

PATRIOT

LOADING AND BRACING[⊙] (CL & LCL) ON EUROPEAN FLATCAR OF THE COMPLETE ROUND IN MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CONTAINER), W/O OVERPACK AND W/OVERPACK

INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	2
CANISTER AND OVERPACK UNIT DETAILS - - - - -	3
UNITIZATION AND HANDLING PROCEDURES (W/O OVERPACK) - - - - -	4
SPECIAL NAILING GUIDANCE - - - - -	5
8-UNIT LOAD (W/O OVERPACK) - - - - -	6,7
4-UNIT LOAD (W/O OVERPACK) - - - - -	8,9
1-UNIT LOAD (W/O OVERPACK) - - - - -	10
1-UNIT LOAD (W/OVERPACK) - - - - -	11
DETAILS - - - - -	12,14
ALTERNATIVE HOLD-DOWNS FOR CANISTERS W/O OVERPACK - - - - -	13

⊙ DELINEATED LOADING AND BRACING PROCEDURES COMPLY WITH THE REGOLAMENTO INTERNAZIONALE VEICOLI (RIV): REGULATIONS GOVERNING THE RECIPROCAL USE OF WAGONS IN INTERNATIONAL TRAFFIC.

NOTICE: DEPICTED LOADS ARE NOT OVERSIZE.

U. S. ARMY MATERIEL COMMAND DRAWING			
APPROVED, U. S. ARMY MISSILE COMMAND 	DRAFTSMAN	TECHNICIAN	ENGINEER
	B. LEONARD	R. ARNOLD	
APPROVED BY ORDER OF COMMANDING GENERAL, U. S. ARMY MATERIEL COMMAND 	VALIDATION ENGINEERING DIVISION	TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE
	AUGUST 1982		
REVISION NO. 1	AUGUST 1993	CLASS	DIVISION
		DRAWING	FILE
SEE THE REVISION LISTING ON PAGE 2	19	48	5520 GM5PA2

DO NOT SCALE

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 OUTLOADING PROCEDURES SHOWN HEREIN ARE APPLICABLE TO EUROPEAN RAILCARS THAT CONFORM TO THE RIV REQUIREMENTS.
- C. THE LOADS AS SHOWN ON PAGES 4, 6, 8 AND 9 ARE BASED ON RIV FLATCARS (KBS 442/443 AND KLS 442/443) 41'-0-1/8" (12,500 MM) LONG BY 9'-1-3/64" (2,770 MM) WIDE WITH 18" (458 MM) HIGH CAR SIDES.
- D. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO THE PATRIOT COMPLETE ROUND WHEN PACKED IN MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CONTAINER).
- E. THE MISSILE ROUND IS AN EXPLOSIVE ITEM. THESE PROCEDURES CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE CONTAINERS 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 11450000, AND THE "CANISTER DETAIL" ON PAGE 3.
- CANISTER DIMENSIONS - - - 234" (5,944 MM) LONG BY 42-3/8" (1,076 MM) WIDE BY 38-3/4" (984 MM) HIGH.
- GROSS WEIGHT - - - 3,750 LBS (1,703 KG) (APPROX).
- FOR DETAIL OF THE OVERPACK (FOR CANISTER), SEE DRAWING NUMBER D-SARAC-4500, AND THE "OVERPACK UNIT DETAIL" ON PAGE 3.
- OVERPACK DIMENSIONS - - - 248" (6,299 MM) LONG BY 47-1/4" (1,200 MM) WIDE BY 49-3/4" (1,264 MM) HIGH.
- GROSS WEIGHT - - - 5,268 LBS (2,371 KG) (APPROX).
- G. A LIST OF FLATCARS THAT MAY BE USED FOR SHIPMENTS OF THE DEPICTED LOADS IS SHOWN IN THE CHART ON PAGE 3. OTHER TYPES OF FLATCARS 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 ON A CAR ARE PERMITTED. HOWEVER, THE INTENT OF THE SPECIFIED BLOCKING PROCEDURES MUST BE ACHIEVED.

(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.
- STRAP - - - - - : WEBBING, UNIVERSAL TIEDOWN, NSN 5340-01-204-3009, PN9392419.
- 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.
- ANTI-CHAFING MATERIAL - - - - - : MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- ROPE - - - - - : FED SPEC RR-W-410; IMPROVED PLOW STEEL WIRE, PREFORMED, REGULAR LAY, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL).
- CLIP - - - - - : FED SPEC FF-C-450; TYPE I, CLASS 1, "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- THIMBLE - - - - - : FED SPEC FF-T-276; TYPE II.
- CHAIN - - - - - : NATIONAL ASSOCIATION OF CHAIN MANUFACTURER'S WELDED CHAIN SPECIFICATION ADOPTED NOVEMBER 1975.
- LOAD BINDER - - - - - : FED SPEC GGG-B-325.

(GENERAL NOTES CONTINUED)

- H. REMOVE ALL POSTS FROM SIDE OF CAR AND PLACE IN RACKS UNDER CAR, AS APPLICABLE.
- J. THE NUMBER OF UNITS MAY BE ADJUSTED TO FIT THE FLATCAR CONCERNED, OR THE QUANTITY TO BE SHIPPED; HOWEVER, THE APPROVED METHODS CONTAINED HEREIN MUST BE FOLLOWED FOR BLOCKING, BRACING, AND STAYING OF THIS ITEM.
- K. OTHER TYPES OF LADING ITEMS MAY BE LOADED ON A CAR WHICH IS PARTIALLY LOADED WITH THE DESIGNATED ITEM, 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. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE FLATCAR. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED, SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR 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.
- M. NAILS USED FOR FLOOR BLOCKING WILL HAVE A MINIMUM DIAMETER OF 5 MM. NAIL SIZES WILL BE SELECTED TO PROVIDE A MINIMUM OF 40 MM PENETRATION INTO THE CAR FLOOR. HOWEVER, THE LENGTH OF THE NAIL WILL BE SUCH THAT THE NAIL DOES NOT COMPLETELY PENETRATE THE FLOOR. SEE THE "NAIL CHART" AND THE "SPECIAL NAILING GUIDANCE" ON PAGE 5. 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 IN THIS DOCUMENT.
- N. NAILS USED FOR FABRICATING DUNNAGE ASSEMBLIES MUST BE OF A LENGTH TO PENETRATE TWO-THIRDS THE THICKNESS OF THE SECOND BOARD, WHILE PREVENTING 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.
- O. STEEL WIRE USED FOR HOLD-DOWN MUST HAVE A MINIMUM DIAMETER OF 3 MM. WHERE REQUIRED WITHIN THIS DOCUMENT, NO. 8 GAGE BLACK ANNEALED WIRE HAS BEEN SPECIFIED FOR WIRE HOLD-DOWNS. IF DESIRED, OR IF NO. 8 GAGE WIRE IS NOT AVAILABLE, WIRE OF A LARGER DIAMETER, OR 3/8" (OR LARGER) STEEL WIRE ROPE, MAY BE SUBSTITUTED.
- P. THE PROCEDURES DEPICTED WITHIN THIS DRAWING ARE BASED ON THE USE OF U.S. NOMINAL 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 ON THE BASIS OF ONE INCH EQUALS 25.4 MM. METRIC EQUIVALENTS FOR WEIGHTS ARE BASED ON 1 LB EQUALS 0.454 KG. METRIC EQUIVALENTS FOR TORQUE ARE BASED ON 1 FOOT-POUND EQUALS 1.356 NEWTON-METERS.
- Q. IF THE MISSILE CANISTERS HAVE THE SHOCK ISOLATION FRAMES AND SKIDS REVERSED, THE OVERALL LENGTH OF THE CANISTERS WILL BE REDUCED FROM 19'-6" (5,944 MM) TO 18'-3" (5,563 MM). REFER TO SPECIAL NOTE 5 ON PAGE 7 OR SPECIAL NOTE 7 ON PAGE 8 FOR GUIDANCE IN BLOCKING AND BRACING OF THE CANISTERS IN THIS CONFIGURATION.

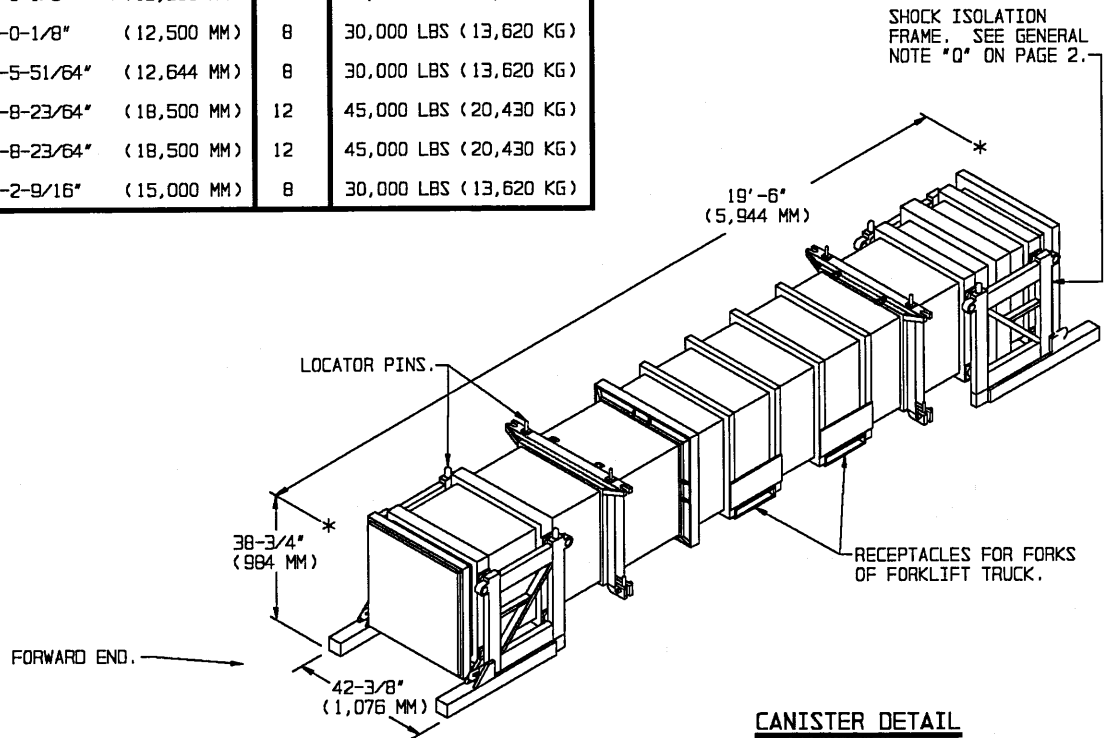
REVISION

REVISION NO. 1, DATED AUGUST 1993, CONSISTS OF:

1. ADDING 2-HIGH LOADING PROCEDURES FOR CANISTERS W/O OVERPACK.
2. ADDING "UNITIZATION AND HANDLING PROCEDURES" FOR STACKED CANISTERS W/O OVERPACK.
3. ADDING ALTERNATIVE HOLD-DOWN GUIDANCE.

