INCH-POUND
MIL-PRF-32452
16 December 2013

PERFORMANCE SPECIFICATION

PALLET BOX, COLLAPSIBLE

This specification is approved for use by all Departments and Agencies of the Department of Defense

1. SCOPE

1.1 Scope. This specification describes the performance requirements and verification procedures for four types of Pallet Box, Collapsible.

1.2 Classification. The pallet box design shall be of the following types.

Type 1: Support a gross weight up to 1000 lbs
Type 2: Support a gross weight up to 2000 lbs
Type 3: Support a gross weight up to 3000 lbs
Type 4: Support a gross weight up to 4000 lbs

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to: Commander, U.S. Army ARDEC, ATTN: RDAR-QES-E, Picatinny, New Jersey 07806-5000, or usarmy.picatinny.ardec.list.ardec-stdzn-branch@mail.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST online database at https://assist.dla.mil.

AMSC N\A FSC 3990

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1660	-	Ammunition Unit Loads
MIL-STD-1916	-	DOD Preferred Methods for Acceptance of Product

(Copies of these documents are available online at http://quicksearch.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D 4444	-	Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters
ASTM D 1654	-	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 951	-	Standard Test Method for Water Resistance of Shipping Containers by Spray Method

(Copies of these documents are available online at http://www.astm.org or from the ASTM International, 100 Barr Harbor Drive, Conshohocken, PA 19428-2959.)

INTERNATIONAL STANDARD FOR PHYTOSANITARY MEASURES (ISPM)

ISPM 15	-	Guidelines for Regulating Wood Packaging Material in International Trade

(Copies of these documents are available online at http://www.ippc.int.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Design verification. When specified (see 6.2), a sample of pallet boxes shall be subjected to design verification in accordance with 4.2.

3.2 First article. When specified (see 6.2), a sample of pallet boxes shall be subjected to first article inspection in accordance with 4.3.

3.3 Conformance inspection. When specified (see 6.2), a sample of pallet boxes shall be subjected to conformance inspection in accordance with 4.4.

3.4 Interface and interoperability.

3.4.1 Entry base. The pallet box shall utilize a 4-way entry base.

3.4.2 Forklift opening. The size of each forklift opening shall be not less than 3.875 inches in height and not less than 8.625 inches in width.

3.4.3 Side and top panels. The four sides and top panel shall securely contain all contents for shipping and storage. Each panel shall be constructed without holes through to the interior and have no gaps at the joints through to the interior greater than 1/16".

3.4.4 Construction. The internal dimensions of the pallet box shall be specified in the contract. (See 6.2)

3.4.5 Collapsibility. When collapsed, the pallet box panels shall be stackable and secured on the pallet base. The total height of the collapsed pallet shall be no greater than 15 inches.

3.5 Environmental requirements.

3.5.1 Corrosion resistance. The exterior surfaces of the metal parts shall show no visible evidence of corrosion of base metal in excess of 1/8 inch on either side of the score marks after exposure to a 5% solution of salt spray for 96 hours.

3.5.2 Moisture content. The moisture content of the components at time of acceptance shall not exceed 18% when tested in accordance with ASTM D4444.

3.5.3 Temperature. If a material other than wood or metal is used in the construction of the pallet box, the pallet box shall meet the testing requirements of paragraph 3.6.3 after temperature conditioning to -65°F and 160°F for a period of 24 hours.

3.5.4 Water Resistance. The pallet box shall not experience a weight gain greater than 18% after exposure to water in accordance with ASTM D951.

3.5.5 Preservative Treatment. Wood used in the construction of the pallet box shall be treated in accordance with the requirements of the American Wood Protection Association (AWPA) standard U1 to the requirements of use category 4A (U1C4A).

3.5.6 Heat Treatment. Non-Manufactured Wood used in the construction of the pallet box shall be heat treated and marked in accordance with ISPM-15. An applicable heat treatment quality mark shall be applied to each panel and pallet base and be visible when fully assembled.

