FINAL REPORT
JULY 2003

REPORT NO. 03-14

CLIP CRATE CONTAINER,
MIL-STD-1660 FIRST ARTICLE TEST (FAT)

Prepared for: Distribution Unlimited

U.S. Army Defense Ammunition Center
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MCALESTER, OKLAHOMA 74501-9053
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ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV) conducted First Article Test (FAT) per MIL-STD-1660, "Design Criteria for Ammunition Unit Loads" on the Clip Crate Container manufactured by Transport Packaging International Inc., from Atlanta, Georgia. The testing was accomplished to support the Mobile Ammunition Renovation, Inspection, and Demilitarization (MARID) Team of the Joint Munitions Command (JMC) proposed use of the clip crate container for unitization and truckload shipment of fiberboard boxes of explosives (Comp B) from Ravenna AP, OH to McAlester AAP, OK and the subsequent storage of bulk explosives. The testing was conducted on two containers with a load of 2,575 lbs. and two containers with a load of 4,115 lbs. The tests accomplished on the test units were the stacking, repetitive shock, edgewise rotational drop, incline-impact, forklifting, and disassembly tests. The containers passed all requirements with no significant problems encountered. As a result of the performance of the container, the Clip Crate Container manufactured by Transport Packaging International Inc. is recommended for United States Army-wide use world-wide.
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PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV) conducted First Article Tests (FAT) per MIL-STD-1660, “Design Criteria for Ammunition Unit Loads” on the Clip Crate Container manufactured by Transport Packaging International Inc., from Atlanta, Georgia. The testing was accomplished to support the Mobile Ammunition Renovation, Inspection, and Demilitarization (MARID) Team of the Joint Munitions Command (JMC) proposed use of the clip crate container for unitization and truckload shipment of fiberboard boxes of explosives (Comp B) from Ravenna AP, OH to McAlester AAP, OK and the subsequent storage of bulk explosives. The testing was conducted on two containers with a load of 2,575 lbs. and two containers with a load of 4,115 lbs. The tests accomplished on the test units were the stacking, repetitive shock, edgewise rotational drop, incline-impact, forklifting, and disassembly tests. The unitization procedures were provided by DAC, Transportation Engineering Division (SJMAC-DET).

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command, Rock Island, IL. Reference is made to the following:


C. OBJECTIVE. The objective of the tests was to determine if the Clip Crate Container met MIL-STD-1660 test requirements prior to the acceptance of the unitization procedures by the U.S. Army.
D. Conclusion. The containers passed all requirements with no significant problems encountered. As a result of the performance of the container, the Clip Crate Container manufactured by Transport Packaging International Inc. is recommended for United States Army-wide use worldwide.
PART 2 - ATTENDEES

DATE PERFORMED:

Test Unit #1- 3 June 2003
Test Unit #2- 3-4 June 2003
Test Unit #3- 4 June 2003
Test Unit #4- 4-5 June 2003

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PART 3 - TEST PROCEDURES

The test procedures outlined in this section were extracted from the MIL-STD-1660. The tests are conducted on ammunition pallet units or unit loads and are summarized as follows:

A. MIL-STD-1660:

1. STACKING TEST. The specimen will be tested to simulate a stack of identical items stacked 16 feet high, for a period of one hour. This stacking load will be simulated by subjecting the specimen to a compression weight equal to an equivalent 16-foot stacking height. Photo 1 below shows an example of a unit load in the compression tester.

Photo 1. Example of Stacking Test.
(2.75-inch Hydra 70, PA151 Rocket Pallet in the Stacking Tester.)
2. REPETITIVE SHOCK TEST. The repetitive shock test is conducted IAW Method 5019, Federal Standard 101. The test procedure is as follows: The test specimen will be placed on (not fastened to) the platform. With the specimen in one position, the platform will be vibrated at ½-inch amplitude (1-inch double amplitude) starting at a frequency of approximately 3 cycles-per-second. The frequency will 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 will be rotated 90 degrees, and the test continued for the duration. Unless failure occurs, the total time of vibration will be three hours. Photo 2 shows an example of the repetitive shock test.

![Photo 2. Example of the Repetitive Shock Test. (MSTF Low)](image)

3. EDGEWISE ROTATIONAL DROP TEST. This test is conducted using the procedures of Method 5008, Federal Standard 101. The procedure for the edgewise rotational drop test is as follows: The specimen will be placed on its skids with one end of the pallet supported on a beam 6 inches high. The height of the beam will be increased as necessary to ensure that there is no support for
the skids 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 and allowed to fall freely to the concrete, pavement, or similar unyielding surface from a prescribed height. Unless otherwise specified, the height of drop for level A protection will conform to the following tabulation:

<table>
<thead>
<tr>
<th>GROSS WEIGHT (WITHIN RANGE LIMITS) (Pounds)</th>
<th>DIMENSIONS OF ANY EDGE, HEIGHT OR WIDTH (WITHIN RANGE LIMITS) (Inches)</th>
<th>HEIGHT OF DROPS ON EDGES</th>
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<tr>
<td>150-250</td>
<td>60-66</td>
<td>36</td>
</tr>
<tr>
<td>250-400</td>
<td>66-72</td>
<td>32</td>
</tr>
<tr>
<td>400-600</td>
<td>72-80</td>
<td>28</td>
</tr>
<tr>
<td>600-1,000</td>
<td>80-95</td>
<td>24</td>
</tr>
<tr>
<td>1,000-1,500</td>
<td>95-114</td>
<td>20</td>
</tr>
<tr>
<td>1,500-2,000</td>
<td>114-144</td>
<td>17</td>
</tr>
<tr>
<td>2,000-3,000</td>
<td>Above 145- No limited</td>
<td>15</td>
</tr>
<tr>
<td>Above – 3,000</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Figure 1.
Photo 3. Example of Edgewise Rotational Drop Test
(MSTF Low)

4. **INCLINE-IMPACT TEST.** This test is conducted by using the procedure of Method 5023, Incline-Impact Test of Federal Standard 101. The procedure for the incline-impact test is as follows: The specimen will 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 will be brought to a predetermined position on the incline and released. If it were desired to concentrate the impact on any particular position on the container, a 4- x 4-inch timber may be attached to the bumper in the desired position before the test. The carriage will 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 impacts may be at the option of the testing activity and dependent upon the objective of the test. When the test is to determine satisfactory requirements for a container or pack, and, unless otherwise specified, the specimen will 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 will be 7 feet-per-second. Photo 4 shows an example of this test.
5. **SLING COMPATIBILITY TEST.** The specimen utilizing special design or non-standard pallets will be lifted, swung, lowered and otherwise handled as necessary, using slings of the types normally used for handling the unit loads under consideration. Slings will be easily attached and removed. Danger of slippage or disengagement when load is suspended will be cause for rejection of the specimen.

6. **FORKLIFTING TESTS.** The specimen will be lifted clear of 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 will pass over the Optional Rough Handling Course For Forklift Trucks as outlined in MIL-STD-1660. The course will consist of parallel pairs of 1-inch boards spaced 54 inches apart and will be laid flat wise on the pavement across the path of the forklift. One pair will be laid at an angle of approximately 60 degrees to the path so that the left wheel strikes first. Another pair will be laid securely across the path of the forklift so that the wheels strike simultaneously. Another pair will be laid at an angle of approximately 75 degrees to the path so that the right wheel strikes first. The specimen will be transported
down and back the Optional Rough Handling Course one time. The forklift will be brought to a stop prior to traversing the course. The specimen shall be observed for deflection and damage. The specimen will be rotated 90 degrees and the specimen lifted from the side and the above steps repeated.

