

# LOADING AND BRACING<sup>⊕</sup> IN SIDE OPENING ISO CONTAINERS OF SLAM (AGM-84 AND ATM-84) MISSILES PACKED IN MK724 CONTAINERS

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

## 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).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF SLAM (AGM-84 AND ATM-84) MISSILES PACKED IN MK724 CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS CONTAINER WITH MISSILE INSTALLED. SEE NAVY DRAWING OR68/148 OR OR68/168 AND PAGE 4 FOR DETAILS OF THE CONTAINER. **CAUTION:** REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-5-1/4" LONG BY 89-3/4" WIDE BY 88" HIGH AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE DIFFERENT INSIDE MEASUREMENTS, VERIFY INSIDE CONTAINER DIMENSIONS 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 CONTAINERS, 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 CENTER BLOCKING ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE STRUTS IN THE CENTER BLOCKING ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINERS. THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED BY ADDING ADDITIONAL FILL MATERIAL TO THE BUFFER PIECES OF THE END BLOCKING ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12".
- 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, ON TO, OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- G. IN SOME ISO CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE ENDWALLS. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE VERTICAL ASSEMBLY TO PROVIDE A FLAT SURFACE. 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 ENDWALLS ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER ENDWALLS. ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR ENDWALL LONGITUDINAL BLOCKING.
- H. WHETHER AN ISO 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. **CAUTION:** DO NOT NAIL DUNNAGE MATERIAL TO THE ISO CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- K. PORTIONS OF THE ISO CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- L. THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOAD IS DELINEATED IN THE LOAD VIEW, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOAD 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 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.
- N. 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.
- O. 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.
- P. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE DETAILS ON PAGES 6 AND 7.
- Q. WHEN STEEL STRAPPING IS SEALED IN 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 6 FOR GUIDANCE.
- R. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS, BETWEEN CONTAINERS AND THE SIDE OPENING CONTAINER, AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- S. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
1. PREFABRICATE TWO END BLOCKING ASSEMBLIES, TWO CENTER BLOCKING ASSEMBLIES, AND FOUR VERTICAL ASSEMBLIES.
  2. BUILD THE BLOCKING ASSEMBLY FOR ONE END OF CONTAINER (USE REFERENCE DIMENSION FOR STRUTS) AND INSTALL IN CONTAINER.
  3. LOAD TWO DOUBLE-STACKED AND STRAPPED CONTAINERS TIGHT AGAINST BACK WALL.
  4. BUILD THE BLOCKING ASSEMBLY FOR THE OTHER END WHILE INSIDE CONTAINER, WITH STRUTS CUT-TO-FIT ADDED LAST.
  5. INSTALL TWO CENTER BLOCKING ASSEMBLIES TIGHT AGAINST THE DOUBLE-STACKED CONTAINERS.
  6. LOAD LAST TWO DOUBLE-STACKED AND STRAPPED CONTAINERS TIGHT AGAINST THE CENTER BLOCKING ASSEMBLIES.

