

PATRIOT

LOADING AND BRACING (CL & LCL) IN EUROPEAN BOXCAR OF THE COMPLETE ROUND IN MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CONTAINER)

INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
GENERAL NOTES, AND MATERIAL SPECIFICATIONS - - - - -	2
CANISTER DETAILS AND HANDLING GUIDANCE - - - - -	3
8-UNIT LOAD - - - - -	4,5
2-UNIT LOAD - - - - -	6
1-UNIT LOAD - - - - -	7
SPECIAL NAILING GUIDANCE - - - - -	8
DETAILS - - - - -	9,10

U.S. ARMY MATERIEL COMMAND DRAWING			
APPROVED, U.S. ARMY MISSILE COMMAND <div style="font-size: 2em; font-family: cursive;">Jerry R. Cobb</div>	DRAFTSMAN	TECHNICIAN	ENGINEER
	S. WILSON	R. ARNOLD	
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <div style="font-size: 2em; font-family: cursive;">William F Ernst</div>	VALIDATION ENGINEERING DIVISION	TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE
	<i>JMK</i>	<i>W. French</i>	<i>W F Ernst</i>
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL	JULY 1993		
	CLASS	DIVISION	DRAWING
	19	48	8208
		DRAWING	FILE
		8208	GM5PA3

DO NOT SCALE

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 OUTLOADING PROCEDURES SHOWN HEREIN ARE APPLICABLE TO EUROPEAN RAILCARS WHICH CONFORM TO THE RIV REQUIREMENT.
- C. THE LOADS AS SHOWN ARE BASED ON RIV RAILCARS (TBIS 869/870 AND TBIS 871) 41'-9" (12,744MM) LONG BY 8'-9" (22,670MM) WIDE.
- D. THE OUTLOADING PROCEDURES SPECIFIED HEREIN ARE APPLICABLE TO THE PATRIOT COMPLETE ROUND WHEN PACKED IN MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CONTAINER), W/O OVERPACK.
- E. THE MISSILE ROUND IS AN EXPLOSIVE ITEM. THESE PROCEDURES CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE CANISTERS WHEN THEY ARE LOADED WITH AN ITEM OTHER THAN THE SPECIFIED COMPLETE ROUND OR WHEN THEY ARE EMPTY.
- F. FOR DETAIL OF THE MISSILE CANISTER, SEE DRAWING NUMBER 111450000, AND THE "CANISTER DETAIL" ON PAGE 3.

CANISTER DIMENSIONS:
 234" (5,944MM) LONG BY 42-3/8" (1,076MM) WIDE BY 38-3/4" (984MM) HIGH.

GROSS WEIGHT:
 3,750 LBS (1,703 KG) (APPROX).

- G. LISTS OF RAILCARS THAT MAY BE USED FOR SHIPMENTS OF THE DEPICTED LOADS OF CANISTERS W/O OVERPACK ARE SHOWN IN A CHART ON THIS PAGE. OTHER TYPES OF CLOSED BOXCARS CAN BE USED PROVIDING THESE OTHER CARS ARE PROPERLY EQUIPPED FOR THE APPLICATION OF THE PRESCRIBED LOAD-SECURING BLOCKING IN ACCORDANCE WITH THE SPECIFIED PROCEDURES. MINOR DEVIATIONS FROM THE LOCATIONS SHOWN IN THE LOAD VIEWS FOR INSTALLING BLOCKING COMPONENTS IN A CAR ARE PERMITTED. HOWEVER, THE INTENT OF THE SPECIFIED BLOCKING PROCEDURES MUST BE ACHIEVED.
- H. PORTIONS OF THE BOXCARS DEPICTED WITHIN THIS PROCEDURAL DRAWING, SUCH AS SIDEWALLS, ENDWALLS, AND ROOFS, AND PORTIONS OF THE BLOCKING AND BRACING COMPONENTS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. THE NUMBER OF UNITS MAY BE ADJUSTED TO FIT THE RAILCAR CONCERNED, OR THE QUANTITY TO BE SHIPPED; HOWEVER, THE APPROVED METHODS CONTAINED HEREIN, FOR FULL OR PARTIAL CARLOAD, MUST BE FOLLOWED FOR BLOCKING, BRACING, AND STAYING OF THIS ITEM.