3.6 Operating requirements.

3.6.1 Reusability. The pallet box shall be easily set up and collapsed without special tools and without damaging components to aid in reuse. Any device utilized to secure the assembled pallet box shall not become loose and fall off during testing as specified in paragraph 3.6.3.

3.6.2 Stacking strength. The assembled pallet box shall be capable of being stacked with the same unit load to a minimum height of 16 feet without any evidence of breaking, collapsing, or distortion

3.6.3 Unit load. The pallet load shall remain intact and be capable of continued safe handling after undergoing the following transportation and rough handling tests in accordance with MIL-STD-1660:

a.Repetitive shock

b.Edgewise drop (rotational)
c.Incline-impact
d.Fork lifting
e.Disassembly

3.7 Support and ownership requirements.

3.7.1 Identification marking. The pallet box shall be permanently marked with the following informationby the manufacturer. Black marking shall be used if wood is used in construction of the pallet box. If other material is used in the construction of the pallet box, the marking shall be contrasting. All letters and figures shall not be less than 1/2 inches in height.

a. The manufacturer, part number, month, and year of manufacture shall be unobstructed and clearly legible on one of the outer panels.
b. The inner face of the panels shall be marked to distinguish between the side, end, and top panels.
c. An arrow with "up" shall be marked on the side panels to ensure the stacking slots are on top.
d. Assembly depiction shall be marked on the end pieces to show assembly instructions.
e. If wood is used, mill marking shall not be visible on exterior of assembled container.
f. Panels used for each box shall be of similar in color tone on exterior surfaces.

3.7.2 Workmanship. All components shall be present and assembled correctly in accordance with the verified design. Assembled pallet boxes shall have well fitted corners and joints. The pallet box shall be free of splinters, metal projections, or sharp edges which may cause injury when handled manually.

4. VERIFICATION

TABLE I. Requirement/verification cross reference matrix.

Method of Verification	Classes of Verification
1 - Analysis	A - Design verification
2 - Demonstration	B - First article
3 - Examination	C – Conformance
4 - Test	

Section 3 Requirement		Section 4 Method	Verification Methods				Verification Class		
			1	2	3	4	A	B	C
3.4.1	Entry base	4.6.6			X		X	X	X
3.4.2	Forklift opening	4.6.6			X		X	X	X
3.4.3	Side and top panels	4.6.6			X		X	X	X
3.4.4	Construction	4.6.6			X		X	X	X
3.4.5	Collapsibility	4.6.6			X		X	X	X
3.5.1	Corrosion resistance	4.6.7				X	X		
3.5.2	Moisture content	4.6.1				X	X	X	X
3.5.3	Temperature	4.6.11				X	X		
3.5.4	Water Resistance	4.6.12				X	X		

TABLE I. Requirement/verification cross reference matrix - Continued.

Method of Verification	Classes of Verification
1 - Analysis	A - Design verification
2 - Demonstration	B - First article
3 - Examination	C – Conformance
4 - Test	

Section 3 Requirement		Section 4 Method	Verification Methods				Verification Class		
			1	2	3	4	A	B	C
3.5.5	Preservative treatment	4.6.9			X		X	X	X
3.5.6	Heat treatment	4.6.10			X		X	X	X
3.6.1	Reusability	4.6.8			X		X		
3.6.2	Stacking strength	4.6.3				X	X		
3.6.3	Unit load	4.6.4, 4.6.4.1, 4.6.4.2, 4.6.4.3, 4.6.4.4, 4.6.4.5				X	X		
3.7.1	Identification marking	4.6.2			X		X	X	X
3.7.2	Workmanship	4.6.5			X		X	X	X

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

a. Design verification (see 4.2)

b. First article inspection (see 4.3)

c. Conformance inspection (see 4.4)

4.1.1 Design verification. Unless otherwise specified, all verifications shall be performed in accordance with the test conditions specified in section 4.6.

4.1.2 Classification of defects. For examinations and tests cited herein or when required by contract; critical, major, and minor characteristics are defined in MIL-STD-1916.

