

UNITIZATION PROCEDURES FOR 155MM COPPERHEAD SEPARATE LOADING PROJECTILES, PACKED ONE PER METAL CONTAINER, UNITIZED 6 CONTAINERS PER SPECIAL 4-WAY ENTRY PALLETS

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U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY OPERATIONS SUPPORT COMMAND <i>David A. Piskovich</i> AMSTA-AR-WEP-RP	ENGINEER	BASIC	WILLIAM R. FRERICHS	DO NOT SCALE			
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APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>Timothy J. Fore</i> AMSOS-RST-M	TECHNICIAN	BASIC		DECEMBER 1980			
		REV.		REVISION NO. 3		FEBRUARY 2001	
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>[Signature]</i> U.S. ARMY DEFENSE AMMUNITION CENTER	DRAFTSMAN	BASIC	BARBARA LEONARD	SEE THE REVISION LISTING ON PAGE 2			
		REV.	BETTY J. KUNDERT	CLASS	DIVISION	DRAWING	FILE
	TRANSPORTATION ENGINEERING DIVISION			19	48	4159	20PA1003
	VALIDATION ENGINEERING DIVISION		<i>G. L. Willis</i>				
	ENGINEERING DIRECTORATE		<i>William R. French</i>				

PALLET UNIT DATA				
ITEMS INCLUDED		HAZARD CLASS AND DIVISION ●		APPROX WEIGHT LBS
NSN	DODIC	QD CLASS	COMP GROUP	
1320-01-077-4279	D510	1.1	D	1,397
01-077-4278	D511	---	-	1,259

● 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 SEPTEMBER 1983, CONSISTS OF:

1. CHANGING WOOD GROUP AND NAIL TYPE FOR PALLET AND DUNNAGE ASSEMBLIES.
2. CHANGING PROCEDURES TO CONFORM TO 1, ABOVE.

REVISION NO. 2, DATED OCTOBER 1985, CONSISTS OF:

1. CHANGING GENERAL NOTES.
2. MODIFYING DUNNAGE ASSEMBLIES.
3. ADDING BUFFER ASSEMBLY.

REVISION NO. 3, DATED FEBRUARY 2001, CONSISTS OF:

1. UPDATE DRAWING FORMAT.
2. REVISING GENERAL NOTE RELATING TO PC COPPER NAPHTHENATE.
3. UPDATE STANDARDS AND SPECIFICATIONS TO NEW REQUIREMENTS.
4. ADDING CONTAINER DRAWING TO GENERAL NOTES.
5. ADDING GENERAL NOTE "S".

GENERAL NOTES

(GENERAL NOTES CONTINUED)

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 (CHAPTER 5) AND CONFORMS TO MIL-STD-1660.
- B. DIMENSIONAL LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF A 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.
- C. DETAILS OF THE COPPERHEAD METAL SHIPPING AND STORAGE CONTAINER.