7. **DISASSEMBLY TEST.** Following all rough handling tests the specimen may be squared up within 2 inches of its original shape and on a flat level surface. The strapping will then be cut and removed from the palletized load. Assembly of the specimen will be such that it retains its unity upon removal of the strapping.
PART 4 - TEST EQUIPMENT

A. COMPRESSION TESTER.

1. Nomenclature: Compression Table
2. Manufacturer: Ormond Manufacturing
3. Platform: 60- by 60-inches
4. Compression Limit: 50,000 pounds
5. Tension Limit: 50,000 pounds

B. TRANSPORTATION (REPETITIVE SHOCK) SIMULATOR.

1. Nomenclature: Repetitive Shock Simulator
2. Manufacturer: Gaynes Laboratory
3. Capacity: 6,000-pound payload
4. Displacement: 1/2-inch amplitude
5. Speed: 50 to 400 RPM
6. Platform: 5- by 8-foot

C. INCLINED PLANE.

1. Nomenclature: Incline Plane Impact Tester
2. Manufacturer: Conbur Incline
3. Type: Impact Tester
4. Grade: 10 percent incline
5. Length: 12-foot
PART 5 - TEST RESULTS

A. **CONTAINER DATA.** The test units were inertly loaded to the specified design weight. The test specimen was prepared using the unitization procedures specified in Part 6 – Drawings. Special care was taken to ensure that each individual interior ammunition container had the proper amount of weight in order to achieve a realistic pallet center of gravity (CG). Once properly prepared, the test unit was tested using MIL-STD-1660, “Design Criteria for Ammunition Unit Loads,” requirements.

<table>
<thead>
<tr>
<th>TEST UNIT #1:</th>
<th>Container Inertly loaded with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight: 4,115 pounds</td>
<td>30 Each M548 Containers at 126 lbs</td>
</tr>
<tr>
<td>Length: 48 inches</td>
<td>with ( \frac{3}{4} )&quot; plywood bottom support piece</td>
</tr>
<tr>
<td>Width: 40 inches</td>
<td>and 7 sheets of tri-wall fiberboard</td>
</tr>
<tr>
<td>Height: 51-1/2 inches</td>
<td>placed between containers to fill voids</td>
</tr>
<tr>
<td></td>
<td>(See Photo 5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST UNIT #2:</th>
<th>Container Inertly loaded with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Dates: 3-4 June 2003</td>
<td>36 each fiberboard boxes at 64 lbs</td>
</tr>
<tr>
<td>Weight: 2,575 pounds</td>
<td>with 2 sheets of tri-wall fiberboard</td>
</tr>
<tr>
<td>Length: 48 inches</td>
<td>to fill voids</td>
</tr>
<tr>
<td>Width: 40 inches</td>
<td>(See Photo 6)</td>
</tr>
<tr>
<td>Height: 51-1/2 inches</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST UNIT #3:</th>
<th>Container Inertly loaded with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Date: 4 June 2003</td>
<td>30 Each M548 Containers at 126 lbs</td>
</tr>
<tr>
<td>Weight: 4,115 pounds</td>
<td>with ( \frac{3}{4} )&quot; plywood bottom support piece</td>
</tr>
<tr>
<td>Length: 48 inches</td>
<td>and 7 sheets of tri-wall fiberboard</td>
</tr>
<tr>
<td>Width: 40 inches</td>
<td>placed between containers to fill voids</td>
</tr>
<tr>
<td>Height: 51-1/2 inches</td>
<td></td>
</tr>
</tbody>
</table>
TEST UNIT #4:
Test Dates: 4-5 June 2003
Weight: 2,575 pounds
Length: 48 inches
Width: 40 inches
Height: 51-1/2 inches

Container Inertly loaded with:
36 each fiberboard boxes at 64 lbs
with 2 sheets of tri-wall fiberboard
to fill voids

Photo 5. Test Unit #1 during loading of M548 Containers.

Photo 6. Test Unit #3 during loading of fiberboard boxes.
B. TEST RESULTS - TEST UNIT #1:

1. STACKING TEST. Test Unit #1 was compressed with a load force of 12,345 pounds for 60 minutes on 4 June 2003. There was no damage noted to the test unit as a result of this test. See Photo 7 below for a typical picture of the test unit in the compression tester.

![Photo 7. Test Setup for Compression Testing.](image)

2. REPETITIVE SHOCK TEST. Test Unit #1 was vibrated 90 minutes at 221 RPM in the longitudinal orientation and 90 minutes at 259 RPM in the lateral orientation on 3 June 2003. There was minor abrasion damage to the bottom deck boards that occurred while sliding the test unit across the vibration table. See Photo 8 for the test setup for the vibration test.
3. **EDGewise Rotational Drop Test.** Test Unit #1 was edgewise rotationally dropped from a height of 12 inches on both longitudinal sides and both lateral sides. No damage was noted from this test. See Photo 9 for the test setup for the edgewise rotational drop tests.

4. **Incline-Impact Test.** Test Unit #1 was incline-impacted on all four sides with the pallet impacting the stationary wall from a distance of 8 feet. No
additional problems were encountered. See Photo 10 for test setup for incline-impact testing.


5. FORKLIFTING TEST. Test Unit #1 was lifted from the end of the pallet on the forks of the forklift truck and carried over the hazard course three times with no damage nor instability noted. The test unit was lifted from the opposite end of the pallet and the above steps accomplished with no problems encountered. See Photo 11 for the test setup during the forklifting test.
6. **DISASSEMBLY TEST.** During the disassembly of Test Unit #1 no additional problems were noted.

7. **CONCLUSION.** Test Unit #1 passed all required tests.

C. **TEST RESULTS - TEST UNIT #2:**

1. **STACKING TEST.** Test Unit #2 was compressed with a load force of 7,725 pounds for 60 minutes on 3 June 2003. No damage was noted as a result of this test.

2. **REPETITIVE SHOCK TEST.** Test Unit #2 was vibrated 90 minutes at 225 RPM in the longitudinal orientation and 259 RPM in the lateral orientation. No damage was noted as a result of this test.
3. **EDGewise ROTATIONAL DROP TEST.** Test Unit #2 was edgewise rotationally dropped from a height of 15 inches on both longitudinal sides and both lateral sides. No damage was noted from this test.

4. **INCLINE-IMPACT TEST.** Test Unit #2 was incline-impacted on all four sides with the pallet impacting the stationary wall from a distance of 8 feet. No additional problems were encountered.

5. **ForkLIFTING TEST.** Test Unit #2 was lifted from the end of the pallet on the forks of the forklift truck and carried over the hazard course three times with no damage nor instability noted. The test unit was lifted from the opposite end of the pallet and the above steps accomplished with no problems encountered.

6. **DISASSEMBLY TEST.** During the disassembly of Test Unit #2 no additional problems were noted.

7. **CONCLUSION.** Test Unit #2 passed all required tests.

