HAWK

LOADING AND BRACING ⌖ (CL & LCL) ON EUROPEAN RAILCAR OF ROCKET MOTOR, M22E8 OR M112, PACKED IN WOODEN CRATE ◓

INDEX

⌖ 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.

◓ CAUTION:

THE WOODEN CRATE CONTAINING THE M22E8 MOTOR DESIGNATED HEREIN MUST BE MODIFIED IN ACCORDANCE WITH DRAWING NUMBER 19-48-AMXAC-4103, REV I, DATED SEPTEMBER 1971. THE CRATE CONTAINING THE M112 MOTOR DESIGNATED HEREIN MUST BE MODIFIED IN ACCORDANCE WITH DRAWING NUMBER 19-48-AMXAC-4321.

DO NOT SCALE

REVISIONS			

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APRIL 1980			
CLASS	DIVISION	DRAWING	FILE
19	48	5506	GM 5HA2

PROJECT GM 652-72

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 WHICH CONFORM TO THE RIV REQUIREMENTS.

C. THE LOAD AS SHOWN ON PAGES 4 AND 5 IS BASED ON RIV RAILCARS (KB 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" (457 MM) HIGH CAR SIDES.

D. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO THE M22E8 OR M112 ROCKET MOTOR PACKED IN A WOODEN CRATE. SUBSEQUENT REFERENCE TO A CONTAINER HEREIN MEANS THE WOODEN SHIPPING CRATE WITH THE M22E8 OR M112 ROCKET MOTOR.

E. THE ROCKET MOTOR IS AN EXPLOSIVE ITEM. THESE PROCEDURES CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE CONTAINER WHEN IT IS LOADED WITH AN ITEM OTHER THAN THE ROCKET MOTOR, OR WHEN THEY ARE EMPTY. FOR REFERENCE PURPOSES, THIS ITEM IS A DOT CLASS "B" EXPLOSIVE WITHIN CONUS.

F. DETAILS.

1. FOR DETAILS OF THE CONTAINER FOR THE M22E8 ROCKET MOTOR, SEE DRAWING NO. 9070094 AND DRAWING NO. 19-48-AMXAC-4103, REV 1.

   CONTAINER DIMENSIONS ---- 113-1/2" (2,883 MM) LONG BY 20-3/4" (527 MM) WIDE BY 23-3/8" (594 MM) HIGH.

   GROSS WEIGHT ---------- 1,091 POUNDS (495 KG) (APPROX).

2. FOR DETAILS OF THE CONTAINER FOR THE M112 ROCKET MOTOR, SEE DRAWING NO. 10242897 AND DRAWING NO. 19-48-AMXAC-4321.

   CONTAINER DIMENSIONS ---- 118-1/2" (3,010 MM) LONG BY 20-1/2" (521 MM) WIDE BY 22-7/8" (581 MM) HIGH.

   GROSS WEIGHT---------- 1,128 POUNDS (512 KG) (APPROX).

G. A LIST OF RAILCARS THAT MAY BE USED FOR SHIPMENTS OF THE DEPICTED LOADS IS SHOWN IN A CHART ON THIS PAGE. OTHER TYPES OF RAILCARS 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 AND TIE DOWN COMPONENTS ON A CAR ARE PERMITTED. HOWEVER, THE INTENT OF THE SPECIFIED BLOCKING PROCEDURES MUST BE ACHIEVED.

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 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 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. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL MUST BE USED TO SEAL THE JOINT. CAUTION: EXERCISE CARE DURING TENSIONING TO PREVENT DAMAGE TO THE CONTAINERS.

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 OF THE RAILCAR, 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 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.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

LUMBER ---------- : DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE FROM MATERIAL DEFECTS. REF: FED SPEC MM-L-751.

NAILS ---------- : COMMON. REF: FED SPEC FF-N-105.

STRAPPING, STEEL -- : CLASS 1, TYPE I OR IV, HEAVY DUTY, FINISH A, B (GRADE 2), OR C. REF: FED SPEC QQ-S-781.

STRAP SEAL --------- : TYPE D, STYLE I, II, OR IV, CLASS H, FED SPEC QQ-S-781.

WIRE ---------- : ANNEALED, BLACK. REF: FED SPEC QQ-W-461.

ROPE ---------- : STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY. REF: FED SPEC RR-W-410.

CLIPS ---------- : "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL). REF: FED SPEC FF-C-450, TYPE I, CLASS 1.

(GENERAL NOTES CONTINUED)

N. NAILS USED FOR FLOOR LINE 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 CAR FLOOR. SEE THE "NAIL CHART" BELOW AND THE "SPECIAL NAILING GUIDANCE" ON PAGE 10. 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. STEEL WIRE USED FOR HOLD-DOWNS 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.

Q. 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 25.4 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 0.7376 NEWTON-METERS.

R. STEEL STRAPPING DEPICTED IN THIS DRAWING HAS BEEN SPECIFIED AS 1-1/4" (32 MM) X .035" (.889 MM). HOWEVER, .031" (.787 MM) THICK STRAP MAY BE USED IN LIEU OF .035" THICK STRAP.

