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BUREAU OF EXPLOSIVES

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DATE 1-18-2008

LOADING AND BRACING* ON COMMERCIAL FLATRACK ISO CONTAINERS OF SMALL DIAMETER BOMB CARRIAGE/SYSTEM PACKED IN CNU-660 CONTAINERS

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*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
JOINT MUNITIONS COMMAND

CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.

DO NOT SCALE

OCTOBER 2007

Ed Aslett

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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. ALL LOADS SHIPPED BY THE PROCEDURES DEPICTED IN THIS DRAWING MUST BE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN TITLE 49, THE UNITED STATES CODE OF FEDERAL REGULATIONS; AR 55-355/AFM 75-2; DOD 4500.32-R; DOD 5100.76-M; DOD 6055.9-STD; AS WELL AS ANY AND ALL OTHER APPLICABLE SERVICE REGULATIONS.
- C. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO SMALL DIAMETER BOMB CARRIAGE/SYSTEMS PACKED ONE BRU-61A CARRIAGE SYSTEM AND FOUR GBU-39/B BOMBS PER CNU-660 SHIPPING AND STORAGE CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH AMMUNITION ITEMS. SEE PAGE 3 AND BOEING DRAWING 70P993153-1001 FOR DETAILS OF THE CONTAINER. **CAUTION:** REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE FLATRACK ISO CONTAINER MUST NOT BE EXCEEDED.
- D. THE LOAD AS SHOWN IS BASED ON A 5,700 POUND 20' LONG BY 8'-0" WIDE FLATRACK ISO CONTAINER WITH FULL HEIGHT ENDWALLS, AND INSIDE DIMENSIONS OF 19'-4" LONG BY 7'-2" WIDE. 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.
- E. WHEN LOADING CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD BETWEEN THE END BLOCKING ASSEMBLIES AND THE LADING. ALTHOUGH A TOTAL OF 1" OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD IS PERMITTED, LONGITUDINAL VOIDS WITHIN THE LOADS ARE TO BE HELD TO A MINIMUM, NOT EXCEEDING 1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY INCREASING THE LENGTH OF THE STRUTS.
- F. 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.
- G. 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.
- H. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE ENDWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. **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.
- K. 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 FOLLOW:
1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE 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.

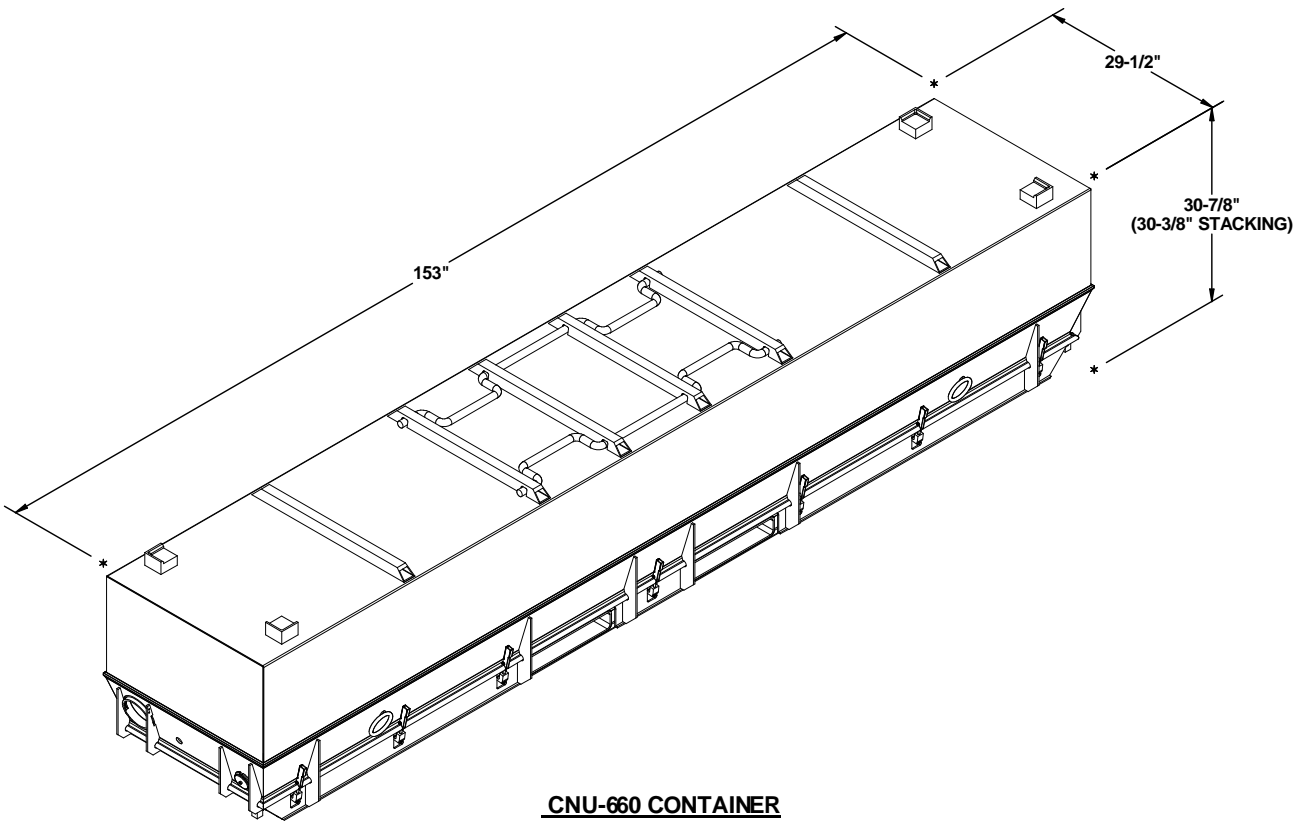
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(GENERAL NOTES CONTINUED)

- L. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- M. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER WITH TWO PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 8 FOR GUIDANCE.
- N. WHEN INSTALLING END BLOCKING ASSEMBLIES AND ENDWALL GATES, THE ASSEMBLIES MUST BE POSITIONED SO AS TO BE SUPPORTED AND IN LINE WITH THE STRONG POINTS OF THE FLATRACK ENDWALLS. **NOTE:** SOME FLATRACK ENDWALLS WILL REQUIRE FILL PIECES TO BE INSTALLED ON THE ENDWALL GATES TO PROVIDE A UNIFORM LOAD BEARING SURFACE. NAIL THESE FILL PIECES TO THE ENDWALL GATES W/1 APPROPRIATELY SIZED NAIL EVERY SIX INCHES. THESE PIECES ARE NOT REQUIRED IF THE ENDWALL IS SMOOTH (IF THE HINGES DO NOT PROTRUDE).
- O. THE 2" STRAPPING USED FOR LOAD SECUREMENT, I.E., HOLD-DOWN STRAPS, WILL ONLY BE FASTENED TO THE FLATRACK ISO CONTAINER BY UTILIZING TIEDOWN PROVISIONS LOCATED ON THE TOP OR ALONG THE SIDE OF THE FLATRACK BOTTOM SIDE RAILS. **CAUTION:** THE LOAD SECUREMENT STRAPS WILL NOT BE POSITIONED AROUND THE UNDERSIDE OR THROUGH THE FORKLIFT POCKETS OF THE FLATRACK ISO CONTAINER. ADDITIONALLY, THE FLATRACK TIEDOWN PROVISIONS MUST BE AT LEAST AS STRONG AS THE 2" LOAD SECUREMENT STRAPPING BEING USED; AND BE OF A SUFFICIENT WIDTH TO RECEIVE THE 2" STRAPPING AND BE OF A DESIGN WHICH WILL PROVIDE A BEARING SURFACE ACROSS THE FULL WIDTH OF THE 2" STRAPPING SO THAT THE STRAPPING WILL NOT BE DEFORMED, ESPECIALLY AT ITS EDGES, WHEN PROPERLY TENSIONED.
- P. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CONTAINERS WHEN THEY ARE LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED IN THE DRAWING TITLE.
- Q. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS" FOR APPLICABLE LOADING RULES AS FOLLOWS: PREFACE, 1, 2, 3, 5, 7, 10, 12, 13, 14, AND 15. NOTE THAT ALL STRAPPING USED FOR LOAD SECUREMENT, I.E., HOLD-DOWN STRAPS, MUST BE MARKED AS SPECIFIED IN LOADING RULE 15.
- R. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- S. 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.
- T. THE QUANTITY OF CONTAINERS SHOWN IN THE LOADS ON PAGE 4 MAY BE REDUCED TO TWO CONTAINERS, IF DESIRED.

MATERIAL SPECIFICATIONS

<u>LUMBER</u>	- - - - -	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
<u>NAILS</u>	- - - - -	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
<u>PLYWOOD</u>	- - - - -	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.
<u>STRAPPING, STEEL</u>	- - -	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
<u>SEAL, STRAP</u>	- - - - -	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
<u>STAPLE, STRAP</u>	- - -	COMMERCIAL GRADE.
<u>ANTI-CHAFING MATERIAL</u>	- - - - -	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
<u>WIRE, CARBON STEEL</u>	- - -	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER. A36; 36,000 PSI MINIMUM YIELD OR BETTER.



GROSS WEIGHT - - - - - 2,321 LBS (APPROX)
 CUBE - - - - - 80.64 CU FT. (APPROX)

UNITIZATION AND HANDLING GUIDANCE

(UNITIZATION AND HANDLING GUIDANCE CONTINUED)

1. STACKING CONTAINERS FOR UNITIZING:

- A. AN UPPER CONTAINER SHOULD BE PLACED AS CLOSE AS POSSIBLE IN VERTICAL ALIGNMENT WITH THE NEXT LOWER CONTAINER.
- B. POSITION THE AFT END OF AN UPPER CONTAINER ABOVE THE AFT END OF THE NEXT LOWER CONTAINER.
- C. THE CONTAINER SKIDS OF AN UPPER CONTAINER SHOULD BE FULLY SEATED AGAINST THE SKID LOCATOR PIECES ON THE COVER OF THE NEXT LOWER CONTAINER.