D. **TEST RESULTS - TEST UNIT #3:**

1. **STACKING TEST.** Test Unit #3 was compressed with a load force of 12,345 pounds for 60 minutes on 4 June 2003. There was no damage noted to the test unit as a result of this test.

2. **REpetITIVE SHOCK TEST.** Test Unit #3 was vibrated 90 minutes at 166 RPM in the longitudinal orientation and 90 minutes at 259 RPM in the lateral orientation on 4 June 2003. It should be noted that the 166 RPM in the longitudinal orientation is considerably lower than the RPM required for the other three test units in the same orientation. The only noticeable difference in the test
units was that the banding in this direction for this test unit was noticeably tighter. There was no apparent damage sustained during this test.

3. **EDGEWISE ROTATIONAL DROP TEST.** Test Unit #3 was edgewise rotationally dropped from a height of 12 inches on both longitudinal sides and both lateral sides. No damage was noted from this test.

4. **INCLINE-IMPACT TEST.** Test Unit #3 was incline-impacted on all four sides with the pallet impacting the stationary wall from a distance of 8 feet. No additional problems were encountered.

5. **FORKLIFTING TEST.** Test Unit #3 was lifted from the end of the pallet on the forks of the forklift truck and carried over the hazard course three times with no damage nor instability noted. The test unit was lifted from the opposite end of the pallet and the above steps accomplished with no problems encountered.

6. **DISASSEMBLY TEST.** During the disassembly of Test Unit #3 no additional problems were noted.

7. **CONCLUSION.** Test Unit #3 passed all required tests.

E. **TEST RESULTS - TEST UNIT #4:**

1. **STACKING TEST.** Test Unit #4 was compressed with a load force of 7,725 pounds for 60 minutes on 4 June 2003. No damage was noted as a result of this test.

2. **REPETITIVE SHOCK TEST.** Test Unit #4 was vibrated 90 minutes at 225 RPM in the longitudinal orientation and 259 RPM in the lateral orientation. No damage was noted as a result of this test.
3. **EDGEWISE ROTATIONAL DROP TEST.** Test Unit #4 was edgewise rotationally dropped from a height of 15 inches on both longitudinal sides and both lateral sides. No damage was noted from this test.

4. **INCLINE-IMPACT TEST.** Test Unit #4 was incline-impacted on all four sides with the pallet impacting the stationary wall from a distance of 8 feet. No additional problems were encountered.

5. **FORKLIFTING TEST.** Test Unit #4 was lifted from the end of the pallet on the forks of the forklift truck and carried over the hazard course three times with no damage nor instability noted. The test unit was lifted from the opposite end of the pallet and the above steps accomplished with no problems encountered.

6. **DISASSEMBLY TEST.** During the disassembly of Test Unit #4 no additional problems were noted.

7. **CONCLUSION.** Test Unit #4 passed all required tests.
PART 6—DRAWINGS

The following test sketches represent the load configuration that was subjected to the test criteria.
CONTAINER MCAAP0304A REV3

Design Notes:
1. All marine-grade plywood construction.
2. Blocks and runners are laminated marine-grade plywood and are nailed and bolted to the base panel.
3. Container is storable.
4. One loose marine-grade plywood base reinforcement is included with the pack.
5. Strapping slots provided through center blocks.

Internal Dimensions, Inches: 46.5"L x 38.5"W x 44.9"H
(Excluding base reinforcement)
Internal Dimensions, mm: 1182 L x 978 W x 1141 H
(Excluding base reinforcement)
Internal Dimensions, Inches: 46.5"L x 38.5"W x 44.2"H
(Including base reinforcement)
Internal Dimensions, mm: 1182 L x 978 W x 1123 H
(Including base reinforcement)
External Dimensions, Inches: 48.0"L x 40.0"W x 51.5"H
External Dimensions, mm: 1218 L x 1014 W x 1310 H

Drawing in Electronic Database
Manual Changes Forbidden

Port Name: CONTAINER MCAAP0304A REV3 ASSEMBLY
Material: 18mm 9-Ply Plywood (exc. 25mm runners)

Creation Date: 05-14-2003
Sheet: 1 of 17
Size: A
Scale: None

TRANSPORT PACKAGING INTERNATIONAL, INC.
2451 Cumberland Parkway
Suite 3317
Atlanta, Georgia 30339 USA
TEL: +1 770-739-9691

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OR USED FOR ANY PURPOSE WHATSOEVER EXCEPT BY WRITTEN PERMISSION FROM TPA, INC.
CONTAINER MCAAP0304A REV3

Stacking Dimensions:
External Dimensions, Inches: 48.0"L x 40.0"W x 103.0"H
External Dimensions, mm: 1218 L x 1014 W x 2618 H

Manual Changes Forbidden

Drawing in Electronic Database
UNLESS OTHERWISE SPECIFIED:
DO NOT SCALE DRAWING
DECLINAL TOLERANCES:
X ± 0.5mm
X, Y ± 0.25mm
ANGULAR TOLERANCES:
X ± 2 DEG
X, X ± 0.5 DEG

Part Name: CNTR MCAAP0304A REV3 STAKING INFO
DWG NO: MCAAP0304A-REV3-AST-STACKED REV: 3
Material: 18mm 9-Ply Plywood (excl. 25mm runners)
Creation Date: 05-14-2003
Sheet 2 OF 17 Size: A Scale: None

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2451 Cumberland Parkway
Suite 3317
Atlanta, Georgia 30339 USA
TEL: +1 770-738-9691

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UNITIZATION PROCEDURES FOR
PALLET BOX PACKING OF
RETROGRADE AMMUNITION

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WHEN SPECIFIC PACKING PROCEDURES HAVE BEEN REQUESTED IN
WRITING OR BY E-MAIL (WEP-R@RIA.ARMY.MIL) AND ARE PROVIDED BY
COMMANDER, JOINT MUNITIONS COMMAND, ATTN: AMSTA-AR-WEP-RP,
ROCK ISLAND, IL 61299-7300, FOR SPECIFIC APPROVAL AND COMPETENT
AUTHORITY APPROVAL (CAA).

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<th>BASIC</th>
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<th>SANDRA M. SCHULTZ</th>
<th>LAURA A. FIEFFER</th>
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<td></td>
<td>Laura A. Fieffer</td>
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<td>VALIDATION ENGINEERING DIVISION</td>
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MAY 1991

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CLASS | DIVISION | DRAWING | FILE
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19 | 48 | 4233 | 20PE1000

PROJECT CA 245-87
L. Packaged retrograde ammunition must contact the side and end assemblies. Fiberboard liners shall be used.

M. Pallet unit "A" details are based on the maximum allowable dimensions of the pallet unit. The height of the side and end assemblies may be shortened according to the size and weight of the retrograde ammunition items in-

N. Regardless of the quantity of retrograde ammunition items to be palletized, the total weight of a fully loaded pallet unit will not exceed 3,000 pounds for pallet unit "A" and 4,000 pounds for pallet unit "B". When the total weight of a fully loaded pallet unit exceeds these weights, ammunition items must be removed, and filler material, such as empty boxes, fiberboard, hardboard, honeycomb filler, foam cushioning material, plywood, or wood must be substituted.