NAIL CHART

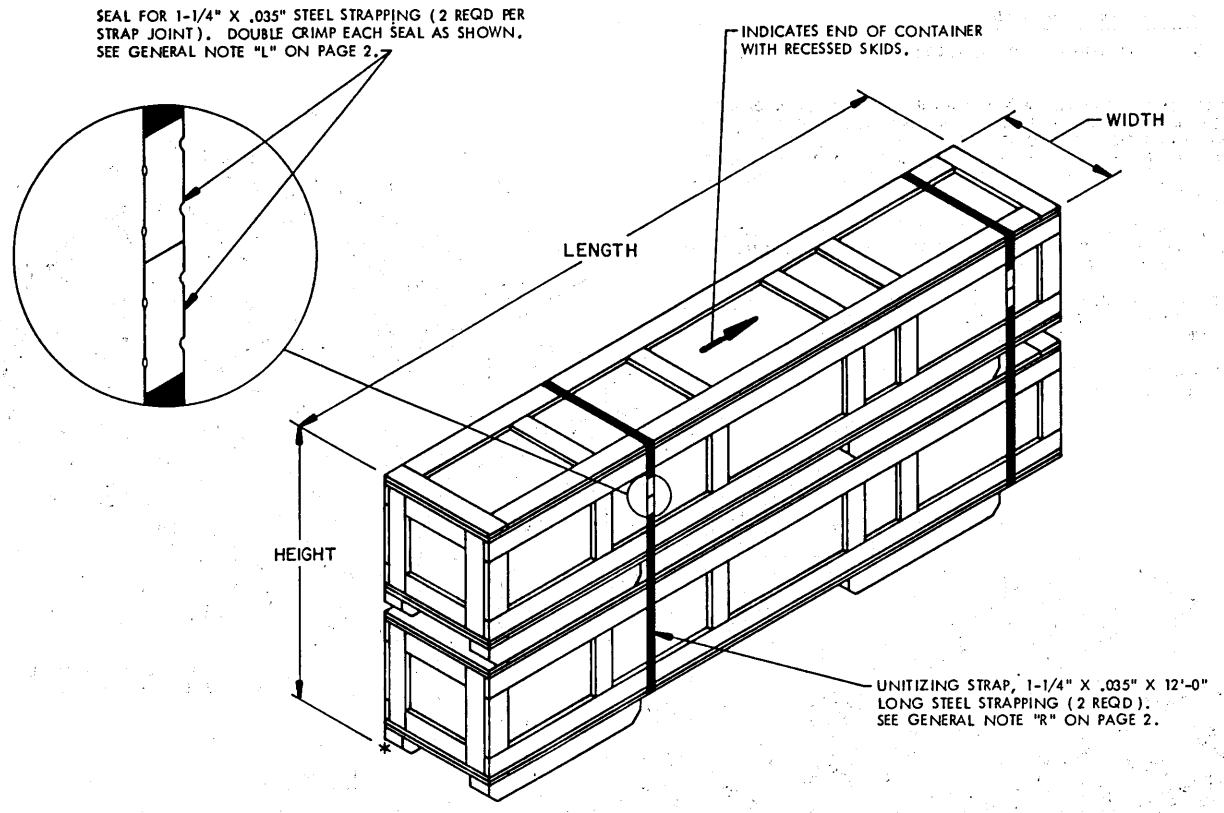
SIZE	LENGTH	DIAMETER
10d	3" (76 MM)	0.1483" (3.77 MM)
12d	3-1/4" (83 MM)	0.1483" (3.77 MM)
16d	3-1/2" (89 MM)	0.1620" (4.11 MM)
20d	4" (102 MM)	0.1920" (4.88 MM)
30d *	4-1/2" (114 MM)	0.2070" (5.26 MM)
40d *	5" (127 MM)	0.2253" (5.72 MM)
50d *	5-1/2" (140 MM)	0.2437" (6.19 MM)
60d *	6" (152 MM)	0.2625" (6.47 MM)

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

LIST OF RAILCARS THAT MAY BE USED FOR SHIPMENTS

TYPE OF RAILCAR	LENGTH OF RAILCAR	NO. OF ITEMS	MAXIMUM TOTAL WEIGHT (APPROX) OF ITEMS **
KLMS - 440	34'-11-11/16" (10,660 MM)	16	18,048 LBS (8,192 KG)
KLM--505	30'-4-9/16" (9,260 MM)	16	18,048 LBS (8,192 KG)
KLM--506	34'-8-1/2" (10,580 MM)	16	18,048 LBS (8,192 KG)
KBS--442/443	41'-0-1/8" (12,500 MM)	24	27,072 LBS (12,288 KG)
KLS--442/443	41'-0-1/8" (12,500 MM)	24	27,072 LBS (12,288 KG)
RMMS-663/664	41'-5-51/64" (12,644 MM)	24	27,072 LBS (12,288 KG)
RS---680/681	60'-8-23/64" (18,500 MM)	32	36,096 LBS (16,384 KG)
RS---683/684	60'-8-23/64" (18,500 MM)	32	36,096 LBS (16,384 KG)
SAS--710	49'-2-9/16" (15,000 MM)	24	27,072 LBS (12,288 KG)

** REFER TO GENERAL NOTE "F" FOR LADING DATA FOR A SPECIFIC ITEM.



STACK DETAIL

DIMENSION CHART			
CONTAINER	LENGTH	WIDTH	HEIGHT
M22E8 MOTOR	113-1/2" (2,883 MM)	20-3/4" (527 MM)	46-3/4" (1,188 MM)
M112 MOTOR	118-1/2" (3,010 MM)	20-1/2" (521 MM)	45-3/4" (1,162 MM)

UNITIZATION AND HANDLING PROCEDURAL GUIDANCE

1. STACKING CONTAINERS FOR UNITIZING.

   A. PLACE AN UPPER CONTAINER AS CLOSELY AS POSSIBLE IN VERTICAL ALIGNMENT WITH THE NEXT LOWER CONTAINER.

   B. POSITION THE FORWARD END OF AN UPPER CONTAINER ABOVE THE FORWARD END OF THE NEXT LOWER CONTAINER.

2. INSTALLATION OF 1-1/4" X .035" UNITIZING STEEL STRAPPING. SEE GENERAL NOTE "L" ON PAGE 2.

   A. POSITION EACH STRAP TO ENCIRCLE THE CONTAINERS NEAR THE AFT END OF THE SKIDS AND SO THAT THE STRAPPING LAYS FLAT AND STRAIGHT WITH THE BODY SURFACES OF THE CONTAINERS, I.E., VERTICAL ALONG THE SIDES AND STRAIGHT ACROSS THE TOP AND BOTTOM OF THE STACK.

   B. THE STRAPPING WILL BE FIRMLY TENSIONED SO THAT EACH STRAP CRUSHES SLIGHTLY INTO THE UPPER AND LOWER EDGES OF THE STACK. EACH END-OVER-END LAP JOINT WILL BE SEALED WITH TWO SEALS (BUTTED TOGETHER) WITH TWO PAIR OF CRIMPS PER SEAL AS SHOWN. SEE GENERAL NOTE "L" ON PAGE 2. THE LAP JOINT WILL BE MADE ALONG THE SIDE OF THE STACK. EXCESS STRAPPING (STRAP ENDS) SHOULD BE CUT OFF OR BROKEN OFF NEAR THE JOINT SEALS.