4.1.3 Inspection lot formation. Lot formation shall be in accordance with MIL-STD-1916.

4.2 Design verification. When specified in the contract, a sample pallet box shall be subjected to design verification and test quantity in accordance with Table II.

4.2.1 Design verification rejection. If any item of the sample fails to comply with the design verification requirements, the sample shall be rejected.

TABLE II. Design verification.

Examination or Test	Conformance Criteria		Requirement Paragraph	Inspection Method
	Sample	Acc/Rej		
Entry base	3	0/1	3.4.1	4.6.6
Forklift opening	3	0/1	3.4.2	4.6.6
Side and top panels	3	0/1	3.4.3	4.6.6
Construction	3	0/1	3.4.4	4.6.6
Collapsibility	3	0/1	3.4.5	4.6.6
Corrosion resistance	3	0/1	3.5.1	4.6.7
Reusability	3	0/1	3.6.1	4.6.8
Moisture content	3	0/1	3.5.2	4.6.1
Identification marking	3	0/1	3.7.1	4.6.2
Stacking strength	2 1/	0/1	3.6.2	4.6.3
Unit load	3 2/	1/2	3.6.3	4.6.4, 4.6.4.1, 4.6.4.2, 4.6.4.3, 4.6.4.4, 4.6.4.5
Preservative treatment	3	0/1	3.5.5	4.6.9
Heat treatment	3	0/1	3.5.6	4.6.10
Temperature	3 2/	0/1	3.5.3	4.6.11
Water Resistance	3	0/1	3.5.4	4.6.12
Workmanship	3	0/1	3.7.2	4.6.5

Notes:
1/ Stacking strength tests required on two separate pallet boxes.
2/ For non-wood or non-metal pallet boxes, this test must be performed at the temperatures specified in 4.6.11. Otherwise this test is performed as specified in 4.6.4.

4.3 First article inspection. When specified in the contract, a sample of pallet box shall be subjected to first article inspection and first article quantity in accordance with Table III.

4.3.1 Inspection to be performed. The first article assemblies, components and test specimens shall be subject to all of the applicable examinations and tests specified in Table III.

4.3.2 First article rejection. If any item of the sample fails to comply with the first article inspection requirements, the sample shall be rejected, unless otherwise specified in Table III notes.

TABLE III. First article inspection.

Examination or Test	Conformance Criteria		Requirement Paragraph	Inspection Method
	Sample	Acc/Rej		
Entry base	3	0/1	3.4.1	4.6.6
Forklift opening	3	0/1	3.4.2	4.6.6
Side and top panels	3	0/1	3.4.3	4.6.6
Construction	3	0/1	3.4.4	4.6.6
Collapsibility	3	0/1	3.4.5	4.6.6
Corrosion resistance	3	0/1	3.5.1	4.6.7
Moisture content	3	0/1	3.5.2	4.6.1
Identification marking	3	0/1	3.7.1	4.6.2
Preservative treatment	3	0/1	3.5.5	4.6.9
Heat treatment	3	0/1	3.5.6	4.6.10
Workmanship	3	0/1	3.7.2	4.6.5

4.4 Conformance inspection.

4.4.1 Conformance inspection. The sample pallet boxes shall be subject to conformance inspection in accordance with Table IV and the method of inspection in 4.6.

4.4.2 Conformance rejection. If any sample fails to comply with the conformance inspection requirements, the lot shall be rejected.

TABLE IV. Conformance inspection.

Examination or Test	Conformance Criteria		Requirement Paragraph	Inspection Method
	Sample	Acc/Rej		
Entry base	3	0/1	3.4.1	4.6.6
Forklift opening	3	0/1	3.4.2	4.6.6
Side and top panels	3	0/1	3.4.3	4.6.6
Construction	3	0/1	3.4.4	4.6.6
Collapsibility	3	0/1	3.4.5	4.6.6
Moisture content	3	0/1	3.5.2	4.6.1
Identification marking	3	0/1	3.7.1	4.6.2
Preservative treatment	3	0/1	3.5.5	4.6.9
Heat treatment	3	0/1	3.5.6	4.6.10
Workmanship	3	0/1	3.7.2	4.6.5

4.5 Examinations and tests. Reference shall be made to MIL-STD-1916 for the definition of critical, major, and minor defects. The attribute sampling plan required for the examination for defects in Table IV shall be in accordance with MIL-STD-1916, using Verification Level IV for major characteristics and Level II for minor characteristics unless Table IV states otherwise. One hundred percent inspection shall be used on all critical characteristics.