O. The style 1 pallet delineated in the detail on page 3 need not have chamfers as specified within military specifications MIL-P-16011 when used for the unitization of items covered by this appendix.

MATERIAL SPECIFICATIONS

PALLETS

- MIL SPEC MIL-P-15011; 4-WAY ENTRY, STYLE I, TYPE I, CLASS I, HEAT TREATED. SEE GENERAL NOTE "J".

LUMBER

- SEE TM 743-200-1 (DUMBER LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20. HEAT TREATMENT REQUIRED. SEE GENERAL NOTE "J".

NAILS

- ASTM F1667; COMMON STEEL NAIL (NLCS OR NLNS), ALT UNDERLAYMENT NAIL (NLUL), PALLE T NAIL (NLPL), OR COOLER NAIL (NLCM) OF SAME SIZE. SEE GENERAL NOTE "H".

PLYWOOD

- COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.

STRAPPING, STEEL

- ASTM D3953; FLAT STRAPPING, TYPE I, HEAVY DUTY, FINISH B (GRADE 2), SIZE 3/4" OR 1-1/4" X .035" OR .031", NOTE: Wire or slat edges shall have finishing applied not to exceed 5/16" in width. THE EDGE OF THE STRAP SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED UN¬ TIL THEY CUT INTO THE EDGE OF THE PALLET BOX AND THE PAL¬ LET DECK. AFTER TENSIONING, ALL STRAPS WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL.

SEAL, STRAP

- ASTM D3953; CLASS H, FINISH B (GRADE 2), DOUBLE NOTCH TYPE, STYLE I, II, III, OR IV. ALTERNATIVE SEAL FIN¬ ISH: SIGNODE OR DELTA PAINTED SEALS MAY BE USED AS AN ALTERNATIVE IF ALL SURFACES ARE PAINTED. GRIFFED BACK¬ ING IS NOT PERMITTED.

STAPLE

- ASTM F1667; STFC 189 OR STFC 207, 1/2" OR 3/4" CROWN WIDTH X 3/4" LEG LENGTH FOR 3/4" STRAPPING, OR STFC¬ 224, 1-17/32" CROWN WIDTH X 3/4" LEG LENGTH FOR 1-1/4" STRAPPING.

HARDBOARD

- ANSI/AHA A335.4, CLASS 1.

FIBERBOARD

- ASTM D4727.

HONEYCOMB FILLER

- FIBERBOARD, FACING PAPER WEIGHT 69 POUNDS/1,000 SQUARE FEET, CORE PAPER WEIGHT 33 POUNDS/1,000 SQUARE FEET, 1/2" CORE CELL CENTERS, INTERNATIONAL HONEYCOMB CORP. (OR EQUAL).

FOAM CUSHIONING

- MATERIAL SPECIFICATIONS


general notes continued
TIEDOWN STRAP, 1-1/4" X .035" OR .031" X 14'-2" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

LOAD STRAP, 1-1/4" X .035" OR .031" X 15'-4" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

SEAL FOR 1-1/4" STRAPPING (6 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.

TOP HORIZONTAL STRAP, 1-1/4" X .035" OR .031" X 16'-2" LONG STEEL STRAPPING (1 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

END ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.

SIDE ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5. NAIL TO CORNER PIECES OF THE END ASSEMBLY W/4-6d NAILS AT EACH LOCATION.

BASE ASSEMBLY (1 REQD). SEE THE "COVER/BASE ASSEMBLY" DETAIL ON PAGE 4. NAIL TO THE PALLETS W/5-6d NAILS. STAPLE BOTTOM HORIZONTAL STRAP TO BASE ASSEMBLY AS SHOWN.

BOTTOM HORIZONTAL STRAP, 1-1/4" X .035" OR .031" X 15'-4" LONG STEEL STRAPPING (1 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

PALLETS

SEE GENERAL NOTE "N" ON PAGE 2.

RETROGRADE AMMUNITION INSIDE BOX - --- 2,684 LBS (APPROX)
DUNNAGE --- --- 236 LBS
Pallet --- --- 80 LBS
TOTAL WEIGHT --- --- 3,000 LBS (APPROX)
CUBE --- --- 46.9 CU FT (APPROX)

BILL OF MATERIAL (PALLETS UNIT "A")

<table>
<thead>
<tr>
<th>Item</th>
<th>Linear Feet</th>
<th>Board Feet</th>
</tr>
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<tr>
<td>2&quot; X 4&quot;</td>
<td>57.16</td>
<td>38.11</td>
</tr>
<tr>
<td>NAILS</td>
<td>No. Req'd</td>
<td>Pounds</td>
</tr>
<tr>
<td>6d (2&quot;)</td>
<td>117</td>
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<tr>
<td>10d (3&quot;)</td>
<td>64</td>
<td>0.99</td>
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<tr>
<td>Pallet, 40&quot; X 48&quot;</td>
<td>---</td>
<td>80 LBS</td>
</tr>
<tr>
<td>Steel Strapping, 1-1/4&quot; X 90.17”</td>
<td>13.66 LBS</td>
<td></td>
</tr>
<tr>
<td>Seal for 1-1/4&quot; Strapping</td>
<td>6 Req'd</td>
<td>0.27 LB</td>
</tr>
<tr>
<td>Plywood, 3/4”</td>
<td>69.58 SQ FT</td>
<td>143.51 LBS</td>
</tr>
<tr>
<td>Staple, 1-1/2” X 3/4”</td>
<td>24 Req'd</td>
<td>NIL</td>
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</table>
COVER PIECE, PLYWOOD, 3/4" X 40" X 48" (1 REQD). NAIL TO THE LATERAL PIECES W/5-10d NAILS AT EACH LOCATION AND TO THE LONGITUDINAL PIECES W/7-10d NAILS AT EACH LOCATION.

LONGITUDINAL PIECE, 2" X 4" X 48" (2 REQD). NAIL TO THE LATERAL PIECES W/2-10d NAILS AT EACH END.

LATERAL PIECE, 2" X 4" X 37" (2 REQD).

COVER/BASE ASSEMBLY
(2 REQD)

REVISIONS

REVISION NO. 1, DATED JUNE 1991, CONSISTS OF:
1. ADDING PALLET UNIT "B" (CURRENT PALLET UNIT "A").

REVISION NO. 2, DATED OCTOBER 1993, CONSISTS OF:
1. ADDING WARNING NOTE TO PAGE 1.
2. REVISIGN THE MATERIAL SPECIFICATIONS.
3. REVISIGN GENERAL NOTE "H" ON PAGE 2 (CURRENT GENERAL NOTE "L").

REVISION NO. 3, DATED JUNE 1996, CONSISTS OF:
1. DELETING PALLET UNIT "A".
2. RENAMING PALLET UNIT "B" TO PALLET UNIT "A".
3. ADDING GENERAL NOTE PERMITTING CONTINUED USE OF EXISTING PALLET UNITS "A" IN STOCK.
4. CHANGING 2" X 8" PIECE IN BASE ASSEMBLY TO 2" X 4".
5. ADDING CLIP-LOK® PALLET BOX (PALLET UNIT "B").
6. CHANGING ADDRESS IN WARNING.