## MATERIAL SPECIFICATIONS

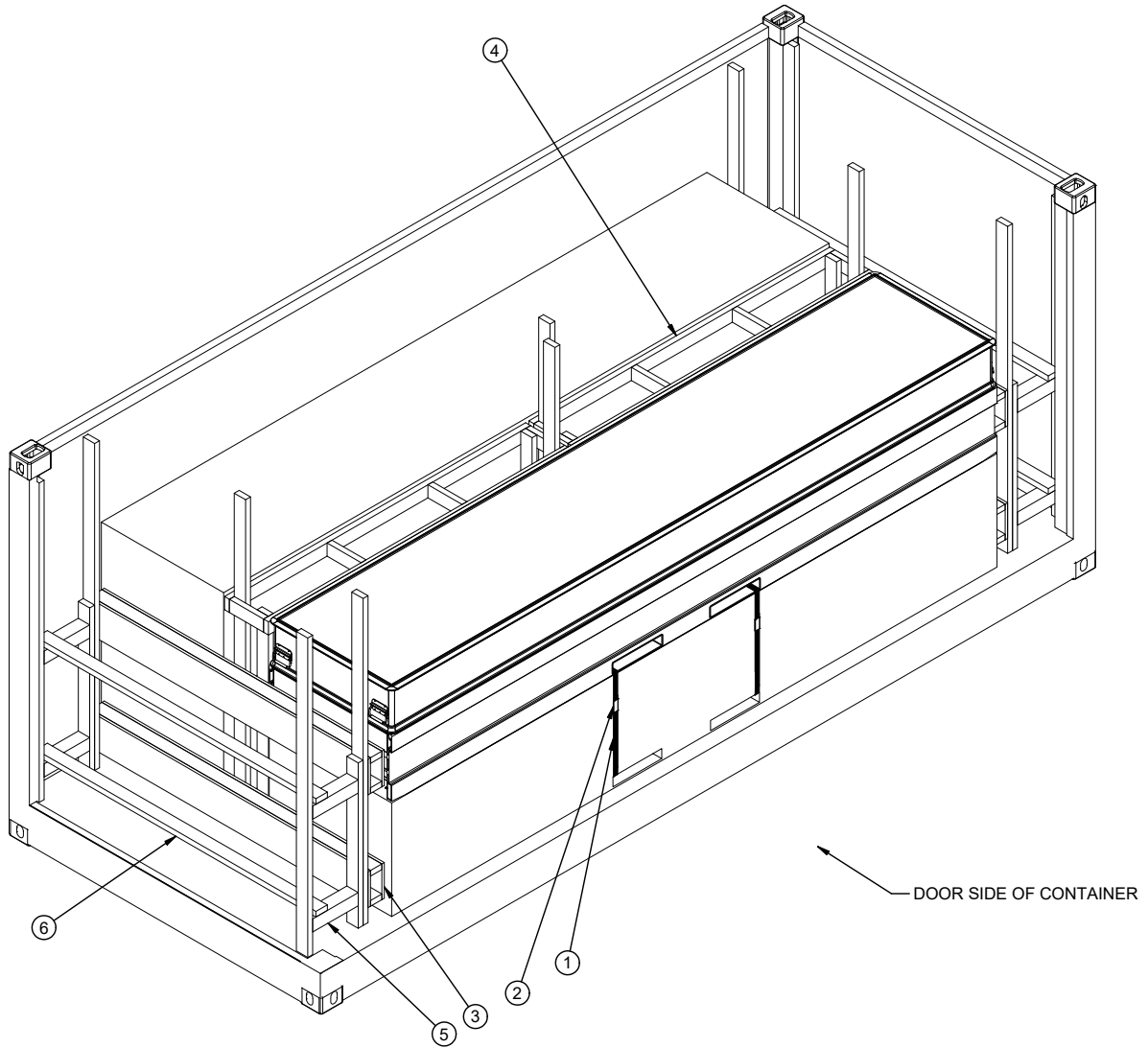
<u>LUMBER</u>	- - - - -	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
<u>NAILS</u>	- - - - -	ASTM F1667; COMMON STEEL NAIL NLCS OR NLCCMS).
<u>PLYWOOD</u>	- - - - -	COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED 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>WIRE, CARBON STEEL</u>	- - -	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
<u>ANTI-CHAFING MATERIAL</u>	- - - - -	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

## REVISION

REVISION NO. 1, DATED APRIL 2019, CONSISTS OF:

1. UPDATED SIGNATURE BLOCK ON TITLE PAGE.
2. UPDATED GENERAL NOTES ON PAGE 2.
3. UPDATED KEY NUMBERS AND BILL OF MATERIAL ON PAGE 3.

(CONTINUED AT RIGHT)



**KEY NUMBERS**

- ① UNITIZING STRAP, 1-1/4" X .031" OR .035" X 14'-0" (4 REQD). INSTALL STRAPPING THROUGH THE FORK POCKETS OF THE TOP AND BOTTOM CONTAINERS AS FAR APART AS POSSIBLE.
- ② SEAL FOR 1-1/4" STRAPPING (4 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ③ END BLOCKING ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 5.
- ④ CENTER BLOCKING ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 4.
- ⑤ STRUT ASSEMBLY (4 REQD). NAIL THROUGH THE VERTICAL PIECE INTO THE END BLOCKING ASSEMBLY W/5-10d NAILS. SEE DETAIL ON PAGE 5.
- ⑥ SPREADER PIECE, 2" X 4" X 86" (4 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.

**BILL OF MATERIAL**

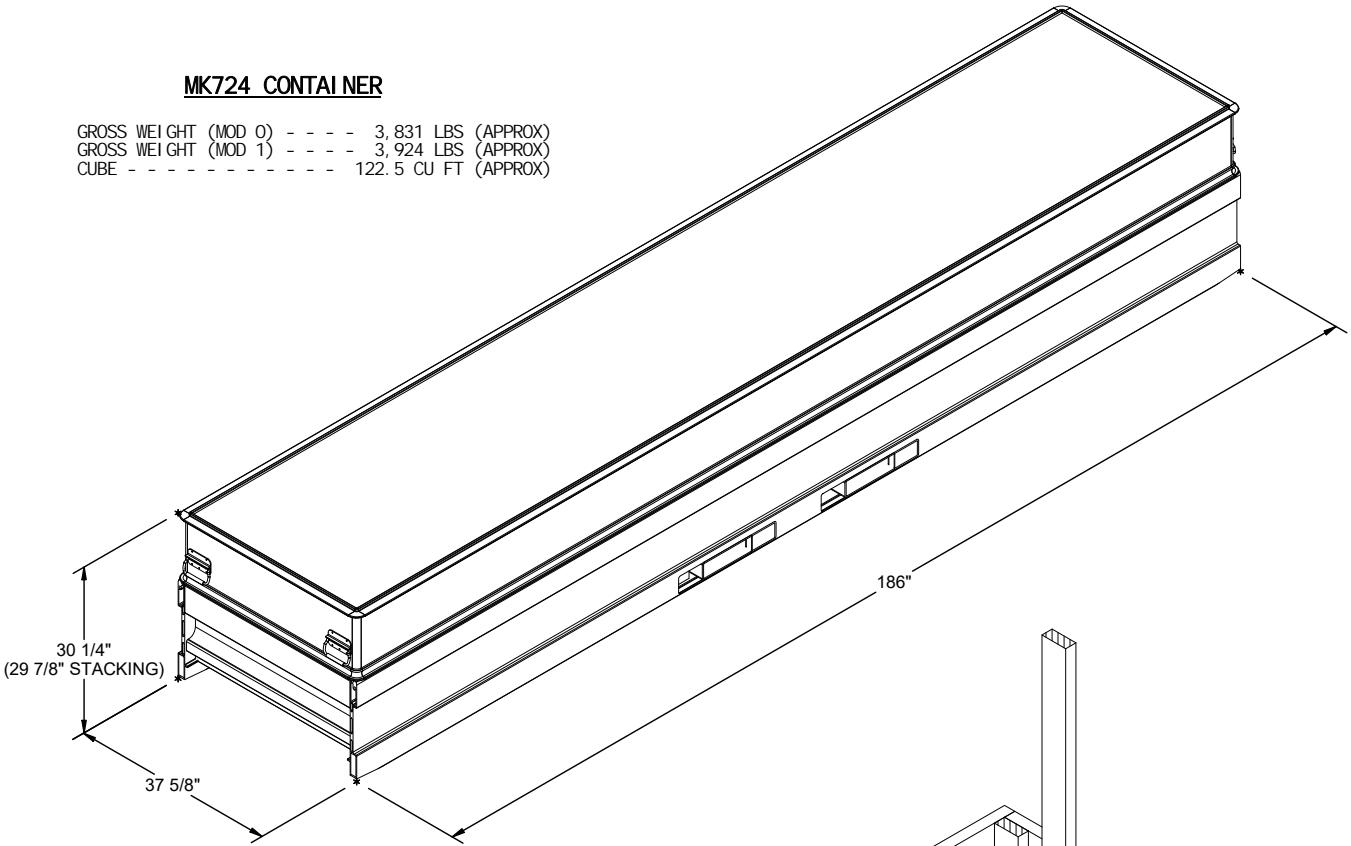
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	320	214
4" X 4"	9	12
NAI LS	NO. REQD	POUNDS
6d (2")	176	1
10d (3")	208	3-1/4
PLYWOOD, 3/4" - - - -	45.4 SQ FT REQD - - - -	93.6 LBS
STEEL STRAPPING, 1-1/4" - -	56' REQD - - - -	8.0 LBS
SEAL FOR 1-1/4" STRAPPING - -	4 REQD - - - -	0.18 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
MK724 - - - - -	4 - - - - -	15,696 LBS
DUNNAGE - - - - -	- - - - -	558 LBS
CONTAINER - - - - -	- - - - -	6,050 LBS
<b>TOTAL WEIGHT - - - - -</b>		<b>22,304 LBS</b>

