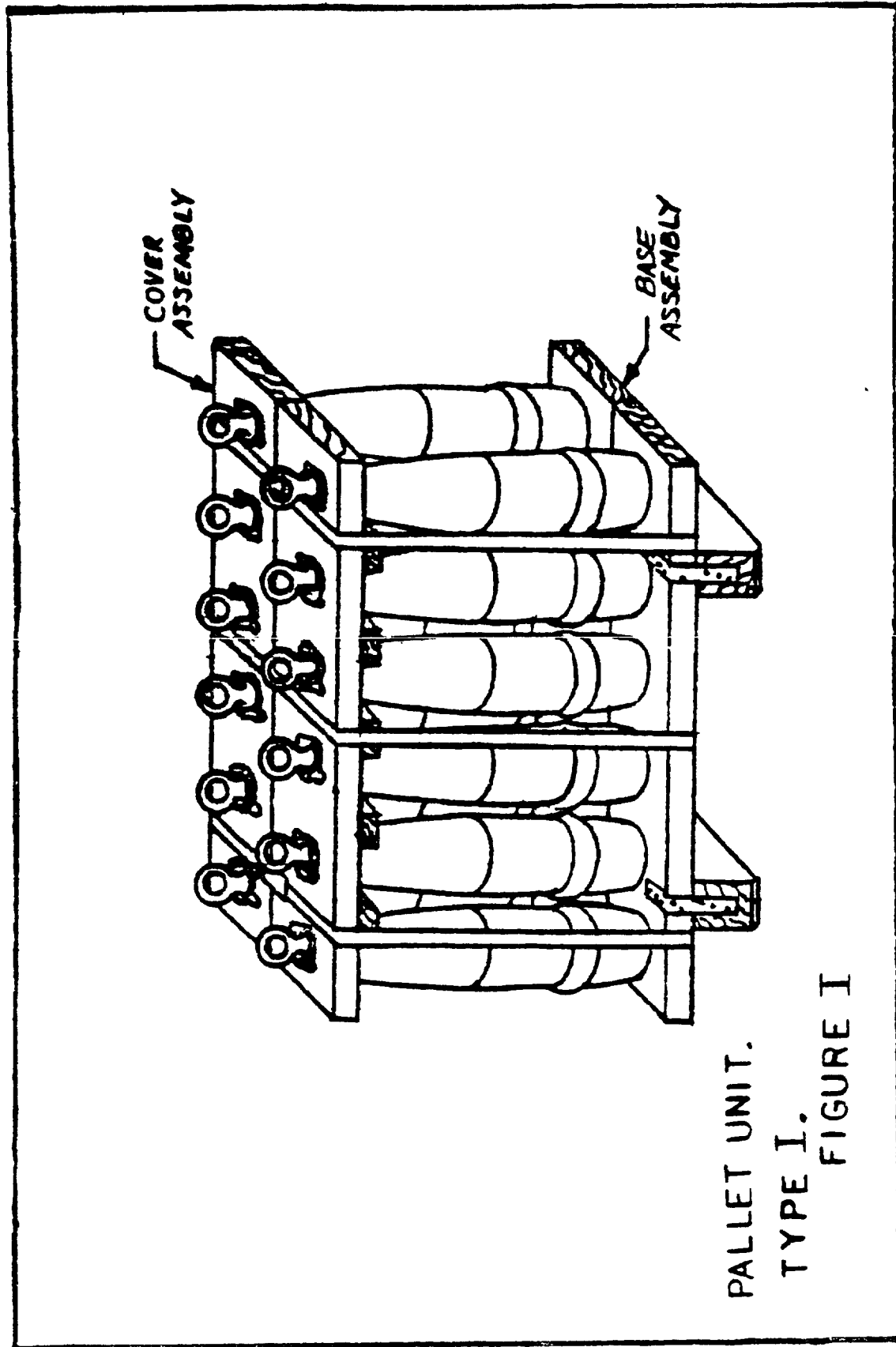
6.12 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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Army AR

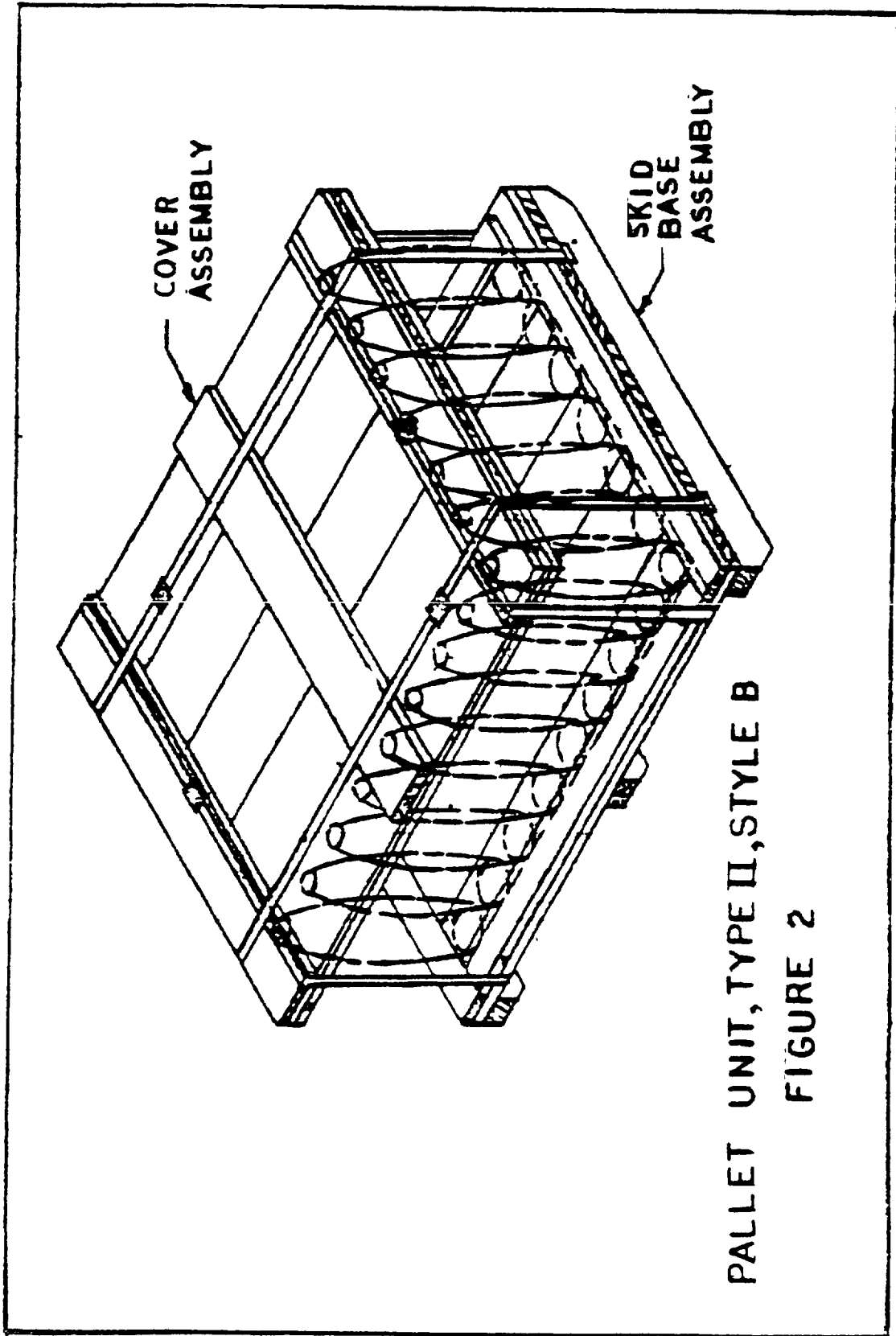
Preparing Activity:  
Army - AR

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