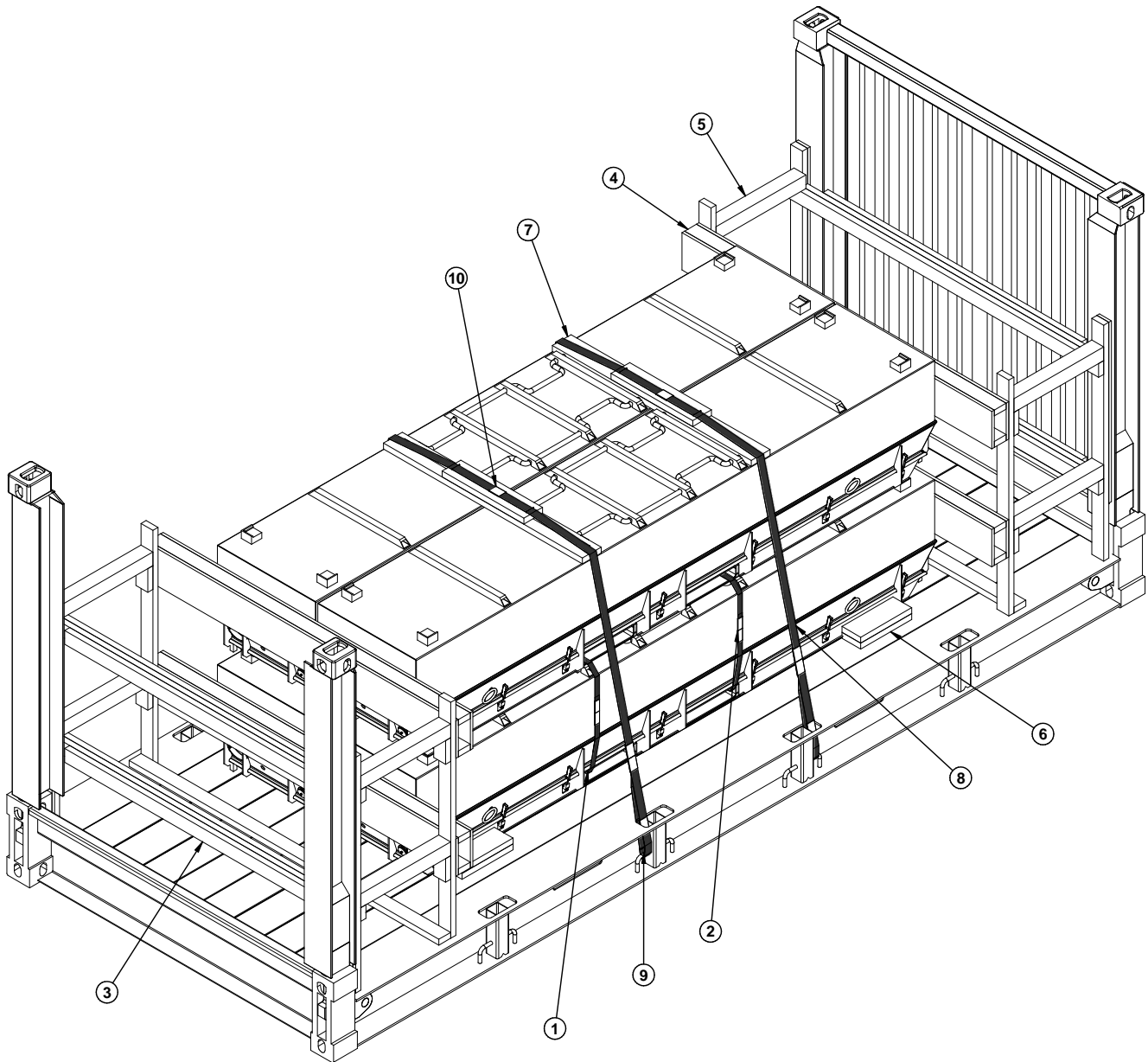
2. UNITIZING PROCEDURE USING 1-1/4" BANDING STRAPS.

- A. STACK TWO CONTAINERS AS SHOWN. BE SURE TO ALIGN THE STACKING FEATURES.
- B. FEED UNITIZING STRAP THROUGH FORK POCKETS OF BOTH CONTAINERS. (2 PLACES)
- C. TENSION AND SECURE EACH STRAP WITH ONE DOUBLE-NOTCHED SEAL.

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3. CONTAINER OR CONTAINER STACK HANDLING:

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS. APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD.
- D. THE MK45 HANDLIFT TRUCK IS PREFERRED FOR LIFTING AND MANEUVERING THE CONTAINERS WITHIN THE VAN TRAILER. THE MK45 HANDTRUCK CONSISTS OF A CAST ALUMINUM BODY MOUNTED ON TWO WHEELS WITH A LIFTING MECHANISM. THE MK45 LIFTING MECHANISM IS CONNECTED TO A RECESS IN THE END OF THE CONTAINER. THE HANDTRUCK SHALL BE USED IN PAIRS WITH ONE MK45 POSITIONED AT EACH END OF THE CONTAINER. THE WEIGHT CAPACITY OF TWO MK45 HANDTRUCKS IS 6,000 POUNDS.



ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

- ⑧ HOLD-DOWN STRAP, 2" X .050" OR .044" X 20'-4" LONG STEEL STRAPPING (2 REQD). INSTALL EACH STRAP FROM TWO PIECES, EACH 10'-2" LONG. FASTEN TO TIEDOWN PROVISION ON THE SIDE OF THE FLATRACK AND BRING UP TO THE TOP OF THE LOAD WHERE THEY CAN BE TENSIONED AND SEALED. STAPLE TO STRAPPING BOARD W/2 STAPLES EACH.
- ⑨ PAD, STRAPPING 2" X .050" OR .044" X 18" (4 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP AND THE FLATRACK TIEDOWN PROVISIONS. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑩ SEAL FOR 2" STRAPPING (10 REQD, 5 PER STRAP). FASTEN 2" HOLD DOWN STRAP WITH ONE SEAL AT EACH LOCATION CRIMPED WITH TWO PAIR OF NOTCHES. FASTEN PAD WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.

