U.S. DEPARTMENT OF TRANSPORTATION

SAFETY APPLIANCES AND POWER BRAKES

FEDERAL RAILROAD ADMINISTRATION
OFFICE OF SAFETY

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FEDERAL RAILROAD ADMINISTRATION

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UNITED STATES
SAFETY APPLIANCE STANDARDS
AND
POWER BRAKE REQUIREMENTS

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INTRODUCTION

Public Law 89–670, approved October 15, 1966 (49 U.S.C. 1651–9), established the United States Department of Transportation. Pursuant to that law, certain functions, powers, and duties of the Interstate Commerce Commission were transferred to and vested in the Secretary of Transportation, including the following laws relating generally to safety appliances and equipment on railroad engines and cars, and protection of employees and travelers:

(A) The Act of March 2, 1893, as amended, (27 Stat. 531; 45 U.S.C. 1 et seq.).

(B) The Act of March 2, 1903, as amended, (32 Stat. 943; 45 U.S.C. 8 et seq.).

(C) The Act of April 14, 1910, as amended, (36 Stat. 298; 45 U.S.C. 11 et seq.).

Public Law 89–670 (49 U.S.C. 1655 (f) (3) (a)) further provided that the Federal Railroad Administrator shall carry out the functions, powers, and duties of the Secretary pertaining to railroad safety as set forth in the statutes transferred to the Secretary.

Also included in this publication are Part 231, Railroad Safety Appliance Standards, and Part 232, Railroad Power Brakes and Drawbars. These Parts are codified under Title 49 of the Code of Federal Regulations.

Plates C through V are provided to show safety appliance arrangements. For specific details, see appropriate text.

The U.S. Safety Appliance Standards are administered by the Federal Railroad Administration, U.S. Department of Transportation, Washington, D.C. 20590.

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The Safety Appliance Acts

(45 U.S. Code, Secs. 1–16)

(With notes relating to orders issued to effectuate certain provisions of these acts.)

Section 1. Driving-wheel brakes and appliances for operating train-brake system.

It shall be unlawful for any common carrier engaged in interstate commerce by railroad to use on its line any locomotive engine in moving interstate traffic not equipped with a power-driving-wheel brake and appliances for operating the trainbrake system, or to run any train in such traffic that has not a sufficient number of cars in it so equipped with power or train brakes that the engineer on the locomotive drawing such train can control its speed without requiring brakemen to use the common hand brake for that purpose. (Mar. 2, 1893, ch. 196, sec. 1, 27 Stat. 531.)

Section 2. Automatic couplers.

It shall be unlawful for any common carrier engaged in interstate commerce by railroad to haul or permit to be hauled or used on its line any car used in moving interstate traffic not equipped with couplers coupling automatically by impact, and which can be uncoupled without the necessity of men going between the ends of the cars. (Mar. 2, 1893, ch. 196, sec. 2, 27 Stat. 531.)

Section 3. Refusal of insufficiently equipped cars from connecting lines.

When any person, firm, company, or corporation engaged in interstate commerce by railroad shall have equipped a sufficient number of its cars so as to comply with the provisions of section 1 of this title, it may lawfully refuse to receive from connecting lines of road or shippers any cars not equipped sufficiently, in accordance with said section, with such power or train brakes as will work and readily interchange with the brakes in use on its own cars, as required by sections 1–7 of this title. (Mar. 2, 1893, ch. 196, sec. 3, 27 Stat. 531.)

Section 4. Grab irons or handholds for security in coupling and uncoupling cars.

Until otherwise ordered by the Secretary of Transportation, it shall be unlawful for any railroad company to use any car in interstate commerce that is not provided with secure grab irons or handholds in the ends and sides of each car for greater security to men in coupling and uncoupling cars. (Mar. 2, 1893, ch. 196, sec. 4, 27 Stat. 531.)

Section 5. Standard height of drawbars for freight cars; non-complying cars excluded from traffic.

No freight cars, either loaded or unloaded, shall be used in interstate traffic which do not comply with the prescribed standard as to height of drawbars. (Mar. 2, 1893, ch. 196, sec. 5, 27 Stat. 531.)

(NOTE 1.—Standard height of drawbars prescribed by 49 CFR 232.2 standard-gage railroads: maximum 34½, minimum 31½ inches; narrow-gage railroads: maximum 26, minimum 23 inches; 2-foot gage railroads: maximum 17½, minimum 14½inches.)

Section 6. Failure to equip cars as provided; duty of United States attorneys and Secretary of Transportation; exceptions from operation of provisions.

Any common carrier engaged in interstate commerce by railroad using any locomotive engine, running any train, or hauling or permitting to be hauled or used on its line any car in violation of any of the provisions of sections 1–7 of this title, shall be liable to a penalty of not less than $250 and not more than $2,500 for each and every violation, to be recovered in a suit or suits to be brought by the United States attorney in the district court of the United States having jurisdiction in the locality where such violation shall have been committed; and it shall be the duty of such United States attorney to bring such suits upon duly verified information being lodged with him of such violation having occurred; and it shall also be the duty of the Secretary of Transportation to lodge with the proper United States attorneys information of any such violations as may come to his knowledge: *Provided*, that nothing in sections 1–7 of this title shall apply to trains composed of four-wheel cars or to trains composed of eight-wheel standard logging cars where the height of such car from top of rail to center of coupling does not exceed 25 inches, or to locomotives used in hauling such trains when such cars or locomotives are exclusively used for the transportation of logs. (Mar. 2, 1893, ch. 196, sec. 6, 27

Stat. 532; Apr. 1, 1896, ch. 87, 29 Stat. 85; June 25, 1948, ch. 646, sec. 1, 62 Stat. 909; Aug. 14, 1957, Public Law 85–135, sec. 1(1), 71 Stat. 352.)

Section 7. Assumption of risk by employees.

Any employee of any common carrier engaged in interstate commerce by railroad who may be injured by any locomotive, car, or train in use contrary to the provision of sections 1–7 of this title shall not be deemed thereby to have assumed the risk thereby occasioned, although continuing in the employment of such carrier after the unlawful use of such locomotive, car, or train had been brought to his knowledge. (Mar. 2, 1893, ch. 196, sec. 8, 27 Stat. 532.)

Section 8. Provisions of certain sections extended.

The provisions and requirements of sections 1–7 of this title shall be held to apply to common carriers by railroads in the Territories and the District of Columbia and shall apply in all cases, whether or not the couplers brought together are of the same kind, make, or type; and the provisions and requirements relating to train brakes, automatic couplers, grab irons, and the height of drawbars shall be held to apply to all trains, locomotives, tenders, cars, and similar vehicles used on any railroad engaged in interstate commerce, and in the Territories and the District of Columbia, and to all other locomotives, tenders, cars, and similar vehicles used in connection therewith, excepting those trains, cars and locomotives exempted by the provisions of section 6 of this title, or which are used upon street railways. (Mar. 2, 1903, ch. 976, sec. 1, 32 Stat. 943.)

Section 9. Power or train brakes; operation by engineer; rules for installation, inspection, maintenance, and repair.

Whenever, as provided in sections 1–7 of this title, any train is operated with power or train brakes not less than 50 per centum of the cars in such train shall have their brakes used and operated by the engineer of the locomotive drawing such train; and all power-braked cars in such train which are associated together with said 50 per centum shall have their brakes so used and operated; and, to more fully carry into effect the objects of said sections, the Secretary of Transportation may, from time to time, after full hearing, increase the minimum percentage of cars

in any train required to be operated with power or train brakes which must have their brakes used and operated as aforesaid. One hundred and twenty days after the date of enactment of the Power or Train Brakes Safety Appliance Act of 1958, the Secretary of Transportation shall adopt and put into effect the rules, standards, and instructions of the Association of American Railroads, adopted in 1925 and revised in 1933, 1934, 1941, and 1953, with such revisions as may have been adopted prior to the enactment of such act, for the installation, inspection, maintenance, and repair of all power or train brakes for common carriers engaged in interstate commerce by railroad. Such rules, standards, and instructions shall thereafter remain the rules, standards, and instructions for the installation, inspection, maintenance and repair of all power or train brakes unless changed, after hearing, by order of the Secretary of Transportation: *Provided, however,* That such rules or standards or instructions or changes therein shall be promulgated solely for the purpose of achieving safety. The provisions and requirements of this section shall apply to all trains, locomotives, tenders, cars and similar vehicles used, hauled, or permitted to be used or hauled, by any railroad engaged in interstate commerce. In the execution of this section, the Secretary of Transportation may utilize the services of the Association of American Railroads, and may avail himself of the advice and assistance of any department, commission, or board of the United States Government, and of State governments, but no official or employee of the United States shall receive any additional compensation for such service except as now permitted by law. Failure to comply with any rule, regulation, or requirement promulgated by the Secretary of Transportation pursuant to the provisions of this section shall be subject to the like penalty as failure to comply with any requirement of this section. (Mar. 2, 1903, ch. 976, sec. 2, 32 Stat. 943; Apr. 11, 1958, Public Law 85–375, 72 Stat. 86.)

(NOTE 2.—Minimum percentage of power brakes increased by 49 CFR 232.1 to 85 percent.)

(NOTE 3.—Rules, standards and instructions for the installation, inspection, maintenance, and repair of power or train brakes adopted by 49 CFR 232.10 to 232.17.)

Section 10. Former duties, requirements, and liabilities continued unless specifically amended.

Nothing in sections 8 and 9 of this title shall be held or construed to relieve any common carrier, the Secretary of Trans-

portation, or any United States attorney from any of the provisions, powers, duties, liabilities, or requirements of sections 1–7 of this title, and all of such provisions, powers, duties, requirements, and liabilities shall, except as specifically amended by sections 8 and 9 of this title, apply thereto. (Mar. 2, 1903, ch, 976, sec. 3, 32 Stat. 943; June 25, 1948, ch. 646, sec. 1, 62 Stat. 909.)

Section 11. Safety appliances required for each car; when hand brakes may be omitted.

It shall be unlawful for any common carrier subject to the provisions of sections 11–16 of this title to haul, or permit to be hauled or used on its line, any car subject to the provisions of said sections not equipped with appliances provided for in said sections, to wit: All cars must be equipped with secure sill steps and efficient hand brakes; all cars requiring secure ladders and secure running boards shall be equipped with such ladders and running boards, and all cars having ladders shall also be equipped with secure handholds or grab irons on their roofs at the tops of such ladders: *Provided*, That in the loading and hauling of long commodities, requiring more than one car, the hand brakes may be ommitted on all save one of the cars while they are thus combined for such purpose. (Apr. 14, 1910, ch. 160, sec. 2, 36 Stat. 298.)

Section 12. Safety appliances, as designated by Secretary to be standards of equipment; modification of standard height of drawbars.

The number, dimensions, location, and manner of application of the appliances provided for by sections 4 and 11 of this title as designated by the Secretary of Transportation shall remain as the standards of equipment to be used on all cars subject to the provisions of sections 11–16 of this title, unless changed by an order of said Secretary of Transportation, to be made after full hearing and for good cause shown; and failure to comply with any such requirement of the Secretary of Transportation shall be subject to a like penalty as failure to comply with any requirement of sections 11–16 of this title. Said Secretary is given authority, after hearing, to modify or change, and to prescribe the standard height of drawbars and to fix the time within which such modification or change shall become effective and obligatory, and prior to the time so fixed it shall be unlawful to use any car or

vehicle in interstate or foreign traffic which does not comply with the standard now fixed or the standard so prescribed, and after the time so fixed it shall be unlawful to use any car or vehicle in interstate or foreign traffic which does not comply with the standard so prescribed by the Secretary. (Apr. 14, 1910, ch. 160, sec. 3, 36 Stat. 298.)

(NOTE 4.—Safety Appliance Standards fixed by 49 CFR 231)

Section 13. Penalty for using car not equipped as provided; hauling car for repairs where equipment becomes defective; liability for death or injury of employee; use of chains instead of drawbars.

Any common carrier subject to sections 11–16 of this title using, hauling, or permitting to be used or hauled on its line, any car subject to the requirements of said sections not equipped as provided in said sections, shall be liable to a penalty of not less than $250 and not more than $2,500 for each and every such violation, to be recovered as provided in section 6 of this title: *Provided*, That where any car shall have been properly equipped, as provided in sections 1–16 of this title, and such equipment shall have become defective or insecure while such car was being used by such carrier upon its line of railroad, such car may be hauled from the place where such equipment was first discovered to be defective or insecure to the nearest available point where such car can be repaired, without liability for the penalties imposed by this section or section 6 of this title, if such movement is necessary to make such repairs and such repairs cannot be made except at such repair point; and such movement or hauling of such car shall be at the sole risk of the carrier, and nothing in this section shall be construed to relieve such carrier from liability in any remedial action for the death or injury of any railroad employee caused to such employee by reason of or in connection with the movement or hauling of such car with equipment which is defective or insecure or which is not maintained in accordance with the requirements of sections 1–16 of this title; and nothing in this proviso shall be construed to permit the hauling of defective cars by means of chains instead of drawbars, in revenue trains or in association with other cars that are commercially used, unless such defective cars contain livestock or "perishable" freight. (Apr. 14, 1910, ch. 160, sec. 4, 36 Stat. 299; Aug. 14, 1957, Public Law 85–135, sec. 1(2), 71 Stat. 352.)

Section 14. Liability for using car with defective equipment, except as specified.

Except that, within the limits specified in section 13 of this title the movement of a car with defective or insecure equipment may be made without incurring the penalty provided by the statutes, but shall in all other respects be unlawful, nothing in sections 11–16 of this title shall be held or construed to relieve any common carrier, the Secretary of Transportation, or any United States attorney from any of the provisions, powers, duties, liabilities, or requirements heretofore set out in sections 1–10 of this title; and except as aforesaid, all of such provisions, powers, duties, requirements, and liabilities shall apply to sections 11–16 of this title. (Apr. 14, 1910, ch. 160, sec. 5, 36 Stat. 299.)

Section 15. Enforcement by Secretary.

It shall be the duty of the Secretary of Transportation to enforce the provisions of sections 11–16 of this title as to equipment of each car with safety appliances and all powers heretofore granted to said Secretary are extended to him for the purpose of such enforcement. (Apr. 14, 1910, ch. 160, sec. 6, 36 Stat. 299.)

Section 16. Application of provisions to common carriers and vehicles subject to "Safety Appliance Acts."

The provisions of sections 11–16 of this title, as to the equipment of cars with the designated safety appliances apply to every common carrier and every vehicle subject to what are commonly known as the "Safety Appliance Acts" set out in sections 1–10 of this title. (Apr. 14, 1910, ch. 160, sec. 1, 36 Stat. 298.)