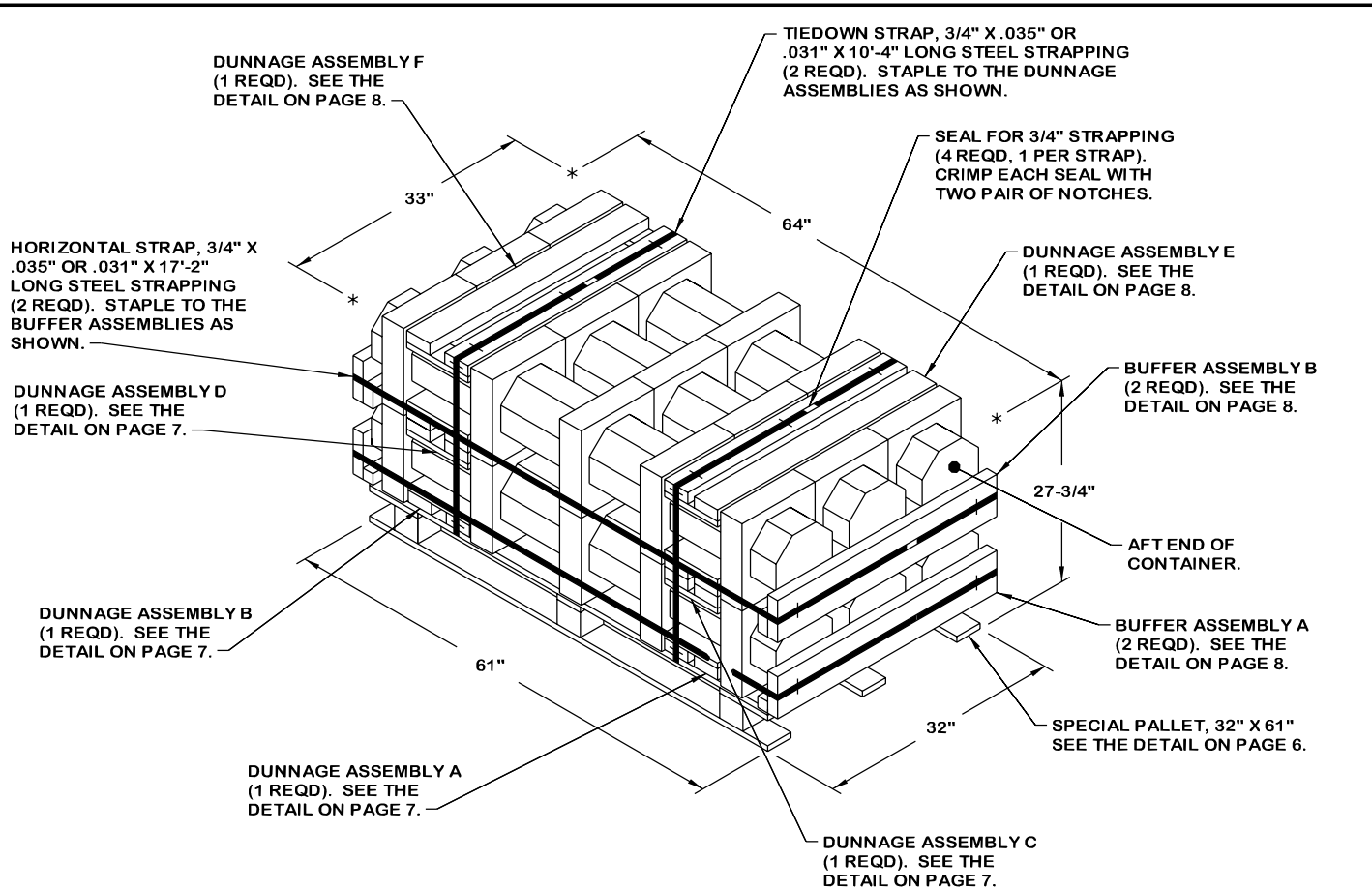
CONTAINER DIMENSIONS	
LENGTH - - - - -	61"
WIDTH - - - - -	11"
HEIGHT - - - - -	11-3/8"
GROSS WEIGHT - - - - -	206 LBS (APPROX)
- D. UNLESS OTHERWISE SPECIFIED, A PLUS OR MINUS 1/4" IS ALLOWED ON OVERALL LENGTH AND WIDTH DIMENSIONS OF ANY DUNNAGE ASSEMBLY. HOWEVER, SIMILAR PIECES IN AN ASSEMBLY MUST BE WITHIN 1/8" OF THE SAME DIMENSION. FOR THICKNESS DIMENSIONS, A PLUS ZERO, MINUS 1/8" IS ALLOWED.
- E. WHEN ASSEMBLING A PALLET UNIT, CARE SHALL BE TAKEN TO INSURE THAT THE CONTAINERS AND ASSEMBLIES ARE EVENLY ALIGNED HORIZONTALLY AND VERTICALLY SO THAT THE SIDES AND ENDS OF THE PALLET UNIT DO NOT EXCEED A 1/2" TOLERANCE.
- F. IN ORDER TO OBTAIN COMPACT (SOUND) UNITS, ALL STRAPS SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED UNTIL THEY CUT INTO THE EDGE OF THE DUNNAGE ASSEMBLY AND THE PALLET DECK. AFTER TENSIONING, ALL STRAPS WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL. ALL STRAPPING MUST BE STRAIGHT WITHIN 2" ON ANY SURFACE OF THE UNITIZED LOAD I.E., TOP, BOTTOM, SIDES, OR ENDS THAT IT ENCOMPASSES.
- G. 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 MINIMUM 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.
- H. IF STRAP CUTTERS ARE SPECIFICALLY REQUIRED BY THE PROCURING ACTIVITY, REFER TO DARCOM DRAWING 19-48-4127-20P1000 FOR APPROPRIATE MEANS OF SECUREMENT TO THE PALLET UNIT.
- J. IF LESS THAN SIX CONTAINERS ARE TO BE LOADED ON A PALLET, IT SHALL BE ACCOMPLISHED BY SUBSTITUTING FILLER ASSEMBLIES, AS DEPICTED ON PAGE 5, FOR ONE OR TWO OMITTED CONTAINERS. HOWEVER, IF MORE THAN TWO CONTAINERS ARE TO BE OMITTED, A COMPLETE LAYER OF CONTAINERS MUST BE OMITTED.
- K. WHEN PLACING DUNNAGE ASSEMBLIES C, D, E, AND F ON THE PALLET UNIT, CARE SHOULD BE EXERCISED TO PRECLUDE INTERFERENCE CAUSED BY THE ROPE HANDLES TO THE DUNNAGE ASSEMBLIES. THE DUNNAGE ASSEMBLIES HAVE BEEN DESIGNED SO THAT THE ROPE HANDLES WILL FIT BETWEEN THE CROSS PIECE ON THE DUNNAGE ASSEMBLY AND THE STACKING PAD ON THE CONTAINER.
- L. DIMENSIONS GIVEN FOR DUNNAGE ASSEMBLIES AND THE DISTANCE BETWEEN STOP PIECES WILL BE FIELD CHECKED PRIOR TO ASSEMBLY OF DUNNAGE ASSEMBLIES. CONTAINERS MUST FIT SNUGLY IN THE DUNNAGE ASSEMBLIES. THIS GUIDANCE MUST BE APPLIED PRIOR TO BEGINNING A PALLETIZED OPERATION. ALSO, DUE TO VARIATION OF CONTAINER DIMENSIONS AND CONTAINER STACKING PAD LOCATIONS, ADJUSTMENTS MAY BE REQUIRED AS TO THE LOCATION OF CROSS PIECES AND/OR OTHER PIECES ON SOME DUNNAGE ASSEMBLIES.
- M. ALL FILLER ASSEMBLIES WILL BE POSITIONED IN THE TOP LAYER OR LAYERS OF THE CENTER STACK OF A UNIT LOAD.
- 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.

