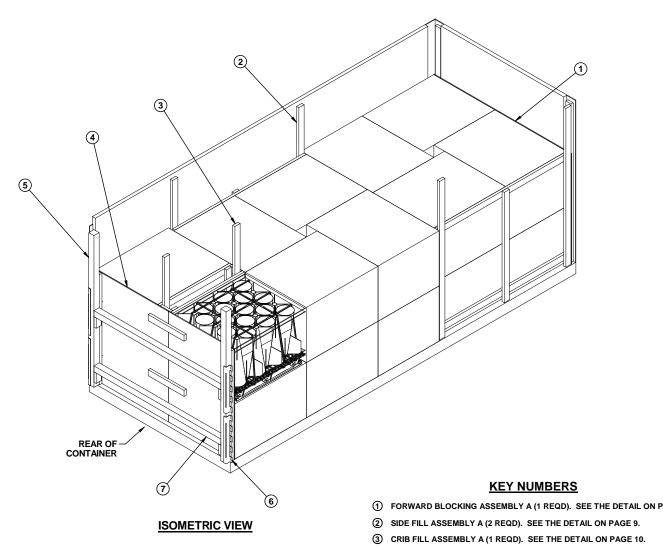
# LOADING AND BRACING<sup>®</sup> IN END OPENING ISO CONTAINERS OF FIN ASSEMBLY, BSU-33, ON METAL PALLET

# <u>INDEX</u>

<u>ITEM</u>	PAGE(S)
20 UNIT LOAD	
GENERAL NOTES AND MATERIAL SPECIFICATIONS	3
PALLET UNIT DETAILS	4
18 UNIT LOAD	5
16 UNIT LOAD	6
DETAILS	7-11
LESS THAN FULL LOAD PROCEDURE	12

<sup>®</sup> THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER CARRIERS.

#### U.S. ARMY MATERIEL COMMAND DRAWING APPROVED, U.S. ARMY CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS JOINT MUNITIONS COMMAND THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 12. DO NOT SCALE **APRIL 2007 ENGINEER ADIN FELICIANO** BASIC TECHNICIAN REV. TRANSPORTATION APPROVED BY ORDER OF COMMANDING **ENGINEERING** GENERAL, U.S. ARMY MATERIEL COMMAND DIVISON DIVISION DRAWING TESTED CLASS FILE VALIDATION **ENGINEERING** DIVISON 19 48 8806 SP15PM5 ENGINEERING\* DIRECTORATE U.S. ARMY DEFENSE AMMUNITION CENTER



1 FORWARD BLOCKING ASSEMBLY A (1 REQD). SEE THE DETAIL ON PAGE 8.

- 4 REAR BLOCKING ASSEMBLY A (1 REQD). SEE THE DETAIL ON PAGE 8.
- DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- UNIVERSAL LOAD RETAINER (4 REQD, 2 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- (7) DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

BILL OF MATERIAL			
LINEAR FEET	BOARD FEET		
146	97		
29	39		
NO. REQD	POUNDS		
32	1/4		
72	1		
8	1/4		
	LI NEAR FEET  146 29  NO. REQD  32 72		

UNIVERSAL LOAD RETAINER - 4 REQD - - - 26 LBS PLYWOOD, 1/2" - 81.78 SQFT REQD - - - 112.44 LBS

## LOAD AS SHOWN

<u>I TEM</u>	QUANTI TY	WEIGHT (APPROX)
DUNNAGE	20	16, 720 LBS 412 LBS 4, 700 LBS

TOTAL WEIGHT - - - - - 21,832 LBS (APPROX)

**20 UNIT LOAD** PAGE 2

#### **GENERAL NOTES**

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF FIN ASSEMBLY, BSU-33, ON METAL PALLETS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND NAVAL SEA SYSTEMS COMMAND DRAWING 6214035 FOR DETAILS OF THE PALLET UNIT. <u>CAUTION</u>: REGARDLESS OF THE QUANTITY OF PALLET UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 4,700 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH END OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 93" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE A TOTAL INSIDE HEIGHT OF 95", BUT A CLEAR HEIGHT UNDER THE ROOF BOWS OF 93", VERIFY INSIDE CONTAINER HEIGHT PRIOR TO FABRICATING DUNNAGE. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING PALLET UNITS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE HORIZONTAL PIECES ON THE CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE WIAPPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE STRUTS IN THE CRIB FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE PALLET UNIT.
- E. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- F. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT.
- H. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- J. <u>CAUTION</u>: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- K. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- L. MAXIMUM LOAD WEIGHT CRITERIA:

THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM.