Part 231—Railroad Safety Appliance Standards

NOTE: Where rivets or bolts are required in Part 231, a two-piece steel rivet may be used consisting of:

(a) A solid shank of one-half (½) inch minimum diameter steel or material of equal or greater strength having cold forged head on one end, a shank length for material thickness fastened, locking grooves, breakneck groove and pull grooves (all annular grooves) on the opposite end.

(b) A collar of similar material which is cold swaged into the locking grooves forming a head for the opposite end of item (a) after the pull groove section has been removed.

§ 231.1 Box and other house cars.

NOTE: After December 31, 1979, cars of this type built on or before April 1, 1966, or under construction prior thereto and placed in service before October 1, 1966, must be equipped as nearly as possible with the same complement of safety appliances, depending upon type, as specified in § 231.27 for box and other house cars without roof hatches, or in § 231.28 for box and other house cars with roof hatches. Cars built after April 1, 1966, or under construction prior thereto and placed in service after October 1, 1966, must be equipped, depending upon type, as specified in § 231.27 for box and other house cars without roof hatches, or in § 231.28 for box and other house cars with roof hatches.

(a) *Hand brakes*—(1) *Number.* (i) Each box or other house car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

(ii) The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on plate A.

(2) *Dimensions.* (i) The brake shaft shall be not less than 1¼ inches in diameter, of wrought iron or steel without weld.

(ii) The brake wheel may be flat or dished, not less than 15, preferably 16, inches in diameter, of malleable iron, wrought iron, or steel.

(3) *Location.* (i) The hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car, to the left of and not less than 17 nor more than 22 inches from center.

(4) *Manner of application.* (i) There shall be not less than 4 inches clearance around rim of brake wheel.

(ii) Outside edge of brake wheel shall be not less than 4 inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

(iii) Top brake-shaft support shall be fastened with not less than ½-inch bolts or rivets. (See plate A.)

(iv) A brake-shaft step shall support the lower end of brake shaft. A brake-shaft step which will permit the brake chain to drop under the brake shaft shall not be used. U-shaped form of brake-shaft step is preferred. (See plate A.).

(v) Brake shaft shall be arranged with a square fit at its upper end to secure the hand-brake wheel; said square fit shall be not less than seven-eighths of an inch square. Square-fit taper, nominally 2 in 12 inches. (See plate A.)

(vi) Brake chain shall be of not less than ⅜-, preferably 7/16-, inch wrought iron or steel, with a link on the brake rod end of not less than 7/16-, preferably ½-, inch wrought iron or steel, and shall be secured to brake-shaft drum by not less than ½-inch hexagon or squareheaded bolt. Nut on said bolt shall be secured by riveting end of bolt over nut. (See plate A.)

(vii) Lower end of brake shaft shall be provided with a trunnion of not less than ¾-, preferably 1, inch in diameter extending through brake-shaft step and held in operating position by a suitable cotter or ring. (See plate A.)

(viii) Brake-shaft drum shall be not less than 1½ inches in diameter. (See plate A.)

(ix) Brake ratchet wheel shall be secured to brake shaft by a key or square fit; said square fit shall be not less than 1 5/16 inches square. When ratchet wheel with square fit is used, provision shall be made to prevent ratchet wheel from rising on shaft to disengage brake pawl. (See plate A.)

(x) Brake ratchet wheel shall be not less than 5¼, preferably 5½, inches in diameter and shall have not less than 14, preferably 16, teeth. (See plate A.)

(xi) If brake ratchet wheel is more than 36 inches from brake wheel, a brake-shaft support shall be provided to support

this extended upper portion of brake shaft; said brake-shaft support shall be fastened with not less than ½-inch bolts or rivets.

(xii) The brake pawl shall be pivoted upon a bolt or rivet not less than five-eighths of an inch in diameter, or upon a trunnion secured by not less than ½-inch bolt or rivet, and there shall be a rigid metal connection between brake shaft and pivot of pawl.

(xiii) Brake wheel shall be held in position on brake shaft by a nut on a threaded extended end of brake shaft; said threaded portion shall be not less than three-fourths of an inch in diameter; said nut shall be secured by riveting over or by the use of a lock nut or suitable cotter.

(xiv) Brake wheel shall be arranged with a square fit for the brake shaft in hub of said wheel; taper of said fit, nominally 2 in 12 inches. (See plate A.)

(b) *Brake step.* If brake step is used, it shall be not less than 28 inches in length. Outside edge shall be not less than 8 inches from face of car and not les than 4 inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

(1) *Manner of application.* Brake step shall be supported by not less than two metal braces having a minimum cross-sectional area ⅜ by 1½ inches or equivalent, which shall be securely fastened to body of car with not less than ½-inch bolts or rivets.

(c) *Running boards*—(1) *Number.* One longitudinal running board. On outside-metal-roof cars two latitudinal extensions.

(2) *Dimensions.* Longitudinal running board shall be not less than 18 and preferably 20 inches in width. Latitudinal extensions shall be not less than 24 inches in width. Wooden running boards or extensions hereafter installed shall be constructed of wood not less than 1⅛ inches in thickness.

(3) *Location.* Full length of car, center of roof. On outside-metal-roof cars there shall be two latitudinal extensions from longitudinal running board to ladder locations, except on refrigerator cars where such latitudinal extensions can not be applied on account of ice hatches.

(4) *Manner of application.* (i) Running board shall be continuous from end to end and not cut or hinged at any point: *Provided,* That the length and width of running board may be made

up of a number of pieces securely fastened to saddle-blocks with screws, bolts, or rivets.

(ii) The ends of longitiudinal running board shall be not less than 6 nor more than 10 inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler-horn against the buffer-block or end sill; and if more than 4 inches from edge of roof of car, shall be securely supported their full width by substantial metal braces.

(iii) Running board shall be securely fastened to car and be made of wood or of material which provides the same as or a greater degree of safety than wood of $1\frac{1}{8}$ inches thickness. When made of material other than wood the tread surface shall be of anti-skid design and constructed with sufficient open space to permit the elimination of snow and ice from the tread surface.

(d) *Sill steps*—(1) *Number.* Four.

(2) *Dimensions.* Minimum cross-sectional area $\frac{1}{2}$ by $1\frac{1}{2}$ inches, or equivalent, of wrought iron or steel. Minimum length of tread, 10, preferably 12, inches. Minimum clear depth, 8 inches.

(3) *Location.* (i) One near each end on each side of car, so that there shall be not more than 18 inches from end of car to center of tread of sill step.

(ii) Outside edge of tread of step shall be not more than 4 inches inside of face of side of car, preferably flush with side of car.

(iii) Tread shall be not more than 24, preferably not more than 22, inches above the top of rail.

(4) *Manner of application.* (i) Sill steps exceeding 21 inches in depth shall have an additional tread.

(ii) Sill steps shall be securely fastened with not less than $\frac{1}{2}$-inch bolts with nuts outside (when possible) and riveted over, or with not less than $\frac{1}{2}$-inch rivets.

(e) *Ladders*—(1) *Number.* Four.

(2) *Dimensions.* (i) Minimum clear length of tread: Side ladders 16 inches; end ladders 14 inches. Maximum spacing between ladder treads, 19 inches.

(ii) Top ladder tread shall be located not less than 12 nor more than 18 inches from roof at eaves.

(iii) Spacing of side ladder treads shall be uniform within a limit of 2 inches from top ladder tread to bottom tread of ladder.

(iv) Maximum distance from bottom tread of side ladder to top tread of sill step, 21 inches.

(v) End ladder treads shall be spaced to coincide with treads of side ladders, a variation of 2 inches being allowed. Where construction of car will not permit the application of a tread of end ladder to coincide with bottom tread of side ladder, the bottom tread of end ladder must coincide with second tread from bottom of side ladder.

(vi) Hardwood treads, minimum dimensions 1½ by 2 inches.

(vii) Iron or steel treads, minimum diameter five-eighths of an inch.

(viii) Minimum clearance of treads, 2, preferably 2½, inches.

(3) *Location.* (i) One on each side, not more than 8 inches from right end of car; one on each end, not more than 8 inches from left side of car; measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

(4) *Manner of application.* (i) Metal ladders without stiles near corners of cars shall have foot guards or upward projections not less than 2 inches in height near inside end of bottom treads.

(ii) Stiles of ladders, projecting 2 or more inches from face of car, will serve as foot guards.

(iii) Ladders shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets. Three-eighths-inch bolts may be used for wooden treads which are gained into stiles.

(f) *End ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

(g) *Roof handholds*—(1) *Number.* (i) One over each ladder.

(ii) One right-angle handhold may take the place of two adjacent specified roof handholds, provided the dimensions and locations coincide, and that an extra leg is securely fastened to car at point of angle.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches. Minimum clearance, 2, preferably 2½ inches.

(3) *Location.* (1) On roof of car, one parallel to treads of each ladder, not less than 8 nor more than 15 inches from edge of roof, except on refrigerator cars where ice hatches prevent, when location may be nearer edge of roof.

(4) *Manner of application.* Roof handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets.

(h) *Side handholds*—(1) *Number.* Four. (Tread of side ladder is a side handhold.)

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches, preferably 24 inches. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) Horizontal, one near each end on each side of car. Side handholds shall be not less than 24 nor more than 30 inches above center line of coupler, except as provided above, where tread of ladder is a handhold. Clearance of outer end of handhold shall be not more than 8 inches from end of car.

(4) *Manner of application.* Side handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets.

(i) *Horizontal end handholds*—(1) *Number.* Eight or more, four on each end of car. (Tread of end ladder is an end handhold.)

(2) *Dimensions.* (i) Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches, preferably 24 inches.

(ii) A handhold 14 inches in length may be used where it is impossible to use one 16 inches in length.

(iii) Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) One near each side on each end of car, not less than 24 nor more than 30 inches above center line of

coupler, except as provided above, when tread of end ladder is an end handhold. Clearance of outer end of handhold shall be not more than 8 inches from side of car.

(ii) One near each side of each end of car on face of end sill or sheathing over end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(iii) On each end of cars with platform end sills 6 or more inches in width, measured from end post or siding and extending entirely across end of car, there shall be one additional end handhold not less than 24 inches in length, located near center of car, not less than 30 nor more than 60 inches above platform end sill.

(4) *Manner of application.* Horizontal end handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets.

(j) *Vertical end handholds*—(1) *Number.* Two on full-width platform end-sill cars, as heretofore described.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrough iron or steel. Minimum clear length, 18, preferably 24, inches. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) One on each end of car opposite ladder, not more than 8 inches from side of car; clearance of bottom end of handhold shall be not less than 24 nor more than 30 inches above center line of coupler.

(4) *Manner of application.* Vertical end handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and rivets over, or with not less than ½-inch rivets.

(k) *Uncoupling levers*—(1) *Number.* Two. Uncoupling levers may be either single or double, and of any efficient design.

(2) *Dimensions.* (i) Handles of uncoupling levers, except those shown on plate B or of similar designs, shall be not more than 6 inches from sides of car.

(ii) Uncoupling levers of design shown on plate B and of similar designs shall conform to the following prescribed limits:

(iii) Handles shall be not more than 12, preferably 9, inches from sides of cars. Center lift arms shall be not less than 7 inches long.

(iv) Center of eye at end of center lift arm shall be not more than 3½ inches beyond center of eye of uncoupling pin of coupler when horn of coupler is against the buffer block or end sill. (See plate B.)

(v) Ends of handles shall extend not less than 4 inches below bottom of end sill or shall be so constructed as to give a minimum clearance of 2 inches around handle. Minimum drop of handles shall be 12 inches; maximum, 15 inches over all. (See plate B.)

(vi) Handles of uncoupling levers of the "rocking" or "push-down" type shall be not less than 18 inches from top of rail when lock block has released knuckle, and a suitable stop shall be provided to prevent inside arm from flying up in case of breakage.

(3) *Location.* One on each end of car. When single lever is used, it shall be placed on left side of end of car.

§ 231.2 Hopper cars and high-side gondolas with fixed ends.

(Cars with sides more than 36 inches above the floor are high-side cars.)

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car to the left of, and not more than 22 inches from, center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Brake step.* Same as specified for "Box and other house cars" (See § 231.1 (b)).

(c) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(d) *Ladders*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (e) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (e) (2)), except that top ladder tread shall be located not more than 4 inches from top of car.

(3) *Location.* Same as specified for "Box and other house cars" (see § 231.1 (e) (3)).

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (e) (4)).

(e) *Side handholds.* Same as specified for "Box and other house cars" (see § 231.1 (h)).

(f) *Horizontal end handholds.* Same as specified for "Box and other house cars" (see § 231.1 (i)).

(g) *Vertical end handholds.* Same as specified for "Box and other house cars" (see § 231.1 (j)).

(h) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(i) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake wheel, brake step, or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face or knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face or buffer block.

§ 231.3 Drop-end high-side gondola cars.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1(a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(c) *Ladders*—(1) *Number.* Two.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (e) (2)), except that top ladder tread shall be located not more than 4 inches from top of car.

(3) *Location.* (i) One on each side, not more than 8 inches from right end of car, measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (e) (4)).

(d) *Side handholds.* Same as specified for "Box and other house cars" (see § 231.1(h)).

(e) *Horizontal end handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) One near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(f) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(g) *End ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake wheel or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions noted in this subparagraph, shall extend beyond the outer face or buffer block.

§ 231.4 Fixed-end low-side gondola and low-side hopper cars.

(Cars with sides 36 inches or less above the floor are low-side cars.)

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1(a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car, to the left of and not more than 22 inches from center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Brake step.* Same as specified for "Box and other house cars" (see § 231.1 (b)).

(c) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(d) *Side handholds*—(1) *Number.* Same as specified for "Box and other house cars (see § 231.1 (h) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one near each end on each side of car, not less than 24 nor more than 30 inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than 8 inches from end of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(e) *Horizontal end handholds*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (i) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) One near each side on each end of car, not less than 24 nor more than 30 inches above center line of coupler, if car construction will permit. Clearance of outer end of handhold shall be not more than 8 inches from side of car.

(ii) One near each side of each end of car on face of end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(f) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(g) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake step, brake wheel or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions noted

in this subparagraph, shall extend beyond the outer face of buffer block.

§ 231.5 Drop-end low-side gondola cars.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1(a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)), provided that top brake-shaft support may be omitted.

(b) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(c) *Side handholds*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (h) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one near each end on each side of car, not less than 24 nor more than 30 inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be no more than 8 inches from end of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(d) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(e) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(f) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake wheel or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face or knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions noted in this subparagraph shall extend beyond the outer face of buffer block.

§ 231.6 Flat cars.

(Cars with sides 12 inches or less above the floor may be equipped the same as flat cars.)

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensioins.* Same as specified for "Box and other house cars" (see § 231 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on the end of car to the left of center, or on side of car not more than 36 inches from right-hand end thereof.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4).

(b) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(c) *Side handholds*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (h) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one on face of each side sill near each end. Clearance of outer end of handhold shall be not more than 12 inches from end of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(d) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4).

(e) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k).

§ 231.7 Tank cars with side platforms.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(c) *Side handholds*—(1) *Number.* Four or more.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one on face of each side sill near each end. Clearance of outer end of handhold shall be not more than 12 inches from end of car.

(ii) If side safety railings are attached to tank or tank bands, four additional vertical handholds shall be applied, one as nearly as possible over each sill step and securely fastened to tank or tankband.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(d) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(e) *Tank-head handholds*—(1) *Number.* Two. (Not required if safety railing runs around ends of tank.)

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½, inches. Clear length of handholds shall extend to within 6 inches of outer diameter of tank at point of application.

(3) *Location.* (i) Horizontal, one across each head of tank not less than 30 nor more than 60 inches above platform.

(4) *Manner of application.* Tankhead handholds shall be securely fastened.

(f) *Safety railings*—(1) *Number.* One continuous safety railing running around sides and ends of tanks, securely fastened to tank or tank bands at ends and sides of tank; or two running full length of tank at sides of cars supported by posts.

(2) *Dimensions.* Not less than three-fourths of an inch, iron.

(3) *Location.* Running full length of tank either at side supported by posts or securely fastened to tank or tank bands, not less than 30 nor more than 60 inches above platform.

(4) *Manner of application.* Safety railings shall be securely fastened to tank body, tank bands, or posts.

(g) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(h) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake-shaft brackets, brake wheel or uncoupling level shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end car or fixtures on same above end sills, other than exceptions noted in this subparagraph, shall extend beyond the outer face of buffer block.

§ 231.8 Tank cars without side sills and tank cars with short side sills and end platforms.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Running boards*—(1) *Number.* One continuous running board around sides and ends; or two running full length of tank, one on each side.

(2) *Dimensions.* Minimum width on sides, 10 inches. Minimum width on ends, 6 inches.

(3) *Location.* Continuous around sides and ends of cars. On tank cars having end platforms extending to bolsters, running boards shall extend from center to center of bolsters, one on each side.

(4) *Manner of application.* (i) If side running boards are applied below center of tank, outside edge of running boards shall extend not less than 7 inches beyond bulge of tank.

(ii) The running boards at ends of car shall be not less than 6 inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or back stop.

(iii) Running boards shall be securely fastened to tank or tank bands.

(c) *Sill steps*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (d) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (d (2)).

(3) *Location.* (i) One near each end on each side under side handhold.

(ii) Outside edge of tread of step shall be not more than 4 inches inside of face of side of car, preferably flush with side of car.

(iii) Tread shall be not more than 24, preferably not more than 22, inches above the top of rail.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (d) (4)).

(d) *Ladders.* If running boards are so located as to make ladders necessary.

(1) *Number.* Two on cars with continuous running boards. Four on cars with side running boards.

(2) *Dimensions.* (i) Minimum clear length of tread, 10 inches. Maximum spacing of treads, 19 inches. Hardwood treads, minimum dimensions, 1½ by 2 inches.

(ii) Wrought iron or steel treads, minimum diameter five-eighths of an inch. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* On cars with continuous running boards, one at right end of each side. On cars with side running boards, one at each end of each running board.

(4) *Manner of application.* Ladders shall be securely fastened with not less than ½-inch bolts or rivets.

(e) *Side handholds*—(1) *Number.* Four or more.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one on face of each side sill near each end on tank cars with short side sills, or one attached to top of running board projecting outward above sill steps or ladders on tank cars without side sills. Clearance of outer end of handhold shall be not more than 12 inches from end of car.

(ii) If side safety railings are attached to tank or tank bands four additional vertical handholds shall be applied, one as nearly as possible over each sill step and securely fastened to tank or tank bands.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(f) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(g) *Tank-head handholds*—(1) *Number.* Two. (Not required if safety railing runs around ends of tank.)

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) Horizontal, one across each head of tank not less than 30 nor more than 60 inches above platform on running board. Clear length of handholds shall extend to within 6 inches of outer diameter of tank at point of application.

(4) *Manner of application.* Tankhead handholds shall be securely fastened.

(h) *Safety railings*—(1) *Number.* One running around sides and ends of tank or two running full length of tank.

(2) *Dimensions.* Minimum diameter, seven-eighths of an inch, wrought iron or steel. Minimum clearance, 2½ inches.

(3) *Location.* Running full length of tank, not less than 30 nor more than 60 inches above platform or running board.

(4) *Manner of application.* Safety railings shall be securely fastened to tank or tank bands and secured against end shifting.

(i) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(j) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake-shaft brackets, brake wheel, running boards or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

§ 231.9 Tank cars without end sills.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* Each hand brake shall be so located that it can be safely operated while car is in motion. The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Brake step.* Same as specified for "Box and other house cars" (see § 231.1 (b)).

(c) *Running boards*—(1) *Number.* One.

(2) *Dimensions.* Minimum width on sides, 10 inches. Minimum width on ends, 6 inches.

(3) *Location.* Continuous around sides and ends of tank.

(4) *Manner of application.* (i) If running boards are applied below center of tank, outside edge of running boards shall extend not less than 7 inches beyond bulge of tank.

(ii) Running boards at ends of car shall be not less than 6 inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or back stop.

(iii) Running boards shall be securely fastened to tank or tank bands.

(d) *Sill steps*—(1) *Number.* Four. (If tank has high running boards, making ladders necessary, sill steps must meet ladder requirements.)

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (d) (2)).

(3) *Location.* (i) One near each end on each side, flush with outside edge of running board as near end of car as practicable.

(ii) Tread not more than 24, preferably not more than 22, inches above the top of rail.

(4) *Manner of application.* (i) Steps exceeding 18 inches in depth shall have an additional tread and be laterally braced.

(ii) Sill steps shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with ½-inch rivets.

(e) *Side handholds*—(1) *Number.* Four or more.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one near each end on each side of car over sill step on running board, not more than 2 inches back from outside edge of running board, projecting downward or outward.

(ii) Where such side handholds are more than 18 inches from end of car, an additional handhold must be placed near each

end on each side not more than 30 inches above center line of coupler.

(iii) Clearance of outer end of handhold shall be not more than 12 inches from end of car.

(iv) If safety railings are on tank, four additional vertical handholds shall be applied, one over each sill step on tank.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(f) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side on each end of car on running board, not more than 2 inches back from edge of running board projecting downward or outward, or on end of tank not more than 30 inches above center line of coupler.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(g) *Safety railings*—(1) *Number.* One.

(2) *Dimensions.* Minimum diameter, seven-eighths of an inch, wrought iron or steel. Minimum clearance, $2\frac{1}{2}$ inches.

(3) *Location.* Safety railings shall be continuous around sides and ends of car, not less than 30 nor more than 60 inches above running board.