(CONTINUED AT RIGHT)

- O. ANY DUNNAGE PIECE IN DUNNAGE ASSEMBLIES A, B, C, D, E, OR F, OR BUFFER ASSEMBLIES A OR B, HAVING A SPLIT THAT EXTENDS FROM THE OPEN END THROUGH A NAIL LOCATION SHALL BE REPLACED. FOR ALLOWABLE DEFECTS OF DUNNAGE PIECES COMPRISING THE PALLET OR DUNNAGE ASSEMBLIES, REFER TO THE CRITERIA CONTAINED WITHIN MILITARY SPECIFICATION MIL-P-15011, SECTION 3 (REQUIREMENTS) AND SECTION 4 (QUALITY ASSURANCE PROVISIONS), AS APPLICABLE.
- P. TO PRECLUDE INTERFERENCE CAUSED BY THE METAL LIFTING HANDLES AND THE DUNNAGE ASSEMBLIES WHEN PLACING CONTAINERS ON THE PALLET, THE METAL HANDLES MUST BE POSITIONED OUTWARD OVER THE DUNNAGE ASSEMBLIES.
- Q. ALL NAILS DRIVEN INTO THE DUNNAGE ASSEMBLIES, FILLER ASSEMBLIES, OR PALLET SHALL BE DRIVEN SO THAT THE NAIL HEADS ARE FLUSH OR SLIGHTLY BELOW THE SURFACE OF THE PIECE THAT THEY ARE BEING DRIVEN THROUGH.
- R. THE LETTERS "PA" DENOTING COPPER-8-QUINOLINATE, "PB" DENOTING ZINC NAPHTHENATE EMULSIFIABLE OR "PC" DENOTING COPPER NAPHTHENATE MUST BE APPLIED TO A PRESERVATIVE TREATED PALLET OR TO DUNNAGE ASSEMBLIES. PALLET AND DUNNAGE COMPONENTS SHALL BE PRESERVED IN ACCORDANCE WITH MIL-B-2427. THE LETTERS WILL BE AT LEAST ONE-INCH HIGH AND WILL BE APPLIED ON THE OUTER FACE OF A CENTER POST ON A 61" SIDE OF THE PALLET AND TO AN OUTER FACE OF A DUNNAGE ASSEMBLY.
- S. 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 AFFILIATED WITH AN INSPECTION AGENCY ACCREDITED BY THE U.S. DEPARTMENT OF AGRICULTURE. 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, AND DUNNAGE ASSEMBLY SHALL BE MARKED TO SHOW THE CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD. PALLET, 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 END POSTS ON THE SAME SIDE AS THE PRESERVATIVE MARKING. THE QUALITY MARK FOR THE FILLER ASSEMBLIES AND DUNNAGE ASSEMBLIES SHALL BE PLACED ON TWO OPPOSITE SITES.
- T. FOR DETAILS OF CONTAINER SEE ARDEC DRAWING 9300440.