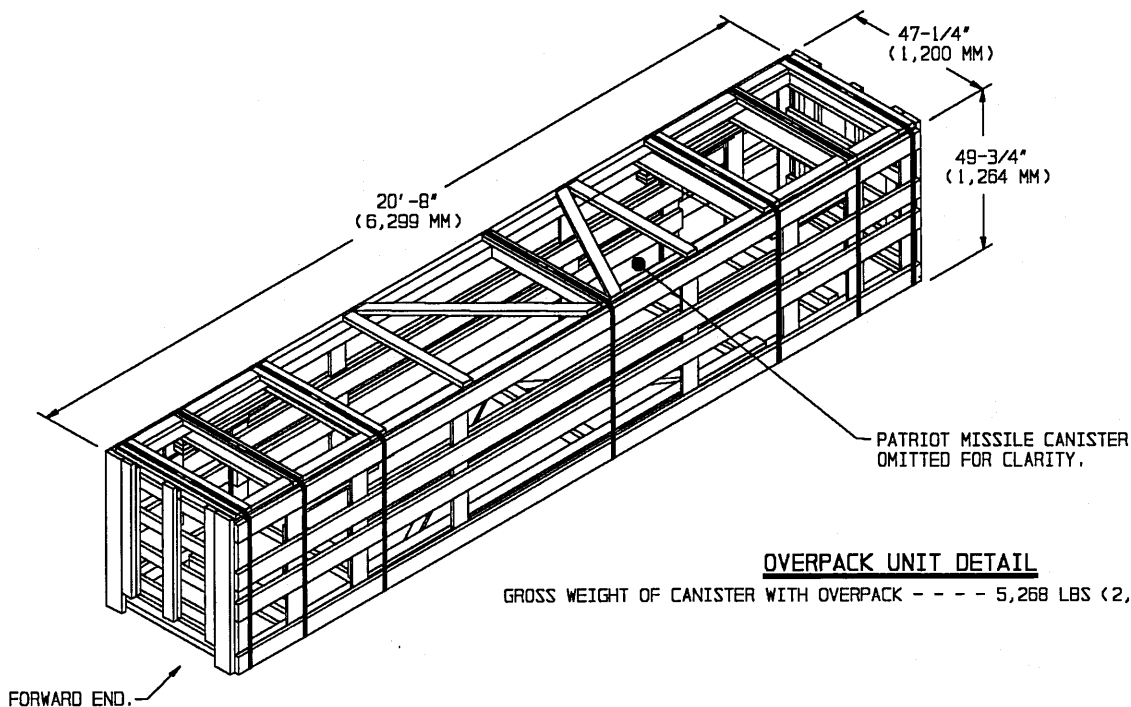
FLATCAR CHART

TYPE OF FLAT CAR	LENGTH OF FLATCAR	NO. OF ITEMS	MAXIMUM TOTAL WEIGHT (APPROX) OF ITEMS
KLMS - - 440	34'-11-11/16" (10,660 MM)	4	15,000 LBS (6,810 KG)
KLMS - - 505	30'-4-9/16" (9,260 MM)	4	15,000 LBS (6,810 KG)
KLM - - 506	34'-8-1/2" (10,580 MM)	4	15,000 LBS (6,810 KG)
KBS - 442/443	41'-0-1/8" (12,500 MM)	8	30,000 LBS (13,620 KG)
KLS - 442/443	41'-0-1/8" (12,500 MM)	8	30,000 LBS (13,620 KG)
RMMS - 663/664	41'-5-51/64" (12,644 MM)	8	30,000 LBS (13,620 KG)
RS - - 680/681	60'-8-23/64" (18,500 MM)	12	45,000 LBS (20,430 KG)
RS - - 683/684	60'-8-23/64" (18,500 MM)	12	45,000 LBS (20,430 KG)
SAS - - 710	49'-2-9/16" (15,000 MM)	8	30,000 LBS (13,620 KG)



CANISTER DETAIL

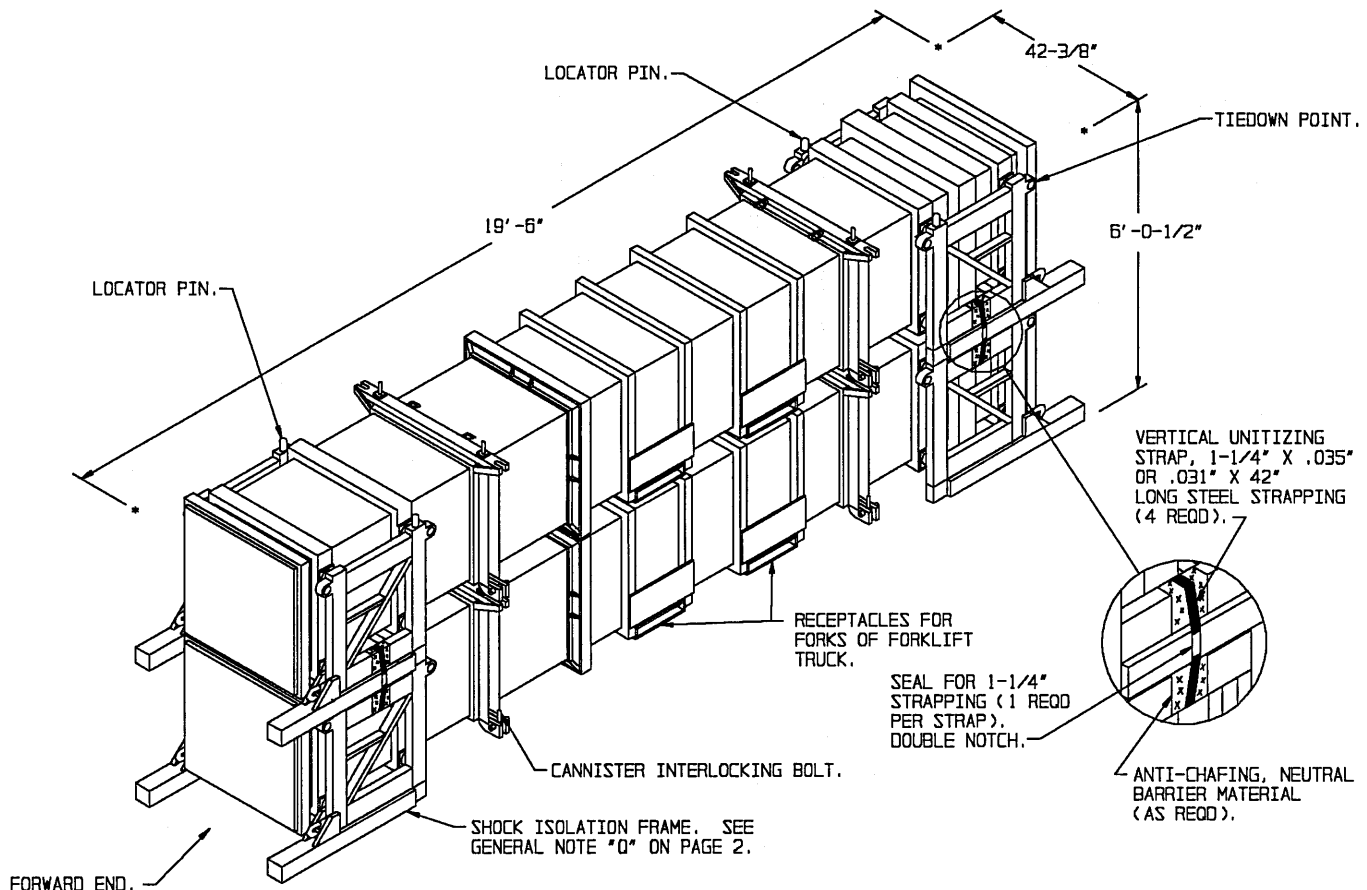
GROSS WEIGHT - - - - 3,750 LBS (1,703 KG) (APPROX)



OVERPACK UNIT DETAIL

GROSS WEIGHT OF CANISTER WITH OVERPACK - - - - 5,268 LBS (2,392 KG) (APPROX)

CANISTER AND OVERPACK UNIT DETAILS



TYPICAL STACK DETAIL

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" UNITIZING STRAP.

NOTE: UNITIZING STEEL STRAPPING IS NOT REQUIRED IF AN UPPER CANISTER IS SECURED TO A LOWER CANISTER WITH FOUR CANISTER INTERLOCKING BOLTS WHICH ARE PROPERLY INSTALLED AND ARE TORQUED TO 60 FOOT POUNDS (44 NEWTON-METERS).

- 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 DISLODGEEMENT DURING AND AFTER STRAP APPLICATION.
- C. STRAPPING WILL BE FIRMLY TENSIONED, AND EACH END-OVER-END LAP JOINT WILL BE SEALED WITH ONE DOUBLE NOTCHED 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. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 14.

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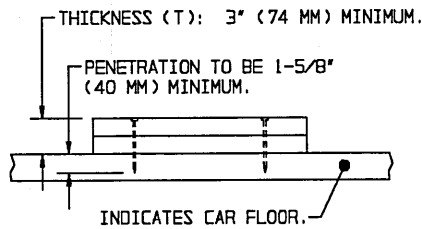
(UNITIZATION AND HANDLING PROCEDURAL GUIDANCE CONTINUED)

3. CANISTER OR CANISTER STACK HANDLING.

NOTES: (1) APPROVED MATERIAL 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.

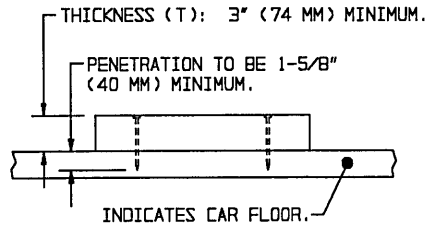
(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

- 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 CANISTER SHOULD BE HANDLED FROM A SIDE POSITION. 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 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.