REVISION NO. 4, DATED MAY 2003, CONSISTS OF:
1. UPDATING CONTACT INFORMATION IN WARNING ON PAGE 1 AND IN SPECIAL NOTE 2 ON PAGE 8.
2. ADDING GENERAL NOTES RELATING TO COOLER NAILS AND HEAT TREATMENT.
3. UPDATING MATERIAL SPECIFICATIONS.
4. DELETING GENERAL NOTE PERMITTING CONTINUED USE OF OLD PALLET UNITS "A" IN STOCK.
SID PANEL, PLYWOOD, 3/4" X 48" X 37" (1 REQD). NAIL TO THE STRAPPING BOARDS W/9-6d NAILS AT EACH LOCATION.

STRAPPING BOARD, 2" X 4" X 29" (2 REQD).

NOTCH ALL FOUR CORNERS AS SHOWN ABOVE.

END PANEL, PLYWOOD, 3/4" X 35-1/2" X 37" (1 REQD). NAIL TO THE STRAPPING BOARDS AND CORNER PIECES W/7-6d NAILS AT EACH LOCATION.

CORNER PIECE, 2" X 4" X 29" (2 REQD).

STRAPPING BOARD, 2" X 4" X 28-1/2" (2 REQD).

SID ASSEMBLY
(2 REQD)

END ASSEMBLY
(2 REQD)
LOAD STRAP, 3/4" X .035" OR .031" X 16'-6" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

SEAL FOR 3/4" STRAPPING (7 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.

TIEDOWN STRAP, 3/4" X .035" OR .031" X 15'-2" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

BOTTOM SUPPORT PIECE, PLYWOOD, 3/4" X 46-1/4" X 38-1/4" (1 REQD). WARNING: OMITTING THIS PIECE WILL CAUSE FAILURE OF THIS CLIP-LOK™ BOX.

HORIZONTAL STRAP, 3/4" X .035" OR .031" X 16'-4" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

PALLET UNIT B
SEE GENERAL NOTE "N" ON PAGE 2.

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<thead>
<tr>
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<th>WEIGHT</th>
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<tr>
<td>RETROGRADE AMMUNITION INSIDE BOX</td>
<td>3,754 LBS</td>
</tr>
<tr>
<td>DUNNAGE</td>
<td>10 LBS</td>
</tr>
<tr>
<td>PALLET BOX</td>
<td>236 LBS</td>
</tr>
<tr>
<td><strong>TOTAL WEIGHT</strong></td>
<td><strong>4,000 LBS</strong></td>
</tr>
<tr>
<td><strong>CUBE</strong></td>
<td><strong>55.6 CU FT</strong></td>
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**BILL OF MATERIAL (PALLET UNIT "B")**

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<th>COMPONENT</th>
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</thead>
<tbody>
<tr>
<td>PALLE BOX, CLIP-LOK™</td>
<td>236 LBS</td>
</tr>
<tr>
<td>STEEL STRAPPING, 3/4&quot;</td>
<td>100.33 LBS</td>
</tr>
<tr>
<td>SEAL FOR 3/4&quot; STRAPPING</td>
<td>9.81 LBS</td>
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**SPECIAL NOTES:**

1. SOURCE OF SUPPLY: THE CLIP-LOK™ REFERENCE NUMBER RIA9961 HAS BEEN TESTED UNDER MIL-STD-1860 AND APPROVED FOR USE. THIS PALLET BOX CAN BE OBTAINED FROM CLIP-LOK BIMPAK™ USA, INC., 1-800-448-CLIP.

2. OTHER VENDORS’ PALLET BOXES MAY BE QUALIFIED FOR USE BY SUBMITTING SAMPLE BOXES TO THE DEFENSE AMMUNITION CENTER, 1 C TREE ROAD, MCALESTER, OK, 74501-9053. CONTACT THE TACOM-ARDEC PACKAGING OFFICE, AMSA-AR-WEP-RP, TELEPHONE 309-782-8205, E-MAIL WEP-R@IA.ARMY.MIL, OR THE DAC TRANSPORTATION ENGINEERING DIVISION, BMAC-D, TELEPHONE 918-420-8927, E-MAIL BJMAC-DET@DAC.ARMY.MIL.
STACKING FOR COLLAPSED CLIP-LOK™ BOX

BUNDLING LOAD STRAP, 3/4" X .035" OR .031" X 6'-9" LONG STEEL STRAPPING (1 REQD).

BUNDLING TIEDOWN STRAP, 3/4" X .035" OR .031" X 6'-6" LONG STEEL STRAPPING (1 REQD).

SEAL FOR 3/4" STRAPPING (2 REQD, 1 PER STRAP).

COLLAPSED BOX
SEE THE STENCIL DETAIL ON PAGE 8.
SPECIAL NOTES:

1. THE DETAIL DEPICTED ABOVE WILL BE STENCILED ON THE BOTTOM SUPPORT PIECE TO SHOW ASSEMBLY INSTRUCTIONS. SEE THE "COLLAPSED BOX" DETAIL ON PAGE 7.

2. AN ARROW WITH UP WILL BE STENCILED ON THE SIDE PIECES AS SHOWN TO ENSURE THE STACKING SLOTS ARE ON TOP.
UNITIZATION PROCEDURES FOR PALLET BOX PACKING OF 20MM, 25MM OR 30MM CARTRIDGES

WARNING:
THIS DRAWING IS ONLY AUTHORIZED FOR RETROGRADE OPERATIONS, WHEN SPECIFIC PACKING PROCEDURES HAVE BEEN REQUESTED IN WRITING OR BY E-MAIL (AMSTA-AR-WEP-R@RIA.ARMY.MIL) AND ARE PROVIDED BY COMMANDER, JOINT MUNITIONS COMMAND, ATTN: AMSTA-AR-WEP-RP, ROCK ISLAND, IL 61299-7300, FOR SPECIFIC APPROVAL AND COMPETENT AUTHORITY APPROVAL (CAA).

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<td>Pallet Unit &quot;A&quot;</td>
<td>3-5</td>
</tr>
<tr>
<td>20MM, 25MM OR 30MM CARTRIDGE INTERNAL DUNNAGE FOR Pallet Unit &quot;A&quot;</td>
<td>6</td>
</tr>
<tr>
<td>Pallet Unit &quot;B&quot; (CLIP-LOK RIA966I)</td>
<td>7-9</td>
</tr>
<tr>
<td>20MM, 25MM OR 30MM CARTRIDGE INTERNAL DUNNAGE FOR Pallet Unit &quot;B&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>

DISTRIBUTION STATEMENT A:
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

U.S. ARMY MATERIEL COMMAND DRAWING

ENGINEER OR TECHNICIAN \(\text{BASIC REV.}\) SANDRA M. SCHULTZ \(\text{MELVIN D. SIX}\)

JUNE 1991

REVISION NO. 2 MAY 2003

CLASS DIVISION DRAWING FILE
19 48 4233/7 20PE1000

PROJECT CA 245/7-87
A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1, AND AUGMENTS TM 743-200-1 (CHAPTER 5) AND CONFORMS TO MIL-STD-1660.

B. THE FOLLOWING AMC DRAWINGS ARE APPLICABLE FOR OUTLOADING AND STORAGE OF THE ITEMS COVERED BY THIS APPENDIX.

C. UNLESS OTHERWISE SPECIFIED, A MANUFACTURING TOLERANCE OF PLUS-OR-MINUS 1/4" IS ALLOWED ON ALL DIMENSIONS. HOWEVER, SIMILAR PIECES IN AN ASSEMBLY MUST BE WITHIN 1/8" OF THE SAME DIMENSION.