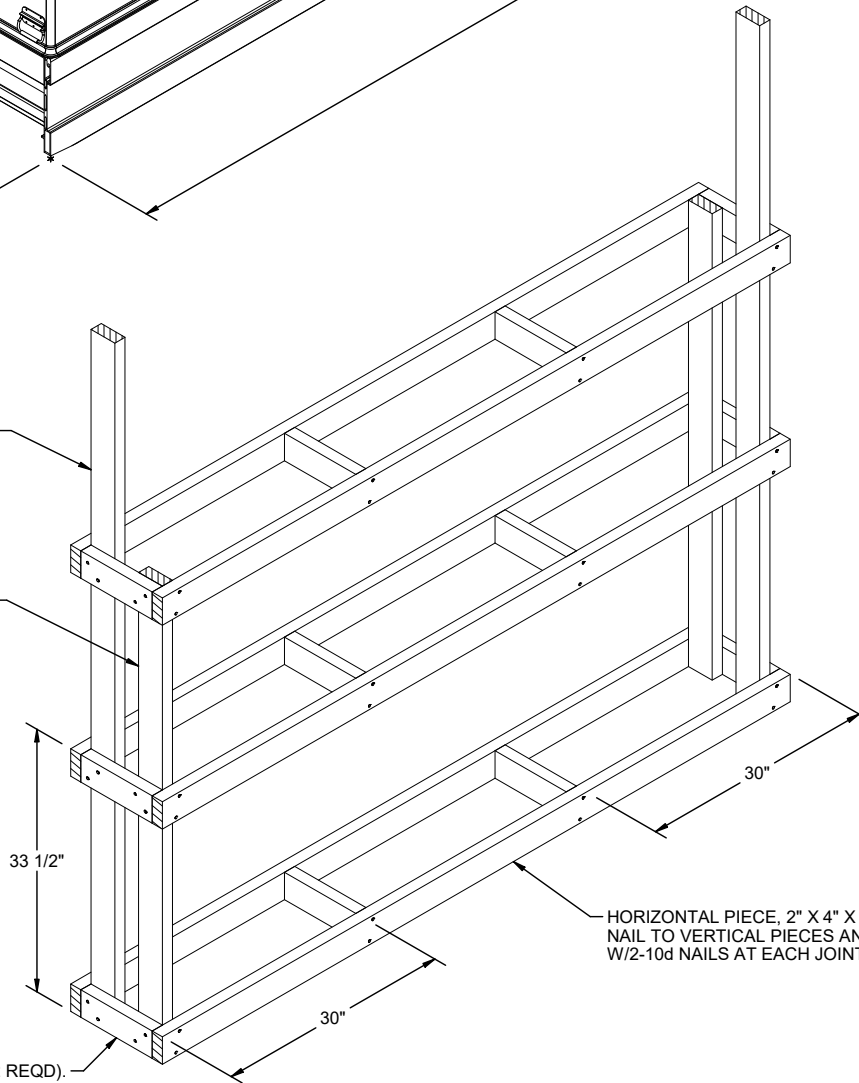
**MK724 CONTAINER**

GROSS WEIGHT (MOD 0) - - - - 3,831 LBS (APPROX)  
 GROSS WEIGHT (MOD 1) - - - - 3,924 LBS (APPROX)  
 CUBE - - - - - - - - - - 122.5 CU FT (APPROX)



VERTICAL PIECE, 2" X 4" BY  
 INSIDE CONTAINER HEIGHT  
 MINUS 1" (REF: 7'-3") (2 REQD).