4.6 Methods of inspection.

4.6.1 Moisture content. The pallet box shall be tested in accordance with ASTM D4444, except that readings shall be taken from two different panels of the box. Failure to meet the requirement of the average of the readings from each panel shall be classified as a defect.

4.6.2 Box identification. Pallet boxes shall be visually inspected for identification markings.

4.6.3 Stacking strength. The pallet box shall be subjected to a stacking load equivalent to or greater than the total weight of identical packages represented in a 16 ft un-collapsed stack height of the same type box. The stacking weight to be used for load equivalent calculations shall be the maximum gross weight of the type of pallet box specified or the weight of the packaging configuration specified in the contract or applicable drawing. The calculated load shall be applied to the top of the pallet box for a period of not less than one (1) hour.

4.6.4 Unit load test. The pallet loads shall be assembled in accordance with the packaging configuration specified in the contract or applicable drawing. If the packaging configuration is not specified, the maximum gross weight of the unit load shall be the maximum gross weight of the type of pallet box specified. The following tests shall be conducted in sequence IAW MIL-STD-1660 at ambient temperature unless otherwise specified in 4.6.11.

4.6.4.1 Repetitive shock test. The test specimen shall be placed on and not fastened to the platform. With the specimen in one position, the platform shall be vibrated at 1/2-inch amplitude (1.0-inch double amplitude) starting at a frequency of approximately 3 cycles-per second. The frequency shall be steadily increased until the specimen leaves the platform. The resonant frequency is achieved when a 1/16-inch-thick feeler gage momentarily slides freely between every point on the specimen in contact with the platform at some instance during the cycle. Midway into the testing period, the specimen shall be rotated 90 degrees, and the test continued for the duration. Unless failure occurs, the total time of vibration shall be three hours.

4.6.4.2 Edgewise drop (rotational) test. The specimen shall be placed on its base with one end of the base supported on a sill 6 inches high. The height of the sill shall be increased as necessary to ensure that there is no support for the base between the ends of the specimen when the dropping takes place, but should not be high enough to cause the specimen to slide on the supports when the dropped end is raised for the drop. The unsupported end of the specimen is then raised 15 inches high and allowed to fall freely to the concrete, pavement, or similar unyielding surface. The specimen shall be dropped on both longitudinal sides and both lateral sides for a total of four drops.

4.6.4.3 Incline-impact test. The specimen shall be placed on the carriage with the surface or edge to be impacted projecting at least 2 inches beyond the front end of the carriage. The carriage shall be brought to a predetermined position on the incline and released. To concentrate the impact on any particular position on the unit load, a 4x4 inch timber is attached to the bumper in the desired position before the test. The carriage shall not strike any part of the timber. The position of the specimen on the carriage and the sequence in which surfaces and edges are subjected to impact may be at the option of the testing activity. The specimen shall be subjected to one impact on each surface that has each dimension less than 9.5 feet. Unless otherwise specified, the velocity at the time of the impact shall be not less than 7 feet-per-second.

4.6.4.4 Forklift test. The specimen shall be lifted clear off the ground by a forklift from the end of the specimen and transported on the forks in the level or back-tilt position. The forklift shall pass over the Optional Rough Handling Course for Forklift Trucks as outlined in MIL-STD-

1660. The course shall consist of parallel pairs of 1-inch boards spaced 54 inches apart and shall be laid flat at an angle of approximately 60 degrees to the path so that the left wheel strikes first. Another pair shall be laid securely across the path of the forklift so that the wheels strike simultaneously. Another pair shall be laid at an angle of approximately 75 degrees to the path so that the right wheel strikes first. The specimen shall be transported over the Optional Rough Handling Course. The specimen shall be observed for deflection and damage. The specimen shall be rotated 90 degrees and the specimen lifted from the side and the above steps repeated.