D. DIMENSIONAL LUMBER SPECIFIED THROUGHOUT THE DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE.

E. INSTALL EACH HORIZONTAL, LOAD OR TIEDOWN STRAP TO BE LOCATED AS SHOWN. HORIZONTAL STRAPS MUST BE TENSIONED AND SEALED PRIOR TO THE APPLICATION OF TIEDOWN AND LOAD STRAPS. LOAD STRAPS MUST BE TENSIONED AND SEALED AFTER THE HORIZONTAL STRAPS AND PRIOR TO THE TIEDOWN STRAPS. THE LOAD STRAPS ON PALLET UNIT "A" MUST BE THREADED THROUGH THE STRAP SLOTS OF THE PALLET.

F. WHEN APPLYING ANY STRAP, CARE MUST BE EXERCISED TO ASSURE THAT THE END OF THE STRAP ON THE UNDERSIDE OF THE JOINT EXTENDS AT LEAST 6" BEYOND THE SEAL. THIS EXTRA LENGTH OF STRAP IS REQUIRED TO PERMIT SUBSEQUENT TIGHTENING OF LOOSENED STRAPPING. RETENSIONING CAN BE ACCOMPLISHED WITHOUT REPLACING STRAPPING OR SPlicing STRAPPING THROUGH THE USE OF A MANUAL OR PNEUMATIC FEEDWHEEL TYPE TENSIONING TOOL AND THE APPLICATION OF ONE ADDITIONAL SEAL.

G. IN ORDER TO OBTAIN COMPACT AND SOUND UNITS, ALL STRAPS SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED UNTIL THEY CUT INTO THE EDGE OF THE PALLET BOX AND THE PALLET DECK. AFTER TENSIONING, ALL STRAPS WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL.

H. COOLER NAILS MAY BE SUBSTITUTED FOR THE COMMON NAILS AS SPECIFIED BY APPLYING THE FOLLOWING GUIDANCE. THE NUMBER OF COOLER NAILS TO BE USED WILL BE THE NUMBER OF COMMON NAILS MULTIPLIED BY 1.2 AND ROUNDED UP TO THE NEXT WHOLE NUMBER. THE SIZE OF THE COOLER NAILS TO BE USED WILL BE THE SAME AS SPECIFIED FOR THE COMMON NAILS (4D, 6D, 10D, ETC.) BUT WILL CONFORM TO THE SIZE AND WEIGHT TOLERANCES SPECIFIED WITHIN ASTM F1667 FOR COOLER NAILS.

J. ALL NON-MANUFACTURED WOOD USED IN THE PALLETIZED LOAD SHALL BE HEAT TREATED TO A CORE TEMPERATURE OF 56 DEGREES CELSIUS FOR A MINIMUM OF 30 MINUTES. THE PALLET MANUFACTURER AND THE MANUFACTURER OF WOOD TO BUILD FILLER ASSEMBLIES AND DUNNAGE ASSEMBLIES FOR THE PALLETIZED LOAD SHALL BE AUTHORIZED BY THE AMERICAN LUMBER STANDARDS COMMITTEE (ALS). THE PALLET MANUFACTURER AND THE MANUFACTURER OF WOOD USED TO BUILD FILLER ASSEMBLIES AND DUNNAGE ASSEMBLIES FOR THE PALLETIZED LOAD SHALL ENSURE TRACEABILITY TO THE ORIGINAL SOURCE OF HEAT TREATMENT. EACH PALLET, FILLER ASSEMBLY, OR DUNNAGE ASSEMBLY SHALL BE MARKED TO SHOW THE CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD. PALLETS, FILLER ASSEMBLIES AND DUNNAGE ASSEMBLIES MADE OF NON-MANUFACTURED WOOD SHALL BE HEAT TREATED AND MARKED APPROPRIATELY. THE QUALITY MARK FOR THE PALLET SHALL BE PLACED ON TWO OPPOSITE ENDS OF THE BOX ON THE SAME SIDE AS THE PRESERVATIVE MARKING. THE QUALITY MARK FOR THE FILLER ASSEMBLIES AND DUNNAGE ASSEMBLIES SHALL BE PLACED ON TWO OPPOSITE SIDES. FOREIGN MANUFACTURERS SHALL HAVE THE HEAT TREATMENT OF NON-MANUFACTURED WOOD PRODUCTS VERIFIED IN ACCORDANCE WITH THEIR NATIONAL PLANT PROTECTION ORGANIZATION'S COMPLIANCE PROGRAM. CLIP-LOK™ BOXES, AS DEPICTED ON PAGE 7, ARE CONSTRUCTED OF ALL PlyWOOD, FIBERBOARD, FOAM CUSHIONING MATERIAL OR HARDBOARD THAT SHALL BE ADDED AS REQUIRED TO OBTAIN A TIGHT PACK.

K. UNIT LOAD MARKING MUST BE APPLIED AND MUST BE REQUESTED FROM THE ORGANIZATION LISTED IN THE "WARNING" ON THE COVER PAGE.

L. PACKAGED RETROGRADE AMMUNITION MUST CONTACT THE SIDE AND END ASSEMBLIES. FIBERBOARD LINERS SHALL BE USED FOR UNPACKAGED RETROGRADE AMMUNITION TO PREVENT CONTACT WITH THE SIDE AND END ASSEMBLIES. FILLERS SUCH AS PLYWOOD, FIBERBOARD, HONEYCOMB FILLER, FOAM CUSHIONING MATERIAL OR HARDBOARD SHALL BE ADDED AS REQUIRED TO OBTAIN A TIGHT PACK.

M. PALLET UNIT "A" DETAILS ARE BASED ON THE MAXIMUM ALLOWABLE DIMENSIONS OF THE PALLET UNIT. THE HEIGHT OF THE SIDE AND END ASSEMBLIES MAY BE SHORTENED ACCORDING TO THE SIZE AND WEIGHT OF THE RETROGRADE AMMUNITION ITEMS IN-BIDE.

N. REGARDLESS OF THE QUANTITY OF RETROGRADE AMMUNITION ITEMS TO BE PALLETIZED, THE TOTAL WEIGHT OF A FULLY LOADED PALLET UNIT WILL NOT EXCEED 3,000 POUNDS FOR PALLET UNIT "A" AND 4,000 POUNDS FOR PALLET UNIT "B". WHEN THE TOTAL WEIGHT OF A FULLY LOADED PALLET UNIT EXCEEDS THESE WEIGHTS, AMMUNITION ITEMS MUST BE REMOVED, AND FILLER MATERIAL, SUCH AS EMPTY BOXES, FIBERBOARD, HARDBOARD, HONEYCOMB FILLER, FOAM CUSHIONING MATERIAL, PLYWOOD, OR WOOD MUST BE SUBSTITUTED.

O. THE STYLE 1 PALLETS Delineated in the detail on page 3 need not have chamfers as specified within military specification MIL-P-15011 when used for the unitization of items covered by this appendix.