(4) *Manner of application.* Safety railings shall be securely fastened to tank or tank bands, and secured against end shifting.

(h) *Uncoupling levers*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (k) (1).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (k) (2)), except that minimum length of uncoupling lever shall be 42 inches, measured from center line of end of car to handle of lever.

(3) *Location.* Same as specified for "Box and other house cars" (see § 231.1 (k) (3)), except that uncoupling lever shall be not more than 30 inches above center line of coupler.

(i) *End-ladder clearance.* (1) No part of car above buffer block within 30 inches from side of car, except brake shaft, brake-shaft brackets, brake wheel or uncoupling lever shall extend to within 12 inches of a vertical plane parallel with end of car and

passing through the inside face of knuckle when closed with coupler horn against the buffer block or back stop, and no other part of end of car or fixtures on same, above buffer block, other than exceptions herein noted, shall extend beyond the face of buffer block.

§ 231.10 Caboose cars with platforms.

NOTE: 1. The term "bottom of car" as used in Section 231.10 is construed to mean "bottom of side-sill or sheathing over side-sill."

2. The term "corner of car" as used in Section 231.10 is construed to mean the "line at inner edge of platform formed by the intersection of the side and end of car."

(a) *Hand brakes*—(1) *Number.* (i) Each caboose car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

(ii) The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on plate A.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft on caboose cars with platforms shall be located on platform to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Running boards*—(1) *Number.* One longitudinal running board.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (c) (2)).

(3) *Location.* (i) Full length of car, center of roof. (On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.)

(ii) Outside-metal-roof-cars shall have latitudinal extensions leading to ladder locations.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (c) (4)). (See note below)

(c) *Ladders*—(1) *Number.* Two.

(2) *Dimensions.* None specified.

(3) *Location.* One on each end.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (e) (4)). (See note below)

(d) *Roof handholds*—(1) *Number.* One over each ladder. Where stiles of ladders extend 12 inches or more above roof, no other roof handholds are required.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (g) (2)).

(3) *Location.* (i) On roof of caboose, in line with and running parallel to treads of ladder, not less than 8 nor more than 15 inches from edge of roof.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (g) (4)). (See note below)

(e) *Cupola handholds*—(1) *Number.* One or more.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½ inches.

(3) *Location.* (i) One continuous handhold extending around top of cupola not more than 3 inches from edge of cupola roof.

(ii) Four right-angle handholds, one at each corner, not less than 16 inches in clear length from point of angle, may take the place of the one continuous handhold specified, if locations coincide.

(4) *Manner of application.* Cupola handholds shall be securely fastened with not less than ½-inch bolts with nuts outside and riveted over or with not less than ½-inch rivets. (See note below)

(f) *Side handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 36 inches. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) One near each end on each side of car, curving downward toward center of car from a point not less than 30 inches above platform to a point not more than 8 inches from bottom of car. Top end of handhold shall be not more than 8 inches from outside face of end sheathing.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (h) (4)).

(g) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* (i) Horizontal, one near each side on each end of car on face of platform end sill. Clearance of outer end of handhold shall be not more than 16 inches from end of platform end sill.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(h) *End-platform handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* (i) One right-angle handhold on each side of each end extending horizontally from door post to corner of car at approximate height of platform rail, then downward to within 12 inches of bottom of car.

(4) *Manner of application.* Handholds shall be securely fastened with bolts, screws, or rivets.

(i) *Caboose-platform steps.* Safe and suitable box steps leading to caboose platforms shall be provided at each corner of caboose. Lower tread of step shall be not more than 24 inches above top of rail.

(j) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

NOTE: Running boards may be omitted from caboose cars with platforms built after June 1, 1970, when each of the following conditions have been met:

(1) That ladders, roof handholds (including ladder extensions) and cupola handholds as specified in subsections (c), (d), and (e) of this § 231.10 are also omitted.

(2) That an appropriate notice be posted in protective manner or stenciled on interior of caboose stating "operating employees are prohibited under all conditions from occupying the roof of this caboose."

(3) That a safe means must be provided to assure the safety of an operating employee when requird to clean or maintain windows of a caboose without running boards.

(4) That the following additional safety appliances as specified be securely installed at the outer edge of each platform:

(a) *Safety railing*—(i) *Number.* Horizontal—four (4), two (2) upper and two (2) lower. Vertical—four (4).

(ii) *Dimensions.* Minimum diameter—one (1) inch wrought iron, steel, or other material of equivalent strength. Minimum clearance—four (4), preferably six (6) inches except at brace and fastening locations.

(iii) *Locations.* Vertical—one (1) at each corner of car extending from platform end sill to level of lower horizontal safety railing or to suitable bracket at roof.

Horizontal upper—Across each end of car near outer edge securely braced with vertical supports not less than 48 nor more than 54 inches above top of platform extending not less than full width of platform excluding hand brake stanchion area.

Horizontal lower—Across each end of car near outer edge securely braced with vertical supports not less than 36 nor mor than 42 inches above top of platform excluding hand brake stanchion area. An opening may be provided near center. Such opening shall be provided with a secure safety chain(s) not less than ¼-inch diameter wrought iron, or steel, or other secure suitable closure.

(iv) *Manner of application.* Safety railing shall be securely fastened with ½-inch bolts or rivets when possible and securely supported. A weld at connection of vertical and horizontal safety railing and vertical supports is permissible when those appliances are fabricated as a single unit.

(b) *Kick plates*—(i) *Number.* Four (4).

(ii) *Dimensions.* Minimum thickness—10-gauge wrought iron, steel or other material of equivalent strength. Width–Minimum—24 inches. Height–Minimum—24 inches.

(iii) *Location.* One near each side on each end. Outer edge not more than 12 inches from adjacent vertical safety railing with bottom edge near top of platform. Hand brake stand may serve as part of kick plate.

(iv) *Manner of application.* Securely fastened by ½-inch bolts or rivets, or weld.

(v) Vertical hand rail supports spaced not more than eighteen (18) inches apart may be used in lieu of kick plates.

(5) That stove pipe shall be secured to prevent turning.

(6) That windows shall be laminated safety-type glass or equivalent.

EXISTING CABOOSE CARS WITH PLATFORMS.

Running boards may be removed from caboose cars with platforms built or under construction on or before June 1, 1970, when each of the following conditions have been met:

(1) That ladder treads above safety railing, roof handholds including ladder extensions, and cupola handholds specified in subsections (c), (d), and (e) of this § 231.10 are removed.

(2) That an appropriate notice be posted in protective manner or stenciled in interior of caboose stating "operating employees are prohibited under all conditions from occupying the roof of this caboose."

(3) That a safe means must be provided to assure the safety of an operating employee when required to clean or maintain windows of a caboose without running boards.

(4) That end platform safety railing and handhold arrangement will be deemed to meet requirements except as to upper safety railing and kick plates, when those appliances are not provided. When vertical supports are not more than twenty-four (24) inches apart, such supports may be used in lieu of kick plates.

(5) That the following additional safety appliances (when not so provided) shall be securely installed at outer edge of each platform:

(a) *Safety railing*—(i) *Number.* Horizontal upper—two (2).

(ii) *Dimensions.* Minimum diameter—one (1) inch wrought iron steel or other material of equivalent strength. Minimum clearance—Four (4), preferably six (6) inches except at brace and fastening locations.

(iii) *Location.* Horizontal upper—Across each end of car near outer edge securely braced with vertical supports not less than 48 nor more than 54 inches above top of platform extending not less than full width of platform excluding hand brake stanchion area. Ladder tread not more than two (2) inches below level of upper safety railing may serve as a portion of said safety railing.

(b) *Kick plates or vertical supports.* Same as provided for caboose cars with platforms built after June 1, 1970, this note. See above.

(6) That stove pipe should be secured to prevent turning.

(7) Cupola or bay windows shall be laminated safety-type glass or equivalent and all other caboose windows shall be so provided.

§ 231.11 Caboose cars without platforms.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* (i) Each hand brake shall be so located that it can be safely operated while car is in motion.

(ii) The brake shaft on caboose cars without platforms shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *Brake step.* Same as specified for "Box and other house cars" (see § 231.1 (b)).

(c) *Running boards*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (c) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (c) (2)).

(3) *Location.* (i) Full length of car, center of roof. (On caboose car with cupolas, longitudinal running boards shall extend from cupola to ends of roof.)

(ii) Outside-metal-roof cars shall have latitudinal extensions leading to ladder locations.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (c) (4)).

(d) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(e) *Side-door steps*—(1) *Number.* Two. (If caboose has side doors.)

(2) *Dimensions.* Minimum length, 5 feet. Minimum width, 6 inches. Minimum thickness of tread, 1½ inches. Minimum height of back stop, 3 inches. Maximum height from top of rail to top of tread, 24 inches.

(3) *Location.* One under each side door.

(4) *Manner of application.* Side-door steps shall be supported by 2 iron brackets having a minimum cross-sectional area ⅞ by 3 inches or equivalent, each of which shall be securely fastened to car by not less than two ¾-inch bolts.

(f) *Ladders*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (e) (2)).

(3) *Location.* Same as specified for "Box and other house cars" (see § 231.1 (e) (3)), except when caboose has side doors, then side ladders shall be located not more than 8 inches from doors.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (e) (4)).

(g) *End-ladder clearance.* (1) No part of car above end sills within 30 inches from side of car, except buffer block, brake shaft, brake wheel, brake step, running board, or uncoupling lever shall extend to within 12 inches of a vertical plane, parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions noted in this subparagraph, shall extend beyond the outer face of buffer block.

(h) *Roof handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (g) (2)).

(3) *Location.* (i) One over each ladder, on roof in line with and running parallel to treads of ladder, not less than 8 nor more than 15 inches from edge of roof.

(ii) Where stiles of ladders extend 12 inches or more above roof, no other roof handholds are required.

(4) *Manner of application.* Roof handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets.

(i) *Cupola handholds*—(1) *Number.* One or more.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½ inches.

(3) *Location.* (i) One continuous cupola handhold extending around top of cupola, not more than 3 inches from edge of cupola roof.

(ii) Four right-angle handholds, one at each corner, not less than 16 inches in clear length from point of angle, may take the place of the one continuous handhold specified, if locations coincide.

(4) *Manner of application.* Cupola handhold shall be securely fastened with not less than ½-inch bolts with nuts outside and riveted over or with not less than ½-inch rivets.

(j) *Side handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* (i) Horizontal, one near each end on each side of car, not less than 24 nor more than 30 inches above center line of coupler. Clearance of outer end of handhold shall be not more than 8 inches from end of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231. (h) (4)).

(k) *Side-door handholds*—(1) *Number.* Four: Two curved, two straight.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½ inches.

(3) *Location.* (i) One curved handhold, from a point at side of each door opposite ladder, not less than 36 inches above bottom of car, curving away from door downward to a point not more than 6 inches above bottom of car.

(ii) One vertical handhold at ladder side of each door from a point not less than 36 inches above bottom of car to a point not more than 6 inches above level of bottom of door.

(4) *Manner of application.* Sidedoor handholds shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over or with not less than ½-inch rivets.

(l) *Horizontal end handholds*—(1) *Number.* Same as specified for "Box and other house cars." (See § 231.1 (i) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars." (See § 231.1 (i) (2)).

(3) *Location.* (i) Same as specified for "Box and other house cars" (see § 231.1 (i) (3)), except that one additional end handhold shall be on each end of cars with platform end sills as heretofore described, unless car has door in center of end. Said handhold shall be not less than 24 inches in length, located near center of car, not less than 30 nor more than 60 inches above platform end sill.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(m) *Vertical end handholds.* Same as specified for "Box and other house cars" (see § 231.1 (j)).

(n) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

§ 231.12 Passenger-train cars with wide vestibules.

(a) *Hand brakes*—(1) *Number.* Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

(2) *Location.* Each hand brake shall be so located that it can be safely operated while car is in motion.

(b) *Side handholds*—(1) *Number.* Eight.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, metal. Minimum clear length, 16 inches. Minimum clearance, 1¼, preferably 1½ inches.

(3) *Location.* Vertical, one on each vestibule door post.

(4) *Manner of application.* Side handholds shall be securely fastened with bolts, rivets, or screws.

(c) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* (i) Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches. Minimum clearance, 2, preferably 2½ inches.

(ii) Handholds shall be flush with or project not more than 1 inch beyond vestibule face.

(3) *Location.* Horizontal, one near each side on each end projecting downward from face of vestibule end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* End handholds shall be securely fastened with bolts or rivets. When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

(d) *Uncoupling levers.* (1) Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

(2) Minimum length of ground uncoupling attachment, 42 inches, measured from center line of end of car to handle of attachment.

(3) On passenger-train cars used in freight or mixed-train service, the uncoupling attachment shall be so applied that the coupler can be operated from left side of car.

§ 231.13 Passenger-train cars with open-end platforms.

(a) *Hand brakes*—(1) *Number.* Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

(2) *Location.* Each hand brake shall be so located that it can be safely operated while car is in motion.

(b) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches. Minimum clearance, 2, preferably $2\frac{1}{2}$ inches. Handholds shall be flush with or project not more than 1 inch beyond face of end sill.

(3) *Location.* Horizontal, one near each side of each end on face of platform end sill, projecting downward. Clearance of outer end of handhold shall be not more than 16 inches from end of end sill.

(4) *Manner of application.* End handholds shall be securely fastened with bolts or rivets.

(c) *End-platform handholds*—(1) *Number.* Four. (Cars equipped with safety gates do not require end-platform handholds.)

(2) *Dimensions.* Minimum clearance 2, preferably 2½ inches, metal.

(3) *Location.* Horizontal from or near door post to a point not more than 12 inches from corner of car, then approximately vertical to a point not more than 6 inches from top of platform. Horizontal portion shall be not less than 24 inches in length nor more than 40 inches above platform.

(4) *Manner of application.* End-platform handholds shall be securely fastened with bolts, rivets, or screws.

(d) *Uncoupling levers.* (1) Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

(2) Minimum length of ground uncoupling attachment, 42 inches, measured from center of end of car to handle of attachment.

(3) On passenger-train cars used in freight or mixed-train service the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

§ 231.14 Passenger-train cars without end platforms.

(a) *Handbrakes*—(1) *Number.* Each passenger-train car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

(2) *Location.* Each hand brake shall be so located that it can be safety operated while car is in motion.

(b) *Sill steps*—(1) *Number.* Four.