4.6.4.5 Disassembly test. Following all tests the specimen shall be placed on a flat level surface. The securing devices and panels shall then be removed from the specimen. Assembly of the inner contents shall be such that it retains its unity upon removal of these devices and panels.

4.6.5 Workmanship. Visually verify that all parts and assemblies meet the requirements of paragraph 3.7.2.

4.6.6 Construction. Verify the forklift opening size, internal dimensions, and collapsed height. Visually verify that the box is constructed with a 4-way entry base and secured with side and top panels without gaps greater than 1/8”.

4.6.7 Corrosion Resistance. The method of test shall be as specified in ASTM B117 Method of Test for Salt Spray (FOG) Testing. Using a sharp instrument, (machinist scriber or equivalent) one vertical line shall be scored across one side of the part being tested. After salt spray testing, the scribe shall be evaluated according to ASTM D1654, Procedure A.

4.6.8 Reuse. The pallet boxes shall be disassembled and reassembled four times. At the end of third disassembly, the boxes shall be inspected for signs of damage that would prevent subsequent reassembly. Failure to completely reassemble the pallet box a fourth time shall constitute a failure.

4.6.9 Preservative treatment. A conformance certificate shall be provided showing that the preservative treatment used is in conformance with the American Wood Protection Association standard U1 to the requirements of Use Category 4A (U1C4A).

4.6.10 Heat Treatment. Visually inspect the heat treatment quality marking on each of the panels and pallet base for conformance to the applicable requirements, including content, legibility and location.

4.6.11 Temperature. Condition the assembled pallet box for a period of 24 hours before the start of the test sequence as specified in 4.6.4. Three specimens shall be conditioned to -65°F and three specimens to 160°F. The pallet boxes must be reconditioned for a minimum of 4 hours in between each test to ensure the temperature is maintained to -65°F and 160°F. Each conditioned pallet box shall be tested no more than 15 minutes following removal from the conditioning chamber.

4.6.12 Water Resistance. The empty pallet box shall be tested and evaluated in accordance with ASTM D951 at a medium intensity for a total of 6 hours. The test shall be conducted at ambient temperature. The total weight of the pallet box after testing shall not exceed 18% of the original weight.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point’s packaging

activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This pallet box is intended for use with the small and medium caliber ammunition packaged in fiberboard or metal boxes.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification and all reference documentation cited in this specification (see 2.2.1). Note, reference documents should be those current at the time of solicitation or contract.

b. Requirements for submission of design verification (if applicable): A design verification sample, either in part or complete (Table II), may be required for the qualification of a new material, vendor, production process, or design configuration as directed by the government contracting officer.

c. Requirements for submission of first article (if applicable): A first article sample, either in part or complete (Table III), may be required for the commencement of production after the award of a new contract, a change in production venue, production process, or after a production stoppage in excess of 90 days as directed by the government contracting officer.

Requirements for submission of acceptance

d. Requirement for submission of inspection equipment designs.

e. Packaging requirements (see 5.1).

f. First article sample requirements. Contractual provisions may require that the unit load test (as per MIL-STD-1660) should be performed at the U.S. Army Defense Ammunition Center, 1C Tree Road, McAlester, OK 74501-9053.

g. Requirements for internal dimensions of pallet box.

6.3 Submission of alternative conformance provisions. All proposed alternative conformance provisions should be submitted for evaluation and approval. Point of contact can be obtained from U.S. Army ARDEC, RDAR-QEM-F, Picatinny, NJ 07806-5000.

6.4 Subject term (keyword) listing.

Packaging
Reusable

Custodians:
Army-AR
Air Force-99
Navy-OS

Preparing activity:
Army-AR
(Project 3990-2013-004)

Review activities:
Army- QM1
Air Force-11, 84
DLA-IS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil.