

APPENDIX 50A

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

**MODULAR ARTILLERY CHARGE SYSTEMS (MACS),
M232 OR M232A1 OR M232A2, PACKED 5 PER
PA103A2 CYLINDRICAL METAL CONTAINER, UNIT-
IZED 30 PER 38" X 46-1/2" PALLET*; APPROX CON-
TAINER SIZE 38" L X 7-1/2" W X 7-1/2" H**

**NOTICE: THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION
PROCEDURES DRAWING 19-48-4326-20PM1012.**

*SEE GENERAL NOTE "J" ON PAGE 3.

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U.S. ARMY MATERIEL COMMAND DRAWING

<p>APPROVED, COMBAT CAPABILITIES DEVELOPMENT COMMAND ARMAMENTS CENTER</p> <p>HANSSSEN.JOSEP H.W.1376495538</p> <p><small>Digitally signed by HANSSSEN.JOSEPH.W.13764955 38 Date: 2023.11.20 08:41:40 -06'00'</small></p> <p style="text-align: right;"><small>FCDD-ACE-LTP</small></p>	<p>CAUTION: VERIFY PRIOR TO USE AT https://www.dau.edu/cop/ammo/Pages/Default.aspx THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 6.</p>		<p style="font-size: 24pt;">JUNE 2000</p>																				
<p>APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND</p> <p>WARD.GINA. M.1369379808</p> <p><small>Digitally signed by WARD.GINA.M.1369379808 Date: 2023.11.16 13:38:06 -06'00'</small></p> <p style="text-align: right;"><small>AMJM-MLT</small></p>	<p>DO NOT SCALE</p>	<p>REVISION NO. 7</p>	<p>OCTOBER 2023</p>																				
<p>APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND</p> <p>BRAILSFORD.KEITH H.ANTHONY.10286 55661</p> <p><small>Digitally signed by BRAILSFORD.KEITH.ANTHONY. 1028655661 Date: 2023.11.16 13:59:24 -06'00'</small></p> <p style="text-align: right;"><small>DEFENSE AMMUNITION CENTER</small></p>	<p>DESIGN ENGINEER</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">BASIC</td> <td style="width: 50%;">PATRICK DOUGHERTY</td> </tr> <tr> <td>REV.</td> <td>MADELINE BANKS</td> </tr> </table> <p>ENGINEERING DIVISON</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">FIEFFER.LAUR A.A.1230375727</td> <td style="width: 50%;"><small>Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2023.10.29 19:13:55 -05'00'</small></td> </tr> <tr> <td>TEST ENGINEER</td> <td>FELICIANO.AD IN.1259200373</td> </tr> <tr> <td>TEST REPORT</td> <td>NA</td> </tr> </table> <p>EXPLOSIVE SAFETY DIRECTORATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">CUMMINS.PAU L.A.1231883122</td> <td style="width: 50%;"><small>Digitally signed by CUMMINS.PALL.A.1231883122 Date: 2023.11.02 13:01:49 -05'00'</small></td> </tr> </table>	BASIC	PATRICK DOUGHERTY	REV.	MADELINE BANKS	FIEFFER.LAUR A.A.1230375727	<small>Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2023.10.29 19:13:55 -05'00'</small>	TEST ENGINEER	FELICIANO.AD IN.1259200373	TEST REPORT	NA	CUMMINS.PAU L.A.1231883122	<small>Digitally signed by CUMMINS.PALL.A.1231883122 Date: 2023.11.02 13:01:49 -05'00'</small>	<p>SEE THE REVISION LISTING ON PAGE 2</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">CLASS</td> <td style="width: 25%;">DIVISION</td> <td style="width: 25%;">DRAWING</td> <td style="width: 25%;">FILE</td> </tr> <tr> <td style="text-align: center;">19</td> <td style="text-align: center;">48</td> <td style="text-align: center;">4326/50A</td> <td style="text-align: center;">20PM1012</td> </tr> </table>	CLASS	DIVISION	DRAWING	FILE	19	48	4326/50A	20PM1012
BASIC	PATRICK DOUGHERTY																						
REV.	MADELINE BANKS																						
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CLASS	DIVISION	DRAWING	FILE																				
19	48	4326/50A	20PM1012																				

PALLET UNIT DATA				
ITEMS INCLUDED		*HAZARD CLASS AND DIVISION	*COMPATIBILITY GROUP	APPROX WEIGHT (LBS)
NSN	DODIC			
1320-				
01-457-4063	DA13	1.3	C	1,820
01-526-6523	DA13	1.3	C	1,820
01-485-4370	DA24	-----INERT-----		1,820
01-659-8988	DA67	1.3	C	1,820

*HAZARD CLASSIFICATION DATA CONTAINED IN THE ABOVE CHART IS FOR GUIDANCE AND INFORMATIONAL PURPOSES ONLY. VERIFICATION OF THE SPECIFIED DATA SHOULD BE MADE BY CONSULTING THE MOST RECENT JOINT HAZARD CLASSIFICATION SYSTEM LISTING OR OTHER APPROVED LISTING(S).

