

BASIC PROCEDURES

UNITIZATION PROCEDURES FOR AMMUNITION AND COMPONENTS PACKED IN CYLINDRICAL METAL OR PLASTIC CONTAINERS ON 4-WAY ENTRY WOODEN PALLETS WITH METAL TOP LIFT

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NOTICE:

THIS BASIC PROCEDURE DOCUMENT WILL BE AUGMENTED BY SEPARATELY ISSUED APPENDICES BEARING THE DRAWING AND FILE NUMBERS OF THIS DOCUMENT. AN APPENDIX WILL DELINEATE THE APPROVED CONFIGURATION OF A UNIT LOAD FOR A SPECIFIC SERIES CONTAINER WITH AMMUNITION ITEMS. APPENDICES CANNOT STAND ALONE, BUT MUST BE USED IN CONJUNCTION WITH THIS BASIC PROCEDURES DRAWING. THE DRAWING NUMBER OF EACH APPENDIX WILL CONTAIN A SUB-NUMBER FOR IDENTIFICATION (E.G., THE DRAWING NUMBER FOR APPENDIX 50 WILL BE 19-48-4326/50-20PM1012).

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U.S. ARMY MATERIEL COMMAND DRAWING

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GENERAL NOTES

(GENERAL NOTES CONTINUED)

- 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. APPROVED SPECIFICATIONS, COVERING THE ASSEMBLY AND UNITIZATION OF CYLINDRICAL CONTAINERS INTO UNIT LOADS, ARE SET FORTH IN THIS DRAWING. THIS DRAWING WILL BE CONSIDERED THE BASIC DOCUMENT FOR THE UNITIZATION OF AMMUNITION ITEMS PACKED IN CYLINDRICAL METAL OR PLASTIC CONTAINERS, EXCEPT FOR SOME RESTRICTED ITEMS, SUCH AS WP FILLED AMMUNITION. THIS DOCUMENT INCLUDES MATERIAL SPECIFICATIONS AND UNITIZING STANDARDS APPLICABLE TO UNITIZATION, PLUS INFORMATION RELATIVE TO TYPICAL POSITIONING OF CONTAINERS ON A PALLET AND INSTALLATION OF THE TOP PALLET ADAPTERS AND UNITIZING STEEL STRAPPING. FOR TYPICAL UNITIZATION PROCEDURES SEE PAGE 5.
- C. APPENDICES PERTAINING TO THIS BASIC DOCUMENT WILL BE ISSUED SEPARATELY. ALL APPENDICES, HOWEVER, ARE A PART OF THIS BASIC PROCEDURE DRAWING. EACH APPENDIX WILL COVER THE APPROVED CONFIGURATION FOR A UNIT LOAD, THE SPECIFIC UNITIZATION PROCEDURES AND THE PERTINENT TABULAR DATA FOR ONE ITEM OF AMMUNITION OR FOR A CATEGORY OF AMMUNITION ITEMS.
- D. GENERALLY, UNIT LOADS SHOWN IN THE APPENDICES WILL CONFORM TO THE STANDARDS LISTED BELOW.
1. GROSS WEIGHTS OF PALLETIZED UNIT LOADS ARE BASED ON AN OPTIMUM WEIGHT OF 2,464 POUNDS, DUE TO MATERIAL HANDLING EQUIPMENT CONSIDERATIONS. UNLESS SPECIFICALLY RESTRICTED BY ANOTHER AUTHORITATIVE DOCUMENT, THE MAXIMUM GROSS WEIGHT OF AMMUNITION UNIT LOADS IS 2,500 POUNDS.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

- PALLET** - - - - - : MIL SPEC MIL-DTL-15011; 4-WAY ENTRY, STYLE 1, 1A OR 1B, TYPE I, CLASS 1, PRESERVATIVE AND HEAT TREATED.
- LUMBER** - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20 FOR FILLER ASSEMBLIES. ASTM D6199; CLASS 2, GROUP II, III, OR IV, PRESERVATIVE TREATED AND HEAT TREATED FOR OTHER DUNNAGE ASSEMBLIES. **NOTE:** ONLY GROUP IV LUMBER IN ACCORDANCE WITH ASTM D6199 WILL BE ACCEPTABLE FOR THE CONSTRUCTION OF THE PALLET. SEE GENERAL NOTES "X" AND "Z" ON PAGE 4.
- NAILS** - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMSM). ALT: UNDERLAYMENT NAIL (NLUL), PALLET NAIL (NLPL), OR COOLER NAIL (NLCL) OF SAME SIZE. SEE GENERAL NOTE "AA" ON PAGE 4.
- 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 1, HEAVY DUTY, FINISH B (GRADE 2), SIZE 1-1/4" X .035" OR .031" OR .029"; BUNDLING STRAP SIZE 3/4" X .035" OR .031" OR .029". **NOTE:** IF EDGES DO NOT MEET THE PREECE TEST FOR GRADE 2, ANY BRITTE OR SLIT EDGES SHALL HAVE FINISH A OVERLAY APPLIED.
- SEAL, STRAP** - - - - - : ASTM D3953; CLASS H, FINISH B (GRADE 2) DOUBLE NOTCH TYPE, STYLE I, II, III OR IV. ALTERNATIVE SEAL FINISH: SIGNODE OR DELTA PAINTED SEALS MAY BE USED AS AN ALTERNATIVE IF ALL SURFACES ARE PAINTED. GRITTED BACKING IS NOT PERMITTED.
- STAPLE, STRAP** - - - - - : ASTM F1667; STFCs-189, STFCs-198, STFCs-207, OR STFCs-216, 15/16" OR 1" CROW WIDTH X 3/4" LEG LENGTH FOR 3/4" STRAPPING OR STFCs-224, 1-17/32" CROW WIDTH X 3/4" LEG LENGTH FOR 1-1/4" STRAPPING. SEE GENERAL NOTE "P" ON PAGE 3.

2. UNIT LOADS SHOULD NOT EXCEED 44" IN LENGTH BY 54" IN WIDTH FOR STYLE 1 (44" X 48") PALLETS, 39" IN LENGTH BY 51- 1/2" IN WIDTH FOR STYLE 1A (35" X 45-1/2") PALLETS, 44" IN LENGTH X 54" IN WIDTH FOR TYPE III (48" X 40") PALLETS, OR 44" IN LENGTH BY 59" IN WIDTH FOR STYLE 1B (42" X 53") PALLETS. UNIT LOAD HEIGHT, INCLUDING PALLET HEIGHT, SHOULD NOT EXCEED 54". ANY OR ALL OF THE STATED DIMENSIONS FOR THE LENGTH, WIDTH OR HEIGHT OF A UNIT LOAD, HOWEVER, CAN BE INCREASED OR DECREASED, DEPENDING UPON PECULIARITIES OF THE COMMODITY BEING UNITIZED AND IDENTIFIABLE FACTORS THAT INFLUENCE TOTAL COST EFFECTIVENESS THROUGHOUT THE AMMUNITION LOGISTICS SYSTEM.
3. THE UNIT LOAD SHOULD EITHER BE FLUSH WITH OR SLIGHTLY OVERHANG THE PALLET ON ALL FOUR SIDES. OVERHANG IS DEFINED AS THE DISTANCE THAT THE AMMUNITION ITEM PACKAGE(S) AND/OR PALLET ADAPTER EXTEND BEYOND THE EDGE OF THE PALLET.
4. A UNIT LOAD, SUCH AS THE LAST UNIT LOAD FOR AN AMMUNITION LOT, CAN BE ASSEMBLED WITH LESS LAYERS THAN SPECIFIED FOR THE BASIC UNIT LOAD. HOWEVER, UNIT LOADS, INCLUDING PARTIAL UNIT LOADS, WILL NOT BE ASSEMBLED WITH A PARTIAL LAYER. EMPTY CONTAINERS WILL BE USED TO ACHIEVE FULL-LAYER UNIT LOADS. FOR SPECIFIC GUIDANCE, SEE GENERAL NOTES "F" AND THE "PROVISIONS FOR LESS-THAN-FULL-LAYER LOADS" ON PAGE 5.
5. A CYLINDRICAL CONTAINER WILL NOT CONTAIN MORE THAN ONE LOT OF AMMUNITION PER CONTAINER. UNIT LOADS WILL NOT CONTAIN MORE THAN TWO LOTS PER UNIT LOAD, EXCEPT WHERE REQUIRED FOR BALLISTIC SAMPLE SHIPMENT OR FOR TROOP USE AT POST, CAMP OR STATION. SEE GENERAL NOTE "R" ON PAGE 3.
6. LESS-THAN-FULL CYLINDRICAL CONTAINERS OF AN AMMUNITION ITEM (LIGHT CONTAINERS) ARE LIMITED TO ONLY ONE LIGHT CONTAINER PER ITEM LOT. A UNIT LOAD WILL NOT CONTAIN MORE THAN ONE LIGHT CONTAINER PER ITEM LOT ON A PALLET. SEE THE "PROVISIONS FOR LESS-THAN-FULL-LAYER LOADS" ON PAGE 5 FOR ADDITIONAL REQUIREMENTS.
- E. ANY REQUEST FOR DEVIATION FROM THE STANDARDS DESCRIBED IN GENERAL NOTE "D" OR FROM THE PROCEDURES DELINEATED IN AN APPENDIX MUST BE DIRECTED TO THE COMMANDER, U.S. ARMY DEVCOM ARMAMENTS CENTER, ATTN: FCDD-ACE-TP, ROCK ISLAND, IL 61299-7300, FOR SPECIFIC APPROVAL. FOR EXAMPLE, SPECIFIC APPROVAL MUST BE OBTAINED FOR UNITIZATION OF AN ITEM WHEN PACKED IN CONTAINERS WHICH ARE DIFFERENT IN SIZE THAN THOSE SHOWN IN THE APPENDIX FOR THAT ITEM, EVEN THOUGH THE UNIT LOAD MAY COMPLY WITH THE STANDARDS DESCRIBED IN GENERAL NOTE "D".
- F. EXCEPT AS OTHERWISE STATED WITHIN GENERAL NOTE "D.4" ABOVE, UNIT LOADS MUST ONLY BE MADE UP WITH FULL LAYERS. FOR REDUCED QUANTITIES, HOWEVER, ONE OR MORE FULL LAYERS MAY BE OMITTED, AND/OR A FULL LAYER MAY CONSIST OF LOADED CONTAINERS AND AN EMPTY CONTAINER(S), AS DELINEATED IN GENERAL NOTE "Q" ON PAGE 3. ONLY ONE UNIT LOAD HAVING A REDUCED QUANTITY OF ITEMS SHOULD BE PERMITTED PER LOT OF THAT ITEM. EACH LAYER OF CONTAINERS WILL BE POSITIONED AS APPROPRIATE WITHIN THE PALLET ADAPTER. CARE SHALL BE TAKEN TO ENSURE THAT THE CONTAINERS ARE EVENLY ALIGNED HORIZONTALLY AND VERTICALLY SO THAT THE SIDES AND ENDS OF THE UNIT LOAD DO NOT EXCEED A 1/2" TOLERANCES, RELATIVE TO THE PALLET DECK. SEE THE "ALLOWABLE TOLERANCES FOR ASSEMBLING UNITS" ON PAGE 6.
- G. **CAUTION:** ROCKETS AND ROCKET MOTORS IN A PROPULSIVE STATE WILL BE POSITIONED IN THE UNIT LOAD WITH ALL NOSE ENDS IN ONE DIRECTION.
- H. DIMENSIONAL LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE SPECIFIED. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE. **NOTE:** IF THE 1" X 2", 2" X 2", OR 2" X 3" DUNNAGE LUMBER SPECIFIED IN THE APPENDICES IS NOT READILY AVAILABLE, TWO ACCEPTABLE SIZE DUNNAGE PIECES CAN BE MADE BY RIPPING (SAWING) A PIECE OF NOMINAL SIZE 1" X 4", 2" X 4", OR 2" X 6" LUMBER, RESPECTIVELY, ON THE CENTER LINE OF ITS WIDTH.
- J. UNLESS OTHERWISE SPECIFIED, A PLUS-OR-MINUS 1/4" IS ALLOWED ON OVERALL DIMENSIONS OF ANY PIECE OF DUNNAGE OR DUNNAGE ASSEMBLY. HOWEVER, SIMILAR PIECES IN AN ASSEMBLY MUST BE WITHIN 1/8" OF THE SAME DIMENSION.

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- K. IN ORDER TO OBTAIN COMPACT (SOUND) UNITS, ALL STRAPS SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED. AFTER TENSIONING, EACH STRAP WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL. SEE "ALLOWABLE TOLERANCES FOR ASSEMBLING UNITS" DETAILS ON PAGE 6. SEALS MAY BE LOCATED ON A SIDE OR ON THE TOP OF THE UNIT, AS REQUIRED BY OPERATIONAL NECESSITY.
- L. WHEN APPLYING ANY STRAP, CARE MUST BE EXERCISED TO ENSURE THAT THE END OF THE STRAP ON THE UNDERSIDE OF THE JOINT EXTENDS AT LEAST 6" BEYOND THE SEAL. THIS EXTRA MINIMUM LENGTH OF THE 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. SEE "STRAP RETENSIONING TAB" DETAIL ON PAGE 4.
- M. DETERMINATION OF LENGTH OF STRAPPING. THE FOLLOWING DEFINITIONS APPLY.

L = LENGTH OF STRAP REQUIRED IN INCHES
 A = LENGTH OF UNIT IN INCHES
 W = WIDTH OF UNIT IN INCHES
 H = HEIGHT OF UNIT, INCLUDING PALLET, IN INCHES

THE LENGTH OF A UNITIZING STRAP REQUIRED FOR A SPECIFIC UNIT, WHERE THE STRAP PASSES UNDER THE PALLET DECK, WILL BE DETERMINED BY USING THE FOLLOWING FORMULA: $L = 2A$ (OR $2W$) + $2H + 2'$. $2A$ WILL BE USED WHEN THE STRAP IS PARALLEL TO THE PALLET UNIT LENGTH, AND $2W$ WILL BE USED WHEN THE STRAP IS PERPENDICULAR TO THE PALLET UNIT LENGTH.

- N. PALLET UNIT LOADS SHALL BE INSPECTED FOR TORN, DETERIORATED OR LOOSENED STRAPPING PRIOR TO SHIPPING.
1. TORN OR BROKEN STRAPS SHOULD BE REPLACED OR REPAIRED BY SPLICING IN A MANNER SIMILAR TO THAT DESCRIBED IN "N.4(B)" BELOW.
 2. DETERIORATION DUE TO A MINOR AMOUNT OF RUST WILL NOT NECESSARILY BE CAUSE FOR REPLACING A STRAP. HOWEVER, AN EXTENSIVELY RUSTED/SCALED/PITTED STRAP IS CAUSE FOR REPLACING THE STRAP.
 3. A DAMAGED OR DEFECTIVE SEAL IS SUFFICIENT CAUSE FOR REPLACEMENT OF THE SEAL.
 4. LOOSE STRAPS SHOULD BE CHECKED FOR DEGREE OF LOOSENESS BY POSITIONING THE HOOK OF A SCALE (COMMONLY KNOWN AS A FISH SCALE) BEHIND THE STRAPS NEAR THE MIDPOINT AT THE TOP OR SIDE OF THE UNIT LOAD. PULL THE SCALE UNTIL A READING OF 20 POUNDS IS OBTAINED. THE DISTANCE BETWEEN THE TOP PALLET ADAPTER AND THE STRAP MUST NOT EXCEED 1-1/2". IF MEASUREMENT EXCEEDS 1-1/2", THE STRAP MUST BE TIGHTENED OR REPLACED. SEE PAGE 4 FOR GUIDANCE. TIGHTENING CAN BE ACCOMPLISHED BY EITHER OF TWO METHODS.
 - (A) A STRAP TENSIONING TOOL CAN BE USED IF THE STRAP HAS AT LEAST A 6" LONG TAB AT THE SEAL. SEE GENERAL NOTE "L" FOR GUIDANCE.
 - (B) AN 18" OR LONGER STRAP CAN BE USED AS A SPLICE PIECE. CUT THE LOOSE STRAP ON BOTH SIDES OF THE ORIGINAL SEAL AND DISCARD THE CUT OUT SECTION. OVERLAP ONE END OF THE ORIGINAL STRAPPING SO AS TO PROTRUDE SLIGHTLY BEYOND THE END OF THE SEAL TO BE USED. POSITION AND SECURE SEAL TO OVERLAPPED SECTION WITH TWO PAIR OF NOTCHES. USING A STRAPPING TOOL, TENSION AND SEAL THE LENGTHENED STRAP. THE STRAP SPLICE PIECE MAY BE CUT FROM NEW STRAP OR USED STRAP, PROVIDED IT IS AT LEAST AS GOOD A QUALITY AS THE STRAP TO WHICH IT IS BEING SECURED. **NOTE:** ONLY ONE SPLICE PER STRAP IS ALLOWED ON UNIT LOADS OF AMMUNITION.
 - (C) **CAUTION:** WHEN A STRAP IS REPLACED/SPLICED OR RETENSIONED, AND THE OTHER STRAPS ON A UNIT LOAD ARE NOT, CARE MUST BE EXERCISED TO ENSURE THAT THE TENSION ON THE AFFECTED STRAP IS NEARLY THE SAME AS THAT OF THE OTHER STRAPS.
- O. AMMUNITION UNITIZED PRIOR TO DISTRIBUTION OF THIS DRAWING OR OF AN APPENDIX THERETO, NEED NOT BE REUNITIZED SOLELY TO CONFORM TO THE STANDARDS SPECIFIED HEREIN OR TO THE METHOD SHOWN IN AN AUGMENTING APPENDIX. HOWEVER, CONTAINER AND STRAP ALIGNMENT MUST CONFORM WITH THE TOLERANCE STANDARDS SPECIFIED ON PAGE 6 OF THIS DRAWING BEFORE A UNIT IS ACCEPTABLE FOR SHIPMENT. ALSO, THE CONDITION OF THE UNITIZING STRAPPING ON A UNIT LOAD MUST COMPLY WITH THE CRITERIA OF GENERAL NOTE "N" ABOVE.

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- P. ROOFING NAILS IN ACCORDANCE WITH ASTM F1667 NL RF R-02Z MAY BE USED AS AN ALTERNATE TO STAPLES FOR SECURING STEEL STRAPS TO BOARDS. NAILS MUST BE APPLIED NEXT TO THE STRAPPING SUCH THAT THE NAIL HEADS OVERLAP THE STRAPPING. APPLY TWO NAILS IN PAIRS (TO REPLACE ONE STAPLE) ON EITHER SIDE OF THE STRAP, WITH THE SECOND NAIL APPLIED APPROXIMATELY 180 DEGREES FROM THE FIRST NAIL.
- Q. EMPTY CONTAINERS, PREFERABLY "REJECTS", WILL BE USED TO ACHIEVE A FULL-LAYER PALLET UNIT. THE FOLLOWING SPECIFICATIONS MUST BE FOLLOWED WHEN EMPTY CONTAINERS ARE USED TO ACHIEVE A FULL-LAYER PALLET UNIT.
1. EMPTY CONTAINERS WILL BE POSITIONED IN THE TOP LAYER OF THE PALLET UNIT, AS DEPICTED IN THE DETAIL ON PAGE 5. EMPTY OR REJECT CONTAINERS MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER(S) OF CONTAINERS. IF THE QUANTITY OF CONTAINERS TO BE OMITTED EQUALS ONE FULL LAYER, ONE FULL LAYER OF CONTAINERS WILL BE OMITTED. FILLER (REJECTED) CONTAINERS USED TO COMPLETE A LAYER ON A PALLET, MUST BE MARKED AS SPECIFIED IN ARDEC DRAWING NO. 12982865. FOR HYDRA-70 CONFIGURATION ONLY, MARK AS SPECIFIED IN AMCOM DRAWING 13643712.
 2. EACH PALLET UNIT CONTAINING EMPTY CONTAINERS WILL HAVE A WEATHER RESISTANT PLACARD APPLIED TO ONE SIDE AND ONE END OF THE UNIT. THE PLACARDS WILL BE STENCILLED WITH A CONTRASTING COLOR, USING LETTERS THAT ARE AS LARGE AS PRACTICAL BUT NOT LESS THAN 1/2" IN SIZE, TO READ: "THIS UNIT LOAD CONTAINS (NUMBER) EMPTY CONTAINER(S)".
- R. IF UNITIZING OPERATIONS ARE BEING PERFORMED IN SUPPORT OF A SHIPMENT OF ITEMS FOR TROOP USE AT A CAMP, POST OR STATION, AND, IF IN ADDITION TO FULL LAYER UNITS SPECIFIED IN GENERAL NOTE "F" ON PAGE 2, A FEW LOOSE CONTAINERS ARE REQUIRED TO SATISFY THE QUANTITY REQUISITIONED, THE LOOSE CONTAINERS NEED NOT BE UNITIZED, HOWEVER, THE METHOD FOR BRACING AND STAYING OF THE LOOSE CONTAINERS WITHIN THE LOAD TO BE SHIPPED MUST COMPLY WITH THE METHODS SPECIFIED WITHIN THE APPLICABLE 19-48 SERIES OUTLOADING PROCEDURAL DRAWING.
- S. OUTLOADING AND STORAGE OF PALLET UNITS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH APPLICABLE PROCEDURAL DRAWINGS AS IDENTIFIED IN THE APPENDICES FOR SPECIFIC UNITS. THESE DRAWINGS ARE AVAILABLE AT [HTTPS://WWW.DAU.EDU/COP/AMMO/PAGES/DEFAULT.ASPX](https://www.dau.edu/cop/ammo/pages/default.aspx). CONTACT THE DEFENSE AMMUNITION CENTER AT THE ABOVE WEB ADDRESS IF SPECIFIC STORAGE AND OUTLOADING DRAWINGS ARE NOT IDENTIFIED WITHIN A PARTICULAR APPENDIX.
- T. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES, AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- U. WHEN ASSEMBLING A COMPLETE PALLET UNIT, CARE SHALL BE TAKEN TO ENSURE THAT THE AMMUNITION ITEM PACKAGES AND PALLET ADAPTERS, AS APPLICABLE, ARE EVENLY ALIGNED SO THAT THE SIDES AND ENDS OF THE PALLET UNIT DO NOT EXCEED A 1/2" TOLERANCE, RELATIVE TO THE PALLET. SEE THE "ALLOWABLE TOLERANCES FOR ASSEMBLING UNITS" DETAILS ON PAGE 6.
- V. TWO METHODS ARE APPROVED FOR DETERMINING THE AVERAGE WEIGHT THAT IS TO BE SHOWN ON PALLETIZED UNITS OF AMMUNITION THAT ARE BEING PRODUCED AT LOAD, ASSEMBLE AND PACK PLANTS.
1. PREFERRED METHOD FOR DETERMINATION OF UNIT LOAD WEIGHT: THE WEIGHT OF AMMUNITION UNIT LOADS MAY BE DETERMINED BY RANDOMLY SELECTING FIVE UNIT LOADS FROM THE CURRENT MONTH'S PRODUCTION. EACH UNIT LOAD SHALL THEN BE WEIGHED. THE CALCULATED AVERAGE WEIGHT OF THE FIVE UNIT LOADS (TOTAL WEIGHT OF THE FIVE UNIT LOADS DIVIDED BY FIVE) WILL BE USED AS THE UNIT LOAD WEIGHT FOR WHICHEVER IS LESS, EITHER A 60-DAY PERIOD OR UNTIL A DIMENSIONAL OR CONFIGURATION CHANGE IS MADE TO THE UNIT LOAD.
 2. ALTERNATIVE METHOD FOR DETERMINATION OF UNIT LOAD WEIGHT: THE WEIGHT OF AMMUNITION UNIT LOADS MAY BE DETERMINED BY RANDOMLY SELECTING AND WEIGHING FIVE GROUPS OF UNIT LOAD COMPONENTS (PALLET, STRAPPING, SEALS, SPACER ASSEMBLIES, ADAPTERS, ETC.) FROM THE CURRENT MONTH'S PRODUCTION AND ADDING TO IT THE WEIGHT OF THE LOADED CONTAINERS TO BE PLACED ON THE PALLET. THE WEIGHT OF THE LOADED CONTAINERS WILL BE DETERMINED BY USING THE FOLLOWING PROCEDURES:
 - (A) WEIGH FIVE LOADED CONTAINERS INDIVIDUALLY AND RECORD THE TOTAL WEIGHT.

(CONTINUED ON PAGE 4)

(GENERAL NOTES CONTINUED FROM PAGE 3)

- (B) WEIGHT THREE INDIVIDUAL GROUPS OF FIVE LOADED CONTAINERS EACH AND RECORD EACH GROUP WEIGHT.
- (C) WEIGH THREE INDIVIDUAL GROUPS OF TEN LOADED CONTAINERS EACH AND RECORD EACH GROUP WEIGHT.
- (D) TOTAL ALL RECORDED WEIGHTS AND DIVIDE BY 50. THE RESULT IS THE APPROVED LOADED CONTAINER GROSS WEIGHT.

THE APPROVED LOADED CONTAINER WEIGHT WILL THEN BE MULTIPLIED BY THE QUANTITY OF CONTAINERS TO BE PLACED ON THE PALLET AND ADDED TO EACH GROUP OF UNIT LOAD COMPONENTS. THE CALCULATED AVERAGE WEIGHT OF THE FIVE UNIT LOAD GROUPS (TOTAL WEIGHT OF THE FIVE UNIT LOAD GROUPS DIVIDED BY FIVE) WILL BE USED AS THE UNIT LOAD WEIGHT FOR WHICHEVER IS LESS, EITHER A 60-DAY PERIOD OR UNTIL A DIMENSIONAL OR CONFIGURATION CHANGE IS MADE TO THE UNIT LOAD.

- W. UNIT LOAD MARKING WILL BE ACCOMPLISHED IN ACCORDANCE WITH DAC DRAWING ACV00561, UNIT LOAD MARKING FOR SHIPMENT AND STORAGE, AMMUNITION AND EXPLOSIVES. 2-D BAR CODES SHALL BE APPLIED AS SPECIFIED IN DAC DRAWING ACV00561.
- X. ALL WOODEN DUNNAGE USED IN UNIT LOADS SHALL BE TREATED WITH EITHER TYPE I OR TYPE III WOOD PRESERVATIVE, IN ACCORDANCE WITH ARDEC DRAWING 13064136. IF THE DUNNAGE CONSISTS OF MORE THAN ONE COMPONENT, IT MUST BE ASSEMBLED PRIOR TO TREATMENT. PRESERVATIVE MARKING SHALL BE APPLIED TO AT LEAST ONE LOCATION ON THE ASSEMBLY OR COMPONENT IN ACCORDANCE WITH PARAGRAPH 3.3.6 OF ARDEC DRAWING 13064136.
- Y. DIMENSIONS GIVEN FOR DUNNAGE ASSEMBLIES WILL BE FIELD CHECKED PRIOR TO THEIR ASSEMBLY. CONTAINERS MUST FIT SNUGLY IN THE DUNNAGE ASSEMBLIES. THIS GUIDANCE MUST BE APPLIED PRIOR TO BEGINNING A PALLETIZING OPERATION. ALSO, DUE TO VARIATION OF CONTAINER DIMENSIONS, ADJUSTMENTS MAY BE REQUIRED AS TO THE LOCATION OF CERTAIN PIECES ON DUNNAGE ASSEMBLIES.
- Z. ALL NON-MANUFACTURED WOOD USED IN THE UNIT LOAD WILL BE HEAT TREATED AND MARKED TO SHOW CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD (IPPC), ISPM-15. SEE DAC DRAWING ACV00831 FOR ISPM-15 CERTIFICATION MARKING AND PLACEMENT DETAILS.
- AA. ORIGINAL SOURCE OF HEAT TREATMENT. EACH PALLET OR DUNNAGE ASSEMBLY SHALL BE MARKED TO SHOW THE CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD. PALLETS 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 END POST ON THE SAME SIDE AS THE PRESERVATIVE MARKING. THE QUALITY MARK FOR THE 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.
- BB. COOLER NAILS MAY BE SUBSTITUTED FOR THE COMMON NAILS AS SPECIFIED WITHIN EACH APPENDIX 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 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.

REVISIONS

REVISION NO. 1, DATED OCTOBER 2003, CONSISTS OF:

1. UPDATING GENERAL NOTES "Z" AND "AA" AND MATERIAL SPECIFICATIONS.
2. UPDATING THE PALLET UNITS DEPICTED ON PAGE 5.

REVISION NO. 2, DATED AUGUST 2006, CONSISTS OF:

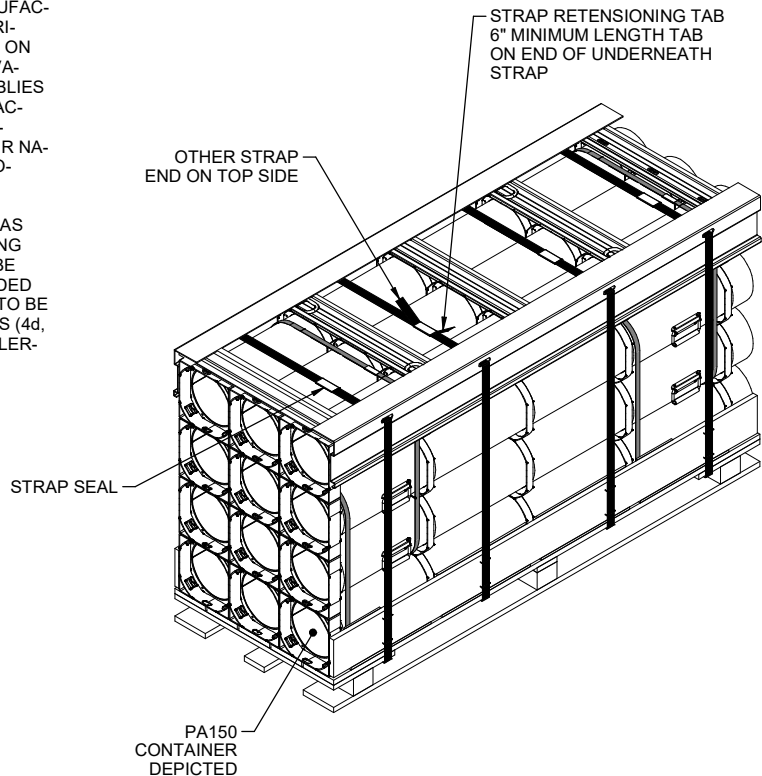
1. UPDATING ARDEC ADDRESS.
2. DELETING GENERAL NOTE RELATING TO STRAP CUTTERS ("P").
3. ADDING GENERAL NOTE RELATING TO ROOFING NAILS ("P").
4. ADDING NEW TYPE OF PRESERVATIVE TREATMENT (PE).

REVISION NO. 3, DATED SEPTEMBER 2008, CONSISTS OF CHANGES PER ECP R07K3013 INCLUDING:

1. UPDATING THE MATERIAL SPECIFICATION FOR NEW ALLOWABLE STRAPPING THICKNESS.
2. REMOVING TANALITH E OR TANALITH E3492 FROM GENERAL NOTE "X" (PRESERVATIVE).
3. UPDATING THE MATERIAL SPECIFICATION FOR NEW ALLOWABLE STAPLES.

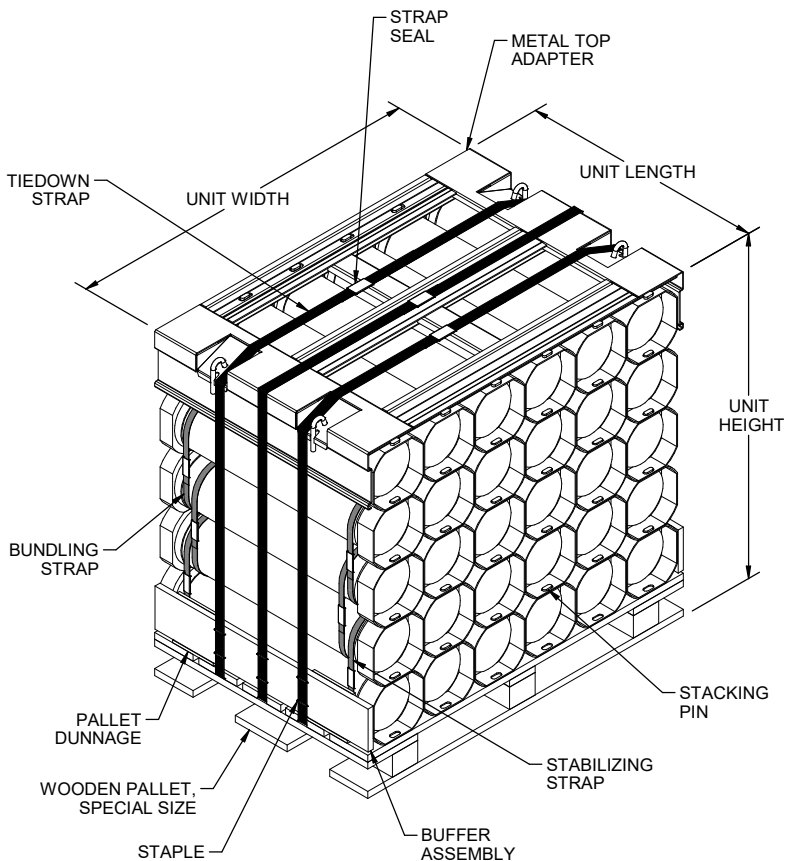
REVISION NO. 4, DATED NOVEMBER 2021, CONSISTS OF CHANGES PER ECP MI-P1690R2A1 INCLUDING:

1. ADDING HYDRA-SPECIFIC INFORMATION TO GENERAL NOTE "Q.1" (EMPTY CONTAINERS) ON PAGE 3.
2. REVISING GENERAL NOTES "S" (OUTLOADING DRAWINGS) ON PAGE 3 AND "X" (PRESERVATIVE) ON PAGE 4.
3. ADDING HYDRA-SPECIFIC INFORMATION TO NOTES "1" AND "2" ON PAGE 5.