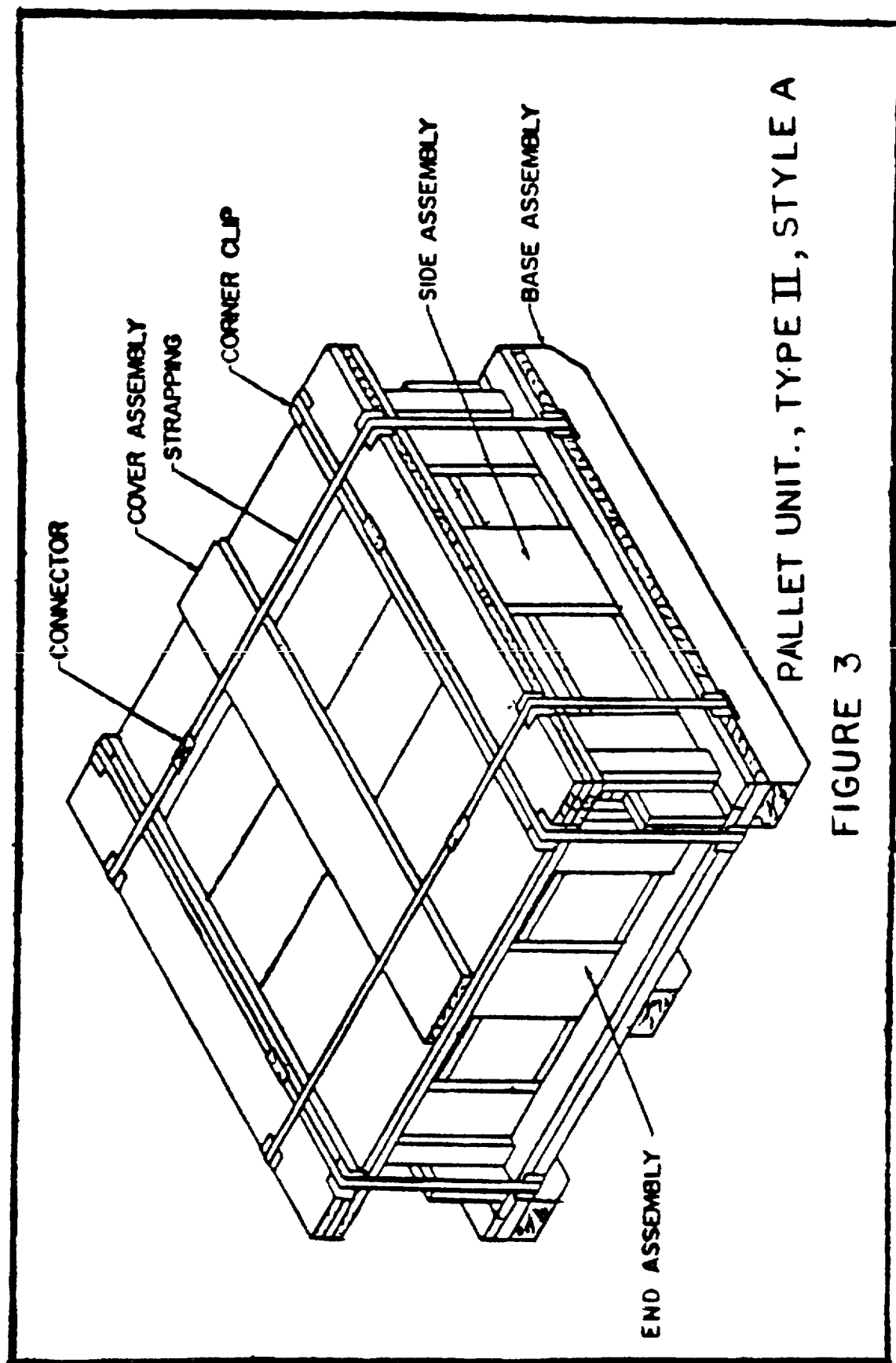


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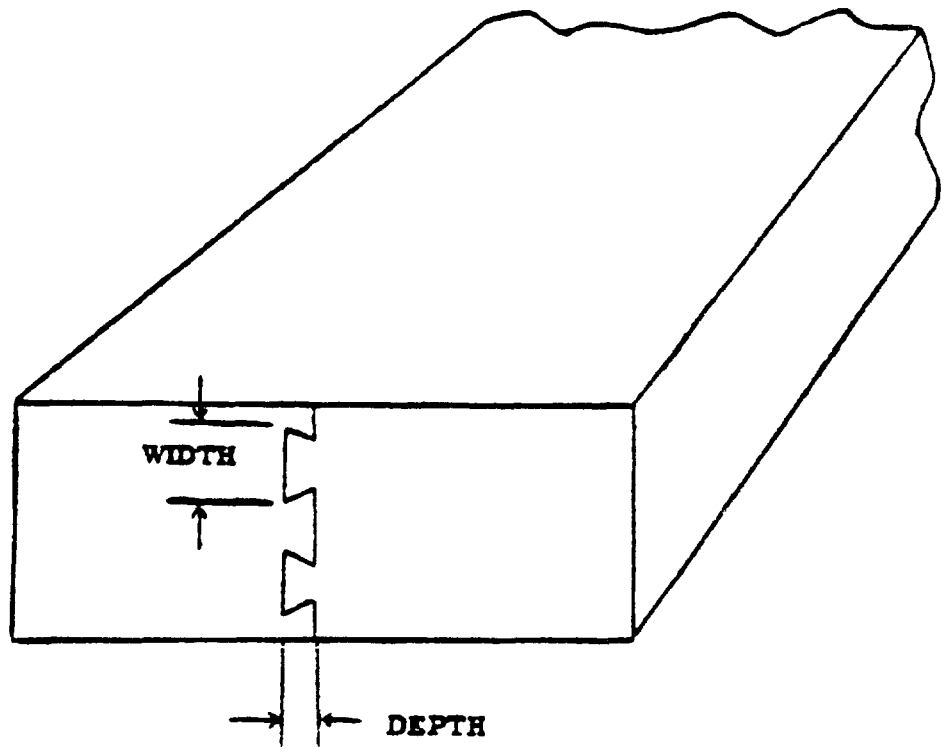




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**FIGURE 4 - - DOUBLE-TAPERED. TWO DOVETAIL. LINDERMAN JOINT**

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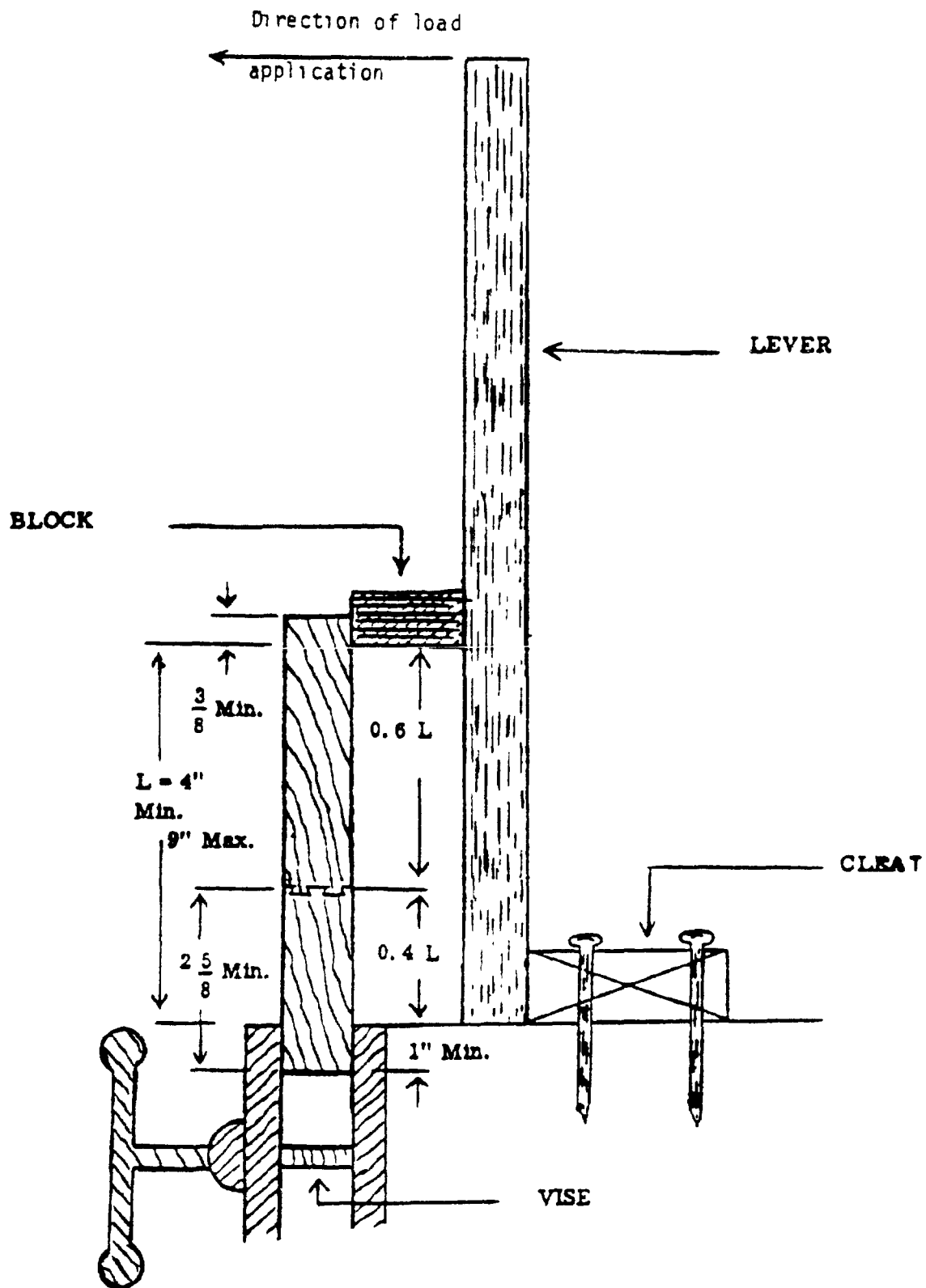


FIGURE 5 - Set-up for testing Quality of Linderman Joints

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APPENDIX

PALLET, UNITS, WOOD, FOR SHIPMENT OF  
PROJECTILE METAL PARTS AND PROJECTILE AMMUNITION  
(GRADE B, GOVERNMENT FURNISHED)

10. SCOPE

10.1 This appendix prescribes the criteria to be utilized to determine the serviceability of Government furnished pallets.

20. CLASSIFICATION

20.1 Grade, type and style. This appendix covers one grade, one type and two styles of wood pallets as follows:

GRADE

Grade B	Pallet Units for Interplant Shipment of Inert Projectiles, and Non-Issue Ammunition Components.
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TYPE

Type II	Cover and Base Assemblies
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STYLES

Style A	With demountable sides and ends as shown on Figure 3.
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Style B	Without demountable sides and ends as shown on Figure 2.
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30. APPLICABLE DOCUMENTS

30.1 STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
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## 30.2 DRAWINGS

## U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER

7548604	Pallet for Fixed and Semi-Fixed Projectiles
8837835	Pallet for Projectile Metal Parts
8848553	Pallet for 4.2 Inch Mortar Projectile Bodies

## 40. REQUIREMENTS

40.1 Workmanship. Pallets shall be free of imperfections which may affect their utility. In addition, the pallets shall be free of excessive splinters, metal projections, or sharp edges which may cause injury when manually handled (see 60.1).

## 50. INSPECTION PROVISIONS

50.1 Lot formation. The term "lot" as used throughout this specification refers to an inspection lot, which is defined as an essentially homogeneous collection of units of product from which a representative sample is drawn and inspected to determine conformance of the lot with applicable requirements. Inspection lots shall comply with MIL-STD-105.

50.2 Examination. Inspection for critical defects, (and major defects, when so specified), shall be 100 percent. Sampling plans and procedures for major and minor defects shall be in accordance with MIL-STD-105.

50.2.1 Assembly, Pallet (see drawing 7548604, 8837835 or 8848553).

Categories	Defects	Method of Inspection
Critical:	Non defined.	
Major:	AQL 1.0 percent for each defect	
101.	Presence of decay	Visual
102.	Broken or loose board	Visual
103.	Pallet deformed	Visual
Minor:	AQL 1.5 percent for each defect	
201.	Nail projecting	Visual
202.	Surface of pallet not level	Visual
203.	Evidence of poor workmanship (see 60.1)	Visual

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60. NOTES

60.1 Reworked pallets. If economically repairable and only under specific direction from the procuring contracting officer, pallets shall be reworked to comply with the applicable requirements of this document.

**INSTRUCTIONS:** In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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<b>STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL</b> <i>(See Instructions - Reverse Side)</i>	
<b>1. DOCUMENT NUMBER</b> MTL-P-45449B	<b>2. DOCUMENT TITLE</b> PALLET, UNITS, WOOD, FOR SHIPMENT OF PROJECTILE METAL PARTS
<b>3a. NAME OF SUBMITTING ORGANIZATION</b>	<b>4. TYPE OF ORGANIZATION (Mark one)</b> <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____
<b>b. ADDRESS (Street, City, State, ZIP Code)</b>	
<b>5. PROBLEM AREAS</b>	
<b>a. Paragraph Number and Wording:</b>	
<b>b. Recommended Wording:</b>	
<b>c. Reason/Rationale for Recommendation</b>	
<b>6. REMARKS</b>	
<b>7a. NAME OF SUBMITTER (Last, First, MI) - Optional</b>	<b>b. WORK TELEPHONE NUMBER (Include Area Code) - Optional</b>
<b>8. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional</b>	<b>9. DATE OF SUBMISSION (YYMMDD)</b>