(CONTINUED AT RIGHT)

(UNITIZATION AND HANDLING PROCEDURAL GUIDANCE CONTINUED)

3. CONTAINER OR CONTAINER 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 CONTAINERS.

   B. 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 A CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING RAILCAR LOADING, A TWO CONTAINER STACK MAY BE HANDLED BY INSERTING THE FORKS OF THE FORKLIFT TRUCK UNDER THE BODY OF AN UPPER CONTAINER.

   C. IF A CONTAINER OR STACK OF CONTAINERS IS HANDLED BY SLINGING, THE SLING MUST BE OF SUCH A DESIGN THAT LIFTING IS DONE ON THE BOTTOM OF THE LOWEST CRATE.

(KEY NUMBERS CONTINUED)

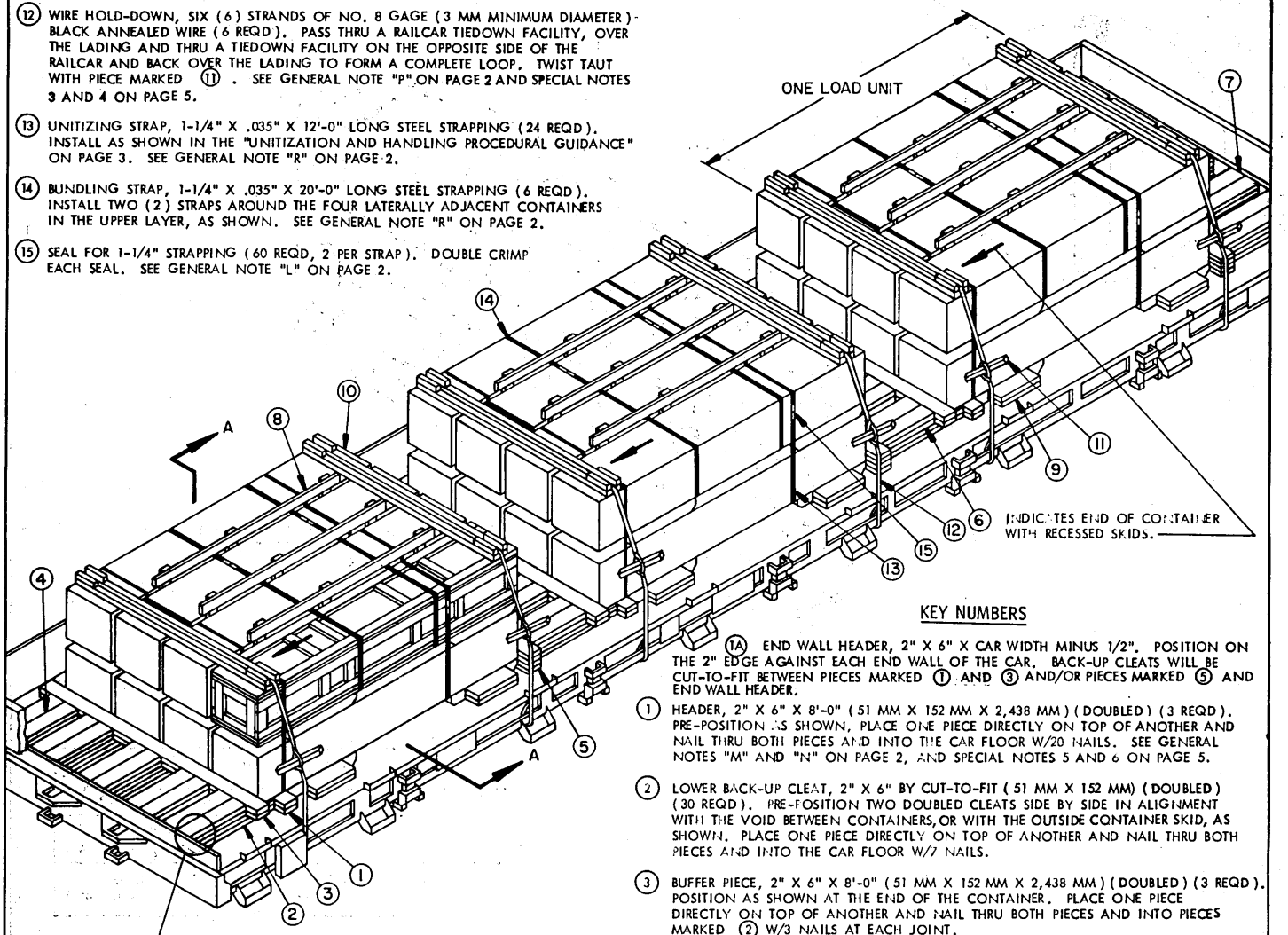
(11) WIRE TWISTER, 2" X 2" BY LENGTH TO SUIT (12 REQD). SEE SPECIAL NOTE 2 ON PAGE 5.

(12) WIRE HOLD-DOWN, SIX (6) STRANDS OF NO. 8 GAGE (3 MM MINIMUM DIAMETER) BLACK ANNEALED WIRE (6 REQD). 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 (11). SEE GENERAL NOTE "P" ON PAGE 2 AND SPECIAL NOTES 3 AND 4 ON PAGE 5.

(13) UNITIZING STRAP, 1-1/4" X .035" X 12'-0" LONG STEEL STRAPPING (24 REQD). INSTALL AS SHOWN IN THE "UNITIZATION AND HANDLING PROCEDURAL GUIDANCE" ON PAGE 3. SEE GENERAL NOTE "R" ON PAGE 2.

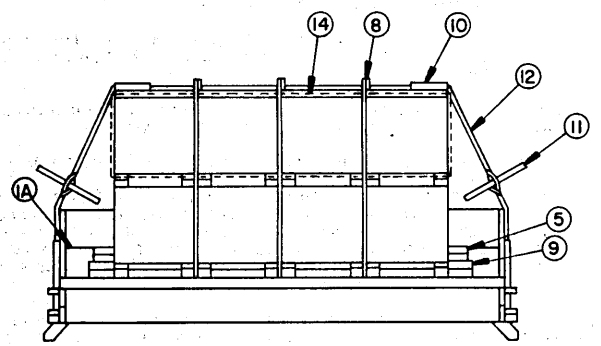
(14) BUNDLING STRAP, 1-1/4" X .035" X 20'-0" LONG STEEL STRAPPING (6 REQD). INSTALL TWO (2) STRAPS AROUND THE FOUR LATERALLY ADJACENT CONTAINERS IN THE UPPER LAYER, AS SHOWN. SEE GENERAL NOTE "R" ON PAGE 2.

(15) SEAL FOR 1-1/4" STRAPPING (60 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "L" ON PAGE 2.



ISOMETRIC VIEW

APPLICATION OF STAGGERED NAILING PATTERN. SEE GENERAL NOTE "M" ON PAGE 2.



SECTION A-A

KEY NUMBERS

(1A) END WALL HEADER, 2" X 6" X CAR WIDTH MINUS 1/2". POSITION ON THE 2" EDGE AGAINST EACH END WALL OF THE CAR. BACK-UP CLEATS WILL BE CUT-TO-FIT BETWEEN PIECES MARKED (1) AND (3) AND/OR PIECES MARKED (5) AND END WALL HEADER.

(1) HEADER, 2" X 6" X 8'-0" (51 MM X 152 MM X 2,438 MM) (DOUBLED) (3 REQD). PRE-POSITION AS SHOWN, PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/20 NAILS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2, AND SPECIAL NOTES 5 AND 6 ON PAGE 5.

(2) LOWER BACK-UP CLEAT, 2" X 6" BY CUT-TO-FIT (51 MM X 152 MM) (DOUBLED) (30 REQD). PRE-POSITION TWO DOUBLED CLEATS SIDE BY SIDE IN ALIGNMENT WITH THE VOID BETWEEN CONTAINERS, OR WITH THE OUTSIDE CONTAINER SKID, AS SHOWN. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/7 NAILS.

(3) BUFFER PIECE, 2" X 6" X 8'-0" (51 MM X 152 MM X 2,438 MM) (DOUBLED) (3 REQD). POSITION AS SHOWN AT THE END OF THE CONTAINER. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO PIECES MARKED (2) W/3 NAILS AT EACH JOINT.

(4) UPPER BACK-UP CLEAT, 2" X 6" BY CUT-TO-FIT (51 MM X 152 MM) (DOUBLED) (10 REQD). POSITION AS SHOWN ON TOP OF PIECES MARKED (2). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO A PIECE MARKED (2) W/7 NAILS. TOENAIL TO PIECE MARKED (1A) W/2 NAILS PER CLEAT.

(5) REAR HEADER, 2" X 6" X 8'-0" (51 MM X 152 MM X 2,438 MM) (QUADRUPLED) (3 REQD). POSITION AS SHOWN AT THE END OF THE CONTAINER. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/20 NAILS. PLACE THE THIRD AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/20 NAILS.

(6) INTERMEDIATE BACK-UP, 2" X 6" (51 MM X 152 MM) BY CUT-TO-FIT (REF: 22") (DOUBLED) (20 REQD). POSITION AS SHOWN ON TOP OF PIECES MARKED (2). PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO PIECE MARKED (2) W/6 NAILS.

(7) REAR BACK-UP CLEAT, 2" X 6" BY CUT-TO-FIT (51 MM X 152 MM) (QUADRUPLED) (10 REQD). POSITION TWO QUADRUPLED CLEATS SIDE BY SIDE IN ALIGNMENT WITH THE VOID BETWEEN THE CONTAINER, OR THE OUTSIDE CONTAINER SKID. 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 AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/7 NAILS. TOENAIL TO PIECE MARKED (1A) W/2 NAILS PER CLEAT.

(8) ANTI-CHAFING ASSEMBLY (9 REQD). SEE THE "ANTI-CHAFING ASSEMBLY" DETAIL ON PAGE 9. INSTALL BETWEEN LATERALLY ADJACENT CONTAINERS, AS SHOWN.

(9) SIDE BLOCKING, 2" X 6" X 18" (51 MM X 152 MM X 457 MM) (DOUBLED) (12 REQD). POSITION AGAINST THE CONTAINER SKIDS AS SHOWN. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.

(10) TIE DOWN BOARD (6 REQD). SEE THE "TIE DOWN BOARD ASSEMBLY" DETAIL ON PAGE 9. POSITION TWO ON EACH LOAD UNIT, AS SHOWN.

(CONTINUED AT LEFT ABOVE)

SPECIAL NOTES:

1. A TWENTY-FOUR UNIT LOAD IS SHOWN ON A 41'-0-1/8" (12,500 MM) LONG BY 9'-1-3/64" (2,770 MM) WIDE EUROPEAN RAILCAR. LARGER CARS MAY BE USED FOR SHIPMENT OF THE DEPICTED LOAD. SEE GENERAL NOTE "G" ON PAGE 2.

2. TWO WIRE TWISTERS, PIECE MARKED KEY NUMBER (11), WILL BE USED TO TIGHTEN EACH TWISTED WIRE HOLD-DOWN. ONE TWISTER WILL BE USED ON EACH SIDE OF THE LADING. THE TWISTER WILL BE SECURED TO PREVENT UNTWISTING AND LOOSENING OF THE WIRE HOLD-DOWN. THE WIRE TWISTERS MUST NOT PROTRUDE BEYOND THE SIDES OF THE CAR WHEN SECURED FOR MOVEMENT.

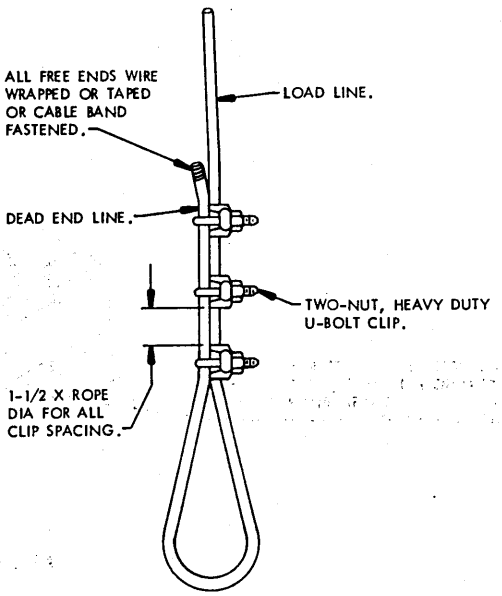
3. AT ANY LOCATION WHERE THE TWISTED WIRE HOLD-DOWN PASSES AROUND A SHARP CORNER, PROVIDE SUITABLE CUSHIONING OR BUFFERING MATERIAL TO PROTECT THE WIRE FROM BEING CUT ON THE SHARP CORNER.

4. IF DESIRED, OR IF ANNEALED WIRE IS NOT AVAILABLE FOR FABRICATING TWISTED WIRE HOLD-DOWNS, MARKED AS KEY NUMBER (12), 3/8" (OR LARGER) STEEL WIRE ROPE MAY BE INSTALLED IN LIEU OF THE TWISTED WIRE HOLD-DOWNS. ONE END OF THE STEEL WIRE ROPE WILL PASS THRU A RAILCAR TIEDOWN FACILITY, WILL BE FOLDED BACK UPON THE OTHER LEG OF THE ROPE, AND BE SECURED WITH THREE CLIPS, AS SHOWN IN THE "CABLE JOINT" DETAIL ON THIS PAGE. THE STEEL WIRE ROPE WILL THEN PASS OVER THE LADING, ON TOP OF THE TIE DOWN BOARD, AND THE OTHER END OF THE STEEL WIRE ROPE WILL BE PASSED THROUGH A RAILCAR TIEDOWN FACILITY ON THE OPPOSITE SIDE OF THE CAR AND BE SECURED IN THE SAME MANNER. TENSIONING OF THE STEEL WIRE ROPE CAN BE ACCOMPLISHED BY EMPLOYING TWO CABLE GRIPPERS ON 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 CONTAINER. THE NUTS ON THE CABLE CLIPS SHALL BE TIGHTENED TO A TORQUE OF APPROXIMATELY 40 FOOT-POUNDS. A PROPER TORQUE CAN BE ACHIEVED BY USING A WRENCH WHICH HAS A HANDLE THAT IS AT LEAST 12" LONG. 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. WHEN USING A STEEL WIRE ROPE WHICH IS LARGER THAN 3/8", THE NUTS ON THE CABLE CLIPS SHALL BE TIGHTENED TO A TORQUE OF AT LEAST 60 FOOT-POUNDS. A WRENCH WHICH HAS A HANDLE THAT IS AT LEAST 15" LONG MAY BE USED TO OBTAIN THE 60 FOOT-POUNDS TORQUE. SEE GENERAL NOTE "Q" ON PAGE 2.

5. PRE-POSITIONED HEADERS AND BACK-UP CLEATS, MARKED AS KEY NUMBERS (1) AND (2), ARE SPECIFIED AS DOUBLED 2" X 6" LUMBER. IF THE DOUBLED 2" X 6" LUMBER IS TOO THICK TO FIT UNDER THE CONTAINER AND AGAINST THE SKID, THESE PIECES MAY BE ASSEMBLED USING 1" X 6" LUMBER FOR THE FIRST PIECE AND 2" X 6" LUMBER FOR THE SECOND PIECE. PLACE THE 2" X 6" LUMBER ON TOP OF THE 1" X 6" LUMBER AND NAIL THROUGH BOTH PIECES INTO THE CAR FLOOR AS SPECIFIED. SEE THE "SPECIAL NAILING GUIDANCE" ON PAGE 10.

6. WHEN LOADING THE LOAD AS SHOWN, ONE DOUBLED HEADER, ONE END-WALL HEADER, AND TEN DOUBLED BACK-UP CLEATS, MARKED AS KEY NUMBERS (1), (1A), AND (2), WILL BE PRE-POSITIONED NEAR THE END OF THE CAR AND NAILED AS SPECIFIED. ONE LOAD UNIT OF EIGHT CONTAINERS WILL THEN BE LOADED AND PIECES MARKED (3), (4), AND (5) FOR THAT LOAD UNIT WILL BE INSTALLED AND NAILED AS SPECIFIED. PIECES MARKED (1) AND (2) FOR THE SECOND LOAD UNIT WILL THEN BE PRE-POSITIONED AND NAILED. THE SECOND LOAD UNIT WILL THEN BE LOADED AND THIS PATTERN REPEATED AS APPLICABLE. ALL COMPONENTS FOR EACH LOAD UNIT WILL BE INSTALLED AS SPECIFIED IN THE KEY NUMBERS ON PAGE 4.

7. IT IS PERMISSIBLE TO SHIP MIXED LOADS OF M22E8 AND M112 MOTORS. HOWEVER, THESE MOTORS ARE NOT TO BE MIXED WITHIN THE BOTTOM LAYER OF A LOAD UNIT. THE BOTTOM LAYER OF A LOAD UNIT IS TO BE ALL M22E8 MOTORS OR ALL M112 MOTORS. DIFFERENT LENGTH CRATES CAN BE PLACED IN THE SECOND LAYER OF A LOAD UNIT, WITH M22E8 MOTORS STACKED ON TOP OF M112 MOTORS OR VICE VERSA. THE DIFFERENCES IN CRATE LENGTHS WILL BE DIVIDED EQUALLY AT EACH END.



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.

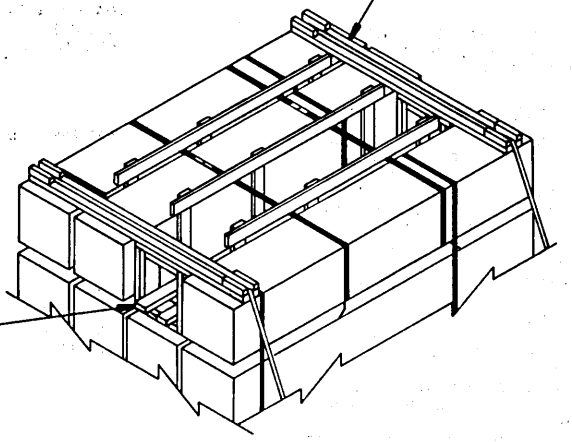
BILL OF MATERIAL

LUMBER	LENGTH	BOARD FEET
1" X 4" (25 MM X 102 MM)	185 FT (56,388 MM)	62
2" X 2" (51 MM X 51 MM)	36 FT (10,973 MM)	12
2" X 6" (51 MM X 152 MM)	731 FT (222,809 MM)	731
NAILS	NO. REQD	WEIGHT
SIZE AS REQD	990	59 LBS

WIRE, NO. 8 GAGE (3 MM DIA)	756' REQD	69 LBS
STEEL STRAPPING, 1-1/4" X .035"	408' REQD	59 LBS
SEAL FOR 1-1/4" STRAPPING	60 REQD	3 LBS

LOAD AS SHOWN

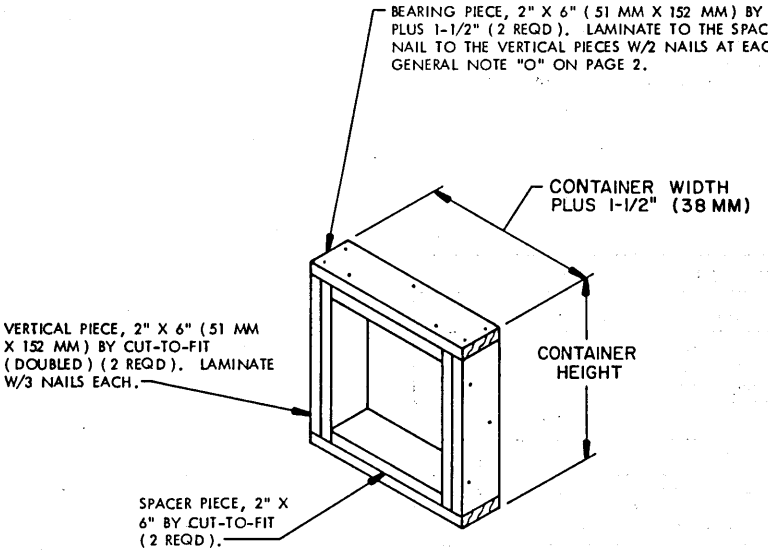
ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER	24	27,072 LBS (12,291 KG)
DUNNAGE		2,203 LBS (1,000 KG)
TOTAL WEIGHT		29,275 LBS (13,291 KG)



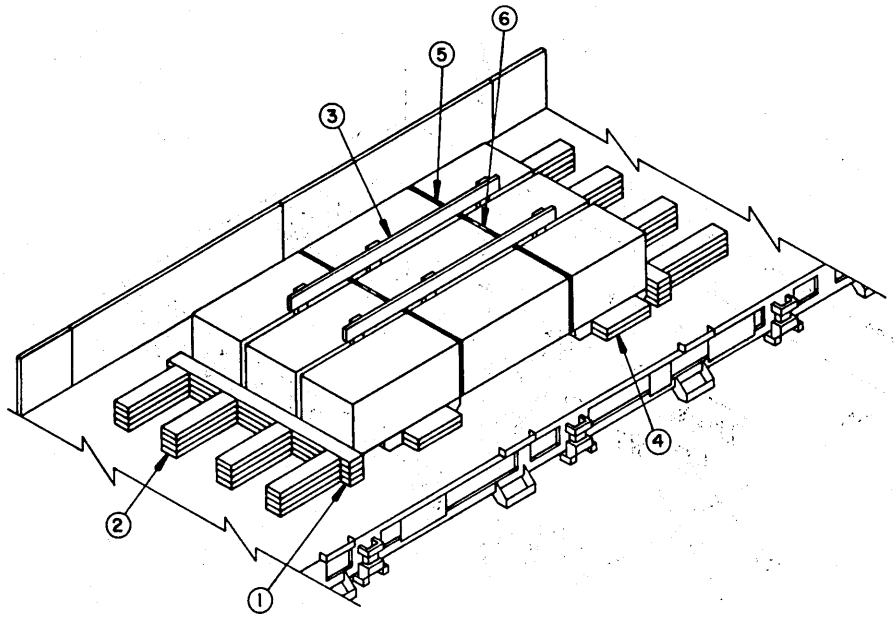
APPLICATION OF SPACER ASSEMBLY

SPECIAL NOTES:

1. ONLY ONE CONTAINER MAY BE OMITTED FROM THE TOP LAYER OF A LOAD UNIT. TWO SPACER ASSEMBLIES AND TWO TIE PIECES MUST BE USED FOR EACH OMITTED CONTAINER AS SHOWN IN THE "APPLICATION OF SPACER ASSEMBLY" DETAIL ABOVE.
2. ALL OTHER BLOCKING, BRACING, AND TIEDOWN COMPONENTS FOR EACH LOAD UNIT WILL BE INSTALLED AS SPECIFIED IN THE LOAD AS SHOWN ON PAGE 4.



SPACER ASSEMBLY



ISOMETRIC VIEW

SPECIAL NOTES:

1. A 3-UNIT LOAD IS SHOWN. ANY CAR WITH A NAILABLE FLOOR 6'-6" (1,971 MM) WIDE (MINIMUM) MAY BE USED.
2. FOUR (4) BACK-UP CLEATS, SHOWN AS PIECE MARKED (2), ARE ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF 3,780 POUNDS (1,718 KG).

KEY NUMBERS

(1) HEADER, 2" X 6" X 72" (51 MM X 152 MM X 1,829 MM) (QUADRUPLED) (2 REQD). POSITION AS SHOWN AT THE ENDS OF THE CONTAINER. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/15 NAILS. PLACE THE THIRD AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/15 NAILS. SEE GENERAL NOTE "N" ON PAGE 2.

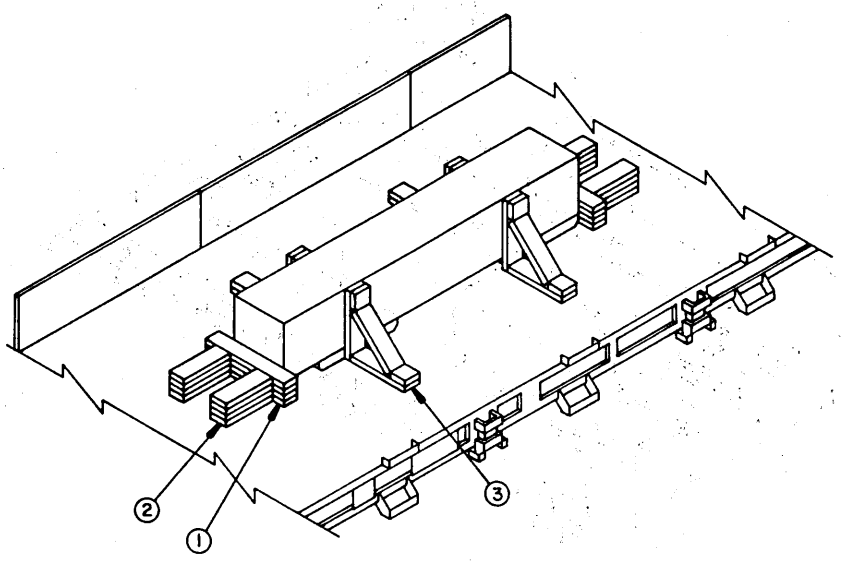
(2) BACK-UP CLEAT, 2" X 6" X 32" (51 MM X 152 MM X 803 MM) (QUADRUPLED) (8 REQD). POSITION AS SHOWN TO ALIGN THE BACK-UP CLEATS WITH THE VOID BETWEEN THE CONTAINERS OR THE OUTSIDE CONTAINER SKID. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/7 NAILS. PLACE THE THIRD AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/7 NAILS.

(3) ANTI-CHAFING ASSEMBLY (2 REQD). SEE THE "ANTI-CHAFING ASSEMBLY" DETAIL ON PAGE 9. INSTALL BETWEEN LATERALLY ADJACENT CONTAINERS, AS SHOWN.

(4) SIDE BLOCKING, 2" X 6" X 18" (51 MM X 152 MM X 457 MM) (DOUBLED) (4 REQD). POSITION AGAINST THE CONTAINER SKIDS AS SHOWN. PLACE ONE PIECE DIRECTLY ON TOP OF ANOTHER AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/3 NAILS.

(5) BUNDLING STRAP, 1-1/4" X .035" X 17'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TWO (2) STRAPS AROUND THREE (3) CONTAINERS, AS SHOWN. SEE GENERAL NOTE "R" ON PAGE 2.

(6) SEAL FOR 1-1/4" STRAPPING (4 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "L" ON PAGE 2.



ISOMETRIC VIEW

SPECIAL NOTES:

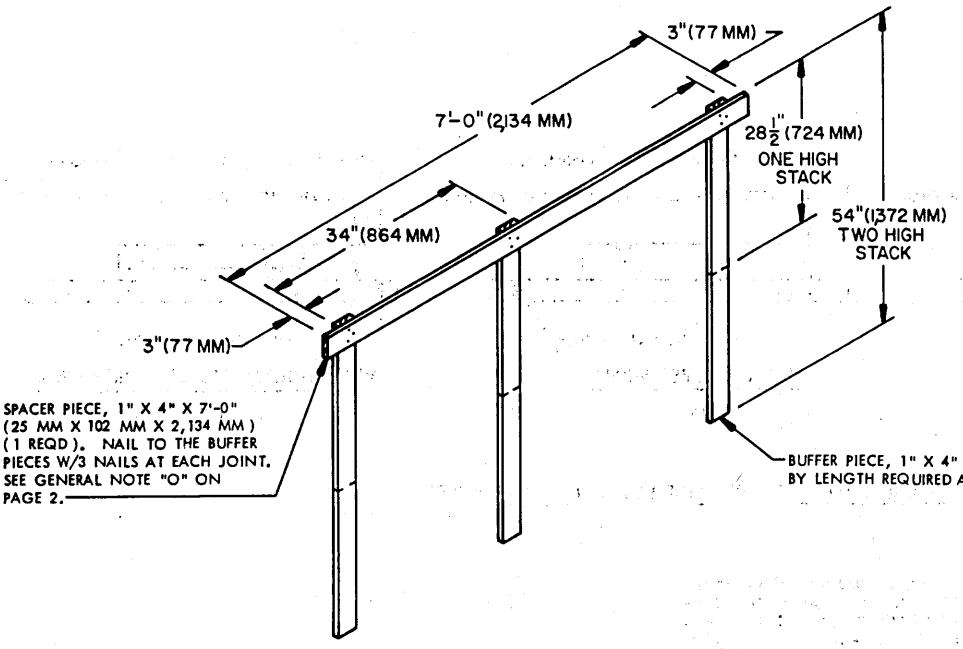
1. A ONE-UNIT LOAD IS SHOWN. ANY CAR WITH A NAILABLE FLOOR 72" (1,829 MM) WIDE (MINIMUM) MAY BE USED.
2. TWO (2) BACK-UP CLEATS, SHOWN AS PIECE MARKED (2), ARE ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF 1,350 POUNDS (614 KG).

KEY NUMBERS

(1) HEADER, 2" X 6" X 30" (51 MM X 152 MM X 762 MM) (QUADRUPLED). (2 REQD). POSITION AS SHOWN AT THE ENDS OF THE CONTAINER. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND 1 TO THE CAR FLOOR W/8 NAILS. PLACE THE THIRD AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/8 NAILS. SEE GENERAL NOTE "N" ON PAGE 2.