REVISIONS

REVISION NO. 1, DATED MARCH 2001, CONSISTS OF:

1. REPLACING NSN AND DODIC.
2. CHANGING PALLET UNIT WEIGHT.
3. ADDING SPECIAL NOTE AND KEY LETTER "F" ON PAGE 5.
4. CHANGING DIMENSION OF DECK BOARD, KEY LETTER "G".
5. REPLACING VIEW A-A.

REVISION NO. 2, DATED MAY 2003, CONSISTS OF:

1. REMOVING ONE LAYER FROM THE PALLET UNIT.
2. UPDATING GROSS WEIGHT AND HAZARD CLASS.
3. ADDING ITEM BY NATIONAL STOCK NUMBER TO THE "PALLET UNIT DATA" CHART.
4. CHANGING THE PALLET UNIT DATA TO REFLECT TOTAL CONTAINER AND WEIGHT CHANGE.
5. UPDATING GENERAL NOTE "H" AND SPECIAL NOTE TO INCLUDE PALLET HEAT TREATMENT REQUIREMENTS.

REVISION NO. 3, DATED JANUARY 2006, CONSISTS OF:

UPDATING DRAWING DIMENSIONS

REVISION NO. 4, DATED FEBRUARY 2014, CONSISTS OF CHANGES PER ECP R11K3026 INCLUDING:

1. ADDING M232A1 CHARGE REFERENCE IN TITLE.
2. ADDING ITEM BY NATIONAL STOCK NUMBER TO THE "PALLET UNIT DATA" CHART.
3. UPDATING THE PALLET UNIT DATA TO REFLECT TOTAL CONTAINER AND WEIGHT CHANGE.
4. ADDING ADDITIONAL NAILING TO PALLET DUNNAGE LOCATION.
5. UPDATING CALLOUTS TO REFERENCE .029" STRAPPING THICKNESSES.

REVISION NO. 5, DATED APRIL 2020, CONSISTS OF CHANGES PER ECP R19K3008 INCLUDING:

1. UPDATING GENERAL NOTE "L" (PALLET DRAWING NUMBER) ON PAGE 3.
2. UPDATING THE SPECIAL NOTE (PALLET SPECIFICATION) ON PAGE 5.

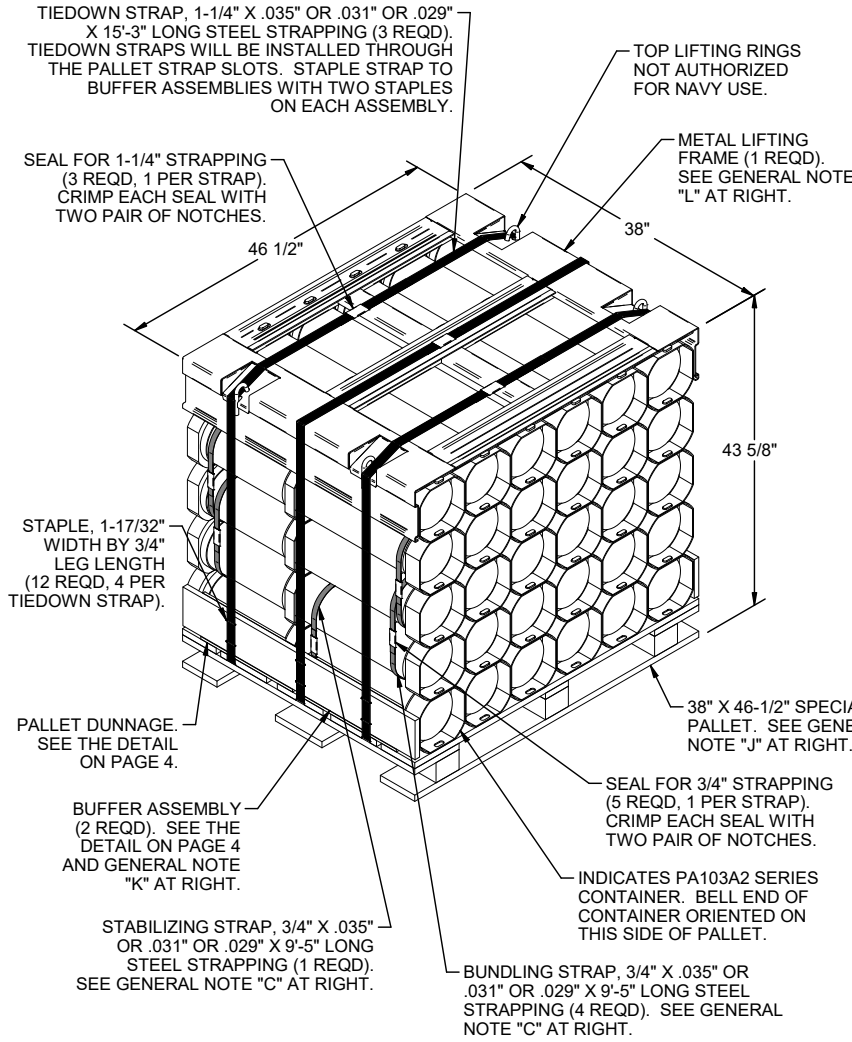
REVISION NO. 6, DATED DECEMBER 2022, CONSISTS OF CHANGES PER ECP R20A2008 INCLUDING:

1. ADDING M232A2 CHARGE REFERENCE IN TITLE.
2. ADDING ITEM BY NATIONAL STOCK NUMBER TO THE "PALLET UNIT DATA" CHART.

REVISION NO. 7, DATED OCTOBER 2023, CONSISTS OF CHANGES PER ECP R23K3001 INCLUDING:

1. UPDATING FEDERAL SUPPLY CLASS (FSC) IN THE "PALLET UNIT DATA" CHART.
2. CHANGING DIMENSION OF OUTER STRINGER, KEY LETTER "C"
3. CHANGING DIMENSION OF INNER STRINGER, KEY LETTER "D"

GENERAL NOTES



A. THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4326-20PM1012. TO PRODUCE AN APPROVED UNIT LOAD, ALL PERTINENT PROCEDURES, SPECIFICATIONS AND CRITERIA SET FORTH WITHIN THE BASIC DRAWING WILL APPLY TO THE PROCEDURES DELINEATED IN THIS APPENDIX. ANY EXCEPTIONS TO THE BASIC PROCEDURES ARE SPECIFIED IN THIS APPENDIX.

B. DIMENSIONS, CUBE AND WEIGHT OF A PALLET UNIT WILL VARY SLIGHTLY DEPENDING UPON THE ACTUAL DIMENSIONS OF THE BOXES AND THE WEIGHT OF THE SPECIFIC ITEM BEING UNITIZED.

C. BUNDLING AND STABILIZING STRAPS MUST BE TENSIONED AND SEALED PRIOR TO THE APPLICATION OF THE TIEDOWN STRAPS. TWO BUNDLING STRAPS MUST SURROUND ALL CONTAINERS IN THE SECOND AND THIRD LAYERS AND TWO BUNDLING STRAPS MUST SURROUND ALL CONTAINERS IN THE THIRD AND FOURTH LAYERS. BUNDLING STRAPS SHALL BE APPLIED AS CLOSE TO THE OUTER CONTAINER RINGS AS POSSIBLE. STABILIZING STRAP MUST SURROUND ALL CONTAINERS IN LAYERS ONE AND TWO WITH THE STRAP LOCATED AS CLOSE TO THE CENTER RING AS POSSIBLE. **CAUTION:** STRAPS MUST NOT BE ALLOWED TO OVERLAP.

D. ALTHOUGH THE CONTAINERS DEPICTED IN THE UNIT LOAD AT LEFT ARE CONSTRUCTED WITH INTERLOCKING DEVICES, THE INTERLOCKS WILL NOT FUNCTION PROPERLY UNLESS THE CONTAINERS ARE POSITIONED SO THAT THE "PINS" OF THE INTERLOCKS ARE FACING UPWARD. THIS ORIENTATION WILL AID IN THE PREVENTION OF CONTAINER MOVEMENT, BOTH Laterally AND LONGITUDINALLY, DURING SHIPMENT OF THE UNIT LOAD.

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

CARLOADING - - - -	19-48-4330/50A-5PM1007
TRUCKLOADING - - -	19-48-4331/50A-11PM1007
STORAGE - - - - -	19-48-4335/50A-1-3-4-14-22PM1007
END OPENING ISO CONTAINER - - - -	19-48-4333/50A-15PM1024
MILVAN - - - - -	19-48-4332/50A-15PM1023
SIDE OPENING ISO CONTAINER - - - -	19-48-4334/50A-15PM1025

F. IF ITEMS COVERED HEREIN ARE UNITIZED PRIOR TO ISSUANCE OF THIS REVISION TO THIS APPENDIX, THE CONTAINERS NEED NOT BE REUNITIZED SOLELY TO CONFORM TO THIS REVISION.