KEY NUMBERS

- ① UNITIZING STRAP, 1-1/4" X .035" OR .031" X 10'-0" (4 REQD). INSTALL STRAPPING THROUGH THE FORK POCKETS OF THE TOP AND BOTTOM CONTAINERS AS SHOWN. SEE "UNITIZATION AND HANDLING GUIDANCE" ON PAGE 3.
- ② SEAL FOR 1-1/4" STRAPPING (4 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ③ ENDWALL GATE (2 REQD). SEE DETAIL ON PAGE 7.
- ④ END BLOCKING ASSEMBLY (2 REQD). NAIL THE HOLD DOWN PIECE TO THE DECK W/6-10d NAILS EACH. SEE DETAIL ON PAGE 6.
- ⑤ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 26-7/8") (8 REQD). TOENAIL TO THE BUFFER PIECES OF THE END BLOCKING ASSEMBLY AND THE ENDWALL GATE W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 8.
- ⑥ SIDE BLOCKING, 2" X 6" X 15" (DOUBLED) (4 REQD). POSITION AGAINST THE CONTAINER AS SHOWN. NAIL TO THE DECK W/4-10d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST IN A SIMILAR MANNER.
- ⑦ STRAPPING BOARD ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 7.

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SPECIAL NOTES:

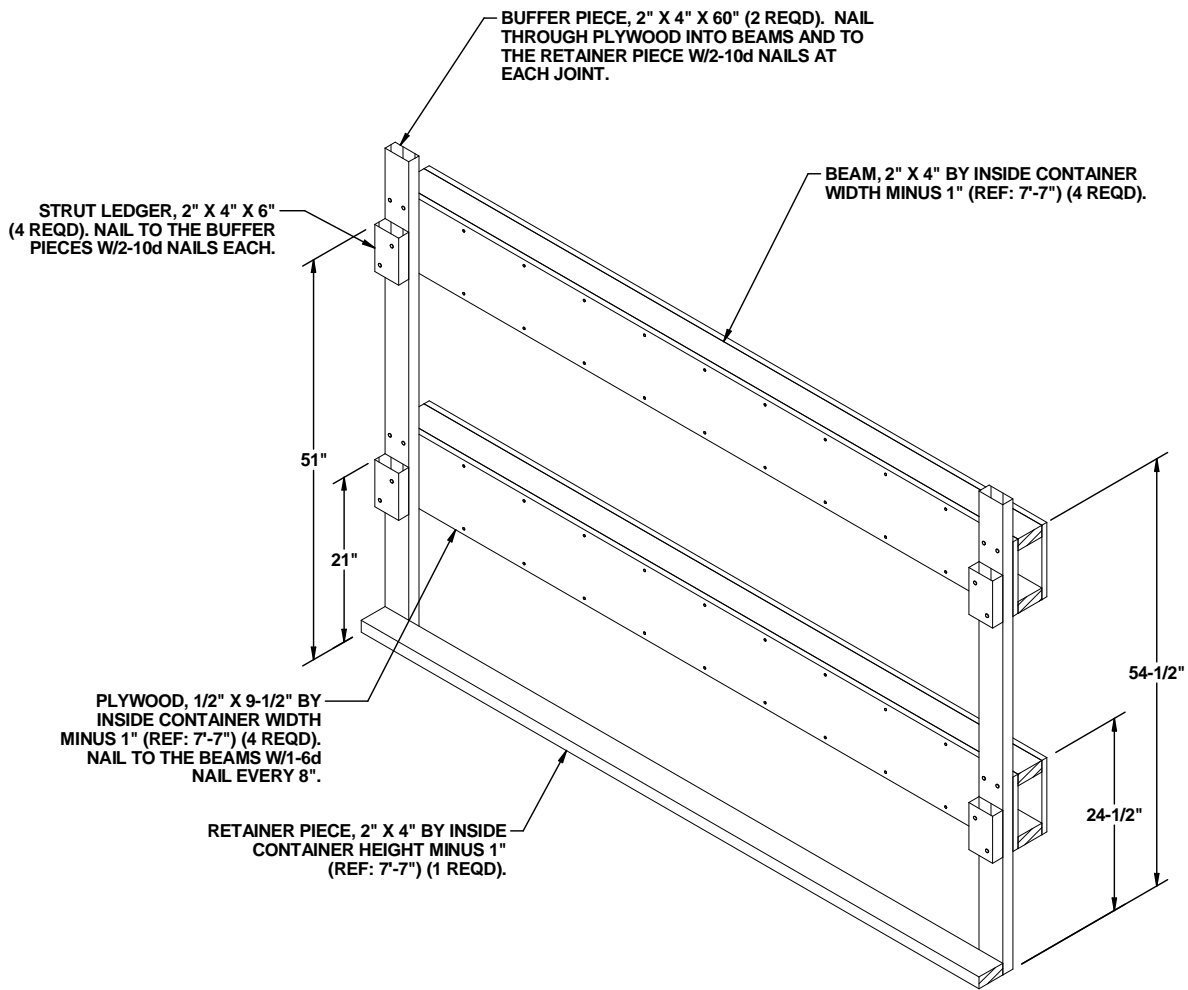
1. IF THE CORNER POSTS OF THE FLATRACK ARE SMOOTH, I.E., THE ENDWALL HINGE DOES NOT PROTRUDE FROM THE CORNER POST, THE FILL PIECES MAY BE ELIMINATED FROM THE ENDWALL GATES. ALSO, THE LENGTH OF THE FILL PIECE MUST BE ADJUSTED AS REQUIRED DEPENDING ON THE LENGTH OF THE PROTRUDING HINGE.
2. POSITION THE STRAPPING BOARD ASSEMBLY AND THE HOLD-DOWN STRAPS TO BE VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS.
3. THE LOAD AS SHOWN MAY BE REDUCED BY ONE LAYER, IF DESIRED FOR A SHIPMENT OF TWO CONTAINERS.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	16	6
2" X 4"	174	16
2" X 6"	24	24
4" X 4"	18	24
NAI LS	NO. REQD	POUNDS
6d (2")	200	1
10d (3")	144	2
12d (3-1/4")	32	1
STEEL STRAPPING, 1-1/4" - - 40' REQD - - - 6 LBS		
SEAL FOR 1-1/4" STRAPPING - 8 REQD - - - NIL		
STEEL STRAPPING, 2" - - - 41' REQD - - 14 LBS		
SEAL FOR 2" STRAPPING - - - 10 REQD - - - 2 LBS		
STAPLE FOR 2" STRAPPING - - - 4 REQD - - - NIL		
PLYWOOD, 3/4" - - - 43.03 SQFT REQD - 99.06 LBS		