STRAP RETENSING TAB

SEE GENERAL NOTE "L" ON PAGE 3.

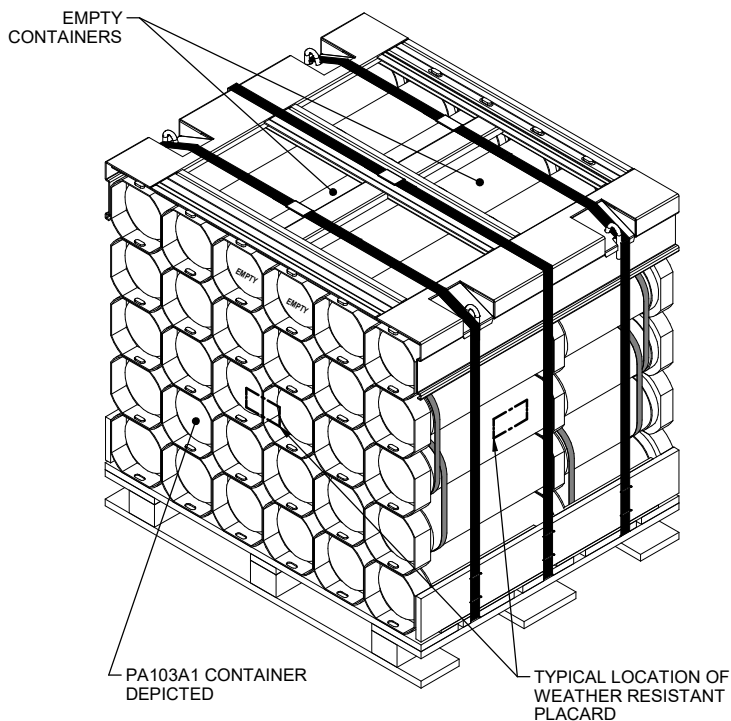


TYPICAL PALLET UNIT

THE PA161 CONTAINER IS DEPICTED.

UNITIZATION PROCEDURES

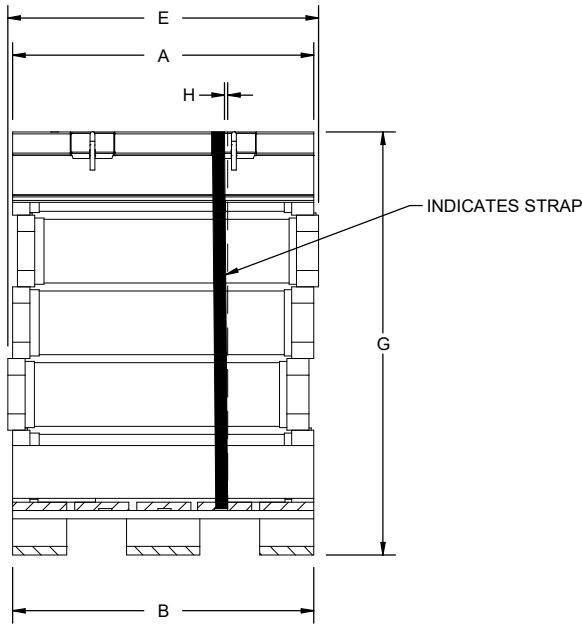
- ① POSITION PALLET IN DESIRED POSITION, WITH THE TOP DECK BOARDS UPWARDS. POSITION PALLET DUNNAGE ON PALLET AS INDICATED AND NAIL TO THE PALLET DECK BOARDS. **NOTE:** NAILS MUST NOT BE DRIVEN THROUGH THE STRAP SLOTS OF THE PALLET.
- ② POSITION CONTAINERS WITH THE STACKING PINS UPWARDS SO AS TO BE CENTERED LENGTHWISE AND WIDTHWISE ON THE PALLET.
- ③ STACK THE SECOND LAYER OF CONTAINERS ON TOP OF THE FIRST LAYER AND BUNDLE WITH A STABILIZING STRAP IF REQUIRED BY THE APPROPRIATE APPENDIX DRAWING. SEE GENERAL NOTES "K", "M" AND "N" ON PAGE 3.
- ④ CONTINUE STACKING CONTAINERS UNTIL A FULL UNIT LOAD IS ACHIEVED. APPLY BUNDLING STRAPS AS REQUIRED BY THE APPROPRIATE APPENDIX DRAWING. SEE GENERAL NOTES "K", "M" AND "N" ON PAGE 3.
- ⑤ POSITION METAL TOP ADAPTER ON THE TOP LAYER OF CONTAINERS. POSITION THE BUFFER ASSEMBLIES AND APPLY THE TIEDOWN STRAPS PER THE APPROPRIATE APPENDIX DRAWING. SEE GENERAL NOTES "K", "M" AND "N" ON PAGE 3.
- ⑥ STAPLE TIEDOWN STRAPS TO THE BUFFER ASSEMBLY PIECES.