G. THE UNITIZATION PROCEDURES DEPICTED HEREIN MAY ALSO BE USED FOR UNITIZING MODULAR ARTILLERY CHARGE SYSTEM (MACS) WHEN IDENTIFIED BY DIFFERENT NATIONAL STOCK NUMBERS (NSN) THAN WHAT IS SHOWN ON PAGE 2, PROVIDED THE CONTAINER PACK DOES NOT VARY FROM WHAT IS DELINEATED HEREIN. THE EXPLOSIVE CLASSIFICATION OF OTHER ITEMS MAY BE DIFFERENT THAN WHAT IS SHOWN.

H. DIMENSIONS GIVEN FOR DUNNAGE PIECES WILL BE FIELD CHECKED PRIOR TO THEIR ASSEMBLY TO THE PALLET UNIT. CONTAINERS MUST FIT SNUGLY IN THE DUNNAGE ASSEMBLIES. ALSO, DUE TO THE VARIATION OF CONTAINER DIMENSIONS, ADJUSTMENTS MAY BE REQUIRED AS TO THE LOCATION OF CERTAIN PIECES OF DUNNAGE IN A DUNNAGE ASSEMBLY.

J. THE SPECIAL PALLET WILL BE CONSTRUCTED AND ASSEMBLED IN ACCORDANCE WITH MILITARY SPECIFICATION MIL-DTL-15011, STYLE 1A, TYPE 1, CLASS 1, PRESERVATIVE TREATED AND HEAT TREATED PALLET AND THE INSTRUCTIONS PROVIDED ON PAGES 5 AND 6.

K. THE THICKNESS OF THE PLYWOOD BUFFER PIECES DEPICTED IN THE BUFFER ASSEMBLY ON PAGE 4 MUST BE ADJUSTED AS REQUIRED TO COMPLY WITH THE DIMENSIONAL VARIANCE OF THE PA103A2 CONTAINERS, SO AS TO COMPLETELY FILL OUT THE PALLET. **NOTE:** NOMINAL 1" X 6" MATERIAL MAY BE SUBSTITUTED FOR THE 3/4" THICK PLYWOOD IF IT WILL CAUSE THE PALLET UNIT DIMENSIONS TO BE EQUAL TO OR GREATER THAN 46-1/2".

L. FOR DETAILS OF THE METAL LIFTING FRAME, SEE DAC DRAWING NO. ACV00637 AND MILITARY SPECIFICATION MIL-A-70788.

M. ALL DUNNAGE SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH GENERAL NOTE "X" IN THE BASIC PROCEDURE.

(CONTINUED ON PAGE 4)

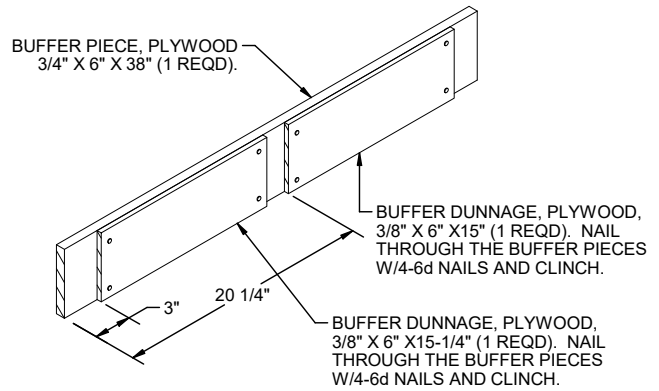
PALLET UNIT
SEE GENERAL NOTE "B" AT RIGHT.

30 CONTAINERS OF MACS (5 PER CNTR) @ 54.5 LBS - - - - -	1,635 LBS
DUNNAGE - - - - -	110 LBS
PALLET - - - - -	75 LBS
TOTAL WEIGHT - - - - -	1,820 LBS (APPROX)
CUBE - - - - -	44.6 CU FT (APPROX)

BILL OF MATERIAL		
NAILS	NO. REQD	POUNDS
6d (2")	48	0.28
SPECIAL PALLET, 38" X 46-1/2" -	1 REQD -	75 LBS
STEEL STRAPPING, 3/4" -	47.08' REQD -	4.20 LBS
SEAL FOR 3/4" STRAPPING - - -	5 REQD - - -	NIL
STEEL STRAPPING, 1-1/4" -	45.75' REQD -	6.54 LBS
SEAL FOR 1-1/4" STRAPPING - -	3 REQD - - -	NIL
STAPLE, 1-17/32" X 3/4" - -	12 REQD - - -	NIL
PLYWOOD, 3/8" - -	12.29 SQ FT REQD -	5.13 LBS
PLYWOOD, 3/4" - - -	3.17 SQ FT REQD -	6.53 LBS
METAL LIFTING FRAME - - - - -	1 REQD - -	80 LBS