MATERIAL SPECIFICATIONS

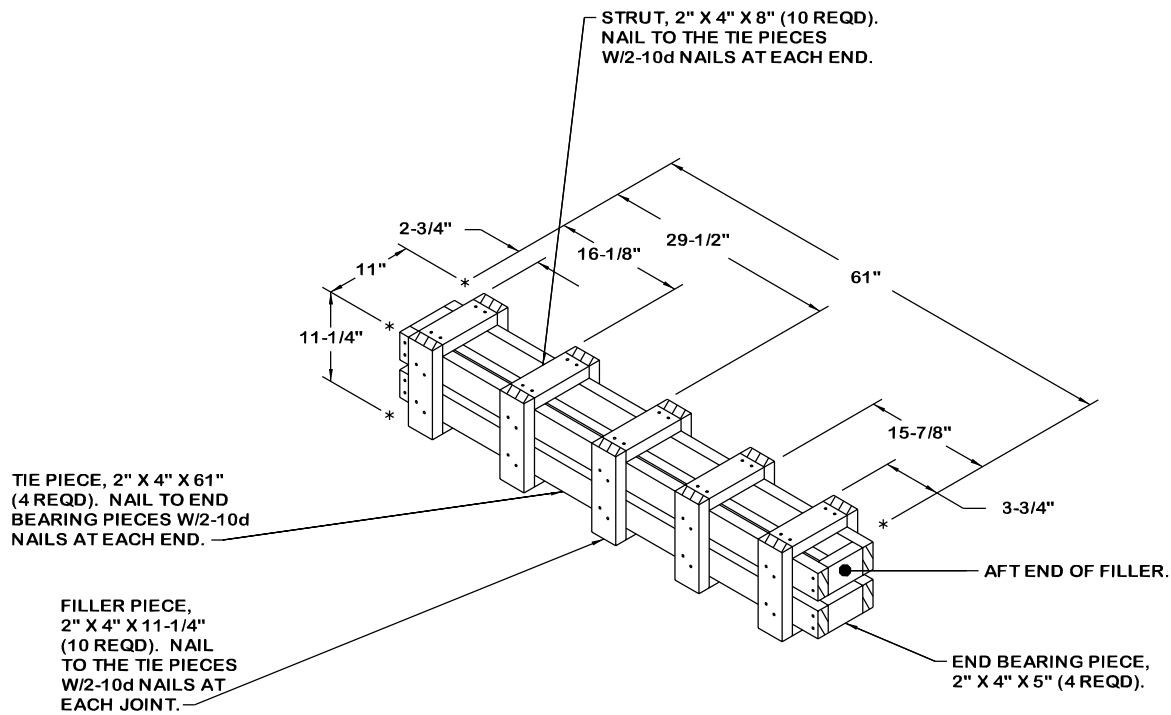
- PALLET - - - - - : SPECIAL 4-WAY ENTRY, SIZE 32" X 61", PRESERVATIVE AND HEAT TREATED. SEE TABLES ON PAGES 5 AND 6 AND GENERAL NOTES "R" AND "S" ABOVE.
- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20 FOR FILLER ASSEMBLIES. SEE ASTM D6199, PRESERVATIVE AND HEAT TREATED, FOR PALLET DUNNAGE ASSEMBLIES AND PALLETS. SEE TABLES ON PAGES 5 AND 6 AND GENERAL NOTES "R" AND "S" ABOVE.
- NAILS - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMS) FOR FILLER ASSEMBLY. ALT: UNDERLAYMENT NAIL (NLUL), PALLET NAIL (NLPL), OR COOLER NAIL (NLCL) OF SAME SIZE. FOR PALLET, SEE KEY NUMBERS ON PAGE 6, FOR DUNNAGE ASSEMBLIES; SEE THE ASSEMBLY DETAILS ON PAGES 7 AND 8.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH B (GRADE 2), SIZE 3/4" X .035" OR .031".
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH B (GRADE 2), DOUBLE NOTCH TYPE, STYLE I, II, III, OR IV. ALTERNATIVE SEAL FINISH: SIGNODE PAINTED SEALS MAY BE USED AS AN ALTERNATIVE IF ALL SURFACES ARE PAINTED. GRITTED BACKING IS NOT PERMITTED.
- STAPLE - - - - - : ASTM F1667; STFCs-189 OR STFCs-207, (15/16" OR 1" CROWN WIDTH X 3/4" LEG LENGTH) TYPE IV, STYLE 3.



PALLET UNIT

6 EACH COPPERHEAD ROUNDS IN CONTAINERS AT 206 LBS - - - -	1,236 LBS (APPROX)
DUNNAGE - - - - -	107 LBS
PALLET - - - - -	54 LBS
<hr/>	
TOTAL WEIGHT - - - - -	1,397 LBS (APPROX)
CUBE - - - - -	33.9 CU FT (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	11.50	3.83
2" X 2"	5.50	1.83
2" X 3"	5.50	2.75
2" X 4"	44.00	29.33
2" X 6"	5.50	5.50
2" X 8"	5.50	7.33
NAILS	NO. REQD	POUNDS
TYPE I, STYLE 18 2" X .120" DIA.	64	0.44
TYPE I, STYLE 18 2-1/2" X .135" DIA.	36	0.39
TYPE I, STYLE 18 3" X .135" DIA.	16	0.20
PALLET, 32" X 61" - - - - -	1 REQD - - - - -	54 LBS
STEEL STRAPPING, 3/4" - - - - -	54.83' REQD - - - - -	4.90 LBS
SEAL FOR 3/4" STRAPPING - - - - -	4 REQD - - - - -	NIL
STAPLE, 15/16" X 3/4" - - - - -	22 REQD - - - - -	NIL



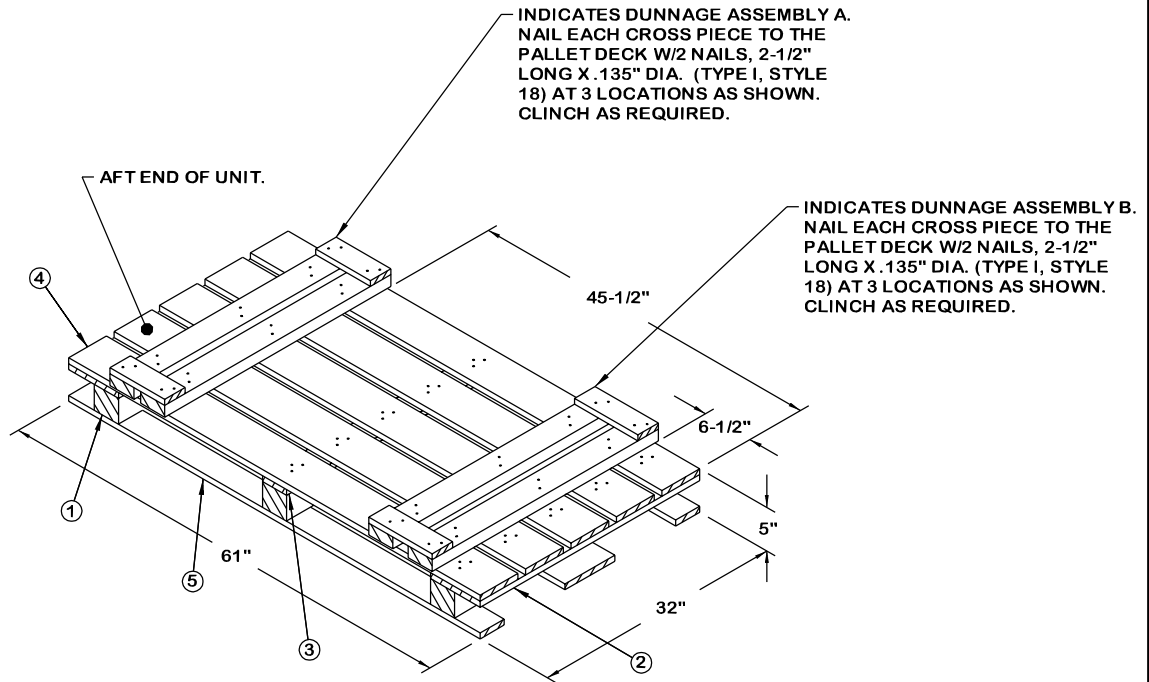
FILLER ASSEMBLY
(FOR MINUS ONE CONTAINER)

DUNNAGE/FILLER ASSEMBLY MATERIAL SPECIFICATIONS		
ASSEMBLY NAME	WOOD GROUP ●	SPEC. NO.
DUNNAGE ASSEMBLY A	GROUP III	ASTM D6199
DUNNAGE ASSEMBLY B	GROUP III	ASTM D6199
DUNNAGE ASSEMBLY C	GROUP III	ASTM D6199
DUNNAGE ASSEMBLY D	GROUP III	ASTM D6199
DUNNAGE ASSEMBLY E	GROUP III	ASTM D6199
DUNNAGE ASSEMBLY F	GROUP III	ASTM D6199
FILLER ASSEMBLY	GROUP I, II, OR III	ASTM D6199
BUFFER ASSEMBLY	GROUP I, II, OR III	ASTM D6199
NAILS	-----	ASTM D1667

WOOD PRESERVATIVES, PQ56 (COPPER-8-QUINOLINOLATE), M-GARD W550 (ZINC NAPHTHENATE EMULSIFIABLE) OR M-GARD W510 OR CUNAPSOL 5 (COPPER NAPHTHENATE). SEE GENERAL NOTE "R" ON PAGE 3.