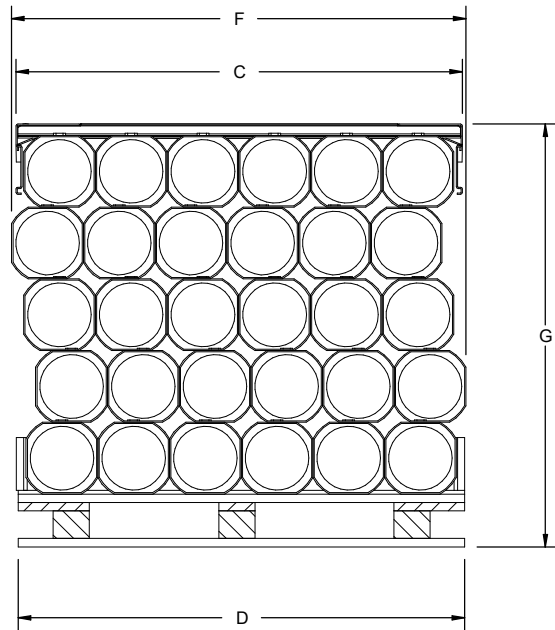
PROVISIONS FOR LESS-THAN-FULL-LAYER LOADS

1. EMPTY CONTAINERS, PREFERABLY "REJECTS", WILL BE USED TO ACHIEVE A FULL-LAYER PALLET UNIT. HOWEVER, EMPTY CONTAINERS WILL BE USED ONLY IN THE TOP LAYER(S) ON A PALLET UNIT AND POSITIONED IN THE MIDDLE OF THE TOP LAYER(S). WHEN EMPTY CONTAINERS ARE USED TO FILL OUT A LAYER, THE EMPTY CONTAINERS WILL BE PAINTED AND MARKED AS SPECIFIED IN ARDEC DRAWING 12982865. FOR HYDRA-70 CONFIGURATION ONLY, PAINT AND MARK AS SPECIFIED IN AMCOM DRAWING 13643712.
2. LESS THAN FULL CONTAINERS OF AMMUNITION (LIGHT CONTAINERS) WILL BE PAINTED AND MARKED AS SPECIFIED IN ARDEC DRAWING 12982865. LIGHT CONTAINERS WILL ONLY BE PLACED IN THE TOP LAYER(S) OF A UNIT LOAD AND BE LOCATED IN THE MIDDLE OF THE TOP LAYER(S). FOR HYDRA-70 CONFIGURATION ONLY, PAINT AND MARK AS SPECIFIED IN AMCOM DRAWING 13643712.
3. TO SATISFY THE REQUIREMENTS FOR A FULL LAYER UNIT, IT IS PERMISSIBLE TO USE A COMBINATION OF EMPTY AND LIGHT CONTAINERS IN THE TOP LAYER(S).
4. EACH PALLET UNIT LOAD CONTAINING EMPTY AND/OR LIGHT CONTAINERS WILL HAVE A WEATHER RESISTANT PLACARD OR TAG PREPARED AND APPLIED TO THE UNIT LOAD AS STATED IN DAC DRAWING ACV00561.

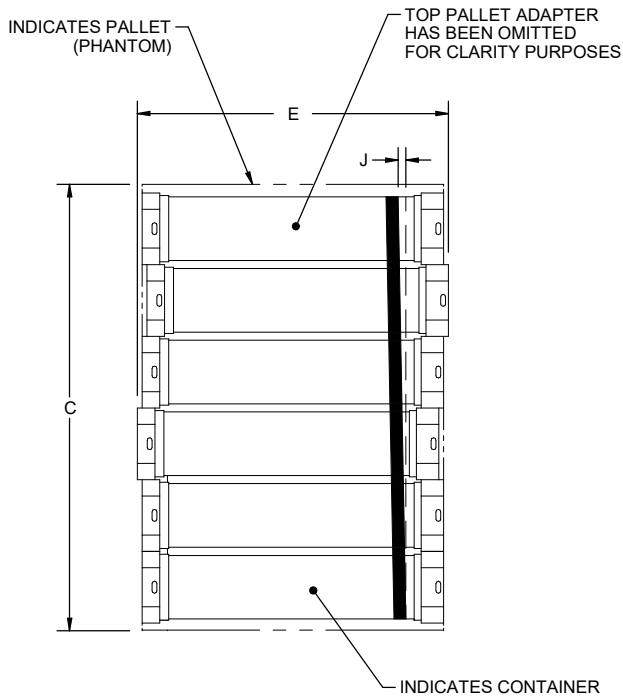
USE OF EMPTY/LIGHT CONTAINERS TO ACHIEVE A FULL LAYER



UNIT LENGTH VIEW



UNIT WIDTH VIEW



UNIT TOP VIEW

SPECIAL NOTES:

1. DIMENSIONS APPLICABLE TO ALLOWABLE TOLERANCES ARE EXPRESSED IN INCHES AND IDENTIFIED BY LETTERS AS FOLLOWS.

A = UNIT LENGTH

B = PALLET LENGTH

C = UNIT WIDTH

D = PALLET WIDTH

E = ALLOWABLE UNIT LENGTH = "A" PLUS 1/2" MAXIMUM

F = ALLOWABLE UNIT WIDTH = "C" PLUS 1/2" MAXIMUM

G = UNIT HEIGHT

H = VERTICAL STRAP ALIGNMENT = $G/40$ = MAXIMUM INCHES FROM TRUE ALIGNMENT (E.G., IF $G = 50$ ", $H = 50/40 = 1-1/4$ " MAXIMUM).

J = TRANSVERSE STRAP ALIGNMENT = $C/40$ = MAXIMUM INCHES FROM TRUE ALIGNMENT (E.G., IF $C = 55$ ", $J = 55/40 = 1-3/8$ " MAXIMUM).

2. CONTAINER ALIGNMENT TOLERANCES APPLY TO EACH LAYER AND TO EACH STACK RELATIVE TO THE PALLET DECK. SEE GENERAL NOTES "F" ON PAGE 2 AND "U" ON PAGE 3.

3. STRAPPING TOLERANCES APPLY TO ALL STRAPS AND TO ALL SURFACES WHICH EACH STRAP ENCOMPASSES, I.E., TOP, BOTTOM, AND BOTH SIDES.