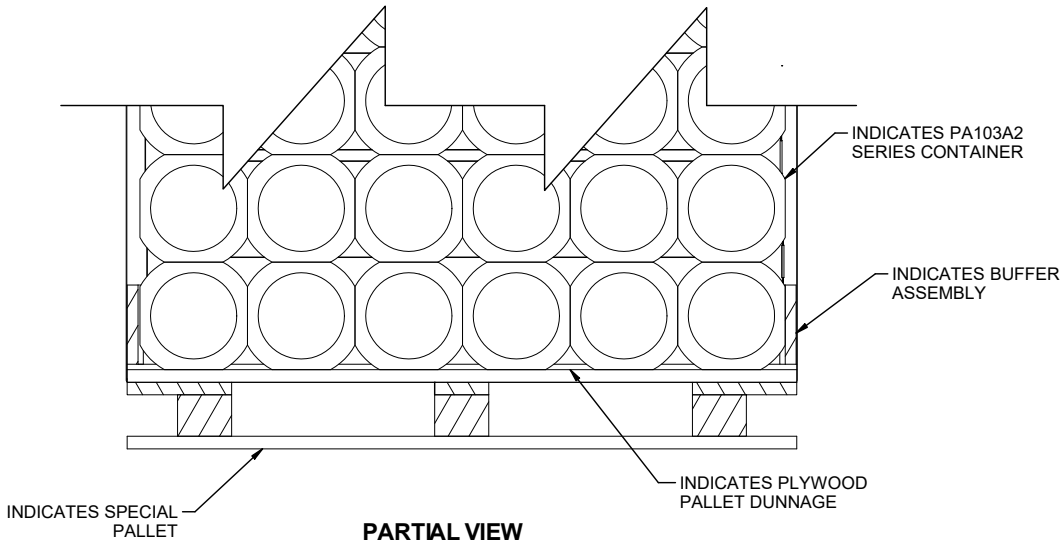
(GENERAL NOTES CONTINUED FROM PAGE 3)

- N. 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.
- O. EMPTY OR REJECT PA103A2 CONTAINERS WILL BE USED AS FILLER CONTAINERS AS NECESSARY. FILLER CONTAINERS MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER(S) OF CONTAINERS. IF SIX FULL CONTAINERS ARE TO BE OMITTED, ONE FULL LAYER OF CONTAINERS WILL BE OMITTED. WHEN (EMPTY) FILLER CONTAINERS ARE USED IN PLACE OF OMITTED CONTAINERS TO COMPLETELY FILL OUT A LAYER ON A PALLET, THEY WILL BE MARKED AS SPECIFIED IN ARDEC DRAWING NO. 12982865.
- P. WHEN ONE OR MORE LAYERS ARE OMITTED, THE BUNDLING STRAP REQUIREMENT WILL CHANGE. A FOUR LAYER UNIT WILL OMIT THE TWO BUNDLING STRAPS THAT SURROUND THE THIRD AND FOURTH LAYERS. THE REMAINING BUNDLING STRAPS WILL SURROUND THE SECOND AND THIRD LAYERS. A UNIT WITH THREE OR LESS LAYERS DOES NOT REQUIRE BUNDLING STRAPS.
- Q. FOR DETAILS OF THE PA103A2 SERIES CONTAINER SEE ARDEC DRAWING NO. 12961111.