SHORT VERTICAL PIECE,  
 2" X 4" X 59-1/2" (2 REQD).

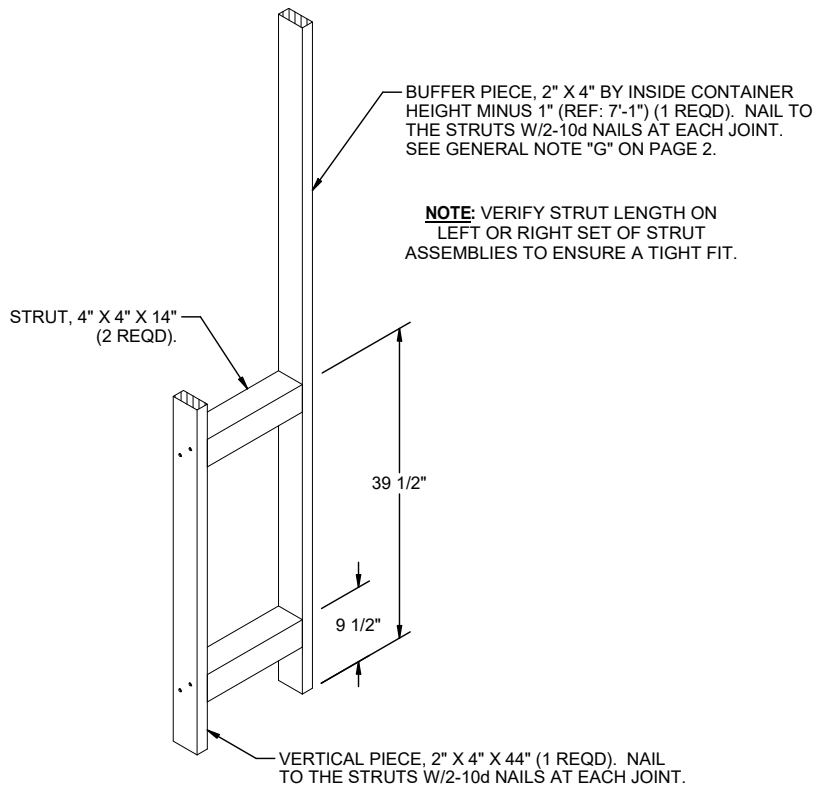


HORIZONTAL PIECE, 2" X 4" X 7'- 8-1/2" (6 REQD).  
 NAIL TO VERTICAL PIECES AND CENTER STRUTS  
 W/2-10d NAILS AT EACH JOINT.

STRUT, 2" X 4" X 10-1/2" (12 REQD).  
 NAIL END STRUTS TO VERTICAL  
 PIECES W/2-10d NAILS AT EACH JOINT.