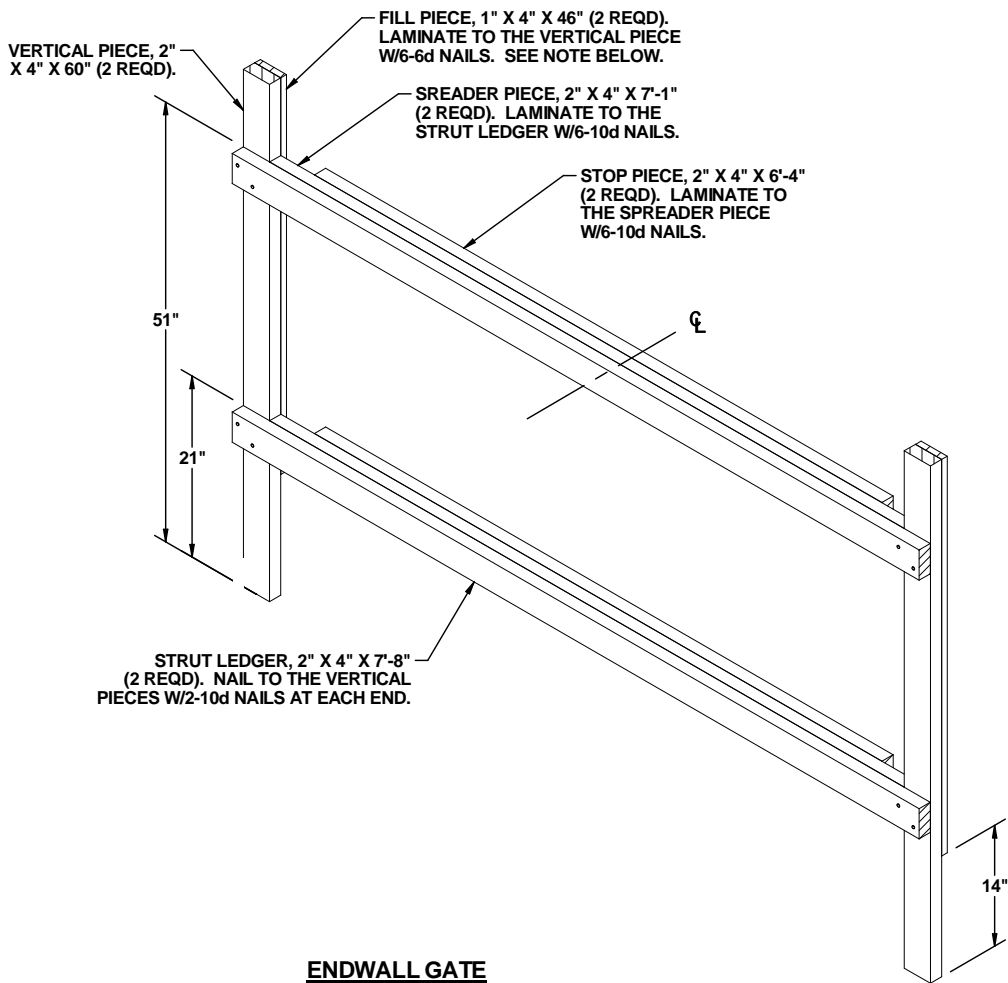
LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-660 - - - - - 4 - - - - -		9,284 LBS
DUNNAGE - - - - -		462 LBS
CONTAINER - - - - -		5,700 LBS
TOTAL WEIGHT - - - - -		15,446 LBS (APPROX)



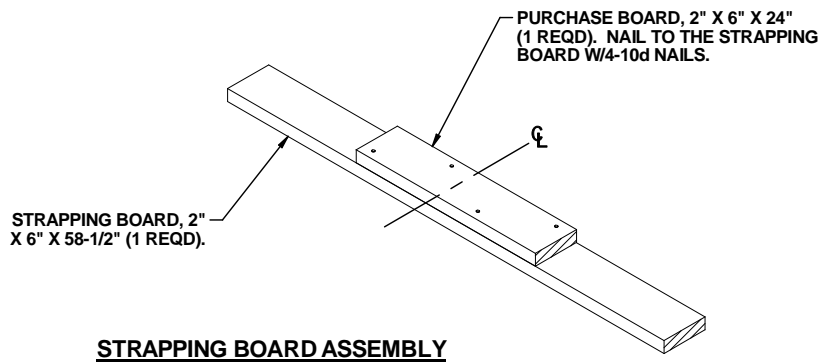
END BLOCKING ASSEMBLY

NOTE: FOR A ONE HIGH LOAD, OMIT THE TOP MOST BEAM ASSEMBLY AND THE TWO TOP STRUT LEDGERS. SHORTEN THE HEIGHT OF THE VERTICAL PIECES TO 30".



ENDWALL GATE

NOTE: FOR A ONE HIGH LOAD, ELIMINATE THE TOP MOST STRUT LEDGER, SPREADER PIECE, AND STOP PIECE. SHORTEN THE VERTICAL AND FILL PIECES APPROPRIATELY. THE FILL PIECES ARE ONLY REQUIRED IF THE ENDWALL HINGES PROTRUDE BEYOND THE EDGES OF THE FLATRACK CORNER POSTS, ELIMINATE IF THE CONTACT SURFACE IS FLAT.



STRAPPING BOARD ASSEMBLY

