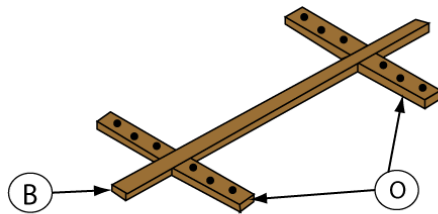
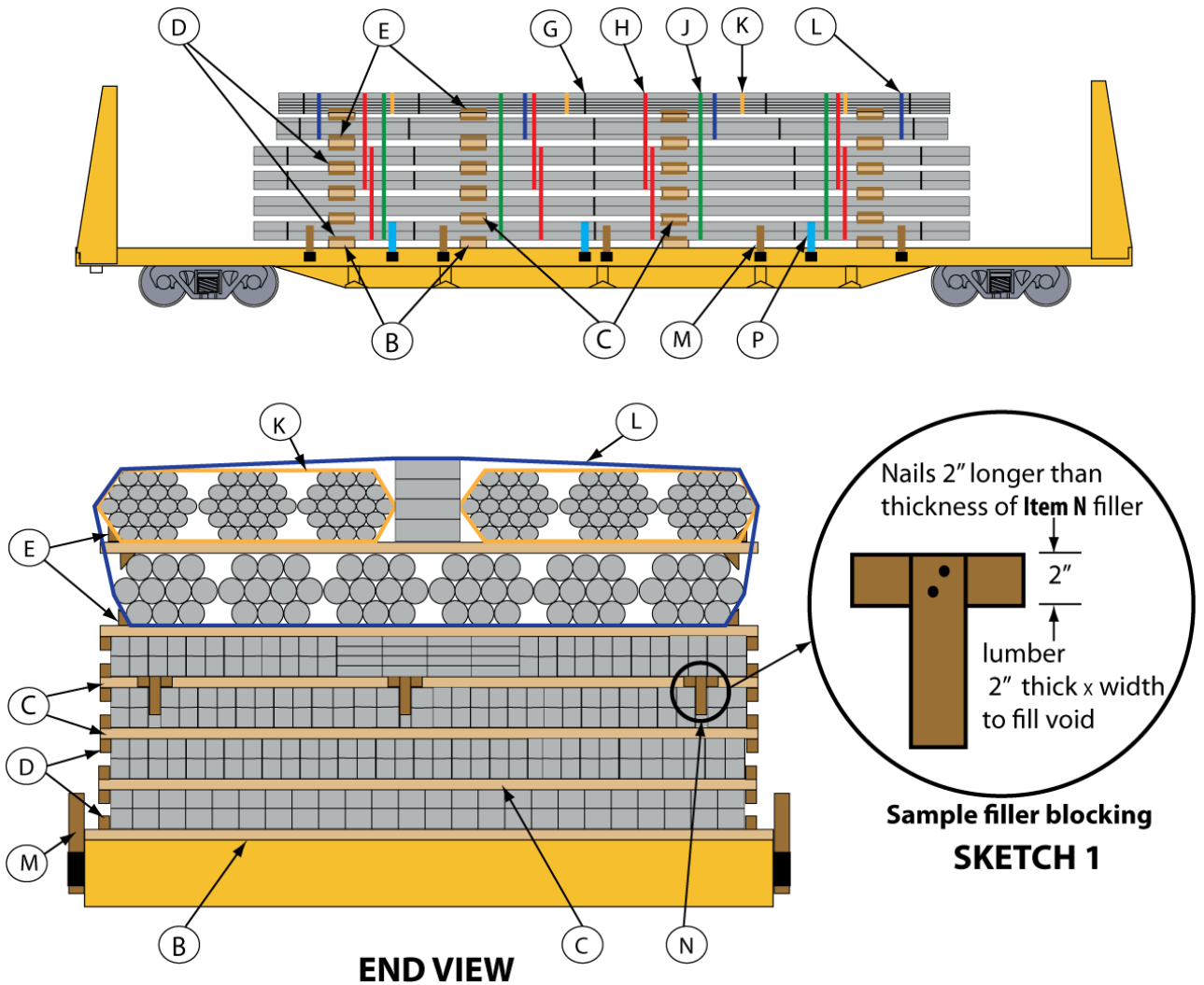


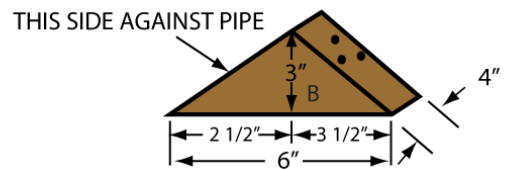
TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN. OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH CUSHIONING DEVICES

RAC 12154B

Revised 01-2024 AAR Ref: Fig. 154B



SKETCH 2

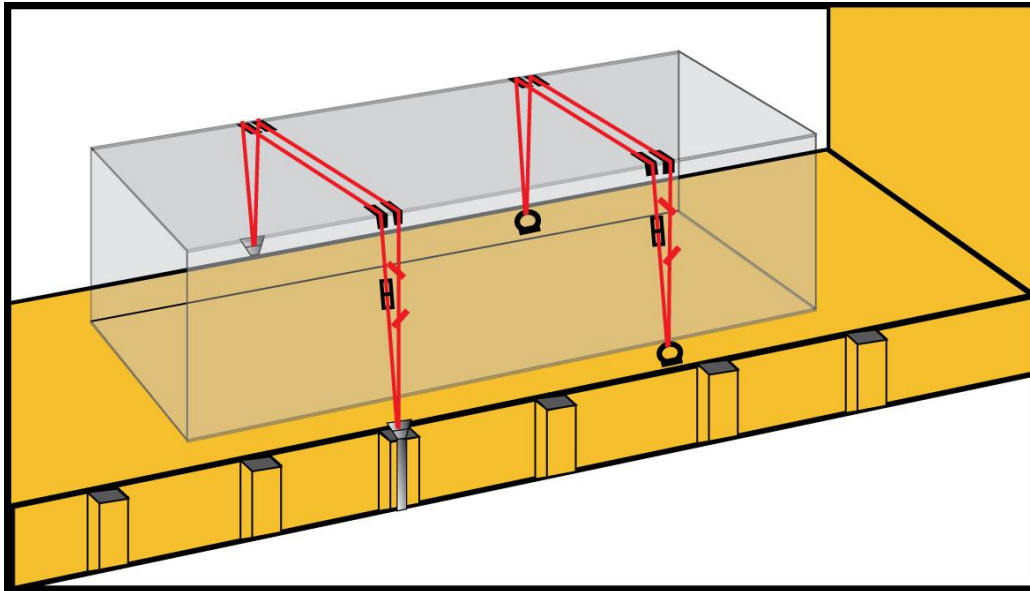


ITEM E
SKETCH 3

**TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
CUSHIONING DEVICES**

RAC 12154B (Continued)

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DOUBLE TIE-DOWN APPLICATION



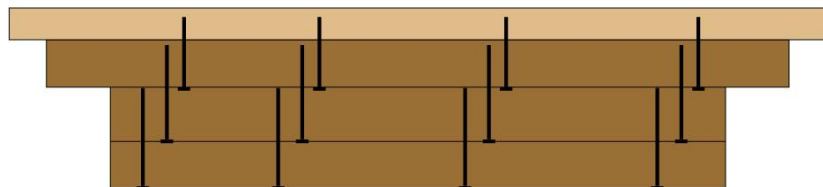
**J-HOOK
PHOTO 1**



**LADDER BUCKLE
PHOTO 2**



**CORNER PROTECTOR
PHOTO 3**



DETAIL A

TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
CUSHIONING DEVICES

RAC 12154B (Continued)

Revised 01-2024 AAR Ref: Fig. 154B

Item	No. of Pcs.	Description
A		Vacant.
B	4 per pile 40 ft long or less. Add 1 for each additional 10 ft or less.	Bearing pieces: hardwood, minimum 2 in. x 4 in., must not be taller than wide, length equal to width of car. Locate end pieces 2 ft. to 4 ft. from each end of pile with intermediate bearing pieces equally spaced. Secure each to car floor with six 20-D nails equally spaced across length of bearing pieces. Lamination of hardwood is not permitted. For nailable steel floors where bearing piece will not be nailed, or when taller than 2 inches, see Sketch 2 and Item O .
C	4 per pile 40 ft long or less. Add 1 for each additional 10 ft or less.	Separators: hardwood, minimum 2 in. x 4 in. Length must extend a minimum of 6 in. beyond the side of load but must not extend beyond deck of car. length equal to width of load. Locate between each layer, of each pile equally spaced.
D	2 per each Item B. 4 per each Item C.	Chock blocks: lumber, 2 in. x 4 in. x 6 in. Use if top tier is narrowed. Locate at each end of Items B against side of tubing and secure each with three 16-D nails. On Items C, locate one top and bottom on each side of load against tubing and secure each with three 16-D nails. Only required when squares or rectangular tubing are located on the exterior side of the load.
E	2 per each Item B. 4 per each Item C.	Chock blocks: hardwood, 3 in. x 4 in. x 6 in., predrilled, unless power-driven nails are used. Attach one at each end of Items B against pipe and secure each with three 16-D nails. Nail securing chock blocks must be applied within 10 degrees of vertical. Attach one top and bottom of each Item C on each side of load against pipe and secure each with three 16-D nails. Only required when rounds are located on exterior of the load. See SKETCH 3 .

**TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
CUSHIONING DEVICES**

RAC 12154B (Continued)

Revised 01-2024 AAR Ref: Fig. 154B

Item	No. of Pcs.	Description
G	3 per package squares and rectangles 20 ft. or less. Add 1 for each additional 10 ft. or less. Rounds: 1 pair each end of package 12 ft. or less. Add 1 additional band for each 10 ft. or less.	Package bands: Squares and Rectangles: 1 1/4 in. × .029 in. high tension bands. Space equally over length of package and avoid contact with dunnage. Package bands: Rounds: 1 1/4 in. × .029 in. high tension bands. 1 pair each end of package 12 ft. or less. Add 1 additional band for each 10 ft. or less. Spaced equally between pairs and avoid contact with dunnage.
H	3 pair per pile 30 ft long. Add 1 pair for each additional 10 ft or less.	Unitizing bands: 1 1/4 in. × .029 in. high tension bands. Apply 50% of bands around the bottom two thirds of load and 50% around top two thirds of load. Space equally over length of load and as far from Item B bearing pieces as practical. May be substituted with Type 1A Grade 7 polyester strap.
J	3 per pile, 30 ft long or less. Add 1 for each additional 10 ft or less	Encircling bands: 2 in. × .044 in. high tension bands. Apply one at each end with others equally spaced between and as far from Item B bearing pieces as practical. When four or more are used, apply two at each end with others equally spaced between. May be substituted with Type 1A Grade 7 polyester strap.
K	As required	Top layer encircling bands: 1 1/4 in. × .029 in. high tension bands. When top layer contains packages of unequal height as illustrated in the end view drawing above, encircle all packages of lesser height on each side of taller packages with three bands for pipe 40 ft long or less, adding one band for each additional 10 ft long or less. May be substituted with Type 1A Grade 7 polyester straps.

TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
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RAC 12154B (Continued)

Revised 01-2024 AAR Ref: Fig. 154B

Item	No. of Pcs.	Description
L	3 pairs per pile 30 ft long or less. Add 1 for each additional 10 ft or less.	Layer encircling bands: 1 1/4 in. × .029 in. high tension bands. Encircle top two layers when containing round tubulars. Space equally over length of layers. May be substituted with Type 1A Grade 7 polyester strap.
M	4 pairs per pile 30 ft long or less. Add 1 for each additional 10 ft or less.	Stub stakes: hardwood, 4 in. × 5 in. Length to extend to 10 in. above car floor. Locate one pair approximately 3 to 5 ft from each end of load with others equally spaced between.
N	As required	Wooden fillers: hardwood, suitably located to fill voids in load. Secure to separators (Item C) to prevent displacement.
O	4 per each item B	Cleats: hardwood, 2 in. × 4 in. × 2 ft. Locate approximately 18 in. from side of car, two on each side of Item B. Secure each to car deck with a minimum of three 20-D nails. Toenail each cleat to the bearing piece for lateral securement. See SKETCH 2 . Not required when Item B bearing pieces are secured to the car floor.
P	3 per bottom pile	Tie-down straps: AAR approved Type 1A Grade 8 non-metallic strapping. Place over bottom layer and secure by single strap method (two buckles) or double tie-down method (one buckle) to either lading strap anchors or stake pockets with appropriate hooks and/or buckles.

Notes:

1. This load is restricted to round tubulars 1 1/2 in. up to and including 16 in. in diameter and square or rectangle tubulars 12 in. × 12 in. or less.
2. Round tubulars less than 2 3/8 in. must be loaded in top two layers.
3. Load height not to exceed 9 ft 6 in. above car floor.



TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
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RAC 12154B (Continued)

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4. High tension bands shown are sufficient for loads up to 110,000 lb. Add one band of each designation for each additional 20,000 lb or less of load weight. All high-tension bands may be substituted with AAR approved Type 1A Grade 7 Polyester Strap.

Load Weight	Additional Bands per Designation on Sketch
110,000 or less	0
110,001 to 130,000	1
130,001 to 150,000	2
150,001 to 170,000	3
170,001 to 190,000	4

5. Load to consist of a single pile with no shorter than nominally 30 ft long product in bottom layer. Heavier load concentration should be placed in bottom layers.
6. Shorter packages must be located within interior of load and supported by at least two Item C separators. Short packages may be placed end-to-end to provide adequate support for layers above, provided the packages do not extend more than one-fifth of their length beyond the supporting layer below. Product less than 12 ft long may not be loaded to this figure.
7. Round tubulars within a package must be nested.
8. When mixed-height packages are loaded in a layer, shorter height packages must be located in center of layer. Outside packages must be of equal height, except in the top layer. Item C separators must be laminated to fill void in load. Laminated material must be hardwood, length sufficient to fill void. Each piece of lamination to be a minimum 2 in. thick and secured with a minimum of four 20-D nails (power-driven is acceptable), equally spaced across length. See **DETAIL A**.
9. All layers must be uniform in width except the top layer, which may be narrower.
10. All lateral voids must be filled. When needed, wooden filler blocking is to be used as shown to fill lateral voids in load and/or maintain package separation. All blockings must be secured to prevent displacement during transit. Nails must be applied to side of wood as shown in **SKETCH 1**, not in the end grain.
11. Unitizing and encircling bands should be located to provide maximum clearance from Items B and C.
12. Sweet gum is an acceptable substitute for hardwood in this figure.

TUBING, STEEL, SQUARE AND RECTANGULAR, AND ROUNDS, 16 IN. X 16 IN.
OR LESS, 12 FT LONG OR OVER, PACKAGED - BULKHEAD FLATCARS, WITH
CUSHIONING DEVICES

RAC 12154B (Concluded)

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13. Douglas fir (coast type) is acceptable for use as bearing pieces and separators in this figure where hardwood is specified for loads weighing 140,000 lbs. or less. Separators must be minimum full 3 in. × 4 in.
14. All sharp edges must be protected by appropriate edge protection for strapping used. Edge protection is not required if all corner radii are no less than 125% of wall thickness and wall thickness is no less than .063 in.
15. When two or more piles are placed end to end on car deck, they require a minimum of 10 in. space between piles with a maximum of 24 in.
16. Load must be centrally located on the rail car at origin.
17. Tie-down assemblies, consisting of a winch, ratchet, and polyester woven straps 4 in. wide with 20,000 MBS. May be used as a substitute for Item P if cars are equipped.
18. Deck of rail car must be free of debris, ice and snow prior to loading
19. If a tarp is used, it must be secured per AAR section 1, General Rules 1.2.26, 1.2.27, and 1.2.28.

Reference the General Rules in Section 1 of the *Open Top Loading Rules Manual* for additional details.