WOOD GROUPS		
GROUP I	GROUP II	GROUP III
TAMARACK	ELM, AMERICAN	HICKORY
FIR, SILVER	ASH (EXCEPT WHITE)	PECAN
HEMLOCK, WESTERN	GUM	BIRCH, SWEET OR
PINE, ALASKA	PINE, SOUTHERN	YELLOW
FIR, DOUGLAS	YELLOW	ELM, ROCK
HEMLOCK, EASTERN	MAPLE, SOFT	HACKBERRY
MAGNOLIA	LARCH, WESTERN	MAPLE, HARD
CEDAR	FIR, DOUGLAS	ASH, WHITE
ASPEN	(COAST)	BEECH
LARCH, WESTERN	SYCAMORE	LOCUST
SPRUCE	TUPELO, WATER	OAK
CHESTNUT		
COTTONWOOD		
FIR, WHITE		
PINE, PONDEROSA		

● THE WOOD GROUPS AS IDENTIFIED WITHIN THE TABLES ARE ONLY APPLICABLE TO THE PROCEDURES CONTAINED WITHIN THIS DOCUMENT. THE WOOD GROUPS AS SPECIFIED IN THE TABLES OF THIS DOCUMENT ARE TO BE USED INSTEAD OF THE WOOD GROUPS CONTAINED IN ASTM D6199 PERTAINING TO THE WOODS USED IN PALLET OR DUNNAGE ASSEMBLY CONSTRUCTION ARE TO BE FOLLOWED.



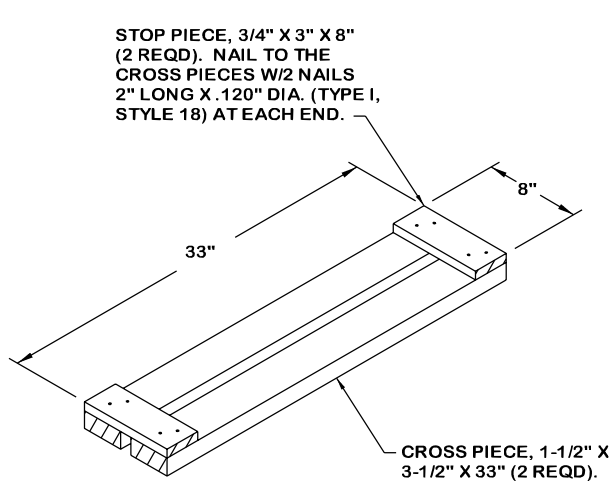
SPECIAL PALLET/PALLET DUNNAGE LOCATION DETAIL

KEY NUMBERS

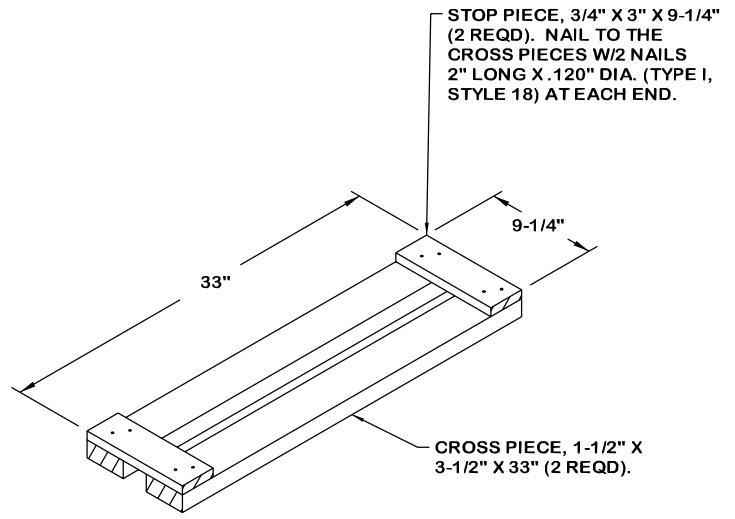
- ① POST, 4" WIDE X 2-3/4" HIGH (ACTUAL) X 3-1/2" LONG (9 REQD).
- ② OUTER STRINGER, 1" X 8" X 32" (2 REQD).
- ③ CENTER STRINGER, 1" X 4" X 32" (1 REQD).
- ④ TOP DECK BOARD, 1" X 6" X 61" (5 REQD). NAIL OUTSIDE AND CENTER DECK BOARDS THRU THE STRINGERS INTO THE POSTS W/3 NAILS 3" TO 3-1/4" LONG X .135" DIA. (TYPE I, STYLE 18) AT EACH LOCATION. NAIL OTHER DECK BOARDS TO THE STRINGERS W/3 NAILS 1-1/2" LONG X .120" DIA. (TYPE I, STYLE 18) AT EACH LOCATION.
- ⑤ RUNNER, 1" X 4" X 61" (3 REQD). NAIL TO THE POSTS W/3 NAILS 2-1/4" LONG X .120" DIA. (TYPE I, STYLE 18) AT EACH JOINT.