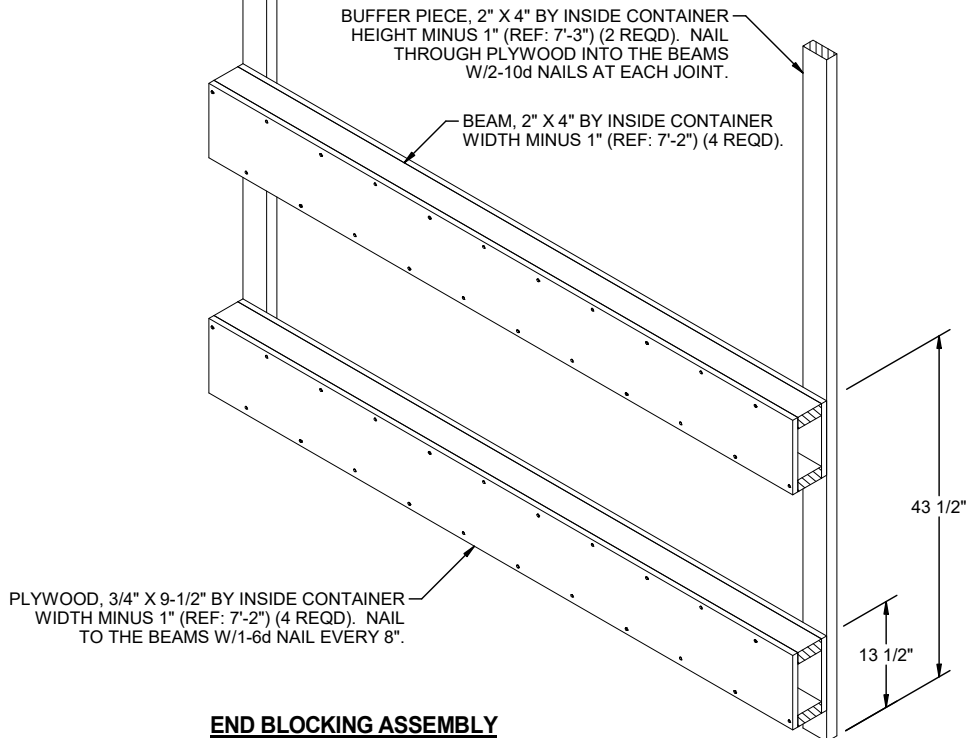
**CENTER BLOCKING ASSEMBLY**

**NOTE:** FOR A ONE-HIGH LOAD, ELIMINATE THE MIDDLE HORIZONTAL PIECES  
 AND STRUTS, AND REDUCE THE SHORT VERTICAL PIECE TO 29-1/2".