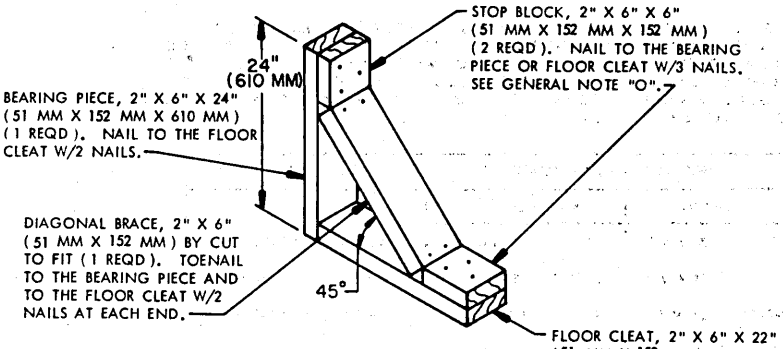
(2) BACK-UP CLEAT, 2" X 6" X 24" (51 MM X 152 MM X 610 MM) (QUADRUPLED) (4 REQD). POSITION AS SHOWN TO ALIGN WITH THE CONTAINER SKID. PLACE THE SECOND PIECE DIRECTLY ON TOP OF THE FIRST AND NAIL THRU BOTH PIECES AND INTO THE CAR FLOOR W/5 NAILS. PLACE THE THIRD AND FOURTH PIECES DIRECTLY ON TOP OF THE FIRST TWO PIECES AND NAIL THRU PIECES THREE AND FOUR INTO PIECES ONE AND TWO W/5 NAILS.

(3) ANTI-SWAY BRACE (4 REQD). SEE THE "ANTI-SWAY BRACE" DETAIL ON PAGE 9. POSITION AGAINST THE CONTAINER AS SHOWN AND NAIL TO THE CAR FLOOR W/5 NAILS.

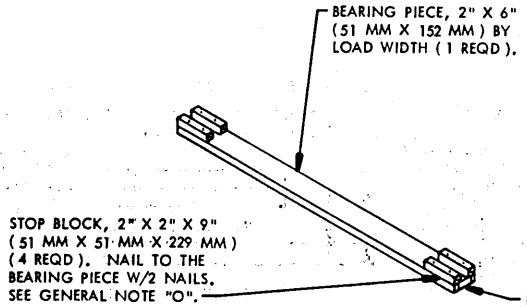


ANTI-CHAFING ASSEMBLY

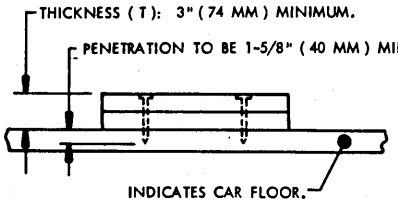
IF 1" X 4" MATERIAL IS NOT AVAILABLE OR IF DESIRED, MATERIAL WIDER THAN 4" (102 MM) MAY BE USED TO FABRICATE THE ASSEMBLY SHOWN ABOVE.



ANTI-SWAY BRACE

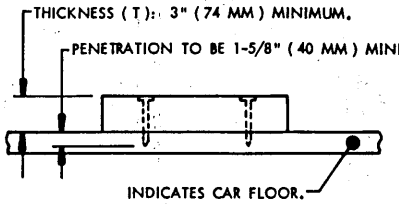


TIE-DOWN BOARD ASSEMBLY



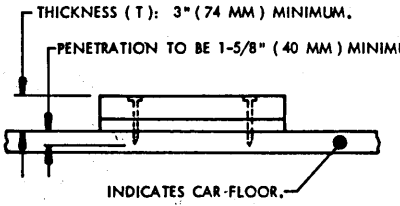
DOUBLED 2" X 6" LUMBER SHOWN

DETAIL A



4" X 6" LUMBER SHOWN

DETAIL B



MIXED THICKNESSES OF LUMBER SHOWN

DETAIL C

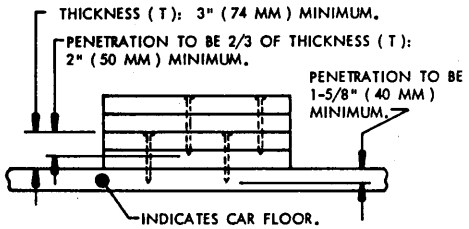
TYPICAL NAILING OF FLOOR LINE BLOCKING TO CAR FLOOR

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 HEADERS, BACK-UP CLEATS, AND SIDE-BLOCKING, AS TYPICALLY SHOWN IN DETAIL A ABOVE. 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 QUADRUPLED 2" X 6" LUMBER IS SPECIFIED, AS TYPICALLY SHOWN IN DETAIL D BELOW, IT IS PERMISSIBLE TO USE DOUBLED 4" X 6" LUMBER, OR MIXED THICKNESSES OF LUMBER, AS TYPICALLY SHOWN IN DETAILS E AND F, IN LIEU OF THE SPECIFIED QUADRUPLED 2" X 6" LUMBER. THE INTENT OF THE SPECIFIED BLOCKING PROCEDURE 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:

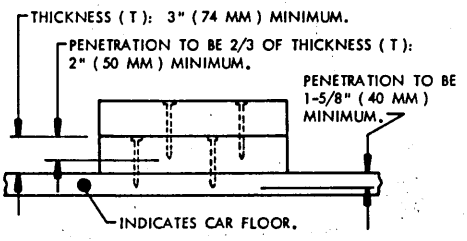
THICKNESS (T) OF BLOCKING		SIZE OF NAIL
MINIMUM	MAXIMUM	
3" (74 MM)	3" (74 MM)	30d (4-1/2") (114 MM)
3" (74 MM)	3-3/8" (87 MM)	40d (5") (127 MM)
3-3/8" (87 MM)	4" (100 MM)	50d (5-1/2") (140 MM)
4" (100 MM)	4-3/8" (112 MM)	60d (6") (152 MM)

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



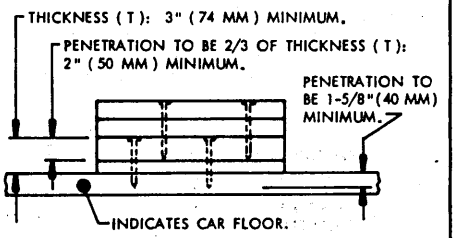
QUADRUPLED 2" X 6" LUMBER SHOWN

DETAIL D



DOUBLED 4" X 6" LUMBER SHOWN

DETAIL E



MIXED THICKNESSES OF LUMBER SHOWN

DETAIL F

TYPICAL NAILING OF ADDITIONAL LAMINATIONS TO FLOOR LINE BLOCKING