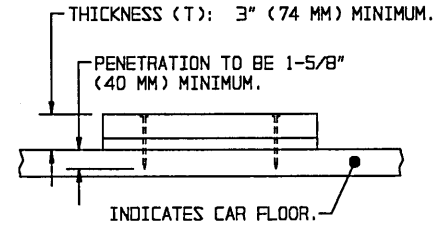
DOUBLED 2" X 6" LUMBER SHOWN

DETAIL A



4" X 6" LUMBER SHOWN

DETAIL B



MIXED THICKNESSES OF LUMBER SHOWN

DETAIL C

TYPICAL NAILING OF FLOOR LINE BLOCKING TO CAR FLOOR

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

SPECIAL NOTES:

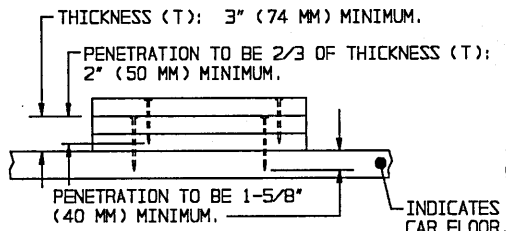
1. THE DETAILS ON THIS PAGE DEPICT POSSIBLE VARIATIONS THAT MAY RESULT FROM USING AVAILABLE LUMBER FOR FLOOR LINE BLOCKING. KEY NUMBERS THROUGHOUT THIS DOCUMENT SPECIFY DOUBLED OR TRIPLED PIECES OF LUMBER WHICH ARE 2" X 6" IN SIZE FOR HEADERS, BACK-UP CLEATS, AND SIDE-BLOCKING, AS TYPICALLY SHOWN IN "DETAIL A" ABOVE AND "DETAIL D" BELOW. IT IS PERMISSIBLE TO USE 4" X 6" LUMBER, OR MIXED THICKNESSES OF LUMBER, AS TYPICALLY SHOWN IN DETAILS "B" AND "C", IN LIEU OF THE SPECIFIED DOUBLED 2" X 6" LUMBER. WHERE TRIPLED 2" X 6" LUMBER IS SPECIFIED, AS TYPICALLY SHOWN IN "DETAIL D" BELOW, IT IS PERMISSIBLE TO USE MIXED THICKNESSES OF LUMBER AS TYPICALLY SHOWN IN DETAILS "E" AND "F", IN LIEU OF THE SPECIFIED TRIPLED 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 SPECIFIED PROCEDURE. THE LENGTH OF THE NAIL 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" (74 MM)	3" (74 MM)	30d (4-1/2") (114 MM)
3" (74 MM)	3-3/8" (87 MM)	40d (5") (127 MM)
3-3/8" (87 MM)	4" (100 MM)	50d (5-1/2") (140 MM)
4" (100 MM)	4-3/8" (112 MM)	60d (6") (152 MM)

NAIL CHART		
SIZE	LENGTH	DIAMETER
10d	3" (74 MM)	0.1483" (3.77 MM)
12d	3-1/4" (83 MM)	0.1483 (3.77 MM)
16d	3-1/2" (89 MM)	0.1620" (4.11 MM)
20d	4" (102 MM)	0.1920" (4.88 MM)
30d *	4-1/2" (114 MM)	0.2070" (5.26 MM)
40d *	5" (127 MM)	0.2253" (5.72 MM)
50d *	5-1/2" (140 MM)	0.2437" (6.19 MM)
60d *	6" (152 MM)	0.2625" (6.67 MM)

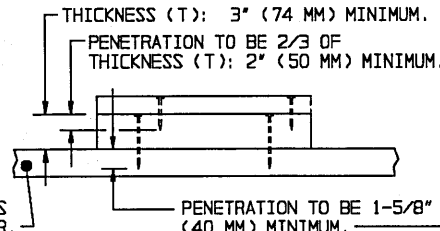
* NAILS WHICH HAVE ADEQUATE DIAMETER FOR NAILING FLOOR LINE BLOCKING. THE LENGTH OF THE NAIL MUST MEET THE REQUIREMENTS OF GENERAL NOTE "N" ON PAGE 2.

3. WHEN NAILING AN ADDITIONAL LAMINATION TO FLOOR LINE BLOCKING, THE LENGTH OF THE NAIL WILL BE ADEQUATE TO PENETRATE THE ADDITIONAL LAMINATION AND PROVIDE THE PENETRATION OF THE FLOOR LINE BLOCKING AS SPECIFIED IN DETAILS "D", "E", AND "F".



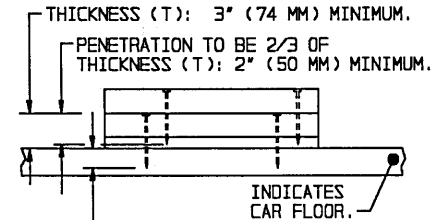
TRIPLED 2" X 6" LUMBER SHOWN

DETAIL D



2" X 6" AND 4" X 6" LUMBER SHOWN

DETAIL E

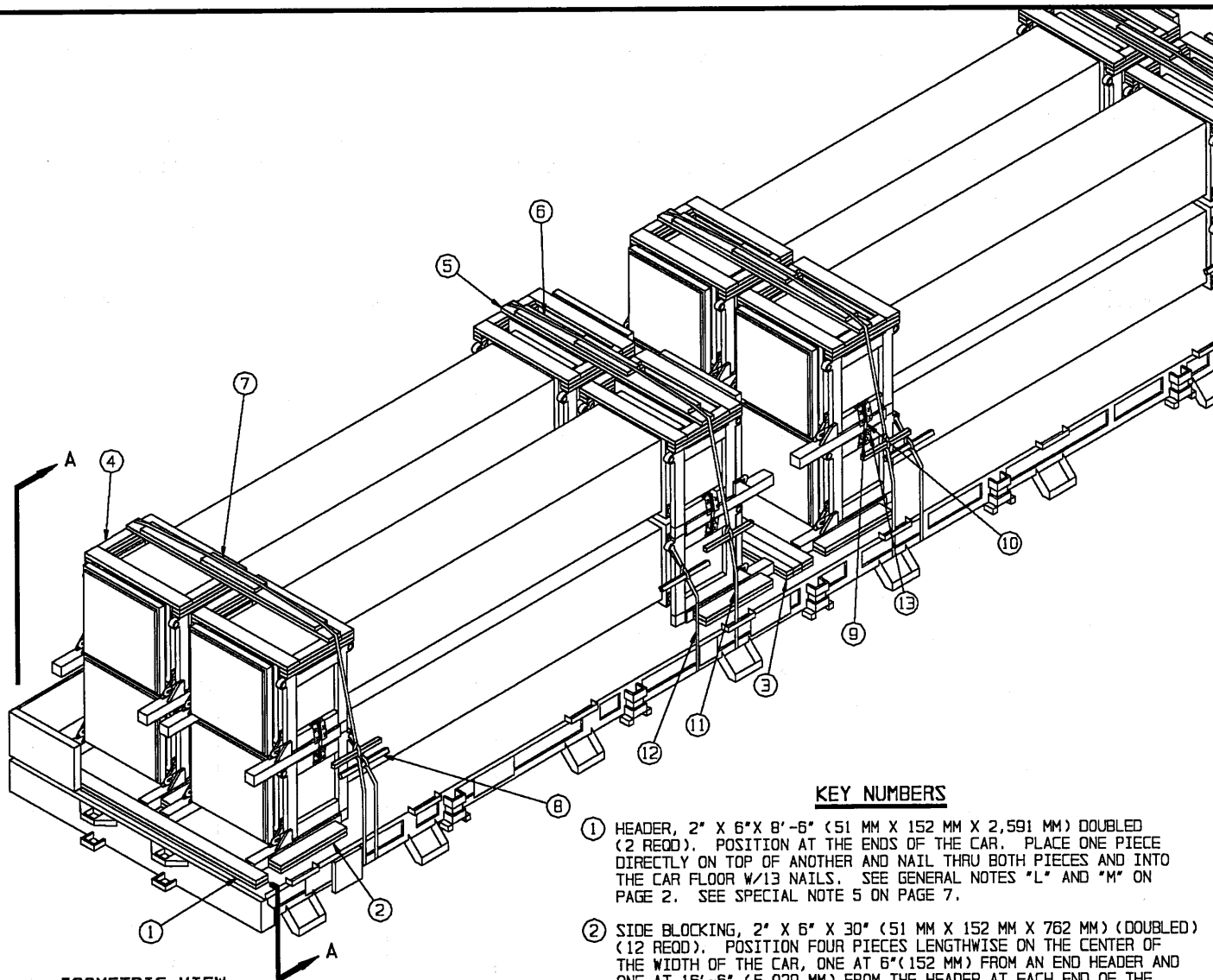


MIXED THICKNESSES OF LUMBER SHOWN

DETAIL F

TYPICAL NAILING OF ADDITIONAL LAMINATIONS TO FLOOR LINE BLOCKING

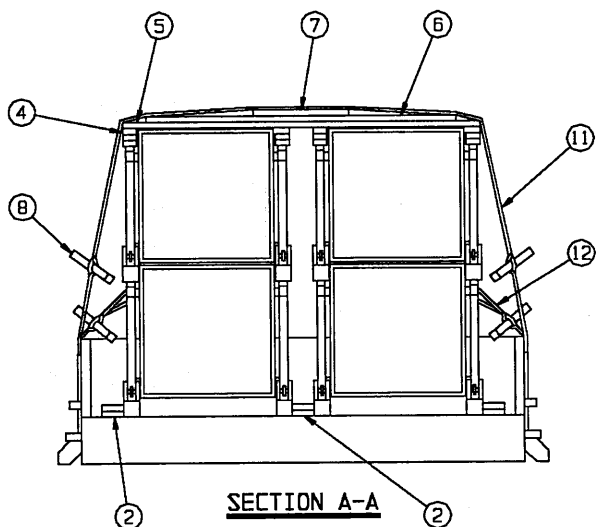
SPECIAL NAILING GUIDANCE



ISOMETRIC VIEW

KEY NUMBERS

- ① HEADER, 2" X 6" X 8'-6" (51 MM X 152 MM X 2,591 MM) DOUBLED (2 REOD). POSITION AT THE ENDS OF THE CAR. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/13 NAILS. SEE GENERAL NOTES "L" AND "M" ON PAGE 2. SEE SPECIAL NOTE 5 ON PAGE 7.
- ② SIDE BLOCKING, 2" X 6" X 30" (51 MM X 152 MM X 762 MM) (DOUBLED) (12 REOD). POSITION FOUR PIECES LENGTHWISE ON THE CENTER OF THE WIDTH OF THE CAR, ONE AT 6" (152 MM) FROM AN END HEADER AND ONE AT 16'-6" (5,029 MM) FROM THE HEADER AT EACH END OF THE CAR. THE REMAINING PIECES WILL BE INSTALLED AFTER THE CANISTERS ARE LOADED. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/5 NAILS.
- ③ SOLID FILL, 2" (51 MM) THICK BY 8'-6" (2,591 MM) LONG BY A WIDTH TO PROVIDE FOR A TIGHT FIT BETWEEN THE SKIDS OF LONGITUDINALLY ADJACENT CONTAINERS (DOUBLED) (AS REOD). RIP THE LAST PIECES AS NECESSARY. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/13 NAILS.
- ④ HOLD-DOWN ASSEMBLY (8 REOD). SEE THE DETAIL ON PAGE 12. POSITION AS SHOWN SO AS TO REST ON THE SHOCK ISOLATION FRAMES.
- ⑤ TIE PIECE, 2" X 6" X 7'-7-1/2" (51 MM X 152 MM X 2,324 MM) (4 REOD). LOCATE ONE NEAR THE CENTER OF TWO LATERALLY ADJACENT HOLD-DOWN ASSEMBLIES, PIECE MARKED ④, AS SHOWN. NAIL TO PIECE MARKED ④ W/3 NAILS AT EACH JOINT.
- ⑥ PURCHASE BOARD, 2" X 6" X 6'-6" (51 MM X 152 MM X 1,981 MM) (4 REOD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED ⑤ W/7 NAILS.
- ⑦ PURCHASE BOARD, 2" X 6" X 24" (51 MM X 152 MM X 610 MM) (4 REOD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED ⑥ W/4 NAILS.
- ⑧ WIRE TWISTER, 2" X 2" (51 MM X 51 MM) BY A LENGTH TO SUIT (16 REOD). SEE SPECIAL NOTE 2 ON PAGE 7.
- ⑨ VERTICAL UNITIZING STRAP, 1-1/4" X .035" OR .031" X 42" (32 MM X .889 MM OR .787 MM X 1,067 MM) LONG STEEL STRAPPING (16 REOD). INSTALL STRAPS AROUND THE SHOCK ISOLATION FRAMES OF AN UPPER AND LOWER CANISTER AS SHOWN. SEE SPECIAL NOTE 9 ON PAGE 7.



SECTION A-A

(CONTINUED ON PAGE 7)

(KEY NUMBERS CONTINUED FROM PAGE 6)

- ⑩ SEAL FOR 1-1/4" STEEL STRAPPING (16 REOD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL.
- ⑪ WIRE HOLD-DOWN, SIX STRANDS OF NO. 8 GAGE (3 MM MINIMUM DIAMETER) BLACK ANNEALED WIRE (4 REOD). PASS THRU A RAILCAR TIEDOWN FACILITY, OVER THE LADING AND THRU A TIEDOWN FACILITY ON THE OPPOSITE SIDE OF THE RAILCAR, AND BACK OVER THE LADING TO FORM A COMPLETE LOOP. TWIST TAUT WITH PIECE MARKED ⑧. SEE SPECIAL NOTES 3 AND 4 AT RIGHT.
- ⑫ WIRE HOLD-DOWN, SIX STRANDS OF NO. 8 GAGE (3 MM MINIMUM DIAMETER) BLACK ANNEALED WIRE (8 REOD). PASS THRU A RAILCAR TIEDOWN FACILITY, THRU A LADING TIEDOWN DEVICE, AND BACK TO THE RAILCAR TIEDOWN FACILITY TO FORM A COMPLETE LOOP. TWIST TAUT WITH PIECE MARKED ⑧.
- ⑬ ANTI-CHAFING MATERIAL, NEUTRAL BARRIER MATERIAL (AS REOD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CANISTERS.

SPECIAL NOTES:

1. AN 8-CANISTER LOAD IS SHOWN ON A 41'-0-1/8" (12,500 MM) LONG BY 9'-1-3/64" (2,770 MM) WIDE EUROPEAN FLATCAR. LARGER CARS MAY BE USED FOR SHIPMENT OF THE DEPICTED LOAD. CARS MUST HAVE WOODEN FLOORS. SEE GENERAL NOTE "G" ON PAGE 2.
2. ONE WIRE TWISTER, PIECE MARKED ⑧, WILL BE USED TO TIGHTEN EACH TWISTED WIRE HOLD-DOWN, OR EACH END AS SHOWN ON PAGE 6. THE TWISTER WILL BE SECURED TO PREVENT UNTWISTING AND LOOSENING OF THE WIRE HOLD-DOWN. THE TWISTER WILL BE POSITIONED SO THAT IT DOES NOT PROTRUDE BEYOND THE SIDE WALLS OF THE RAILCAR.
3. AT ANY LOCATION WHERE THE TWISTED WIRE HOLD-DOWN PASSES AROUND A SHARP CORNER, PROVIDE SUITABLE CUSHIONING OR BUFFERING MATERIAL TO PROTECT THE WIRE FROM BEING CUT ON THE SHARP CORNER.
4. WIRE HOLD-DOWNS, PIECES MARKED ① AND ②, WILL BE INSTALLED AS NEARLY AS POSSIBLE AT RIGHT ANGLES TO THE SIDE OF THE FLATCAR. WHERE THE POSITIONING OF THE RAILCAR TIEDOWN FACILITIES PREVENTS INSTALLATION OF THE HOLD-DOWNS AS STATED ABOVE, THE HOLD-DOWNS ON ONE END OF A CANISTER MAY BE ANGLED FORWARD OR REARWARD A SMALL AMOUNT TO REACH THE FLATCAR TIEDOWN FACILITIES. THE HOLD-DOWNS ON THE OTHER END OF THE SAME CANISTER WILL BE ANGLED IN THE OPPOSITE DIRECTION.
5. IF THE CANISTERS FURNISHED FOR LOADING HAVE THE ISOLATION FRAMES IN THE REVERSE POSITION (WITH THE ENDS OF THE SKIDS EXTENDING UNDER THE CANISTER), IT WILL BE NECESSARY TO INSTALL AN ADDITIONAL HEADER AT EACH END OF THE CAR PRIOR TO LOADING THE CANISTERS. THIS WILL PROVIDE CLEARANCE FOR THE CANISTER TO MOVE WITHIN THE ISOLATION FRAME WITHOUT CONTACTING THE CAR END WALL. ALSO, AT LEAST THE FIRST PIECE OF THE SOLID FILL, PIECE MARKED ③, WILL NEED TO BE PRE-POSITIONED. LOCATE AT 16'-5" (5,004 MM) (REF) FROM THE CENTER-OF-CAR SIDE OF THE ADDED PIECE MARKED ① AT THE END OF THE CAR. THE REMAINING PIECES OF THE SOLID FILL MAY BE INSTALLED EITHER BEFORE OR AFTER LOADING OF THE CANISTERS, AS DESIRED. NOTE THAT THE SIDE BLOCKING, PIECE MARKED ②, WILL BE LOCATED AT 6" (152 MM) AND 13'-5" (4,089 MM) IN LIEU OF THE SPECIFIED DIMENSIONS.
6. STEEL WIRE ROPE MAY BE INSTALLED IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. SEE THE "ALTERNATIVE HOLD-DOWNS FOR CANISTERS W/O OVERPACK" SPECIFICATIONS ON PAGE 13.
7. WEB STRAP ASSEMBLIES CAN BE USED FOR TIEDOWN OF THE MISSILES IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. SEE THE "ALTERNATIVE HOLD-DOWNS FOR CANISTERS W/O OVERPACK" SPECIFICATIONS ON PAGE 13.
8. CHAINS AND LOAD BINDERS CAN BE USED FOR TIEDOWN IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. ONE CHAIN AND LOAD BINDER CAN BE SUBSTITUTED FOR EACH WIRE HOLD-DOWN. SEE THE "SPECIAL PROVISIONS FOR CHAIN TIE DOWN" ON PAGE 13 FOR FURTHER GUIDANCE.
9. WHEN AN UPPER CANISTER IS SECURED TO A LOWER CANISTER WITH FOUR CANISTER INTERLOCKING BOLTS WHICH ARE PROPERLY INSTALLED AND ARE TORQUED TO 60 FOOT-POUNDS (44 NEWTON-METERS), THE VERTICAL UNITIZING STRAPS, SEALS AND THE ANTI-CHAFING, PIECES MARKED ④, ⑤, AND ⑥, WILL NOT BE REQUIRED.
10. TWO-INCH STEEL STRAPPING CANNOT BE USED FOR CANISTER HOLD DOWN WITHOUT OBTAINING A WAIVER FROM THE GERMAN RAIL AUTHORITIES. IF A WAIVER IS OBTAINED, TWO STRAPS WILL BE REQUIRED OVER EACH LOAD UNIT, ONE OVER EACH HOLD-DOWN ASSEMBLY. SEE THE PROCEDURES IN U.S. ARMY MATERIEL COMMAND (AMC) DRAWING 19-48-5519-GMSPA1, PAGE 6, FOR GUIDANCE. REFERENCE PIECES MARKED ⑦ THRU ⑨ ON PAGE 7 OF THAT DRAWING.

BILL OF MATERIAL

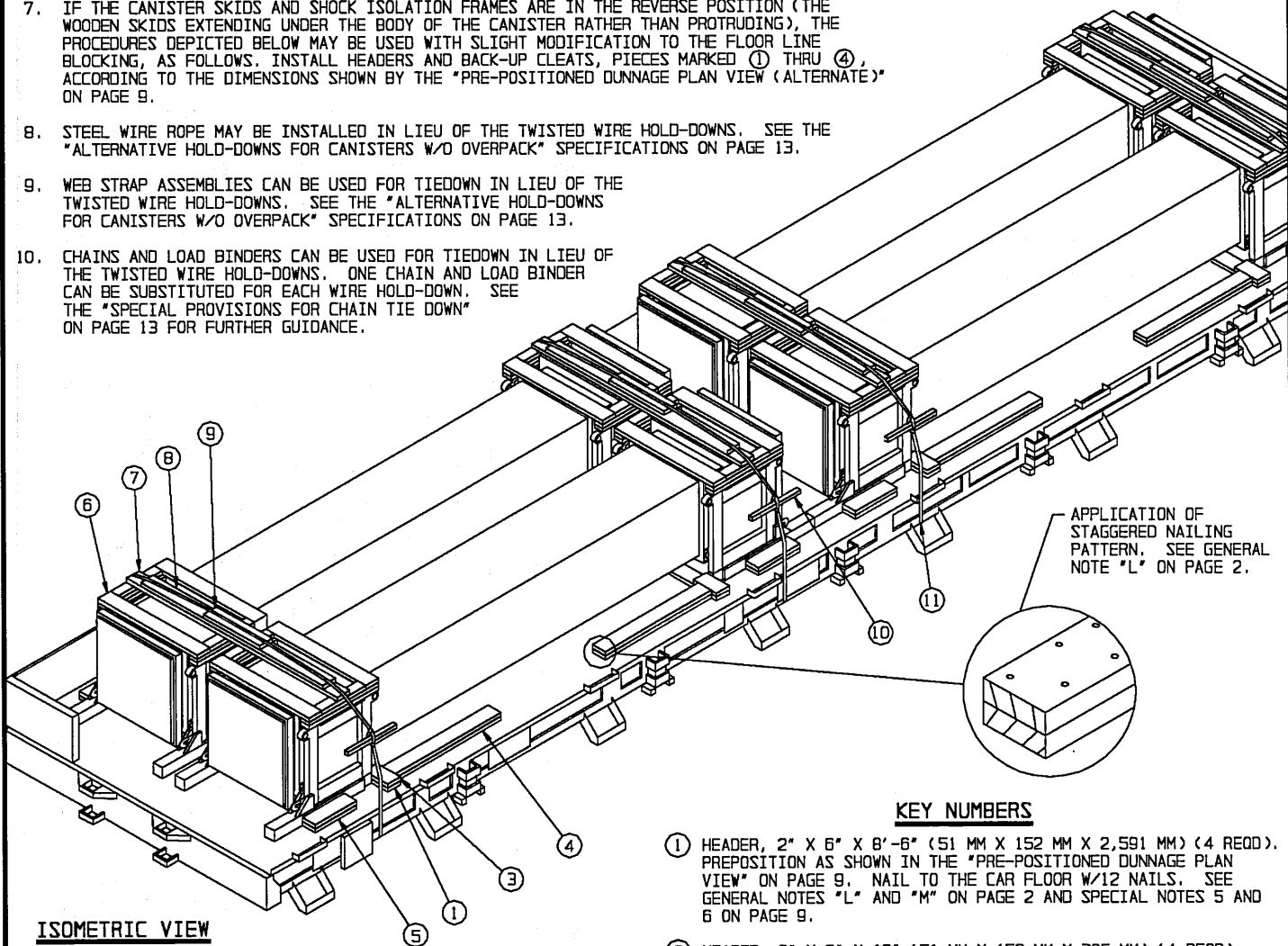
LUMBER	LENGTH	BOARD FEET
1" X 4" (30 MM X 102 MM)	25 FT (7,620 MM)	8
2" X 2" (51 MM X 51 MM)	24 FT (7,315 MM)	8
2" X 4" (51 MM X 102 MM)	139 FT (42,367 MM)	93
2" X 6" (51 MM X 152 MM)	233 FT (71,018 MM)	233
NAILS	NO. REOD	WEIGHT
SIZE AS REOD	585	35 LBS
STEEL STRAPPING, 1-1/4" - - - 56' REOD - - - - 8 LBS		
SEAL FOR 1-1/4" STRAPPING - - 16 REOD - - - - 3/4 LB		
WIRE, NO. 8 GAGE - - - - - 1,032' REOD - - - - 94 LBS		
ANTI-CHAFING - - - - - AS REOD - - - - - NIL		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER - - - - 8 - - - - -	8	30,000 LBS (13,624 KG)
DUNNAGE - - - - -		822 LBS (373 KG)
TOTAL WEIGHT - - - - -		30,822 LBS (13,997 KG)

(SPECIAL NOTES CONTINUED FROM PAGE 9)

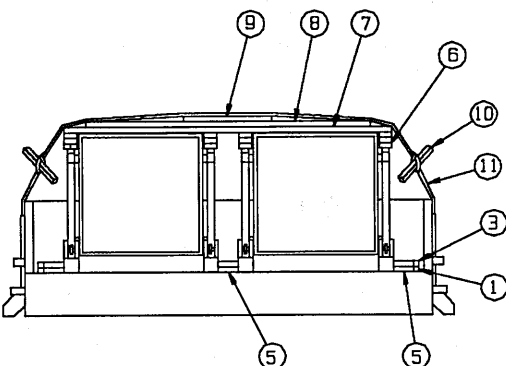
7. IF THE CANISTER SKIDS AND SHOCK ISOLATION FRAMES ARE IN THE REVERSE POSITION (THE WOODEN SKIDS EXTENDING UNDER THE BODY OF THE CANISTER RATHER THAN PROTRUDING), THE PROCEDURES DEPICTED BELOW MAY BE USED WITH SLIGHT MODIFICATION TO THE FLOOR LINE BLOCKING, AS FOLLOWS. INSTALL HEADERS AND BACK-UP CLEATS, PIECES MARKED ① THRU ④, ACCORDING TO THE DIMENSIONS SHOWN BY THE "PRE-POSITIONED DUNNAGE PLAN VIEW (ALTERNATE)" ON PAGE 9.
8. STEEL WIRE ROPE MAY BE INSTALLED IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. SEE THE "ALTERNATIVE HOLD-DOWNS FOR CANISTERS W/O OVERPACK" SPECIFICATIONS ON PAGE 13.
9. WEB STRAP ASSEMBLIES CAN BE USED FOR TIEDOWN IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. SEE THE "ALTERNATIVE HOLD-DOWNS FOR CANISTERS W/O OVERPACK" SPECIFICATIONS ON PAGE 13.
10. CHAINS AND LOAD BINDERS CAN BE USED FOR TIEDOWN IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. ONE CHAIN AND LOAD BINDER CAN BE SUBSTITUTED FOR EACH WIRE HOLD-DOWN. SEE THE "SPECIAL PROVISIONS FOR CHAIN TIE DOWN" ON PAGE 13 FOR FURTHER GUIDANCE.



ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

- ⑩ WIRE TWISTER, 2" X 2" (51 MM X 51 MM) BY A LENGTH TO SUIT (8 REOD). SEE SPECIAL NOTE 2 ON PAGE 9.
- ⑪ WIRE HOLD-DOWN, SIX STRANDS OF NO. 8 GAGE (3 MM MINIMUM DIAMETER) BLACK ANNEALED WIRE (4 REOD). PASS THRU A FLATCAR TIEDOWN FACILITY, OVER THE LADING AND THRU A TIEDOWN FACILITY ON THE OPPOSITE SIDE OF THE RAILCAR, AND BACK OVER THE LADING TO FORM A COMPLETE LOOP. TWIST TAUT WITH PIECE MARKED ⑩. SEE GENERAL NOTE "O" ON PAGE 2 AND SPECIAL NOTES 3 AND 4 ON PAGE 9.

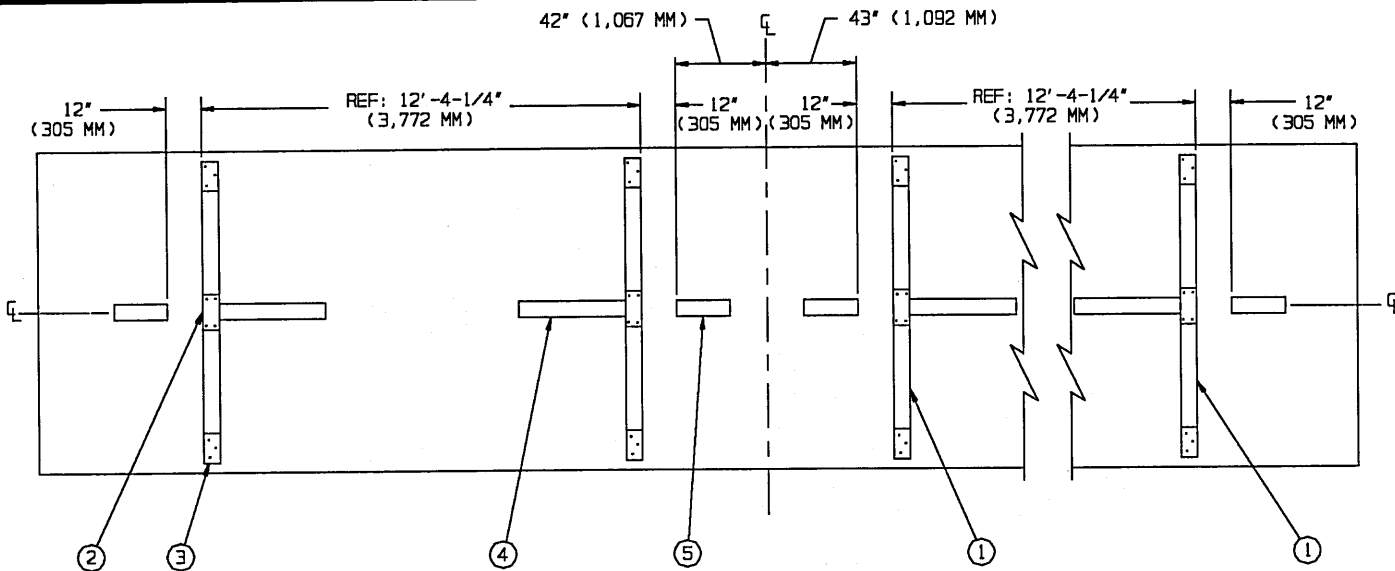


END VIEW

KEY NUMBERS

- ① HEADER, 2" X 6" X 8'-6" (51 MM X 152 MM X 2,591 MM) (4 REOD). PREPOSITION AS SHOWN IN THE "PRE-POSITIONED DUNNAGE PLAN VIEW" ON PAGE 9. NAIL TO THE CAR FLOOR W/12 NAILS. SEE GENERAL NOTES "L" AND "M" ON PAGE 2 AND SPECIAL NOTES 5 AND 6 ON PAGE 9.
- ② HEADER, 2" X 6" X 12" (51 MM X 152 MM X 305 MM) (4 REOD). PRE-POSITION ON CENTER OF PIECE MARKED ① AND NAIL W/4 NAILS.
- ③ HEADER, 2" X 6" X 10" (51 MM X 152 MM X 254 MM) (8 REOD). POSITION ON THE ENDS OF PIECES MARKED ① AND NAIL W/3 NAILS.
- ④ BACK-UP CLEAT, 2" X 6" X 36" (51 MM X 152 MM X 914 MM) (DOUBLED) (12 REOD). PRE-POSITION FOUR PIECES AS SHOWN IN THE "PRE-POSITIONED DUNNAGE PLAN VIEW" ON PAGE 9. POSITION THE OTHER EIGHT PIECES AS SHOWN IN THE ISOMETRIC VIEW ABOVE. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/12 NAILS.
- ⑤ SIDE BLOCKING, 2" X 6" X 18" (51 MM X 152 MM X 457 MM) (DOUBLED) (12 REOD). PRE-POSITION FOUR PIECES AS SHOWN IN THE "PRE-POSITIONED DUNNAGE PLAN VIEW" ON PAGE 9. PLACE THE OTHER EIGHT PIECES AGAINST CANISTER SKIDS AS SHOWN. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.
- ⑥ HOLD-DOWN ASSEMBLY (8 REOD). SEE THE DETAIL ON PAGE 12. POSITION AS SHOWN SO AS TO REST ON THE SHOCK ISOLATION FRAMES.
- ⑦ TIE PIECE, 2" X 6" X 7'-7-1/2" (51 MM X 152 MM X 2,324 MM) (4 REOD). LOCATE ONE NEAR THE CENTER OF EACH TWO LATERALLY ADJACENT PIECES MARKED ⑥ AS SHOWN. NAIL TO PIECES MARKED ⑥ W/3 NAILS AT EACH JOINT.
- ⑧ PURCHASE BOARD, 2" X 6" X 6'-6" (51 MM X 152 MM X 1,981 MM) (4 REOD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED ⑦ W/7 NAILS.
- ⑨ PURCHASE BOARD, 2" X 6" X 24" (51 MM X 152 MM X 610 MM) (4 REOD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED ④ W/4 NAILS.

(CONTINUED AT LEFT)



PRE-POSITIONED DUNNAGE PLAN VIEW

(SPECIAL NOTES CONTINUED)

6. IF FOUR CANISTERS ARE TO BE SHIPPED AND THE CAR FURNISHED FOR LOADING IS AN SAS---710 CAR, EXTERNALLY APPLIED BLOCKING SIMILAR TO THAT SHOWN ON PAGE 10 MAY BE USED, IF DESIRED, IN LIEU OF THE PRE-POSITIONED PIECES MARKED ① AND ② AND PIECES MARKED ③ AND ④. AT THE CENTER OF THE CAR LENGTH, INSTALL FOUR 2" X 6" X 30" (51 MM X 152 MM X 762 MM) LONG BACK-UP CLEATS POSITIONED TO ALIGN WITH THE CANISTER SKIDS. NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/10 NAILS. AT EACH END OF THESE INSTALLED PIECES, POSITION A DOUBLED HEADER CONSISTING OF TWO 2" X 6" X 8'-2" (51 MM X 152 MM X 489 MM) LONG PIECES. NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/12 NAILS. LOAD TWO CANISTERS AGAINST EACH OF THESE HEADERS. THEN AT EACH END OF THE LOADED CANISTERS INSTALL A HEADER AND FOUR BACK-UP CLEATS SIMILAR TO THOSE INSTALLED AT THE CENTER OF THE CAR. THE SIDE BLOCKING AND HOLD-DOWN BLOCKING WILL BE AS SHOWN.

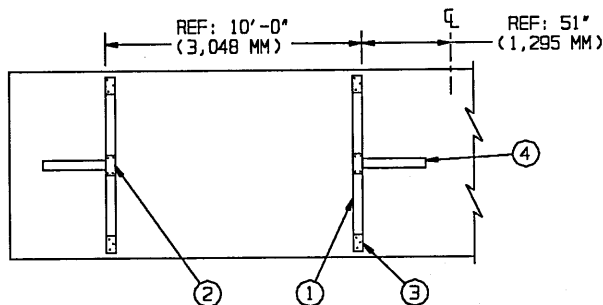
(CONTINUED ON PAGE 8)

SPECIAL NOTES:

- A 4-CANISTER LOAD IS SHOWN ON A 41'-0-1/8" (12,500 MM) LONG BY 9'-1-3/64" (2,770 MM) WIDE EUROPEAN FLATCAR. LARGER CARS MAY BE USED FOR SHIPMENT OF THE DEPICTED LOAD. CARS MUST HAVE WOODEN FLOORS. SEE GENERAL NOTE "G" ON PAGE 2.
- ONE WIRE TWISTER, PIECE MARKED ⑩, WILL BE USED TO TIGHTEN EACH TWISTED WIRE HOLD-DOWN, OR EACH END AS SHOWN ON PAGE 8. THE TWISTER WILL BE SECURED TO PREVENT UNTWISTING AND LOOSENING OF THE WIRE HOLD-DOWN. THE TWISTER WILL BE POSITIONED SO THAT IT DOES NOT PROTRUDE BEYOND THE SIDE WALL OF THE FLATCAR.
- AT ANY LOCATION WHERE THE TWISTED WIRE HOLD-DOWN PASSES AROUND A SHARP CORNER, PROVIDE SUITABLE CUSHIONING OR BUFFERING MATERIAL TO PROTECT THE WIRE FROM BEING CUT ON THE SHARP CORNER.
- WIRE HOLD-DOWNS, PIECE MARKED ⑪ WILL BE INSTALLED AS NEARLY AS POSSIBLE AT RIGHT ANGLES TO THE SIDE OF THE FLATCAR. WHERE THE POSITIONING OF THE FLATCAR TIEDOWN FACILITIES PREVENTS INSTALLATION OF THE HOLD-DOWNS AS STATED ABOVE, THE HOLD-DOWNS ON ONE END OF A CANISTER MAY BE ANGLED FORWARD OR REARWARD A SMALL AMOUNT TO REACH THE FLATCAR TIEDOWN FACILITIES. THE HOLD-DOWNS ON THE OTHER END OF THE SAME CANISTER WILL BE ANGLED IN THE OPPOSITE DIRECTION.
- IF ONLY TWO CANISTERS ARE TO BE SHIPPED, EXTERNALLY APPLIED BLOCKING SIMILAR TO THAT SHOWN ON PAGE 10 MAY BE USED, IF DESIRED, IN LIEU OF THE PRE-POSITIONED PIECES MARKED ① AND ②, AND PIECES MARKED ③ AND ④. AT THE ENDS OF THE CANISTERS, POSITION A HEADER CONSISTING OF DOUBLED 2" X 6" X 8'-2" (51 MM X 152 MM X 2,489 MM) LONG PIECES, AND NAIL THRU THE TOP PIECES AND THE LOWER PIECES INTO THE CAR FLOOR W/12 NAILS. IN ALIGNMENT WITH EACH CANISTER SKID, INSTALL A DOUBLE 2" X 6" X 24" (51 MM X 152 MM X 610 MM) LONG BACK-UP CLEAT. NAIL THRU THE TOP PIECE AND THE OTHER W/8 NAILS. THE SIDE BLOCKING AND HOLD-DOWN BLOCKING WILL BE AS SHOWN.

(CONTINUED AT LEFT)

BILL OF MATERIAL		
LUMBER	LENGTH	BOARD FEET
1" X 4" (30 MM X 102 MM)	26 FT (7,925 MM)	9
2" X 2" (51 MM X 51 MM)	12 FT (3,658 MM)	4
2" X 4" (51 MM X 102 MM)	130 FT (54,254 MM)	87
2" X 6" (51 MM X 152 MM)	275 FT (61,570 MM)	275
4" X 4" (102 MM X 102 MM)	48 FT (14,630 MM)	64
NAILS		WEIGHT
SIZE AS RECD	1,100	65 LBS
WIRE, NO. 8 GAGE (3MM DIA) --- 440' RECD ---		40 LBS

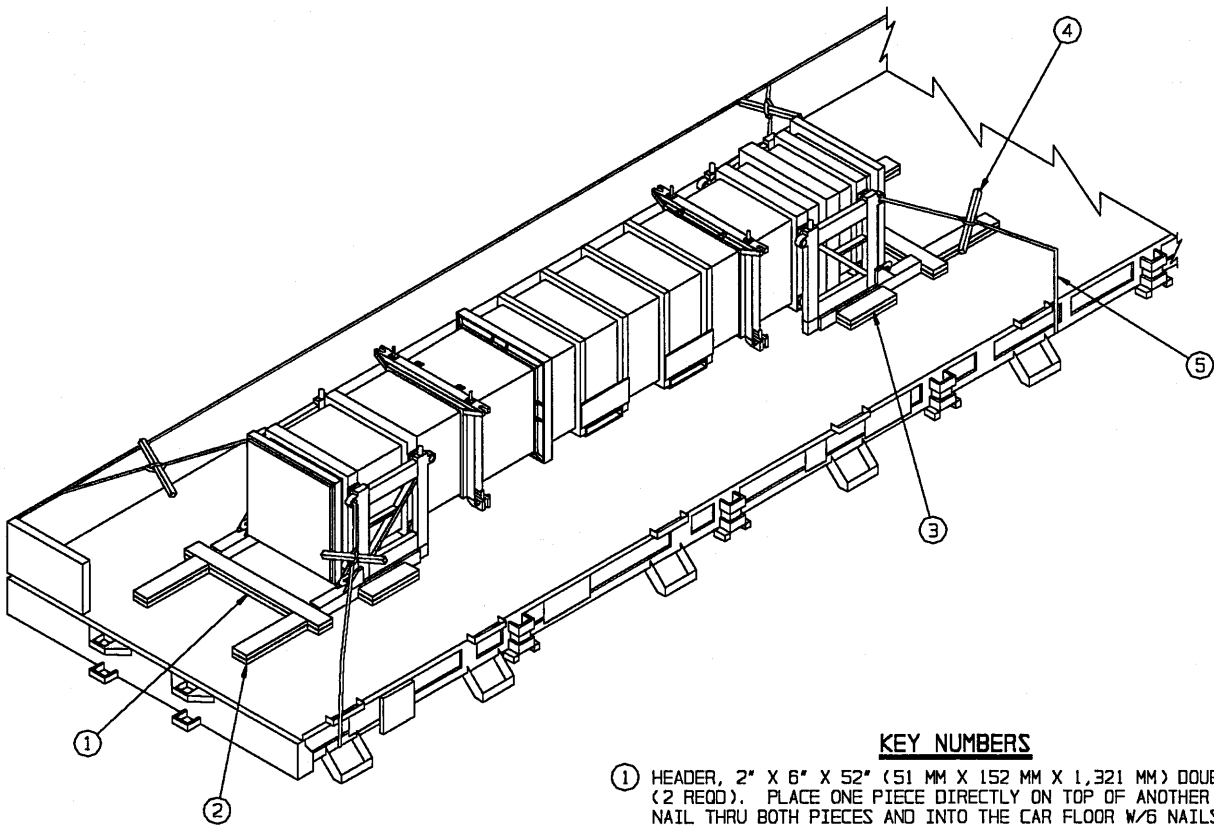


PRE-POSITIONED DUNNAGE PLAN VIEW (ALTERNATE)

SEE SPECIAL NOTE 7 ON PAGE 8.

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER	4	15,000 LBS (6,810 KG)
DUNNAGE		983 LBS (446 KG)
TOTAL WEIGHT		15,983 LBS (7,256 KG)



ISOMETRIC VIEW

KEY NUMBERS

- ① HEADER, 2" X 6" X 52" (51 MM X 152 MM X 1,321 MM) DOUBLED (2 REQD). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/6 NAILS. SEE GENERAL NOTES "L" AND "M" ON PAGE 2.
- ② BACK-UP CLEAT, 2" X 6" X 24" (51 MM X 152 MM X 610 MM) DOUBLED (4 REQD). POSITION AS SHOWN IN ALIGNMENT WITH A CANISTER SKID. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/8 NAILS.
- ③ SIDE BLOCKING, 2" X 6" X 18" (51 MM X 152 MM X 457 MM) DOUBLED (4 REQD). POSITION AGAINST A CANISTER SKID AS SHOWN. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.
- ④ WIRE TWISTER, 2" X 2" (51 MM X 51 MM) BY A LENGTH TO SUIT (4 REQD). SEE SPECIAL NOTE 2 ON PAGE 9 FOR GUIDANCE.
- ⑤ WIRE HOLD-DOWN, SIX STRANDS OF NO. 8 GAGE (3 MM MINIMUM DIAMETER) BLACK ANNEALED WIRE (4 REQD). PASS THRU A FLATCAR TIEDOWN FACILITY, THRU THE TIEDOWN OPENING ON THE CANISTER AS SHOWN, AND BACK TO THE FLATCAR TIEDOWN FACILITY TO FORM A COMPLETE LOOP. TWIST TAUT WITH PIECE MARKED ④. SEE GENERAL NOTE "O" ON PAGE 2, AND SPECIAL NOTE 3 ON PAGE 9.