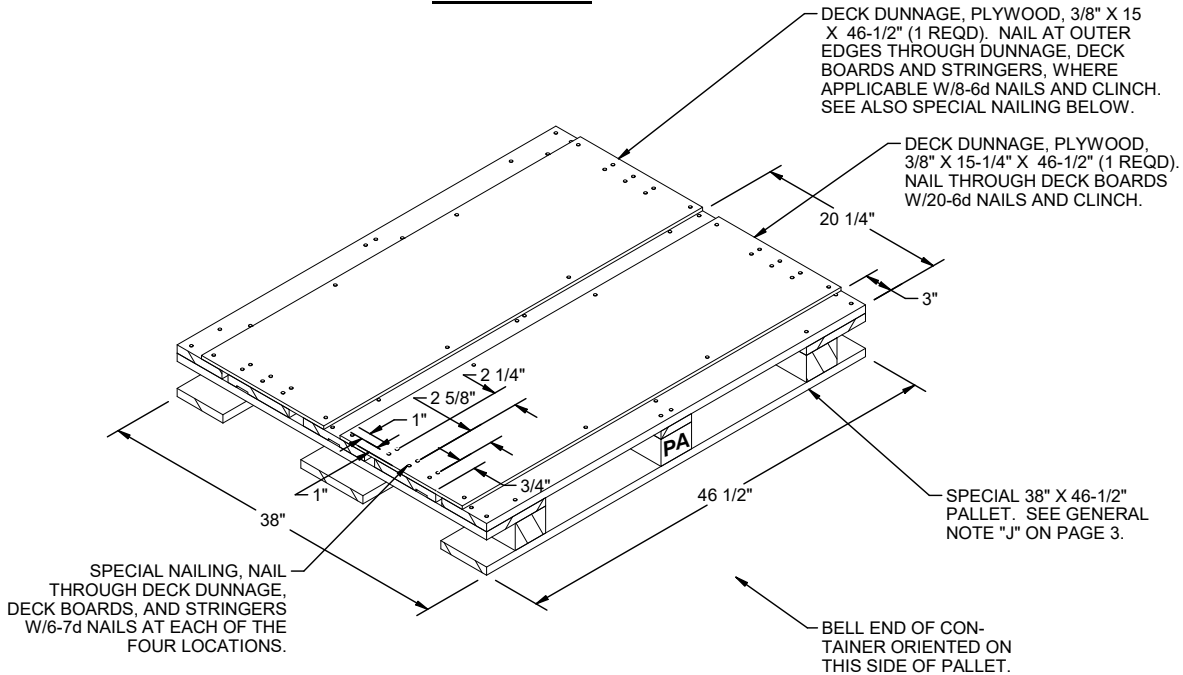


BUFFER ASSEMBLY

A LEFT HAND PIECE IS DEPICTED. A RIGHT HAND PIECE IS ALSO REQUIRED. SEE GENERAL NOTE "K" ON PAGE 3

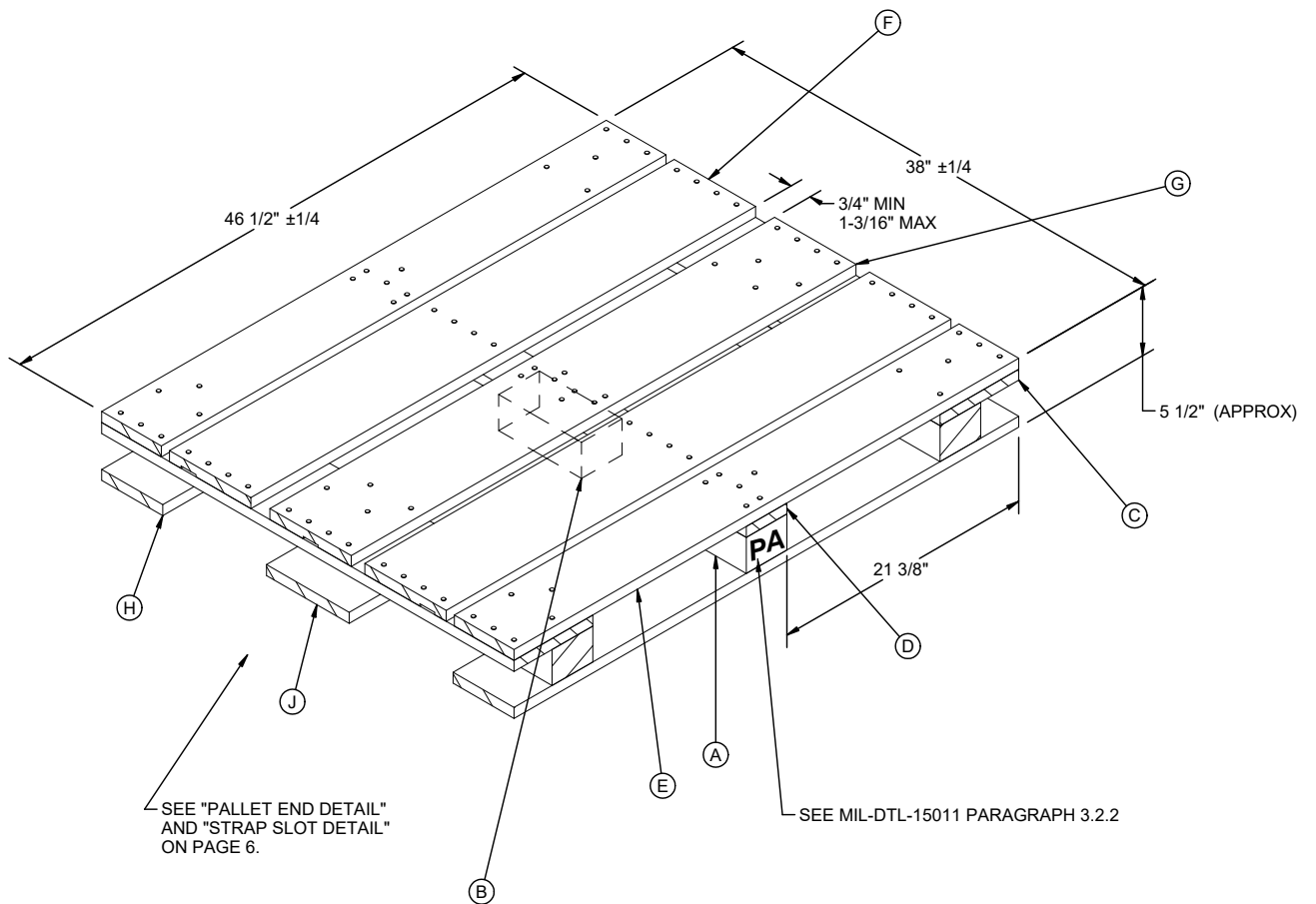


PARTIAL VIEW



PALLET DUNNAGE LOCATION

NOTE: CARE MUST BE TAKEN WHEN APPLYING PALLET DUNNAGE, AVOID NAILING THRU STRAP SLOTS, SPLITTING PALLET DECK OR STRINGER BOARDS WITH DECK DUNNAGE NAILS, OR APPLYING NAILS ON TOP OF EXISTING PALLET NAILS.



SEE "PALLET END DETAIL" AND "STRAP SLOT DETAIL" ON PAGE 6.

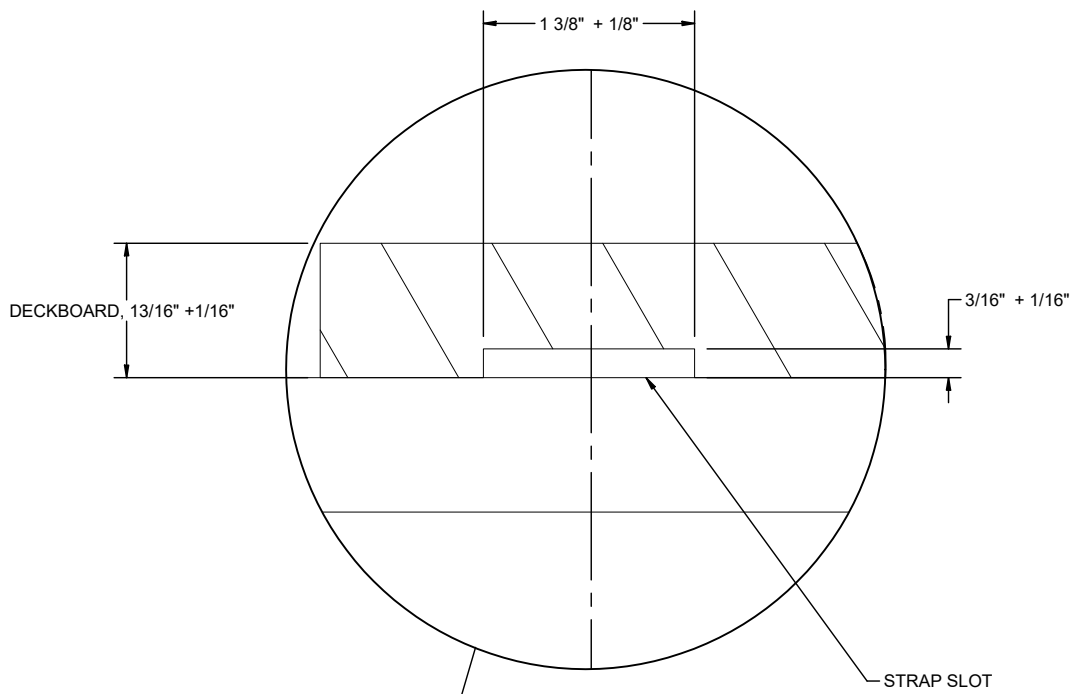
SEE MIL-DTL-15011 PARAGRAPH 3.2.2

SPECIAL NOTE:

THE SPECIAL PALLET DEPICTED ABOVE WILL BE CONSTRUCTED AND ASSEMBLED IN ACCORDANCE WITH A MILITARY SPECIFICATION MIL-DTL-15011, STYLE 1A, TYPE I, CLASS 1, PRESERVATIVE TREATED AND HEAT TREATED PALLET, EXCEPT FOR THE DIMENSION VARIANCES AND COMPONENT QUANTITIES SHOWN IN THE KEY LETTERS AND DETAIL BELOW. REFER TO MILITARY SPECIFICATION MIL-DTL-15011 FOR DETAILS AS TO MATERIAL SPECIFICATIONS, PRESERVATIVE TREATMENT, HEAT TREATMENT, TOLERANCES, INSPECTION CRITERIA, ETC. NOTE THAT CHAMFERS ARE NOT REQUIRED FOR THE PALLET DEPICTED HEREIN. **NOTE:** AVOID NAILING THROUGH STRAP SLOTS.