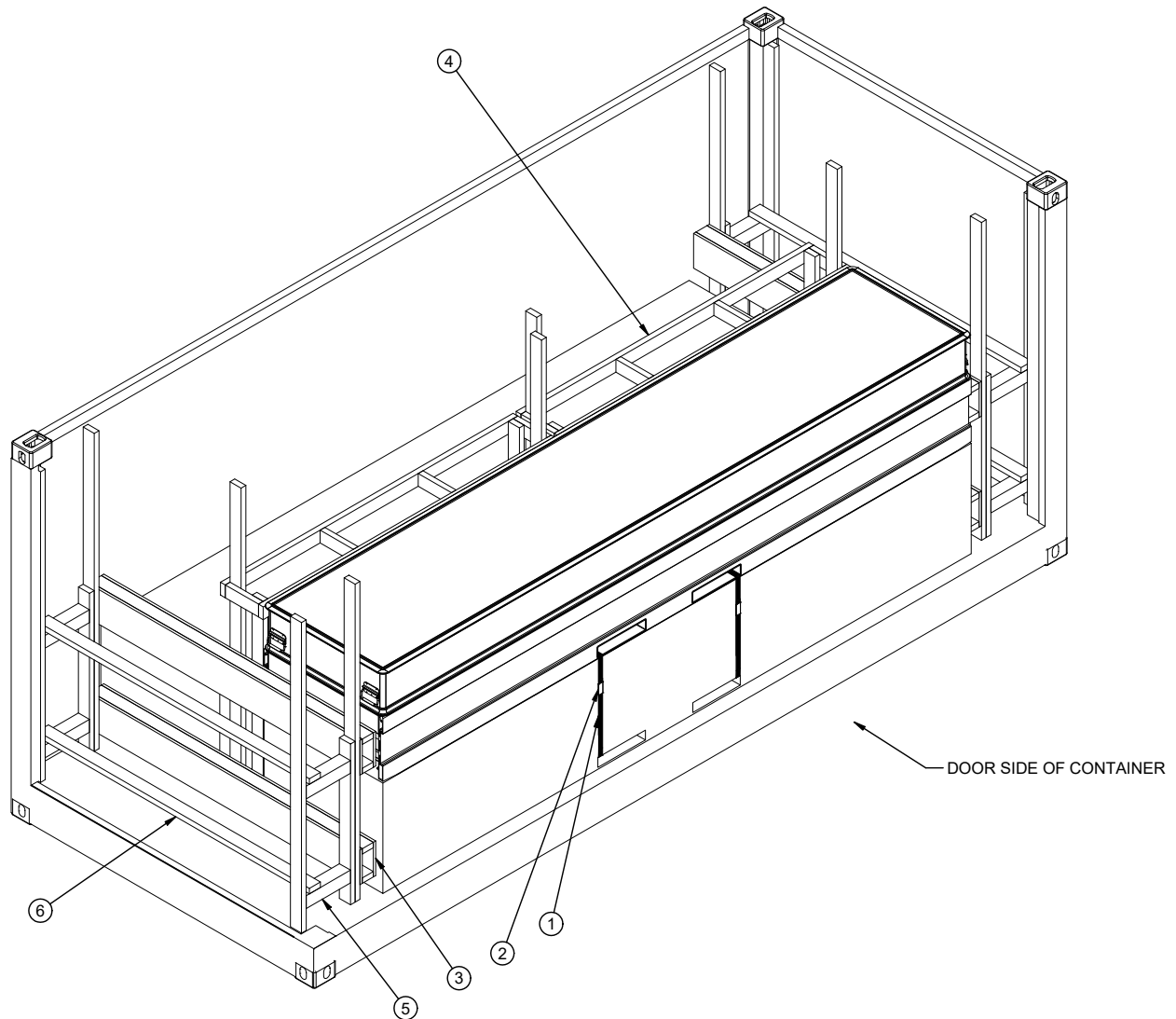
**STRUT ASSEMBLY**

**NOTE:** FOR A ONE-HIGH LOAD, ELIMINATE THE TOP STRUT AND REDUCE THE VERTICAL PIECE TO 15".



**END BLOCKING ASSEMBLY**

**NOTE:** FOR A ONE-HIGH LOAD, ELIMINATE THE TOP BOX BEAM ASSEMBLY.



**LESS-THAN-FULL-LOAD PROCEDURE**

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 3.



ONE SEAL WITH TWO PAIR OF NOTCHES.