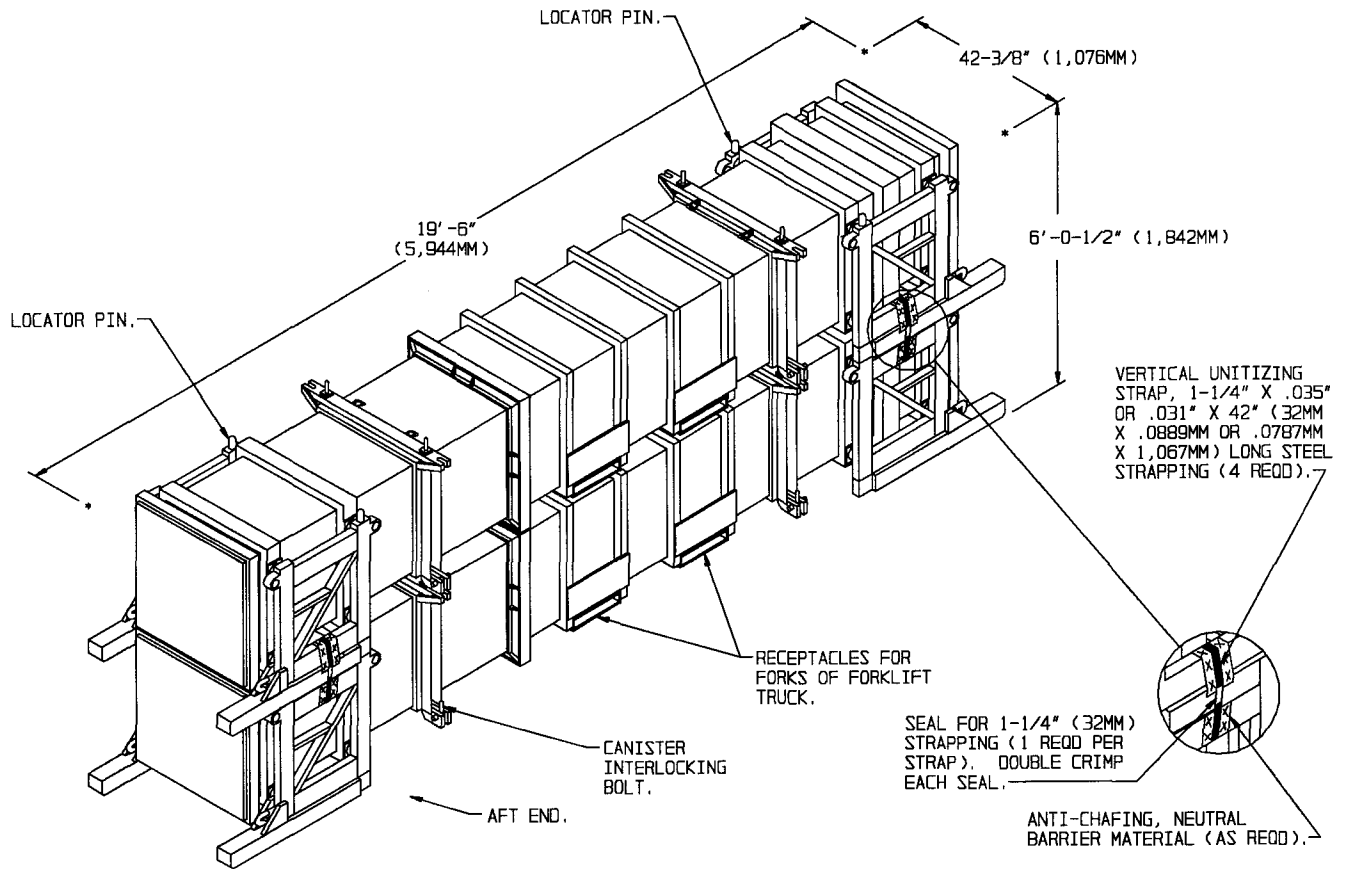
- K. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH THE DESIGNATED ITEMS, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN.
- L. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, ONLY ONE SEAL WITH TWO PAIR OF NOTCHES, IS REQUIRED TO SEAL THE JOINT. HOWEVER, IF A NOTCH TYPE CRIMPING TOOL IS NOT AVAILABLE AND A "CRUSH" TYPE CRIMPING TOOL IS USED, A MINIMUM OF TWO PAIR OF CRIMPS PER SEAL, MUST BE USED TO SEAL THE JOINT.
- M. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OR ENDWALL OF THE BOXCAR, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR OR ENDWALL BOARDS. 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.
- N. NAILS USED FOR FLOOR LINE BLOCKING WILL HAVE A MINIMUM DIAMETER OF 5MM. NAIL SIZES WILL BE SELECTED TO PROVIDE A MINIMUM OF 40MM PENETRATION INTO THE CAR FLOOR. HOWEVER, THE LENGTH OF THE NAIL WILL BE SUCH THAT THE NAIL DOES NOT COMPLETELY PENETRATE THE CAR FLOOR. SEE THE "NAIL CHART" ON PAGE 8. NAILS WHICH ARE OF OTHER SIZES, OR WHICH HAVE A NOMENCLATURE DIFFERENT THAN THAT USED HEREIN, MAY ALSO BE USED PROVIDED THEY MEET THE MINIMUM REQUIREMENTS STIPULATED WITHIN THIS DOCUMENT.
- O. NAILS USED FOR FABRICATING DUNNAGE ASSEMBLIES SHALL BE OF THE MAXIMUM PRACTICAL LENGTH WHICH WILL PREVENT THE NAIL POINT FROM COMPLETELY PENETRATING THE DUNNAGE ASSEMBLY. THE NAIL POINT IS TO BE CONCEALED WITHIN THE DUNNAGE ASSEMBLY TO PREVENT POSSIBLE DAMAGE TO THE LADING.
- P. THE PROCEDURES DEPICTED WITHIN THIS DRAWING ARE BASED ON THE USE OF DIMENSIONAL SIZED LUMBER. IN MOST CASES THE METRIC EQUIVALENT IS GIVEN IN PARENTHESIS FOLLOWING THE DIMENSION. HOWEVER, WHERE THE METRIC EQUIVALENT IS NOT SHOWN, IT MAY BE COMPUTED BY USING 1" EQUALS 25.4MM. METRIC EQUIVALENTS FOR WEIGHT ARE BASED ON 1 POUND EQUALS 0.454 KG. METRIC EQUIVALENTS FOR TORQUE ARE BASED ON 1 FOOT-POUND EQUALS 0.7376 NEWTON-METRIC.
- Q. STEEL STRAPPING DEPICTED IN THIS DRAWING HAS BEEN SPECIFIED AS 1-1/4" (32MM) X .035" (.889MM). HOWEVER, .031" (.787MM) THICK STRAP MAY BE USED IN LIEU OF .035" (.889MM) THICK STRAP.

(GENERAL NOTES CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- WIRE, CARBON STEEL - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, .0800" DIA, GRADE 1006 OR BETTER.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.
- STAPLE - - - - - : FED SPEC FF-N-105; 1-17/32" CROWN WIDTH X 3/4" LEG LENGTH FOR 1-1/4" STRAPPING, TYPE III, STYLE 3.
- ANTI-CHAFING MATERIAL - - - - - : MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

LIST OF RAILCARS THAT MAY BE USED FOR SHIPMENTS			
TYPE OF RAILCAR	LENGTH OF RAILCAR	NO. OF ITEMS	MAXIMUM TOTAL WEIGHT (APPROX) OF ITEMS
TBIS -869/870	41'-9" (12,744MM)	8	30,000 LBS (13,620 KG)
TBIS - - 871	41'-9" (12,744MM)	8	30,000 LBS (13,620 KG)



TYPICAL STACK DETAIL

(UNITIZATION AND HANDLING PROCEDURAL GUIDANCE CONTINUED)

UNITIZATION AND HANDLING PROCEDURAL GUIDANCE

1. CANISTER STACKING FOR OUTLOADING PURPOSES.
 - A. THE SKIDS OF THE UPPER CANISTER MUST BE FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.
 - B. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.
 - C. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL SIZE HAND TOOL WRENCH (REF 60 FOOT-POUNDS) (44 NEWTON-METERS).
2. INSTALLATION OF 1-1/4" (32MM) UNITIZING STRAP.
 - A. EACH OF THE FOUR UNITIZING STRAPS SHOULD BE POSITIONED AROUND THE SHOCK ISOLATION FRAMES AS SHOWN. PLACE STRAPPING SO THAT IT LAYS FLAT AND STRAIGHT.
 - B. PLACE ANTI-CHAFING NEUTRAL BARRIER MATERIAL UNDER THE STRAPPING WHEREVER THE STRAPPING CONTACTS SHARP EDGES AND SECURE TO PREVENT DISLODGE MENT DURING AND AFTER STRAP APPLICATION.
 - C. STRAPPING WILL BE FIRMLY TENSIONED, AND EACH END-OVER-END LAP JOINT WILL BE SEALED WITH ONE DOUBLE CRIMPED SEAL AS SHOWN. DURING STRAP TENSIONING, CARE SHOULD BE EXERCISED TO ENSURE THAT THE CANISTERS ARE NOT DAMAGED. EXCESS STRAPPING (STRAP ENDS) SHOULD BE CUT OFF OR BROKEN OFF NEAR THE JOINT SEAL.

(CONTINUED AT RIGHT)

3. CANISTER OR CANISTER STACK HANDLING.

NOTES: (1) APPROVED MATERIALS HANDLING EQUIPMENT (MHE) IS SPECIFIED IN OTHER DOCUMENTS. MHE IS INTENDED TO MEAN EQUIPMENT SUCH AS FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS AND SPREADER BARS.