SPECIAL NOTES:

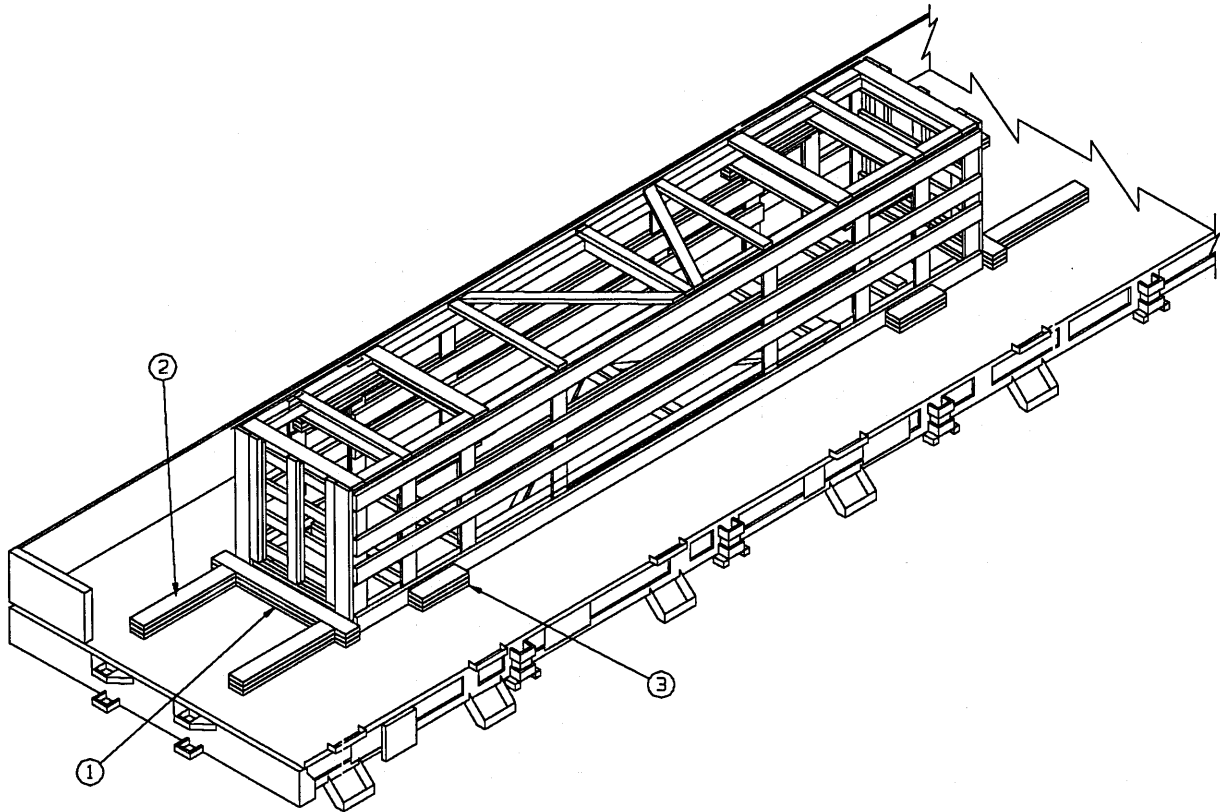
- 1. A 1-CANISTER LOAD IS SHOWN ON A 9'-1-3/64" (2,770MM) WIDE EUROPEAN RAILCAR. WIDER OR NARROWER CARS MAY BE USED.
- 2. TWO CANISTERS CAN BE SHIPPED END-TO-END ON AN RS----680/681 OR AN RS----683/684 CAR. THIS CAN BE ACCOMPLISHED BY INSTALLING A HEADER, PIECE MARKED ①, AT THE END OF THE BACK-UP CLEATS THAT ARE BRACING THE DEPICTED UNIT. POSITION THE ADDED CANISTER AGAINST THIS HEADER. INSTALL A HEADER AND BACK-UP CLEATS AT THE OTHER END OF THE UNIT AND INSTALL SIDE BLOCKING AND WIRE HOLD-DOWNS AS SHOWN.

BILL OF MATERIAL

LUMBER	LENGTH	BOARD FEET
2" X 2" (51 MM X 51 MM)	6 FT (1,829 MM)	2
2" X 6" (51 MM X 152 MM)	42 FT (12,802 MM)	42
NAILS	NO. REQD	WEIGHT
SIZE AS REQD	56	3 LBS
WIRE, NO. 8 GAGE (3MM DIA) - - - 168' REQD - - -		15 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER - - - - -	1 - - - - -	3,750 LBS (1,703 KG)
DUNNAGE - - - - -	- - - - -	106 LBS (49 KG)
TOTAL WEIGHT - - - - -		3,856 LBS (1,752 KG)



ISOMETRIC VIEW

SPECIAL NOTES:

1. A 1-UNIT LOAD OF THE CANISTER OVERPACK IS SHOWN ON A 9'-1-3/64" (2,770 MM) WIDE EUROPEAN FLATCAR. WIDER OR NARROWER CARS MAY BE USED.
2. TWO OVERPACK UNITS CAN BE SHIPPED END-TO-END ON AN RS---680/681 CAR, AN RS---683/684 CAR, OR AN SAS---710 CAR. THIS CAN BE ACCOMPLISHED BY INSTALLING A HEADER, PIECE MARKED ①, AT THE END OF THE BACK-UP CLEATS THAT ARE BRACING THE DEPICTED UNIT. POSITION THE ADDED OVERPACK UNIT AGAINST THIS HEADER. INSTALL A HEADER AND BACK-UP CLEATS AT THE OTHER END OF THE UNIT AND INSTALL SIDE BLOCKING AS SHOWN.

KEY NUMBERS

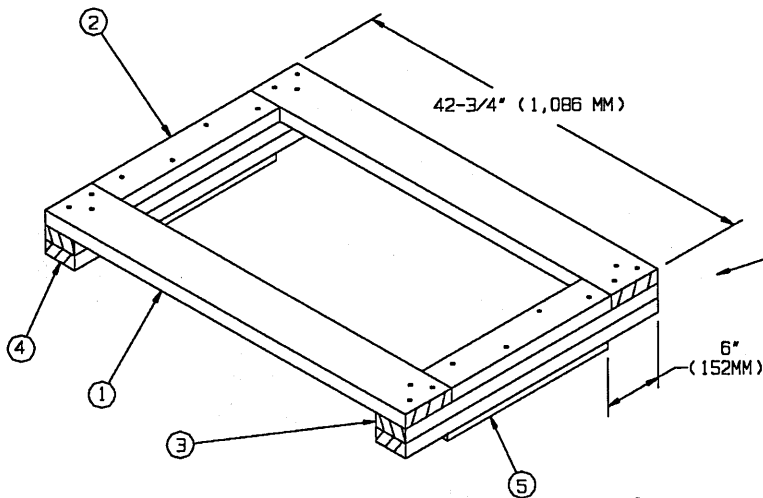
- ① HEADER, 2" X 6" X 56" (51 MM X 152 MM X 1,422 MM) (TRIPLED) (2 REOD). PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/7 NAILS. PLACE THE THIRD PIECE ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECE THREE INTO PIECES ONE AND TWO W/7 NAILS. SEE GENERAL NOTES "L" AND "M" ON PAGE 2.
- ② BACK-UP CLEAT, 2" X 6" X 36" (51 MM X 152 MM X 914 MM) (TRIPLED) (4 REOD). POSITION AS SHOWN. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/12 NAILS. PLACE THE THIRD PIECE ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECE THREE INTO PIECES ONE AND TWO W/12 NAILS.
- ③ SIDE BLOCKING, 2" X 6" X 18" (51 MM X 152 MM X 457 MM) (TRIPLED) (4 REOD). POSITION AGAINST THE OVERPACK UNIT AS SHOWN. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS. PLACE THE THIRD PIECE ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECE THREE INTO PIECES ONE AND TWO W/3 NAILS.

BILL OF MATERIAL

LUMBER	LENGTH	BOARD FEET
2" X 6" (51 MM X 152 MM)	64 FT (19,507 MM)	64
NAILS	NO. REOD	WEIGHT
SIZE AS REOD	144	9 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER		
W/OVERPACK	1	5,268 LBS (2,392 KG)
DUNNAGE		137 LBS (61 KG)
TOTAL WEIGHT		5,405 LBS (2,453 KG)

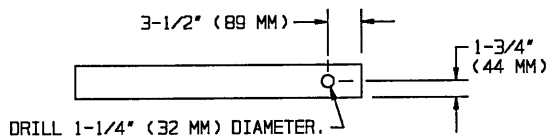


FABRICATE ASSEMBLY SO THAT PIECES MARKED ③ AND ④ ARE POSITIONED WITH THE HOLES AT THIS END OF THE ASSEMBLY. HOLES MUST BE ALIGNED SO THAT THEY WILL ACCEPT THE LOCATOR PINS OF THE SHOCK ISOLATION FRAMES.

HOLD-DOWN ASSEMBLY

KEY NUMBERS

- ① 2" X 6" X 42-3/4" (51 MM X 152 MM X 1,086 MM) (2 REQD). NAIL TO PIECE MARKED ③ W/3 NAILS AT EACH END.
- ② 2" X 4" X 19" (51 MM X 102 MM X 483 MM) (2 REQD). NAIL TO PIECE MARKED ③ W/4 NAILS.
- ③ 2" X 4" X 30" (51 MM X 102 MM X 762 MM) (2 REQD). DRILL A 1-1/4" (32 MM) DIAMETER HOLE AS SHOWN BY THE DETAIL AT LEFT.
- ④ 2" X 4" X 30" (51 MM X 102 MM X 762 MM) (2 REQD). DRILL A 1-1/4" (32 MM) DIAMETER HOLE AS SHOWN BY THE DETAIL AT LEFT. NAIL TO PIECE MARKED ③ W/8 NAILS.
- ⑤ 1" X 4" X 19" (25 MM X 102 MM X 483 MM) (2 REQD). NAIL TO PIECE MARKED ④ W/8 NAILS.

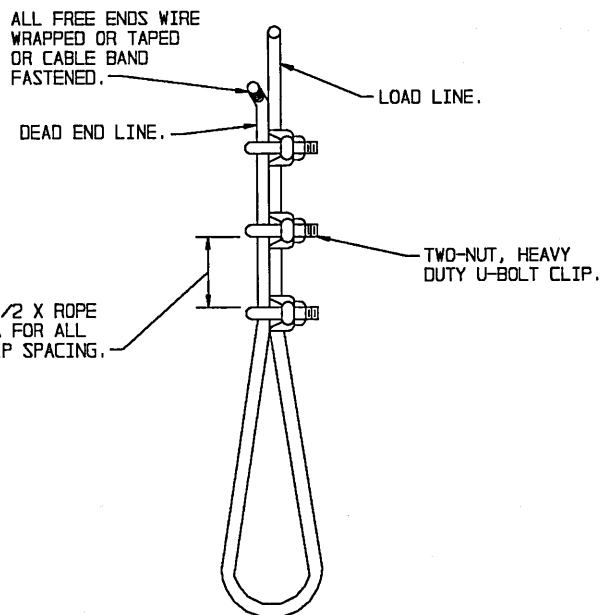


TOP VIEW



SIDE VIEW

DETAIL: PIECES ③ AND ④



CABLE JOINT

PROPER TIGHTENING OF THE WIRE ROPE CLIP NUTS CAN BE ACCOMPLISHED BY UTILIZING A PROPER SIZED TORQUE WRENCH. AFTER THE NUTS HAVE BEEN INITIALLY TIGHTENED, THE "U" SIDE OF EACH CLIP MUST BE STRUCK SEVERAL TIMES WITH A HAMMER TO INSURE PROPER SEATING INTO THE DEAD END LINE. FINAL TORQUE WILL BE ACQUIRED BY REPEATEDLY AND ALTERNATELY TIGHTENING EACH CLIP NUT.