**STRAP JOINT A**

METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

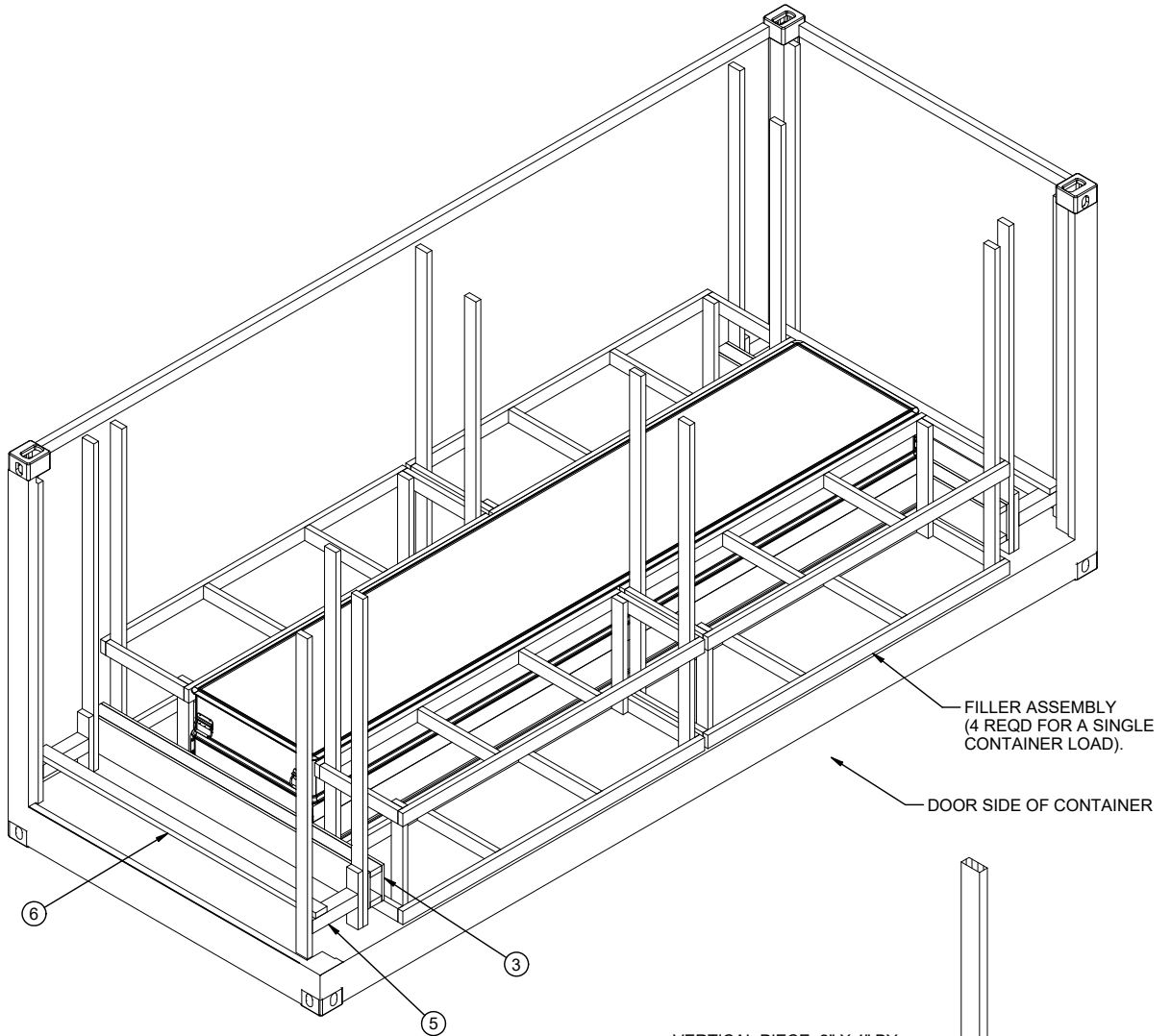


TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS EACH SEAL.

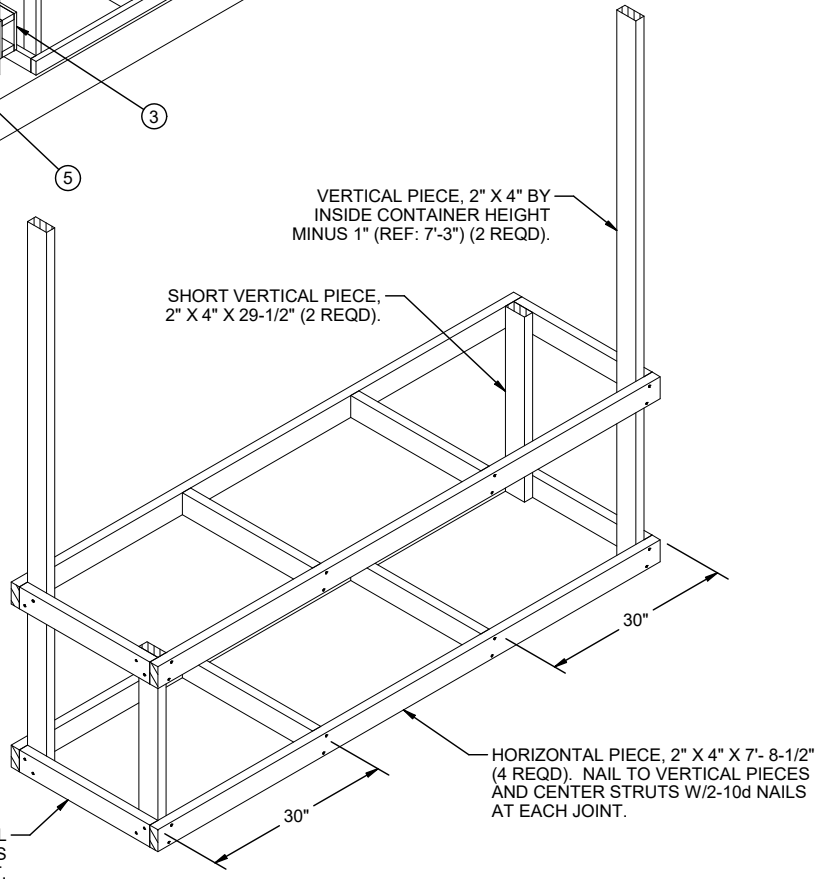
**STRAP JOINT B**

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

**END-OVER-END LAP JOINT DETAILS**



**LESS-THAN-FULL-LOAD PROCEDURE**  
 KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 3.



**FILLER ASSEMBLY**