PALLET MATERIAL SPECIFICATIONS			
KEY NO.	PART NAME	WOOD GRADE ●	SPEC NO.
1	POST	GROUP III	ASTM D6199
2	OUTER STRINGER	GROUP III	ASTM D6199
3	CENTER STRINGER	GROUP III	ASTM D6199
4	TOP DECK BOARD	GROUP III	ASTM D6199
5	RUNNER	GROUP III	ASTM D6199
4 & 5	NAILS	- - - - -	ASTM F1667
WOOD PRESERVATIVES, PQ56 (COPPER-8-QUINOLINOLATE), M-GARD W550 (ZINC NAPHTHENATE EMULSIFIABLE), M-GARD W510 OR CUNAPSOL5 (COPPER NAPHTHENATE). SEE GENERAL NOTE "S" ON PAGE 3.			

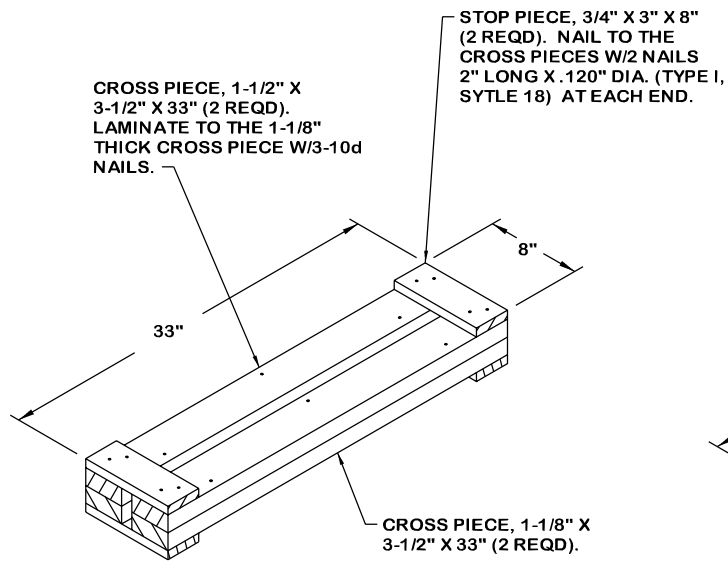
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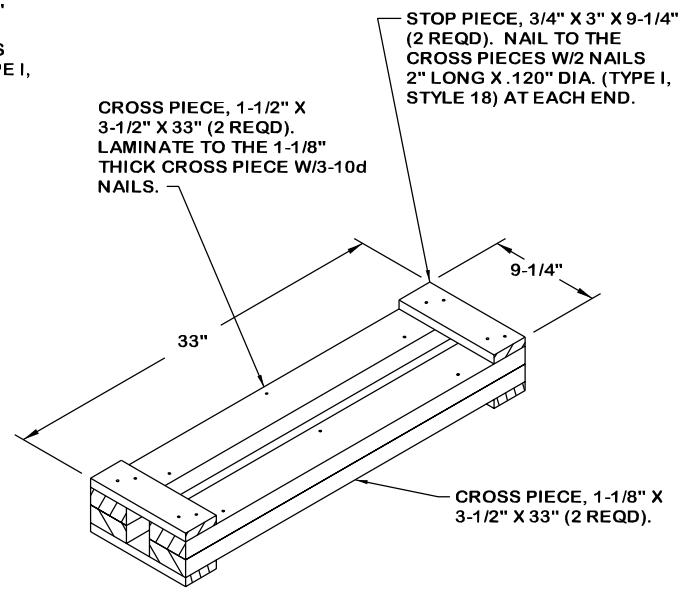
DUNNAGE ASSEMBLY A



DUNNAGE ASSEMBLY B



DUNNAGE ASSEMBLY C



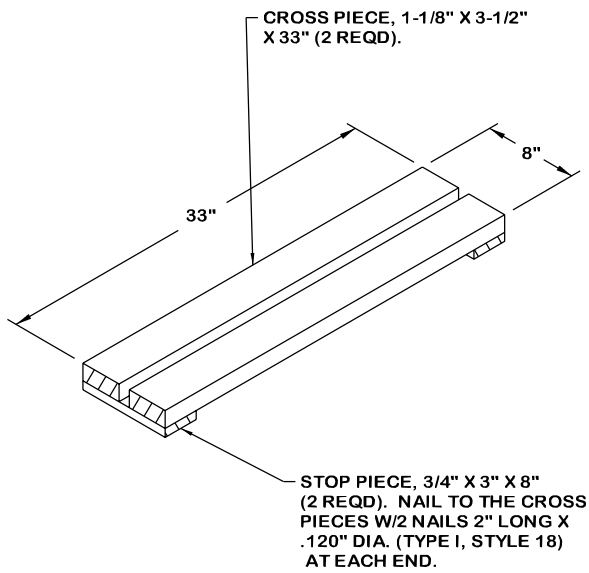
DUNNAGE ASSEMBLY D

SPECIAL NOTES:

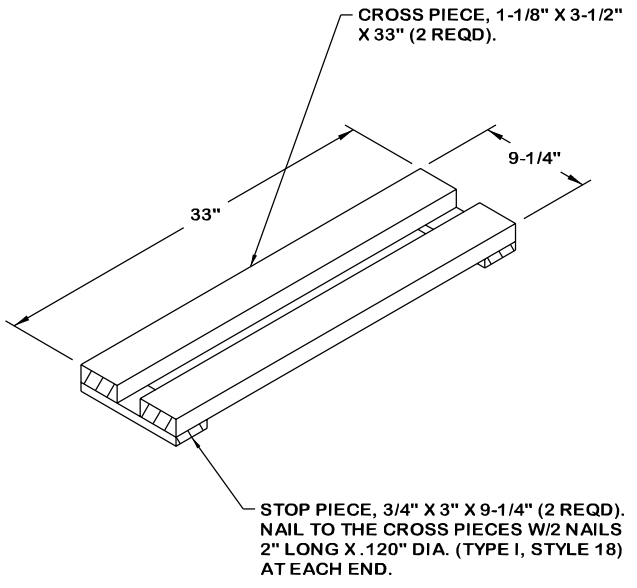
1. ALL THICKNESS DIMENSIONS SPECIFIED FOR THE DUNNAGE PIECES COMPRISING THE ASSEMBLIES DELINEATED ON THIS PAGE, WHEN MEASURED WILL FALL WITHIN THE FOLLOWING DIMENSIONAL TOLERANCING LIMIT:

THICKNESS - SPECIFIED DIMENSION PLUS ZERO, MINUS 1/8".
FOR ALL OTHER SPECIFIED DIMENSIONS, SEE THE TOLERANCING
GUIDANCE CONTAINED IN GENERAL NOTE "D" ON PAGE 3.

2. ALL DIMENSIONS SHOWN ON THIS PAGE ARE ACTUAL, NOT NOMINAL.



DUNNAGE ASSEMBLY E

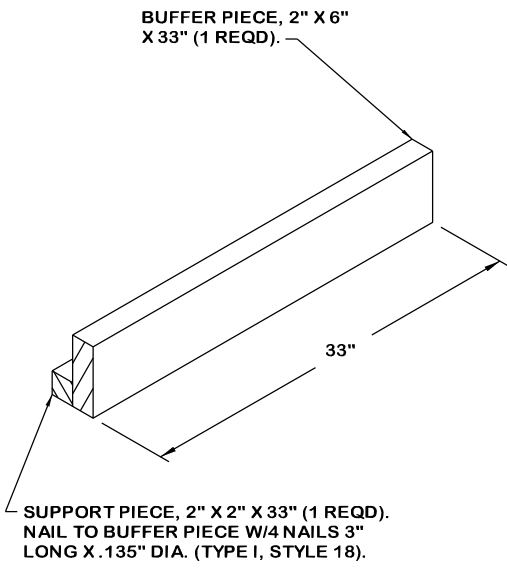


DUNNAGE ASSEMBLY F

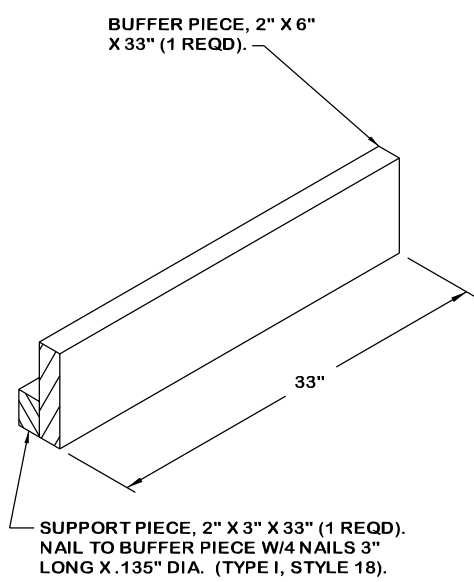
SPECIAL NOTES:

1. ALL THICKNESS DIMENSIONS SPECIFIED FOR THE DUNNAGE PIECES COMPRISING THE ASSEMBLIES DELINEATED ABOVE, WHEN MEASURED WILL FALL WITHIN THE FOLLOWING DIMENSIONAL TOLERANCING LIMIT:

THICKNESS - SPECIFIED DIMENSION PLUS ZERO, MINUS 1/8".
FOR ALL OTHER SPECIFIED DIMENSIONS, SEE THE TOLERANCING GUIDANCE CONTAINED IN GENERAL NOTE "D" ON PAGE 3.
2. ALL DIMENSIONS SHOWN ABOVE ARE ACTUAL, NOT NOMINAL.



BUFFER ASSEMBLY A
(DIMENSIONS FOR BUFFER ASSEMBLY A ARE NOMINAL.)



BUFFER ASSEMBLY B
(DIMENSIONS FOR BUFFER ASSEMBLY B ARE NOMINAL.)