STEEL WIRE ROPE HOLD-DOWN

STEEL WIRE ROPE, 3/8" (9.53 MM) OR LARGER, MAY BE INSTALLED IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. ONE WIRE ROPE WILL BE SUBSTITUTED FOR EACH TWISTED WIRE HOLD-DOWN FOR THE LOADS ON PAGES 6 THRU 10. STEEL WIRE ROPE WILL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING GUIDANCE.

1. ONE END OF THE STEEL WIRE ROPE WILL PASS THRU A FLATCAR TIEDOWN FACILITY, WILL BE FOLDED BACK UPON THE OTHER LEG ON THE ROPE AND BE SECURED WITH THREE CLIPS, AS SHOWN IN THE "CABLE JOINT" DETAIL ON PAGE 12. THE STEEL WIRE ROPE WILL THEN PASS OVER THE LADING, ON TOP OF THE TIE PIECE AND PURCHASE BOARDS, AND THE OTHER END OF THE STEEL WIRE ROPE WILL BE PASSED THROUGH A FLATCAR TIEDOWN FACILITY ON THE OPPOSITE SIDE OF THE CAR AND BE SECURED IN THE SAME MANNER. FOR THE ONE-UNIT LOAD, THE STEEL WIRE ROPE WILL EXTEND FROM THE FLATCAR TIEDOWN FACILITY TO THE TIEDOWN OPENING ON THE CANISTER. PROVIDE A THIMBLE OR OTHER SUITABLE PROTECTION AT ANY POINT WHERE THE WIRE ROPE PASSES AROUND A SHARP CORNER. SECURE EACH THIMBLE WITH AN ADDITIONAL CLIP OR BY EQUIVALENT MEANS.
2. TENSIONING OF THE STEEL WIRE ROPE CAN BE ACCOMPLISHED BY EMPLOYING TWO CABLE GRIPPERS AND AN APPLICABLY SIZED COME-A-LONG TYPE MECHANICAL HOIST. THE STEEL WIRE ROPE SHALL BE TENSIONED SUFFICIENTLY SO AS TO BE TAUT, BUT NOT SO MUCH AS TO DAMAGE THE CANISTER TIEDOWN DEVICES, THE ISOLATION FRAMES, OR THE DUNNAGE.
3. THE NUTS ON THE CABLE CLIPS SHALL BE TIGHTENED TO A TORQUE OF APPROXIMATELY 40 FOOT-POUNDS (29 NEWTON-METERS). A PROPER TORQUE CAN BE ACHIEVED BY USING A WRENCH WHICH HAS A HANDLE THAT IS AT LEAST 12" (305 MM) LONG. WHEN USING A STEEL WIRE ROPE WHICH IS LARGER THAN 3/8" (9.53 MM), NUTS ON THE CABLE CLIPS SHALL BE TIGHTENED TO A TORQUE OF AT LEAST 60 FOOT-POUNDS (44 NEWTON-METERS). A WRENCH WHICH HAS A HANDLE THAT IS AT LEAST 15" (381 MM) LONG MAY BE USED TO OBTAIN THE 60 FOOT-POUNDS TORQUE. SEE GENERAL NOTE "P" ON PAGE 2.

WEB STRAP TIEDOWN ASSEMBLIES

WEB STRAP TIEDOWN ASSEMBLIES MAY BE USED IN LIEU OF TWISTED WIRE HOLD-DOWNS FOR SECUREMENT OF THE MISSILES. ONE WEB STRAP CAN BE SUBSTITUTED FOR EACH TWISTED WIRE HOLD-DOWN FOR THE LOADS ON PAGES 6 THRU 10 AND WILL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING GUIDANCE.

1. A WEB STRAP TIEDOWN ASSEMBLY WILL BE APPLIED AT THE SAME LOCATION AS A TWISTED WIRE HOLD-DOWN. NOTE THAT A CABLE LOOP OR OTHER MEANS OF ATTACHING THE WEB STRAP TO THE CANISTER TIEDOWN DEVICES MUST BE PROVIDED.
 2. TWO WEB STRAP ASSEMBLIES MAY BE HOOKED TOGETHER TO GAIN ENOUGH LENGTH TO EXTEND OVER THE TOP OF THE CANISTERS, AS REQUIRED.
 3. IF TIEDOWN PROVISIONS EXIST ON THE FLATCARS AND THEY ALLOW PROPER ATTACHMENT OF STRAP HOOKS, THEY MAY BE USED. OTHERWISE, THE STRAPS WILL HAVE TO BE ATTACHED TO THE CAR SIDE RAIL, STAKE POCKET OR OTHER SIMILAR ATTACHMENT POINT.
1. ONLY CHAINS AND LOAD BINDERS OF GOOD QUALITY WILL BE USED. ALL CHAINS AND LOAD BINDERS SHALL CONFORM TO THE NATIONAL ASSOCIATION OF CHAIN MANUFACTURER'S WELDED CHAIN SPECIFICATION ADOPTED NOVEMBER 1975.
 2. ALL CHAINS SHALL BE MARKED AS PRESCRIBED BY THE NATIONAL ASSOCIATION OF CHAIN MANUFACTURER'S WELDED CHAIN SPECIFICATION ADOPTED NOVEMBER 1975. AT LEAST ONE LINK IN EVERY 36 LINKS SHALL CARRY THE MANUFACTURER'S PERMANENT AND DISTINCTIVE MARK IDENTIFYING THE GRADE OF CHAIN. CHAINS NOT MARKED IN THIS MANNER SHALL NOT BE USED. IN ADDITION TO THE GRADE MARKING, THE CHAIN MAY ALSO CARRY LETTER MARKINGS OR SYMBOLS IDENTIFYING THE CHAIN MANUFACTURER. THE PRESENCE OF THE MANUFACTURER'S IDENTIFICATION MARKING IS NOT MANDATORY.
 3. BEFORE AND DURING INSTALLATION, THE CHAINS AND LOAD BINDERS SHALL BE INSPECTED FOR BENT HOOKS, STRETCH, GOUGES, BENT LINKS, WEAR, OR ANY OTHER NOTICEABLE DEFECTS. ANY DEFICIENCY SHALL BE CAUSE FOR REJECTION OF A CHAIN OR LOAD BINDER. CHAINS MUST NOT BE TWISTED DURING INSTALLATION. CAUTION: EXTREME CARE MUST BE EXERCISED WHEN TENSIONING CHAINS TO PREVENT DAMAGE OR PERMANENT DEFORMATION TO THE LADING.
 4. CHAIN SIZES AND GRADES APPROVED FOR USE WITH EUROPEAN FLATCAR LOADS ARE AS FOLLOWS:
 - A. GRADE 43 HIGH TEST CHAIN, SIZE 1/4" (6.35 MM), 5/16" (7.94 MM) OR 3/8" (9.53 MM)
 - B. GRADE 70 BINDING CHAIN, SIZE 1/4" (6.35 MM), 5/16" (7.94 MM) OR 3/8" (9.53 MM)
 - C. GRADE 80 ALLOY STEEL CHAIN, SIZE 9/32" (7.14 MM), 5/16" (7.94 MM) OR 3/8" (9.53 MM)
 5. THE GRABHOOKS ON THE ENDS OF THE CHAIN MAY BE OF THE FOLLOWING TYPES WITH GRADE MARKINGS AS INDICATED.
 - A. CLEVIS GRABHOOKS, 1/4" (6.35 MM) OR 3/8" (9.53 MM) SIZE, DO NOT REQUIRE GRADE MARKING. ALLOY GRABHOOKS, 5/16" (7.94 MM) SIZE, SHALL CARRY THE MANUFACTURER'S GRADE MARK OF 7, 70, OR 700. THE HOOKS SHALL BE USED ON THE APPROPRIATE SIZE CHAIN.
 - B. CLOSED EYE GRABHOOKS, 3/8" (9.53 MM) AND 5/16" (7.94 MM) SIZE, MAY BE USED ON THE APPROPRIATE SIZE CHAIN IF THEY ARE A PART OF A CHAIN ASSEMBLY WHICH WAS PROVIDED BY A CHAIN MANUFACTURER, AND THE CHAIN ASSEMBLY CARRIES THE CORRECT GRADE IDENTIFICATION MARKING AS PREVIOUSLY STATED. CLOSED EYE GRABHOOKS THAT FORM A PART OF THE CHAIN ASSEMBLY ARE EXEMPT FROM GRADE MARKINGS.
 6. CONNECTING LINKS USED FOR CHAIN REPAIR MUST BE CORRECTLY MARKED AND BE EQUAL TO OR GREATER IN STRENGTH THAN THE CHAIN THEY ARE REPAIRING. CHAINS WITH UNMARKED CONNECTING LINKS SHALL NOT BE USED.
 7. CHAIN AND FITTINGS OF A HIGHER GRADE MAY BE SUBSTITUTED FOR THE GRADES SPECIFIED IN NOTE 4 ABOVE.
 8. LOAD BINDERS SHALL BE 5/16" (7.94 MM) TO 3/8" (9.53 MM) SIZE AND HAVE A MINIMUM BREAKING STRENGTH OF 16,200 POUNDS (7,290 KG) (WORKING LOAD LIMIT OF 5,400 (2,430 KG) POUNDS). OVERCENTER TYPE LOAD BINDERS SHALL BE SAFETY WIRED TO PREVENT ACCIDENTAL OPENING DURING TRANSPORT. LOAD BINDER SIZE SHALL BE COMPATIBLE WITH THE SIZE OF THE CHAIN BEING USED.

SPECIAL PROVISIONS FOR CHAIN TIE DOWN:

LADING MAY BE SECURED TO THE FLATCAR BY CARRIER-OWNED CHAINS AND LOAD BINDERS IN LIEU OF SPECIFIED TWISTED WIRE HOLD-DOWNS. ONE CHAIN AND LOAD BINDER CAN BE SUBSTITUTED FOR EACH TWISTED WIRE HOLD-DOWN, PROVIDED THE FOLLOWING CONDITIONS ARE MET AND THE APPLICABLE PROCEDURES CONTAINED ON PAGES 6 THRU 10 ARE FOLLOWED.



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