- M. REQUIREMENTS CITED WITHIN THE ASSOCIATION OF AMERICAN RAILROADS (AAR) INTERMODAL LOADING GUIDE APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLIOW.
  - A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BO-GIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
  - 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.

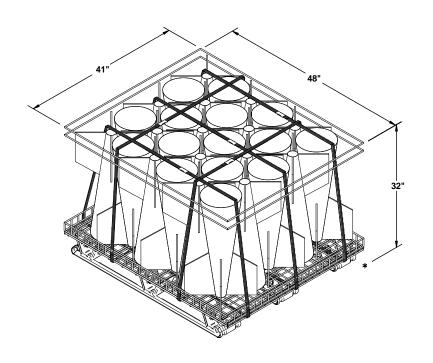
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#### (GENERAL NOTES CONTINUED)

- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRE-CLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCU-MENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COM-PUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- P. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE LOADS ON PAGES 5, 6 AND 12
  - IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE, TWO OR THREE LADING UNITS), LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE CENTER OF THE LOAD.
  - 2. IF A LOAD IS REDUCED BY A LARGE AMOUNT (MORE THAN THREE LADING UNITS), LADING UNITS SHOULD BE ELIMINATED AS REQUIRED
    THE TOTAL LOAD SHIFTED FORE OR AFT, AS NECESSARY, TO ACHIEVE
    A SYMMETRICAL WEIGHT DISTRIBUTION. THE DEPICTED PROCEDURES
    WILL BE FOLLOWED AS CLOSELY AS POSSIBLE, MAKING ONLY THOSE
    ADJUSTMENTS TO THE DUNNAGE WHICH ARE REQUIRED TO ACCOMMODATE THE NUMBER OF UNITS TO BE SHIPPED.
- Q. FOUR UNIVERSAL LOAD RETAINERS, AS DEPICTED IN THE LOADS ON PAGES 2, 5, 6 AND 12 ARE REQUIRED WHEN LOADING TWO-HIGH LOADS, AND TWO ARE REQUIRED WHEN LOADING ONE-HIGH LOADS. THIS IS AN EXCEPTION TO THE ESTABLISHED PROCEDURES; HOWEVER, THE EXCEPTION IS PERMITTED FOR THE AMMUNITION PACK COVERED BY THIS DRAWING. REFER TO DAC DRAWING ACV00682 FOR DETAILS OF THE UNIVERSAL LOAD RETAINER CONSTRUCTION, AND TO DEPARTMENT OF THE ARMY DRAWING DA-116 FOR DETAILS FOR INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- R. ANTI-CHAFING MATERIAL MAY BE ADDED BETWEEN PALLET UNITS OR BETWEEN PALLET UNITS AND END OPENING CONTAINER, IF DESIRED, TO PREVENT CHAFING DAMAGE TO THE PALLET UNIT.

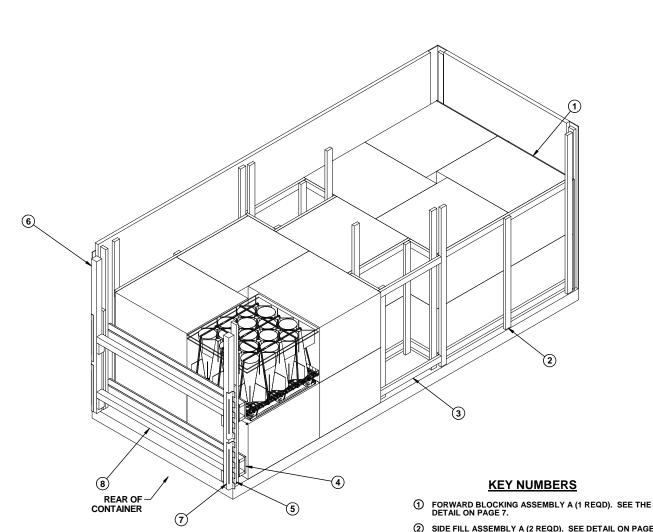
### **MATERIAL SPECIFICATIONS**

<u>LUMBER</u> :	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOL- UNTARY PRODUCT STANDARD PS 20.
<u>NAILS</u> :	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
<u>PLYWOOD</u> :	COMMERCIAL ITEM DESCRIPTION A-A-55057, IN- DUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EX- TERIOR GRADE MAY BE SUBSTITUTED.
WIRE, CARBON STEEL -:	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
ANTI-CHAFING MATERIAL:	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
STEEL, STRUCTURAL:	ASTM A36; 36,000 PSI MINIMUM YIELD OR BETTER.