(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

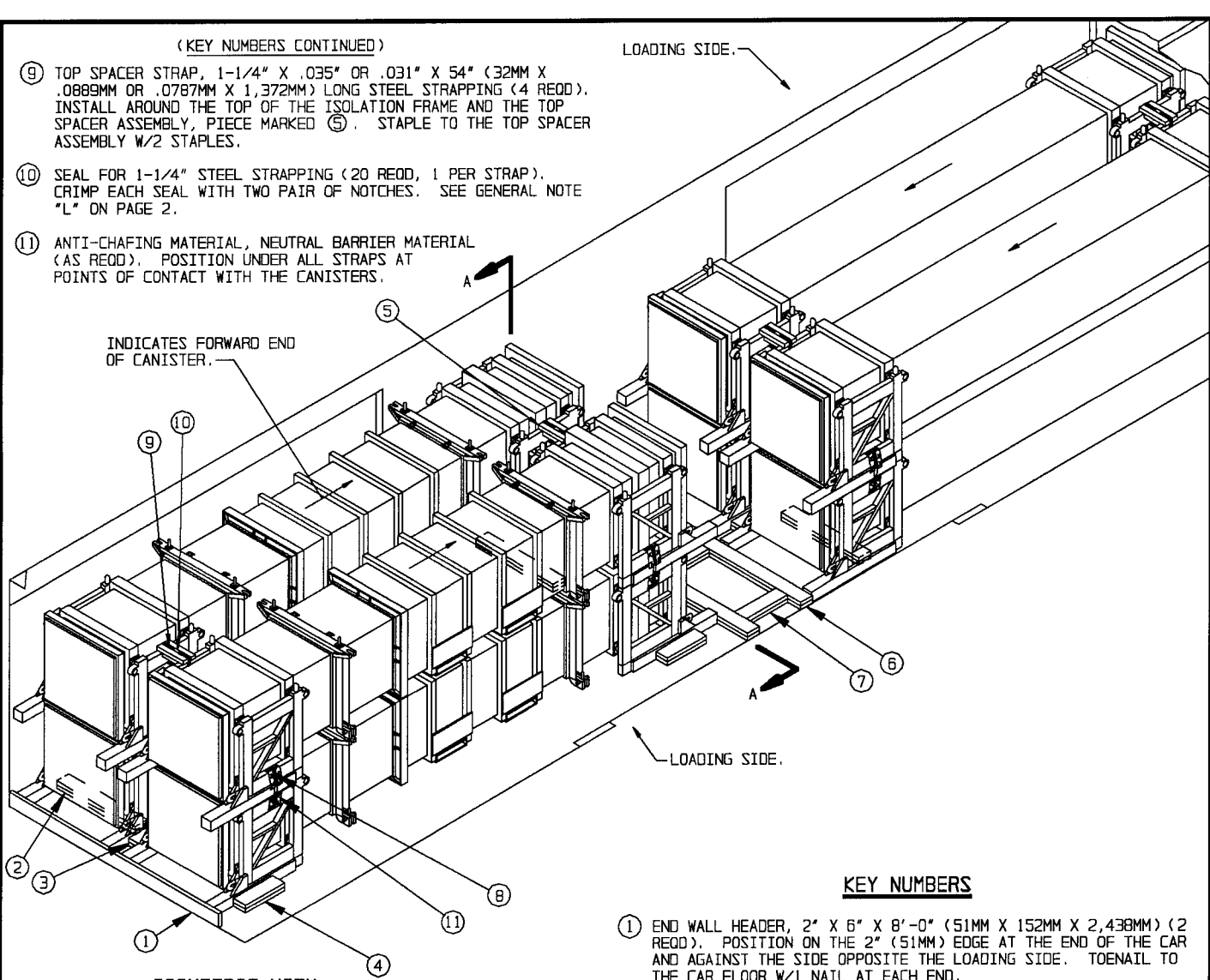
- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CANISTERS.
- B. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CANISTERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CANISTER, TO PREVENT DAMAGE TO THE CANISTER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING BOX CAR LOADING, A TWO-HIGH CANISTER STACK MAY BE HANDLED BY INSERTING THE FORKS OF A FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF THE UPPER CANISTER.
- C. SLINGING OF A CANISTER OR A CANISTER STACK WILL BE ACCOMPLISHED IN ACCORDANCE WITH APPROVED PROCEDURES.
- D. IF AVAILABLE MHE DOES NOT HAVE THE CAPACITY TO LIFT A STACK OF UNITIZED CANISTERS, THEN THE LOWER CANISTER MUST FIRST BE PLACED WITH THE SKIDS ON THE FORWARD END PARTIALLY INTO THE DOOR OPENING OF THE BOX CAR. THE SECOND CANISTER WILL THEN BE PLACED DIRECTLY ON TOP OF THE FIRST AND WILL BE UNITIZED ACCORDING TO THE INSTRUCTIONS CONTAINED IN 1 ABOVE. WHEN LIFTING A STACK OF CANISTERS FROM THE END TO PUSH IT INTO THE BOX CAR, A PUSHER ASSEMBLY MUST BE USED. SEE THE DETAILS ON PAGES 9 AND 10.
- E. DUE TO THE SIZE AND WEIGHT OF THE CANISTERS, A FORKLIFT TRUCK HAVING A MINIMUM CAPACITY OF 6,000 POUNDS AND A SIDE-SHIFT CAPABILITY SHOULD BE USED FOR HANDLING/LOADING THE CANISTERS INTO A BOX CAR.

(KEY NUMBERS CONTINUED)

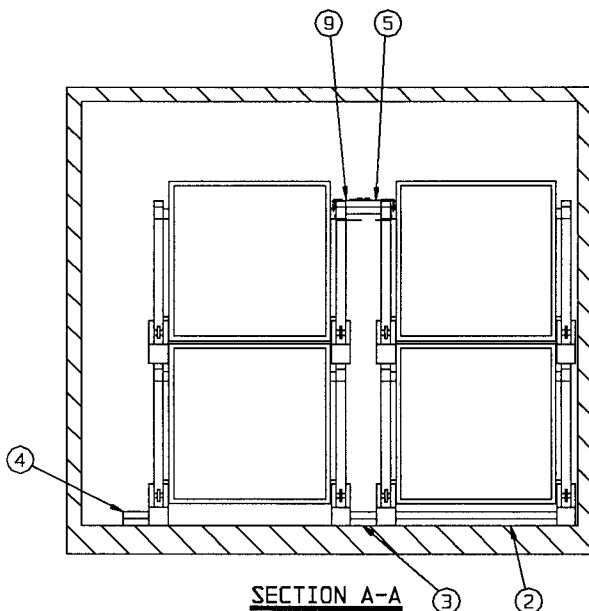
LOADING SIDE.

- ⑨ TOP SPACER STRAP, 1-1/4" X .035" OR .031" X 54" (32MM X .0889MM OR .0787MM X 1,372MM) LONG STEEL STRAPPING (4 REOD). INSTALL AROUND THE TOP OF THE ISOLATION FRAME AND THE TOP SPACER ASSEMBLY, PIECE MARKED ⑤. STAPLE TO THE TOP SPACER ASSEMBLY W/2 STAPLES.
- ⑩ SEAL FOR 1-1/4" STEEL STRAPPING (20 REOD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "L" ON PAGE 2.
- ⑪ ANTI-CHAFING MATERIAL, NEUTRAL BARRIER MATERIAL (AS REOD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CANISTERS.

INDICATES FORWARD END OF CANISTER.



ISOMETRIC VIEW

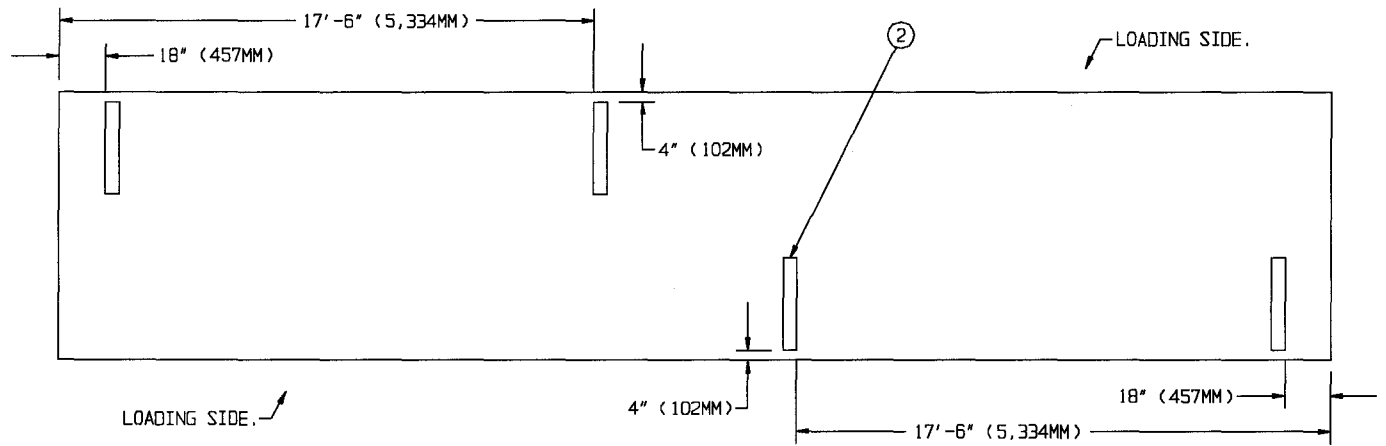


SECTION A-A

KEY NUMBERS

- ① END WALL HEADER, 2" X 6" X 8'-0" (51MM X 152MM X 2,438MM) (2 REOD). POSITION ON THE 2" (51MM) EDGE AT THE END OF THE CAR AND AGAINST THE SIDE OPPOSITE THE LOADING SIDE. TOENAIL TO THE CAR FLOOR W/1 NAIL AT EACH END.
- ② SIDE BLOCKING, 2" X 6" X 36" (51MM X 152MM X 914MM) REF (DOUBLED) (4 REOD). PRE-POSITION AS SHOWN IN THE "PRE-POSITIONED DUNNAGE PLAN VIEW" ON PAGE 5. POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ SIDE BLOCKING/SPACER PIECE, 2" X 6" X 18" (51MM X 152MM X 457MM) DOUBLED (4 REOD). POSITION TO CENTER ON THE CANISTER SKID. POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.
- ④ SIDE BLOCKING, 2" X 6" X 18" (51MM X 152MM X 457MM) DOUBLED (4 REOD). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.
- ⑤ TOP SPACER ASSEMBLY (4 REOD). SEE THE DETAIL ON PAGE 10. PLACE ON TOP OF THE ISOLATION FRAMES OF LATERALLY ADJACENT CANISTERS AND SECURE WITH PIECE MARKED ⑨.
- ⑥ HEADER, 2" X 6" X 8'-8-1/2" (51MM X 152MM X 2,654MM) (DOUBLED) (2 REOD). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/13 NAILS.
- ⑦ BACK-UP CLEAT, 2" X 6" (51MM X 152MM) BY CUT TO FIT (REF 19") (483MM) DOUBLED (4 REOD). POSITION ONE EACH AT 4-1/2" (114MM) AND 41" (1,041MM) ON EACH SIDE OF THE CENTER OF THE CAR. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/6 NAILS.
- ⑧ VERTICAL UNITIZING STRAP, 1-1/4" X .035" OR .031" X 42" (32MM X .0889MM OR .0787MM X 1,057MM) LONG STEEL STRAPPING (16 REOD). INSTALL STRAPS AROUND THE SHOCK ISOLATION FRAMES OF AN UPPER AND LOWER CANISTER AS SHOWN. SEE THE "UNITIZATION AND HANDLING PROCEDURES" ON PAGE 3.

(KEY NUMBERS CONTINUED ABOVE)



PRE-POSITION DUNNAGE PLAN VIEW

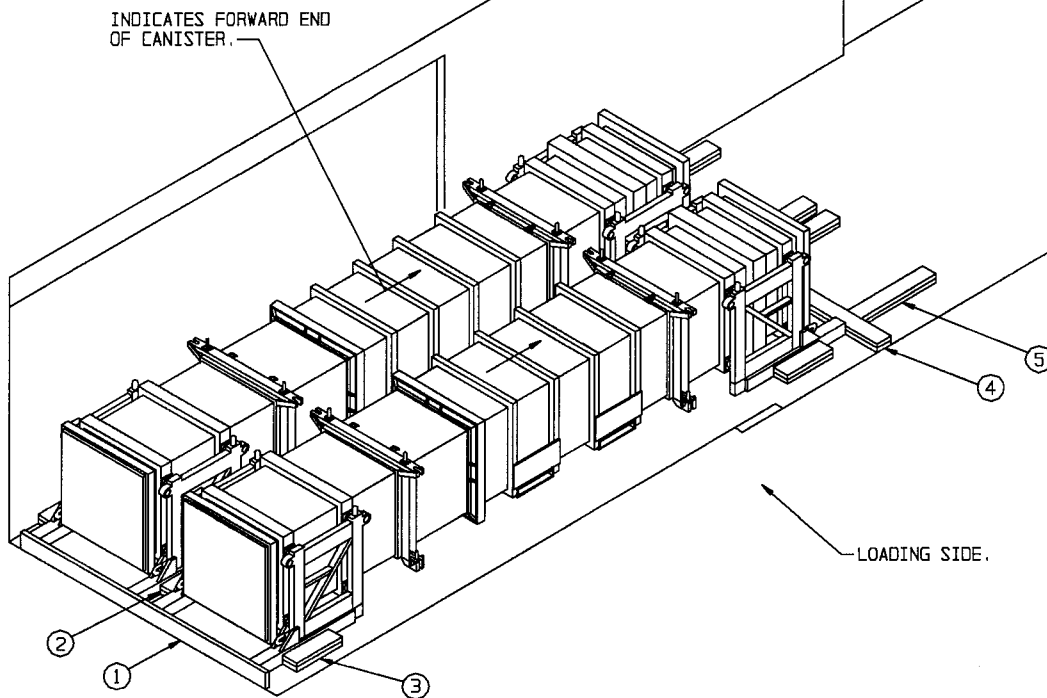
SPECIAL NOTES:

1. AN 8-UNIT LOAD IS SHOWN IN A 41'-9" (12,744MM) LONG BY 8'-9" (2,670MM) WIDE EUROPEAN BOXCAR EQUIPPED WITH 14'-3" (4,343MM) SLIDING WALL OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER DOOR OPENINGS MAY BE USED.
2. THE FOLLOWING GUIDANCE IS APPLICABLE IF LOADING THRU THE SIDE DOOR OF A CAR. TO FACILITATE LOADING, A CANISTER STACK WILL BE LOADED AGAINST THE CAR SIDEWALL OPPOSITE THE LOADING SIDE AND POSITIONED ON THE PRE-POSITIONED SIDE BLOCKING, PIECE MARKED ②. SEE THE "PRE-POSITIONED DUNNAGE PLAN VIEW" ABOVE FOR LOCATION GUIDANCE. PRIOR TO INSTALLING THE SIDE BLOCKING/SPACER, PIECE MARKED ③, LOAD THE NEXT CANISTER STACK. TO ASSIST IN SLIDING THE STACK PAST THE FIRST STACK, IT IS RECOMMENDED A SHEET OF ONE-HALF INCH OR THICKER PLYWOOD OR SIMILAR MATERIAL BE HELD AGAINST THE CENTER-OF-CAR SIDE OF THE FIRST CANISTER STACK TO PROVIDE A BUFFER FOR THE END OF THE CANISTER STACK TO SLIDE AGAINST. AFTER THE STACK IS IN THE CAR AND PRIOR TO FINAL POSITIONING, INSTALL PIECES MARKED ③. SEE SPECIAL NOTE 3.
3. WHEN A CANISTER STACK IS TO BE HANDLED FROM THE END OF THE STACK, A PUSH ASSEMBLY MUST BE USED TO PREVENT DAMAGE TO THE CANISTER BODY. SEE THE DETAILS ON PAGES 9 AND 10.
4. WHEN AN UPPER CANISTER IS SECURED TO A LOWER CANISTER WITH FOUR TIE BOLTS WHICH ARE PROPERLY INSTALLED AND ARE TORQUED TO 60 FOOT-POUNDS (44 NEWTON-METERS), THE VERTICAL UNITIZING STRAPS AND THE ANTI-CHAFING, PIECES MARKED ⑧ AND ①, WILL NOT BE REQUIRED.
5. MISSILE CANISTERS TO BE SHIPPED BY BOXCAR MUST HAVE THE ISOLATION FRAMES INSTALLED SO THE ENDS OF THE SKIDS PROTRUDE BEYOND THE BODY OF THE CANISTER. LOADING OF CANISTERS HAVING THE ISOLATION FRAMES INSTALLED SO THAT THE SKIDS EXTEND UNDER THE BODY OF THE CANISTER WOULD BE EXTREMELY DIFFICULT, IF NOT IMPOSSIBLE, AND IS NOT RECOMMENDED.
6. IF CANISTERS ARE TO BE LOADED BY SLINGING THRU THE TOP OPENING OF A CAR, THE PIECES MARKED ① AND ③ WILL BE CENTERED IN THE WIDTH OF THE CAR. PIECE MARKED ② WILL NOT BE REQUIRED, AND WILL BE REPLACED WITH AN ADDITIONAL 4 EACH PIECES MARKED ④. PIECE MARKED ⑤ MAY BE REDUCED TO 8'-0". THE BACK-UP CLEATS, PIECE MARKED ⑦, WILL BE ALIGNED WITH THE CANISTER SKIDS IN LIEU OF THE SPECIFIED LOCATIONS. ALL OTHER BLOCKING AND BRACING WILL BE AS SHOWN.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 6" (51MM X 152MM)	118' (35,966MM)	118
NAILS	NO. REQD	POUNDS
SIZE AS REQD	76	5
STEEL STRAPPING, 1-1/4" - - - -	74' REQD - - - -	11 LBS
SEAL FOR 1-1/4" STRAPPING - - -	20 REQD - - - -	1 LB
STAPLE, STRAP - - - - -	8 REQD - - - -	NIL
ANTI-CHAFING MATERIAL - - - - -	AS REQD - - - -	NIL

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER - - - - -	8 - - - - -	30,000 LBS (13,620 KG)
DUNNAGE - - - - -	- - - - -	253 LBS (115 KG)
TOTAL WEIGHT - - - - -		30,253 LBS (13,735 KG) (APPROX)



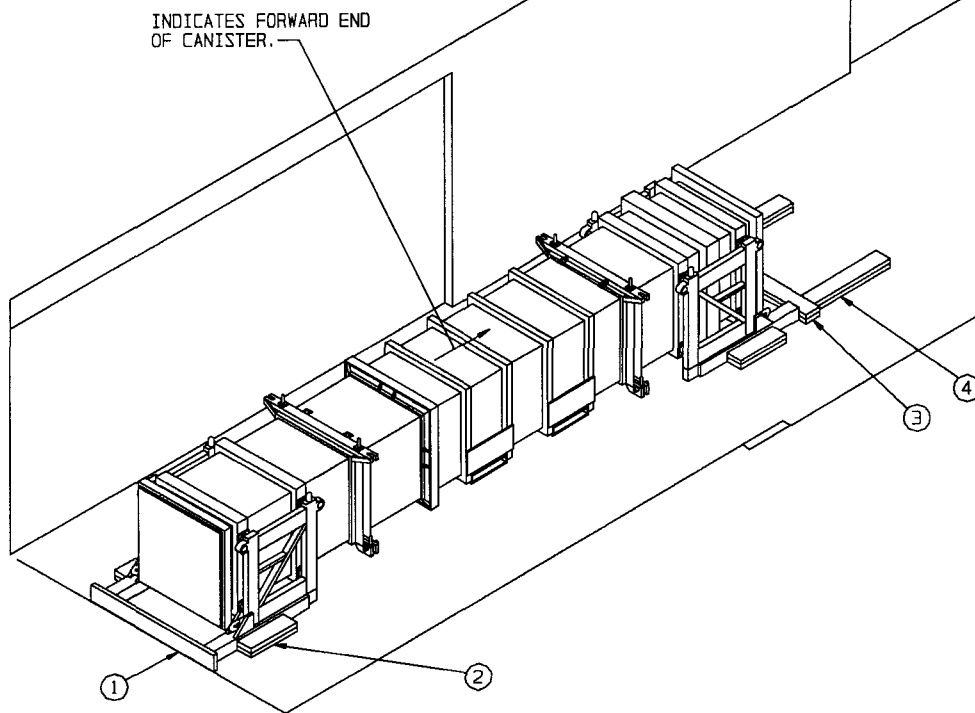
ISOMETRIC VIEW

SPECIAL NOTES:

1. A 2-UNIT LOAD IS SHOWN IN A 41'-9" (12,744MM) LONG BY 8'-9" (2,670MM) WIDE EUROPEAN BOX CAR EQUIPPED WITH 14'-3" (4,343MM) SLIDING WALL OPENINGS. BOX CARS OF OTHER DIMENSIONS AND BOX CARS HAVING WIDER DOOR OPENINGS MAY BE USED.
2. TO FACILITATE LOADING, POSITION THE FIRST CANISTER AGAINST THE CAR SIDEWALL ON THE SIDE OPPOSITE THE LOADING SIDE. LOAD THE NEXT CANISTER INTO THE CAR AND POSITION AGAINST THE PIECES MARKED ② WHICH ARE LOCATED ON THE CENTERLINE OF THE CAR. THEN RELOCATE THE FIRST CANISTER TO BE AGAINST THESE SAME PIECES.
3. WHEN A CANISTER IS TO BE HANDLED FROM THE END, A PUSH ASSEMBLY MUST BE USED TO PREVENT DAMAGE TO THE CANISTER BODY. SEE THE DETAILS ON PAGES 9 AND 10.

KEY NUMBERS

- ① END WALL HEADER, 2" X 6" X 8'-0" (51MM X 152MM X 2,438MM) (1 REQD). POSITION ON THE 2" (51MM) EDGE AT THE END OF THE CAR AND CENTERED IN THE WIDTH OF THE CAR. TONAIL TO THE CAR FLOOR W/1 NAIL AT EACH END.
- ② SIDE BLOCKING, 2" X 6" X 18" (51MM X 152MM X 457MM) DOUBLED (2 REQD). POSITION SO AS TO BE CENTERED ON THE WIDTH OF THE CAR WITH ONE AT 18" (457MM) AND ONE AT 17'-6" (5,334MM) FROM THE END OF THE CAR. POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ SIDE BLOCKING, 2" X 6" X 18" (51MM X 152MM X 457MM) DOUBLED (4 REQD). POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.
- ④ HEADER, 2" X 6" X 8'-0" (51MM X 152MM X 2,438MM) DOUBLED (1 REQD). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/13 NAILS.
- ⑤ BACK-UP CLEAT, 2" X 6" X 30" (51MM X 152MM X 762MM) DOUBLED (4 REQD). POSITION TO ALIGN WITH THE CANISTER SKIDS. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/10 NAILS.



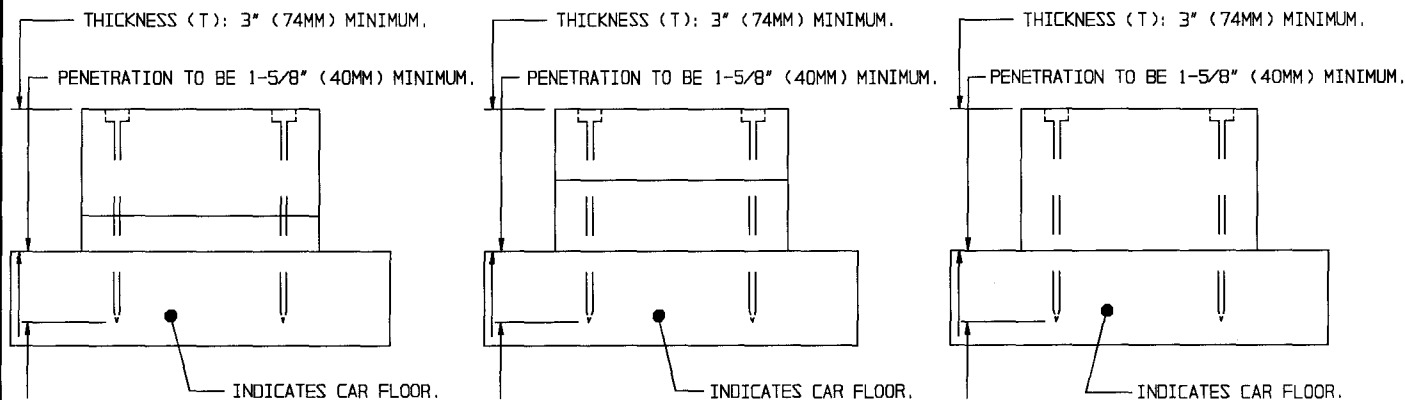
ISOMETRIC VIEW

SPECIAL NOTES:

1. A 1-UNIT LOAD IS SHOWN IN A 41'-9" (12,744MM) LONG BY 8'-9" (2,670MM) WIDE EUROPEAN BOX CAR EQUIPPED WITH 14'-3" (4,343MM) SLIDING WALL OPENINGS. BOX CARS OF OTHER DIMENSIONS AND BOX CARS HAVING WIDER DOOR OPENINGS MAY BE USED.
2. WHEN A CANISTER IS TO BE HANDLED FROM THE END, A PUSH ASSEMBLY MUST BE USED TO PREVENT DAMAGE TO THE CANISTER BODY. SEE THE DETAILS ON PAGES 9 AND 10.

KEY NUMBERS

- ① ENDWALL HEADER, 2" X 6" X 48" (51MM X 152MM X 1,219MM) (1 REQD). POSITION ON THE 2" (51MM) EDGE AT THE END OF THE CAR AND CENTERED ON THE WIDTH OF THE CAR. TOENAIL TO THE CAR FLOOR W/1 NAIL AT EACH END.
- ② SIDE BLOCKING, 2" X 6" X 18" (51MM X 152MM X 457MM) DOUBLED (4 REQD). POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ HEADER, 2" X 6" X 48" (51MM X 152MM X 1,219MM) DOUBLED (1 REQD). POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/6 NAILS.
- ④ BACK-UP CLEAT, 2" X 6" X 30" (51MM X 152MM X 762MM) DOUBLED (2 REQD). ALIGN WITH A CANISTER SKID. POSITION ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/10 NAILS.



MIXED THICKNESS OF LUMBER SHOWN

DETAIL A

DOUBLED 2" X 6" LUMBER SHOWN

DETAIL B

4" X 6" LUMBER SHOWN

DETAIL C

TYPICAL NAILING OF FLOOR LINE BLOCKING TO CAR FLOOR

(FOR ADDITIONAL GUIDANCE, SEE "NAIL CHART" BELOW)

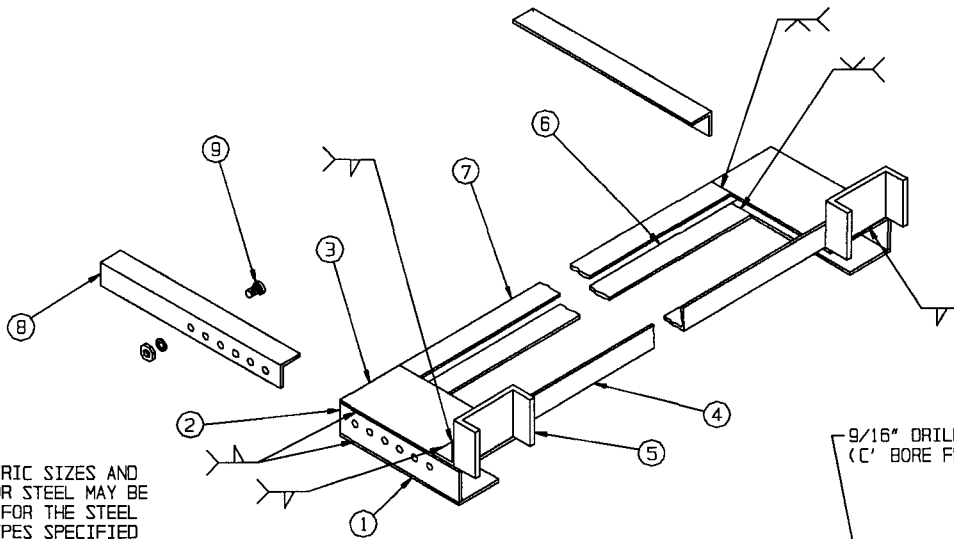
SPECIAL NOTES:

1. THE DETAILS ON THIS PAGE DEPICT POSSIBLE VARIATIONS THAT MAY RESULT FROM USING AVAILABLE LUMBER FOR FLOOR LINE BLOCKING. KEY NUMBERS THROUGHOUT THIS DOCUMENT SPECIFY DOUBLED PIECES OF LUMBER WHICH ARE 2" X 6" IN SIZE FOR HEADERS, BACK-UP CLEATS AND SIDE BLOCKING, AS TYPICALLY SHOWN IN DETAIL B ABOVE. IT IS PERMISSIBLE TO USE 4" X 6" LUMBER, OR MIXED THICKNESSES OF LUMBER, AS TYPICALLY SHOWN IN DETAILS A AND C, IN LIEU OF THE SPECIFIED DOUBLED 2" X 6" LUMBER. THE INTENT OF THE SPECIFIED BLOCKING PROCEDURES MUST BE OBTAINED.
2. THE NUMBER OF NAILS USED TO SECURE EACH PIECE OF BLOCKING WILL BE AS SPECIFIED IN THE KEY NUMBERS FOR EACH SPECIFIC PROCEDURE. THE LENGTH OF THE NAILS SELECTED WILL BE ADEQUATE TO NAIL THROUGH THE BLOCKING AND ACHIEVE THE PENETRATION OF THE CAR FLOOR AS SPECIFIED. WHEN NAILING FLOOR LINE BLOCKING TO THE CAR FLOOR, AS DEPICTED IN DETAILS A, B, AND C, THE FOLLOWING APPLIES:

NAILING GUIDANCE CHART		
THICKNESS (T) OF BLOCKING		SIZE OF NAIL
MINIMUM	MAXIMUM	
3" (74MM)	3" (74MM)	30d (4-1/2") (114MM)
3" (74MM)	3-3/8" (87MM)	40d (5") (127MM)
3-3/8" (87MM)	4" (100MM)	50d (5-1/2") (140MM)
4" (100MM)	4-3/8" (112MM)	60d (6") (152MM)

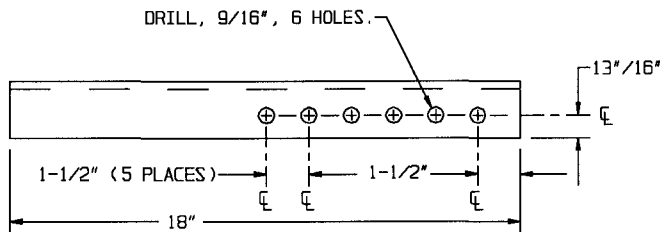
NAIL CHART		
SIZE	LENGTH	DIAMETER
10d	3" (76MM)	0.1483" (3.76MM)
12d	3-1/4" (83MM)	0.1483" (3.76MM)
16d	3-1/2" (89MM)	0.1620" (4.11MM)
20d	4" (102MM)	0.1920" (4.88MM)
30d*	4-1/2" (114MM)	0.2070" (5.26MM)
40d*	5" (127MM)	0.2253" (5.72MM)
50d*	5-1/2" (140MM)	0.2437" (6.19MM)
60d*	6" (152MM)	0.2626" (6.67MM)

*NAILS WHICH HAVE ADEQUATE DIAMETER FOR NAILING FLOOR LINE BLOCKING. THE LENGTH OF THE NAIL MUST MEET THE REQUIREMENTS OF GENERAL NOTE "N".

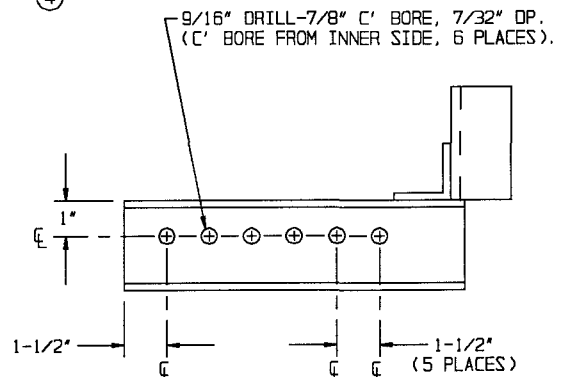


NOTE:
EUROPEAN METRIC SIZES AND STANDARDS FOR STEEL MAY BE SUBSTITUTED FOR THE STEEL SIZES AND TYPES SPECIFIED BELOW.

ISOMETRIC VIEW



PIECE (8)



SIDE VIEW

PUSH ASSEMBLY A

KEY NUMBERS

- ① BOTTOM, 4" X 12" X 3/16" STEEL (2 REQD). WELD TO PIECE ②.
- ② SIDE, 2-5/8" X 12" X 3/16" STEEL (2 REQD). DRILL AND COUNTERSINK EACH PIECE W/6-9/16" DIA HOLES AS SHOWN.
- ③ TOP, 6" X 12" X 3/16" STEEL (2 REQD). WELD TO PIECE ②.
- ④ BRACE, ANGLE, 2" X 2" X 3/16" X 43-1/2" LONG. POSITION 3/4" BACK FROM END OF PIECES MARKED ③ AND WELD TO PIECES MARKED ③.
- ⑤ POCKET, "C" CHANNEL, C-6" X 13.0 X 4" LONG (2 REQD). POSITION AS SHOWN AND WELD TO PIECES MARKED ③ AND ④.
- ⑥ BOTTOM SPACER, 2" X 35-1/2" X 3/16" (1 REQD). WELD TO PIECES MARKED ① AT EACH END.
- ⑦ TOP SPACER, 2" X 31-1/2" X 3/16" (1 REQD). WELD TO PIECES MARKED ③ AT EACH END.
- ⑧ EXTENSION, ANGLE, 2" X 2" X 3/16" X 18" LONG (2 REQD, IF USED). DRILL EACH PIECE W/6-9/16" DIA HOLES AS SHOWN. SEE NOTE 1 BELOW.
- ⑨ MACHINE SCREW, 1/2" X 1" LONG, FLAT HEAD, WITH LOCK WASHER AND NUT (4 REQD).

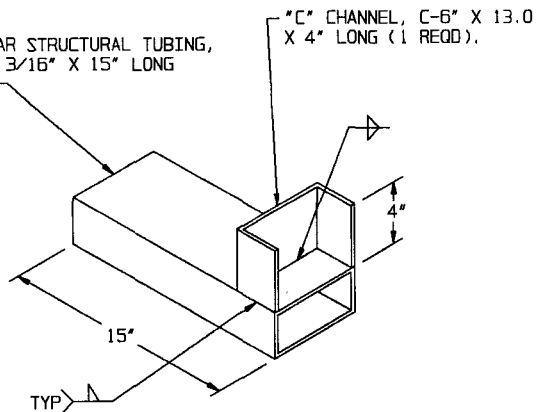
BILL OF MATERIAL

KEY NO.	NOMENCLATURE	QTY REQD
1	BOTTOM, STEEL, SHEET, HOT ROLLED, LOW CARBON, COMMERCIAL QUALITY, 3/16", PER ASTM A569, FSC 9515	2
2	SIDE, STEEL, HOT ROLLED, LOW CARBON, COMMERCIAL QUALITY, 3/16", PER ASTM A569, FSC 9515	2
3	TOP, STEEL, HOT ROLLED, LOW CARBON, COMMERCIAL QUALITY, 3/16", PER ASTM A569, FSC 9515	2
4	BRACE, STEEL, ANGLE, BAR SIZE, 2 INCH X 2 INCH X 3/16 INCH, PER ASTM A36, FSC 9520	1
5	POCKET, STEEL CHANNEL, STRUCTURAL, 6 INCH @ 13.0 LBS/FT PER ASTM A36, FSC 9520	2
6	TOP SPACER, STEEL, SHEET, HOT ROLLED, LOW CARBON, COMMERCIAL QUALITY, 3/16", PER ASTM A569, FSC 9515	1
7	LOWER SPACER, STEEL, SHEET, HOT ROLLED, LOW CARBON, COMMERCIAL QUALITY, 3/16" PER ASTM A569, FSC 9515	1
8	EXTENSION, STEEL, ANGLE, BAR SIZE, 2 INCH X 2 INCH X 3/16 INCH, PER ASTM A36, FSC 9520	1
9	MACHINE SCREW, 82° FLAT COUNTERSUNK HEAD, CROSS RECESSED, 1/2-13 UNC-2A X 1 INCH LONG, MS 35190-342, FSC 5305	4
	WASHER, LOCK, 1/2 INCH NOMINAL, MS 35338-48, FSC 5310	4
	NUT, PLAIN, HEXAGON, 1/2-13 UNC-2B, FSC 5310	4