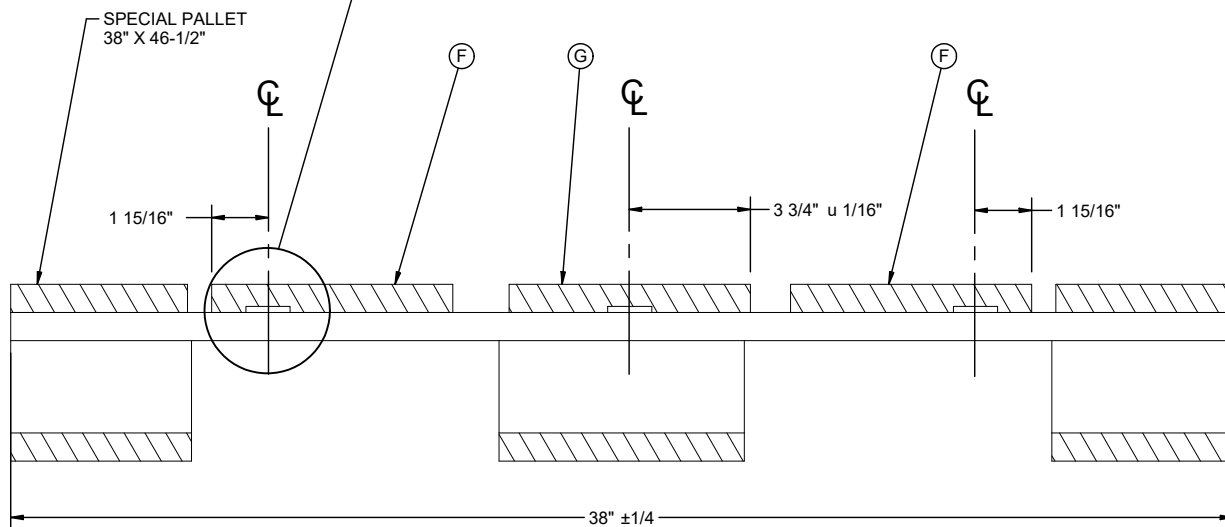
KEY LETTERS

- Ⓐ POST, 3-5/8" + 1/8" X 5-1/2" + 1/8" X 2-3/4" + 1/8" HIGH (6 REQD)..
- Ⓑ POST, CENTER, 3-5/8" + 1/8" X 7-1/2" + 1/8" X 2-3/4" + 1/8" HIGH (3 REQD).
- Ⓒ OUTER STRINGER, 13/16" + 1/16" X 7-1/4" ± 1/8" X 38" ± 1/8" (2 REQD).
- Ⓓ INNER STRINGER, 13/16" + 1/16" X 3-5/8" + 1/8" X 38" ± 1/8" (1 REQD).
- Ⓔ TOP DECK BOARD, OUTER, 13/16" + 1/16" X 5-1/2" ± 1/8" X 46-1/2" ± 1/8" (2 REQD). NAIL DECK BOARDS TO THE STRINGERS W/3 NAILS (1.5" LONG X 0.120" DIAMETER) AT EACH LOCATION. NAIL THRU THE STRINGERS INTO THE POSTS W/3 NAILS (3.25" LONG X 0.135" DIAMETER) AT EACH LOCATION.
- Ⓕ TOP DECK BOARD, INNER, 13/16" + 1/16" X 7-1/2" ± 1/8" X 46-1/2" ± 1/8" (2 REQD). NAIL DECK BOARDS TO THE STRINGERS W/4 NAILS (1.5" LONG X 0.120" DIAMETER) AT EACH LOCATION. **NOTE:** AVOID NAILING THRU STRAP SLOTS.
- Ⓖ TOP DECK BOARD, CENTER, 13/16" + 1/16" X 7-1/2" ± 1/8" X 46-1/2" ± 1/8" (1 REQD). NAIL DECK BOARD TO THE STRINGERS W/4 NAILS (1.5" LONG X 0.120" DIAMETER) AT EACH LOCATION. NAIL THRU THE STRINGERS INTO THE POSTS W/4 NAILS (3.25" LONG X 0.135" DIAMETER) AT EACH LOCATION. **NOTE:** AVOID NAILING THRU STRAP SLOTS.
- Ⓗ BOTTOM DECK BOARD, OUTER, 13/16" + 1/16" X 5-1/2" ± 1/8" X 46-1/2" ± 1/8" (2 REQD). NAIL TO THE POSTS W/3 NAILS (2.25" LONG X 0.120" DIAMETER) AT EACH JOINT.
- Ⓖ BOTTOM DECK BOARD, CENTER, 13/16" + 1/16" X 7-1/2" ± 1/8" X 46-1/2" ± 1/8" (1 REQD). NAIL TO THE POSTS W/4 NAILS (2.25" LONG X 0.120" DIAMETER) AT EACH JOINT.



STRAP SLOT DETAIL

SHOWING STRAP SLOT DIMENSIONS (TYPICAL, 3 PLACES). SEE LOCATION IN "END VIEW DETAIL" BELOW.



END VIEW DETAIL

(KEY LETTERS REFER TO KEY LETTERS ON PAGE 5.)