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**GENERAL NOTES CONTINUED**

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**MATERIAL SPECIFICATIONS**

**PALLETS** - MIL SPEC MIL-P-15011: 4-WAY ENTRY, STYLE 1, TYPE 1, CLASS 1, HEAT TREATED. SEE GENERAL NOTE "J".

**LUMBER** - SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20. HEAT TREATMENT REQUIRED. SEE GENERAL NOTE "J".

**NAILS** - ASTM F1667: COMMON STEEL NAIL (NLCMS OR NLCMM). ALT UNDERLAYMENT NAIL (NULL). PAILLET NAIL (NPL) OR COOLER NAIL (NLQ) OF SAME SIZE. SEE GENERAL NOTE "H".

**PLYWOOD** - COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.

**STRAPPING, STEEL** - ASTM D3953; FLAT STRAPPING, TYPE 1. HEAVY DUTY, FINISH B (GRADE 2), SIZE 3/4" OR 1-1/4" X .035" OR .031", NOT TO BE CUT OR SLIT EDGES SHALL HAVE A FINISH A OVERLAY.

**SEAL, STEEL** - ASTM D3953; CLASS H, FINISH B (GRADE 2), DOUBLE NOTCH TYPE, STYLE I, II, III, IV. ALTERNATIVE SEAL FINISH: SIGEOZE OR DELTA PAINTED SEALS MAY BE USED AS AN ALTERNATIVE IF ALL SURFACES ARE PAINTED. GRIFFED BACKING IS NOT PERMITTED.

**STAPLE** - ASTM F1667; STFC-189 OR STFC-207, 15/16" OR 1" CROW WIDTH X 3/4" LEG LENGTH FOR 3/4" STRAPPING, OR STFC-224, 1-17/32" CROW WIDTH X 3/4" LEG LENGTH FOR 1-1/4" STRAPPING.

**HARDBOARD** - ANSI/AWA A35.4, CLASS 1.

**FIBERBOARD** - ASTM D4727.

**HONEYCOMB FILLER** - FIBERBOARD, FACING PAPER WEIGHT 69 POUNDS/1,000 SQUARE FEET, CORE PAPER WEIGHT 33 POUNDS/1,000 SQUARE FEET, 1/2" CORE CELL, INTERNATION HONEYCOMB CORP. (OR EQUAL).

**FOAM CUSHIONING MATERIAL** - COMMERCIAL ITEM DESCRIPTION A-A-59136, CLASS 3, TYPE III, GRADE A, OR COMMERCIAL EQUIVALENT.
**Pallet Unit A**

See General Note "E" on Page 2.

- **Retrograde**: 20mm, 25mm, or 30mm Cartridges — 2,641 lbs (Maximum)
- **Dunnage**: — 270 lbs (Minimum)
- **Pallet**: — 80 lbs

**Total Weight**: — 3,000 lbs (Maximum)

**Cube**: — 48.9 cu ft (Approx)

---

**Bill of Material (Pallet Unit "A")**

<table>
<thead>
<tr>
<th>Material</th>
<th>Linear Feet</th>
<th>Board Feet</th>
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<tbody>
<tr>
<td>2&quot; X 4&quot;</td>
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<td>38.11</td>
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<td>Nails (6d)</td>
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<td>0.69</td>
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<td>Nails (10d)</td>
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<td>Plywood, 3/4&quot;</td>
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<td>Fiberglass, 1/8&quot;</td>
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<td>24</td>
<td>0.25</td>
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**Page 3**

**Project**: CA 24577-87
COVER/BASE ASSEMBLY

(2 REQD)

LONGITUDINAL PIECE, 2" X 4" X 48"
(2 REQD). NAIL TO THE LATERAL PIECES W/2-10d NAILS AT EACH END.

LATERAL PIECE, 2" X 4" X 37" (2 REQD).

COVER PIECE, PLYWOOD, 3/4" X 40" X 48" (1 REQD). NAIL TO THE LATERAL PIECES W/5-10d NAILS AT EACH LOCATION AND TO THE LONGITUDINAL PIECES W/7-10d NAILS AT EACH LOCATION.

REVISIONS

REVISION NO. 1, DATED JUNE 1996, CONSISTS OF:
1. CHANGING THE PALLET BOX ON PAGE 2 TO CONFORM TO DRAWING 19-48-4233.
2. CHANGING THE INTERNAL DUN NAGE TO CONFORM TO THE PALLET BOX ON PAGE 2.
3. ADDING CLIP-LOK™ PALLET BOX.
4. ADDING WARNING.

REVISION NO. 2, DATED MAY 2003, CONSISTS OF:
1. UPDATING CONTACT INFORMATION IN WARNING ON PAGE 1 AND IN SPECIAL NOTE 2 ON PAGE 7.
2. ADDING GENERAL NOTES RELATING TO COOLER NAILS AND HEAT TREATMENT.
3. UPDATING MATERIAL SPECIFICATIONS.
4. DELETING GENERAL NOTE PERMITTING CONTINUED USE OF OLD PALLET UNITS "A" IN STOCK.
PACKING INSTRUCTIONS:

1. DUE TO VARIATIONS IN LENGTH (6.5” TO 8.8”), DIAMETER, WEIGHT (0.5 TO 1.1 LBS) AND CONFIGURATION (LINKED OR UNLINKED), THE NUMBER OF ROUNDS PER INDIVIDUAL PARTITION CELL AND THE TOTAL FOR THE BOX WILL VARY. TOTAL WEIGHT OF THE RETROGRADE BOX MUST NOT EXCEED 3,000 LBS.

2. DEPENDING ON THE LENGTH OF CARTRIDGES, EITHER FOUR ROWS OF 34-1/2” LONG SEPARATORS FOR 7-1/2” WIDE SECTIONS OR THREE ROWS OF 34-1/2” LONG SEPARATORS FOR 9-6/8” WIDE SECTIONS OR THREE ROWS OF 41-1/2” LONG SEPARATORS RUNNING LENGTHWISE (ROTATED 90° FROM THE SEPARATORS DEPICTED ABOVE), FOR 7-7/8” WIDE SECTIONS MAY BE USED. CARTRIDGES WILL BE PLACED EITHER NOSE-TO-NOSE OR BASE-TO-BASE IN ADJACENT ROWS.

3. PLACE ONE ROW OF CARTRIDGES WITHIN THE BOX SECTION. FILL ANY VOIDS WITH FIBERBOARD CUT TO FIT TO PROVIDE A TIGHT FIT. POSITION HORIZONTAL SPACER AND REPEAT PROCESS. NOTE THAT THE HORIZONTAL SPACER MAY REQUIRE TRIMMING TO PERMIT LOOPING OF LINKED AMMUNITION TO THE NEXT LAYER.

4. CONTINUE TO FILL ALL SECTIONS UNTIL BOX IS FULL OR MAXIMUM WEIGHT OF 3,000 POUNDS IS REACHED. IF THE BOX CANNOT BE FILLED DUE TO REACHING WEIGHT LIMIT, THE INDIVIDUAL SECTIONS SHOULD BE FILLED TO APPROXIMATELY THE SAME LEVEL TO MAINTAIN THE BOX’S CENTER OF GRAVITY.