# PALLET UNIT

GROSS WEI GHT - - - - - - - - - - - 836 LBS CUBE - - - - - - - - - - - - 36. 4 CU FT



**ISOMETRIC VIEW** 

BILL OF MATERIAL			
LUMBER	LI NEAR FEET	BOARD FEET	
2" X 4"	248	166	
4" X 4"	29	39	
NAI LS	NO. REQD	POUNDS	
6d (2")	110	3/4	
10d (3")	130	2	
12d (3-1/4")	8	1/2	

UNI VERSAL LOAD RETAINER - 4 REQD - - - - 26 LBS PLYWOOD, 3/4" - 23.98 SQFT REQD - - 49.46 LBS PLYWOOD, 1/2" - 40.89 SQFT REQD - - 56.22 LBS

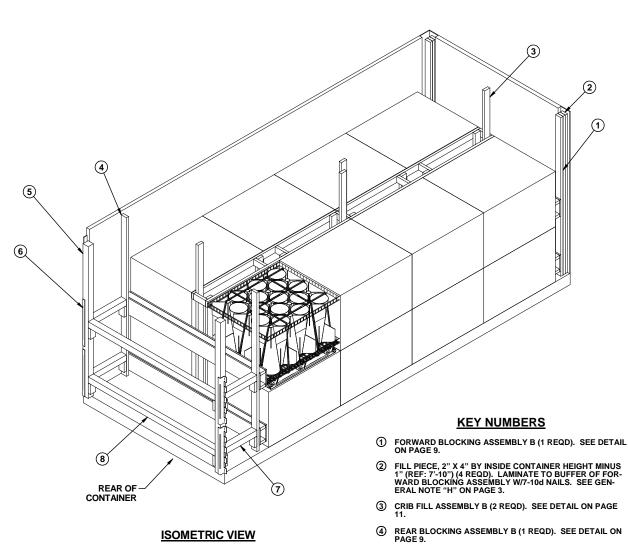
- ② SIDE FILL ASSEMBLY A (2 REQD). SEE DETAIL ON PAGE 9.
- $\ensuremath{\mathfrak{J}}$  SIDE FILL ASSEMBLY B (2 REQD). SEE DETAIL ON PAGE 10.
- REAR BLOCKING ASSEMBLY B (1 REQD). SEE DETAIL ON PAGE 9. 4
- FILL PIECE, 4" WIDE BY 57" LONG MATERIAL (AS REQD).
  NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/5 APPROPRIATELY SIZED NAILS. NAIL EACH ADDITIONAL PIECE TO THE PREVIOUS PIECE IN A SIMILAR
  MATTER. NOTE: MULTIPLE PIECES MAY BE LAMINATED
  TOGETHER FIRST AND THEN TOENAILED TO THE REAR
  BLOCKING ASSEMBLY.
- DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- UNIVERSAL LOAD RETAINER (4 REQD, 2 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W2-126 MAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

# LOAD AS SHOWN

<u>I TEM</u>	QUANTI TY	WEIGHT (APPROX)
DUNNAGE	18 	15, 048 LBS 542 LBS 4, 700 LBS
TOTAL WEIGHT 20, 290 LBS (APPROX		20, 290 LBS (APPROX)

**18 UNIT LOAD** 

PAGE 5



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BILL OF MATERIAL			
LUMBER	LINEAR FEET	BOARD FEET	
2" X 4"	350	233	
4" X 4"	37	49	
NAI LS	NO. REQD	POUNDS	
6d (2")	176	1	
10d (3")	236	3-3/4	
12d (3-1/4")	24	1/2	
UNI VERSAL LOAD RETAINER - 4 REQD 26 LBS PLYWOOD, 3/4" - 47.96 SQFT REQD 98.92 LBS			

# LOAD AS SHOWN

(5) DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q"

UNIVERSAL LOAD RETAINER (4 REQD, 2 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q"

STRUT, 4" X 4" BY CUT-TO-FIT (REF: 24") (8 REQD). TOE-NAIL TO THE BUFFER PIECES OF THE REAR BLOCKING ASSEMBLY W/2-12d NAILS AT EACH END. SEE "BEVEL-CUT" DETAIL ON PAGE 7 AND GENERAL NOTE "H" ON PAGE 3.

DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

ON PAGE 3.

ON PAGE 3.

<u>I TEM</u>	QUANTI TY	WEIGHT (APPROX)
DUNNAGE	16	693 LBS
	TOTAL WEIGHT	18, 769 LBS (APPROX)

**16 UNIT LOAD** 

PAGE 6