NOTE 1: PUSH ASSEMBLY "A" HAS BEEN DESIGNED SO AS TO BE ADJUSTABLE DEPENDING ON THE LENGTH OF THE FORKLIFT TINES. PIECES MARKED ⑧ SHALL BE BOLTED TO PIECES MARKED ② WITH TWO MACHINE SCREWS ON EACH SIDE SO AS TO ALLOW APPROXIMATELY 24" OF THE FORKLIFT TINES TO EXTEND PAST THE END OF THE PUSH ASSEMBLY. PIECES MARKED ⑧ MAY BE OF A LONGER OR SHORTER DIMENSION THAN THAT SPECIFIED IN THE KEY NUMBERS ABOVE, PROVIDED THAT THE FORKLIFT TINES EXTEND BEYOND THE END APPROXIMATELY 24", AS SPECIFIED. SEE THE SPECIAL NOTES ON PAGE 10 FOR GUIDANCE.

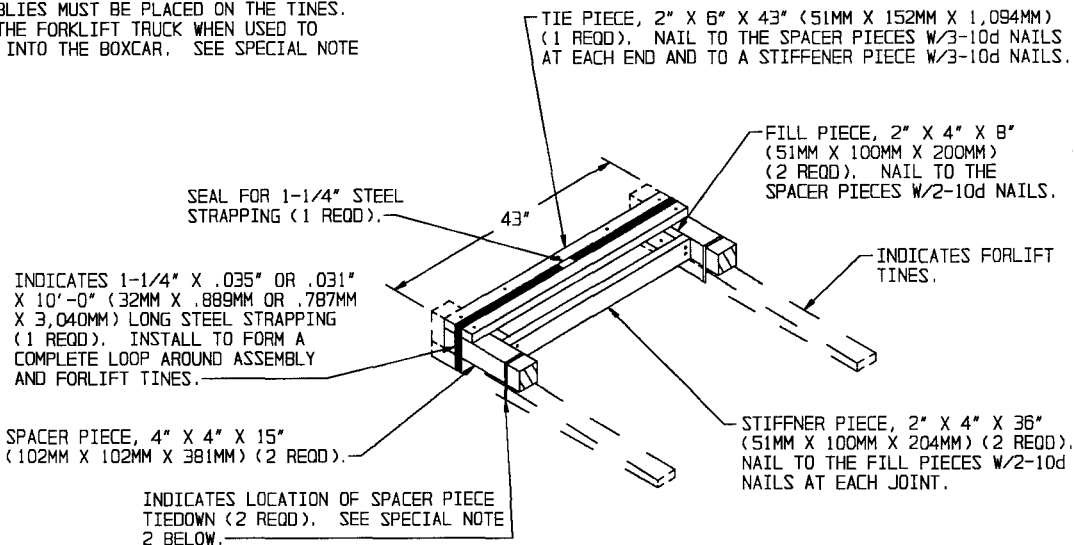
NOTE 2: EUROPEAN METRIC SIZES AND STANDARDS FOR STEEL MAY BE SUBSTITUTED FOR THE STEEL SIZES AND TYPES SPECIFIED AT LEFT.

RECTANGULAR STRUCTURAL TUBING,
6" X 3" X 3/16" X 15" LONG
(1 REQD).



PUSH ASSEMBLY B

TWO OF THESE ASSEMBLIES MUST BE PLACED ON THE TINES.
(ONE PER TINE) OF THE FORKLIFT TRUCK WHEN USED TO
PUSH THE CANISTERS INTO THE BOXCAR. SEE SPECIAL NOTE
1 BELOW.



PUSH ASSEMBLY C

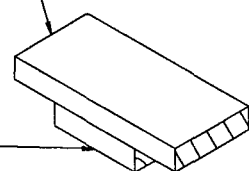
THIS ASSEMBLY IS SHOWN AS AN ALTERNATIVE TO PUSH
ASSEMBLIES "A" AND "B" AND MAY BE USED IF THE MATERIALS
FOR EITHER OF THE OTHER ASSEMBLIES ARE NOT AVAILABLE.
SEE SPECIAL NOTE 2 AT LEFT.

SPECIAL NOTES:

1. PUSH ASSEMBLIES "A" AND "B", AS DETAILED ON PAGE 9 AND ABOVE, ARE THE PREFERRED HANDLING AIDS TO BE USED IN THE LOADING OF MISSILE CANISTERS INTO A BOXCAR. PUSH ASSEMBLY "A" HAS BEEN DESIGNED TO BE COMPATIBLE WITH MOST FORKLIFT TRUCKS COMMONLY USED FOR CANISTER HANDLING. PUSH ASSEMBLY "B" IS DESIGNED FOR USE WITH A FORKLIFT TRUCK HAVING A TINE LENGTH OF 40" (1,016MM) AND A TINE WIDTH OF 4" (102MM) TO 5-1/2" (140MM).
2. PUSH ASSEMBLY "C" IS ALSO DESIGNED FOR USE WITH A FORKLIFT TRUCK HAVING 40" (1,016MM) TINES. THIS ASSEMBLY, HOWEVER, WILL NOT BE USED UNLESS MATERIAL TO CONSTRUCT ASSEMBLIES "A" AND "B" IS UNAVAILABLE OR THESE PREFERRED ASSEMBLIES CANNOT BE CONSTRUCTED IN TIME TO SUPPORT CANISTER OUTLOADING OPERATIONS. EXTREME CAUTION MUST BE EXERCISED WHEN USING PUSH ASSEMBLY "C" TO AVOID CAUSING DAMAGE TO THE CANISTERS. NOTE: PRIOR TO THE USE OF ASSEMBLY "C" FOR CANISTER LOADING OPERATIONS, THE ASSEMBLY MUST BE SECURED TO THE FORKLIFT TRUCK TINES IN THREE LOCATIONS AS DEPICTED IN THE DETAIL AT RIGHT. SECUREMENT MAY BE ACCOMPLISHED BY UTILIZING STEEL STRAPPING, WEB STRAPPING, PLASTIC STRAPPING, WIRE, ETC., PROVIDED THAT THE MOVEMENT OF THE ASSEMBLY DURING CANISTER LOADING IS MINIMAL.
3. DURING FABRICATION OF ALL PUSH ASSEMBLIES DETAILED HEREIN, STRICT DIMENSIONAL ADHERENCE MUST BE MAINTAINED FOR ALL REQUIRED ASSEMBLY PIECES TO ENSURE PROPER CLEARANCE BETWEEN CANISTER ENDS AND FORKLIFT TRUCK MASTS, ETC.

SUPPORT PIECE, 2" X 6" X 12"
(51MM X 152MM X 305MM) (1 REQD).

SPACER PIECE, 2" X 6" X 6"
(51MM X 152MM X 152MM) (1 REQD).
NAIL TO THE SUPPORT PIECE W/2
NAILS.



TOP SPACER ASSEMBLY