5. ANY VOIDS BETWEEN THE TOP ROW OF CARTRIDGES AND THE TOP OF THE BOX WILL BE FILLED WITH FIBERBOARD AS REQUIRED TO PROVIDE CONTACT WITH THE COVER WHEN INSTALLED.
LOAD STRAP, 3/4" X .035" OR .031" X 15'-4" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

SEAL FOR 3/4" STRAPPING (7 REQD, 1 PER STRAP).
CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.

TIEDOWN STRAP, 3/4" X .035" OR .031" X 15'-2" LONG STEEL STRAPPING (3 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

BOTTOM SUPPORT PIECE, PLYWOOD, 3/4" X 46-1/4" X 38-1/4" (1 REQD).
WARNING: OMITTING THIS PIECE WILL CAUSE FAILURE OF THIS CLIP-LOK™ BOX.

HORIZONTAL STRAP, 3/4" X .035" OR .031" X 15'-8" LONG STEEL STRAPPING (2 REQD). SEE GENERAL NOTE "E" ON PAGE 2.

PALLET UNIT "B"
SEE GENERAL NOTE "N" ON PAGE 2.

RETROGRADE 20mm, 25mm OR 30mm CARTRIDGES - 3,677 LBS (MAXIMUM)
DUNNGAGE - - - - - - - - - - - - - - - - - - - - - - - - - - 63 LBS (MINIMUM)
PALLETS - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 260 LBS
TOTAL WEIGHT - - - - - - - - - - - - - - - - - - - - - - - - - - 4,000 LBS (MAXIMUM)
CUBE - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 55.6 CU FT (APPROX)

BILL OF MATERIAL (PALLET UNIT "B")

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>SQFT (MAX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet Box, Clip-Lok™</td>
<td>1</td>
<td>- - - - - - - - - - - - - - - - - - - - - - -</td>
<td>260 LBS</td>
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<tr>
<td>Plywood, 1/2&quot;</td>
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<td>33.29 SQFT</td>
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<tr>
<td>Fiberboard, 1/8&quot;</td>
<td>-</td>
<td>- - - - - - - - - - - - - - - - - - - - - - -</td>
<td>Varies</td>
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<tr>
<td>Fiberboard, 1/4&quot;</td>
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<td>33.29 SQFT</td>
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<tr>
<td>Fiberboard, 1/2&quot;</td>
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<td>26.11 SQFT</td>
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<tr>
<td>Fiberboard, 1&quot;</td>
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<td>32.53 SQFT</td>
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<tr>
<td>Steel Strapping, 3/4&quot;</td>
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<td>110.25 SQFT</td>
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<tr>
<td>Seal, For 3/4&quot; Strapping</td>
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<td>- - - - - - - - - - - - - - - - - - - - - - -</td>
<td>7 REQD</td>
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<tr>
<td>Staple, 1'-17/32&quot; X 3/4&quot;</td>
<td>-</td>
<td>- - - - - - - - - - - - - - - - - - - - - - -</td>
<td>24 REQD</td>
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</tbody>
</table>

SPECIAL NOTES:
1. SOURCE OF SUPPLY: THE CLIP-LOK™ REFERENCE NUMBER RIA9991 HAS BEEN TESTED UNDER MIL-STD-1660 AND APPROVED FOR USE. THIS PALLET BOX CAN BE OBTAINED FROM CLIP-LOK SIMPAK™ USA, INC., 1-800-448-CLIP.
2. OTHER VENDORS’ PALLET BOXES MAY BE QUALIFIED FOR USE BY SUBMITTING SAMPLE BOXES TO THE DEFENSE AMMUNITION CENTER, 1 C TREE ROAD, McAlester, OK 74501-8053. CONTACT THE TACOM-ARDEC PACKAGING OFFICE, AMSTA-AR-WEP-RP, TELEPHONE 309-782-8205, E-MAIL WEP-R@RJA.ARMY.MIL, OR THE DAC TRANSPORTATION ENGINEERING DIVISION, SJMAC-DET, TELEPHONE 918-420-8927, E-MAIL SJMAC-DET@DAC.ARMY.MIL.
STACKING FOR COLLAPSED CLIP-LOK™ BOX

BUNDLING LOAD STRAP, 3/4" X .035" OR .031" X 9'-.9" LONG STEEL STRAPPING (1 REQD).

BUNDLING TIEDOWN STRAP, 3/4" X .035" OR .031" X 8'-6" LONG STEEL STRAPPING (1 REQD).

SEAL FOR 3/4" STRAPPING (2 REQD, 1 PER STRAP).

INDICATES CLIPS

COLLAPSED BOX
SEE THE STENCIL DETAIL ON PAGE 9.
STENCIL (FOR APPLICATION TO BOTTOM SUPPORT PIECE)

SPECIAL NOTES:

1. THE DETAIL DEPICTED ABOVE WILL BE STENCILED ON THE BOTTOM SUPPORT PIECE TO SHOW ASSEMBLY INSTRUCTIONS. SEE THE "COLLAPSED BOX" DETAIL ON PAGE 8.

2. AN ARROW WITH UP WILL BE STENCILED ON THE SIDE PIECES AS SHOWN TO ENSURE THE STACKING SLOTS ARE ON TOP.
PACKING INSTRUCTIONS:

1. DUE TO VARIATIONS IN LENGTH (6.5" TO 8.8"), DIAMETER, WEIGHT (0.5 TO 1.1 LBS) AND CONFIGURATION (LINKED OR UNLINKED), THE NUMBER OF ROUNDS PER INDIVIDUAL PARTITION CELL AND THE TOTAL FOR THE BOX WILL VARY. TOTAL WEIGHT OF THE RETROGRADE BOX MUST NOT EXCEED 3,000 LBS.

2. DEPENDING ON THE LENGTH OF CARTRIDGES, EITHER FOUR ROWS OF 37-1/2" LONG SEPARATORS FOR 8-1/8" WIDE SECTIONS OR THREE ROWS OF 37-1/2" LONG SEPARATORS FOR 10-3/8" WIDE SECTIONS OR THREE ROWS OF 44-1/2" LONG SEPARATORS RUNNING LENGTHWISE (ROTATED 90° FROM THE SEPARATORS DEPICTED ABOVE), FOR 8-6/8" WIDE SECTIONS MAY BE USED. CARTRIDGES WILL BE PLACED EITHER NOSE-TO-NOSE OR BASE-TO-BASE IN ADJACENT ROWS.

3. PLACE ONE ROW OF CARTRIDGES WITHIN THE BOX SECTION. FILL ANY VOIDS WITH FIBERBOARD CUT TO FIT TO PROVIDE A TIGHT FIT. POSITION HORIZONTAL SPACER AND REPEAT PROCESS, NOTE THAT THE HORIZONTAL SPACER MAY REQUIRE TRIMMING TO PERMIT LOOPING OF LINKED AMMUNITION TO THE NEXT LAYER.

4. CONTINUE TO FILL ALL SECTIONS UNTIL BOX IS FULL OR MAXIMUM WEIGHT OF 3,000 POUNDS IS REACHED. IF THE BOX CANNOT BE FILLED DUE TO REACHING WEIGHT LIMIT, THE INDIVIDUAL SECTIONS SHOULD BE FILLED TO APPROXIMATELY THE SAME LEVEL TO MAINTAIN THE BOX'S CENTER OF GRAVITY.

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