(2) *Dimensions.* Minimum length of tread, 10, preferably 12, inches. Minimum cross-sectional area, ½ by 1½ inches or equivalent, wrought iron or steel. Minimum clear depth, 8 inches.

(3) *Location.* (i) One near each end on each side not more than 24 inches from corner of car to center of tread of sill step.

(ii) Outside edge of tread of step shall be not more than 2 inches inside of face of side of car.

(iii) Tread shall be not more than 24, preferably not more than 22, inches above the top of rail.

(4) *Manner of application.* (i) Steps exceeding 18 inches in depth shall have an additional tread and be laterally braced.

(ii) Sill steps shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets.

(c) *Side handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16, preferably 24, inches. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* Horizontal or vertical, one near each end on each side of car over sill step.

(i) If horizontal, not less than 24 nor more than 30 inches above center line of coupler.

(ii) If vertical, lower end not less than 18 nor more than 24 inches above center line of coupler.

(4) *Manner of application.* Side handholds shall be securely fastened with bolts, rivets or screws.

(d) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 16 inches. Minimum clearance, 2 preferably 2½, inches.

(3) *Location.* Horizontal, one near each side on each end projecting downward from face of end sill or sheathing. Clearance of outer end of handhold shall be not more than 16 inches from side of car.

(4) *Manner of application.* (i) Handholds shall be flush with or project not more than 1 inch beyond face of end sill.

(ii) End handholds shall be securely fastened with bolts or rivets.

(iii) When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

(e) *End handrails.* (On cars with projecting end sills.)

(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* One on each side of each end, extending horizontally from doorpost or vestibule frame to a point not more than 6 inches from corner of car, then approximately vertical to

a point not more than 6 inches from top of platform end sill; horizontal portion shall be not less than 30 nor more than 60 inches above platform end sill.

(4) *Manner of application.* End handrails shall be securely fastened with bolts, rivets or screws.

(f) *Side-door steps*—(1) *Number.* One under each door.

(2) *Dimensions.* Minimum length of tread, 10, preferably 12, inches. Minimum cross-sectional area, ½ by 1½ inches or equivalent, wrought iron or steel. Minimum clear depth, 8 inches.

(3) *Location.* Outside edge of tread of step not more than 2 inches inside of face of side of car. Tread not more than 24, preferably not more than 22, inches above the top of rail.

(4) *Manner of application.* (i) Steps exceeding 18 inches in depth shall have an additional tread and be laterally braced.

(ii) Side-door steps shall be securely fastened with not less than ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½ inch rivets.

(iii) A vertical handhold not less than 24 inches in clear length shall be applied above each side-door step on door post.

(g) *Uucoupling levers.* (i) Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

(ii) Minimum length of ground uncoupling attachment, 42 inches, measured from center line of end of car to handle of attachment.

(iii) On passenger-train cars used in freight or mixed-train service, the uncoupling attachment shall be so applied that the coupler can be operated from the left side of car.

§ 231.15 Steam locomotives used in road service.

(a) *Tender sill-steps*—(1) *Number.* Four on tender.

(2) *Dimensions.* (i) Bottom tread not less than 8 by 12 inches, metal. (May have wooden treads.)

(ii) If stirrup steps are used, clear length of trand shall be not less than 10, preferably 12, inches.

(3) *Location.* One near each corner of tender on sides.

(4) *Manner of application.* Tender sill-steps shall be securely fastened with bolts or rivets.

(b) *Pilot sill-steps*—(1) *Number.* Two.

(2) *Dimensions.* Tread not less than 8 inches in width by 10 inches in length, metal. (May have wooden treads.)

(3) *Location.* One on or near each end of buffer-beam outside of rail and not more than 16 inches above rail.

(4) *Manner of application.* Pilot sill-steps shall be securely fastened with bolts or rivets.

(c) *Pilot-beam handholds*—(1) *Number.* Two.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 14, preferably 16, inches. Minimum clearance, 2½ inches.

(3) *Location.* One on each end of buffer-beam. If uncoupling lever extends across front end of locomotive to within 8 inches of end of buffer-beam, and is seven-eighths of an inch or more in diameter, securely fastened, with a clearance of 2½ inches, it is a handhold.)

(4) *Manner of application.* Pilot-beam handholds shall be securely fastened with bolts or rivets.

(d) *Side handholds*—(1) *Number.* Six.

(2) *Dimensions.* Minimum diameter, if horizontal, five-eighths of an inch; if vertical, seven-eighths of an inch, wrought iron or steel. Horizontal, minimum clear length, 16 inches. Vertical, clear length equal to approximate height of tank. Minimum clearance, 2, perferably 2½, inches.

(3) *Location.* (i) Horizontal or vertical. If vertical, one on each side of tender within 6 inches of rear or on corner; if horizontal, same as specified for "Box and other house cars" (see § 231.1 (h) (3)).

(ii) One on each side of tender near gangway; 1 on each side of locomotive at gangway; applied vertically.

(4) *Manner of application.* Side handholds shall be securely fastened with not less than ½-inch bolts or rivets.

(e) *Rear-end handholds*—(1) *Number.* Two.

(2) *Dimensions.* Minimum diameter, five-eighths of an inch, wrought iron or steel. Minimum clear length, 14 inches. Minimum clearance, 2, preferably 2½, inches.

(3) *Location.* Horizontal, one near each side of rear end of tender on face of end sill. Clearance of outer end of handhold shall be not more than 16 inches from side of tender.

(4) *Manner of application.* Rear-end handholds shall be securely fastened with not less than ½-inch bolts or rivets.

(f) *Uncoupling levers*—(1) *Number.* Two double levers, operative from either side.

(2) *Dimensions.* Rear-end lever shall extend across end of tender with handles not more than 12, preferably 9, inches from side of tender with a guard bent on handle to give not less than 2 inches clearance around handle.

(3) *Location.* One on rear end of tender and one on front end of locomotive. Handles of front-end levers shall be not more than 12, preferably 9, inches from ends of buffer-beam, and shall be so constructed as to give a minimum clearance of 2 inches around handle.

(4) *Manner of application.* Uncoupling levers shall be securely fastened with bolts or rivets.

(g) *Couplers.* Locomotives shall be equipped with automatic couplers at rear of tender and front of locomotive.

§ 231.16 Steam locomotives used in switching service.

(a) *Footboards*—(1) *Number.* Two or more.

(2) *Dimensions.* (i) Minimum width of tread, 10 inches.

(ii) Minimum height of back stop, 4 inches above tread.

(iii) Height from top of rail to top of tread, not more than 12 nor less than 9 inches.

(iv) If made of wood, minimum thickness of tread shall be 1½, preferably 2 inches.

(v) Footboards may be made of material other than wood which provides the same as or a greater degree of safety than wood of 1½ inches thickness. When made of material other than wood, the tread surface shall be of antiskid design and constructed with sufficient open space to permit the elmination of snow and ice from the tread surface.

(3) *Location.* Ends or sides. If on ends, they shall extend not less than 18 inches outside of gauge of straight track, and shall be not more than 12 inches shorter than buffer-beam at each end.

(4) *Manner of application.* (i) End footboards may be constructed in two sections, provided that practically all space on each side of coupler is filled; each section shall be not less than 3 feet in length.

(ii) Footboards shall be securely bolted to two 1- by 4-inch metal brackets, provided footboard is not cut or notched at any point.

(iii) If footboard is cut or notched or in two sections, not less than four 1- by 3-inch metal brackets shall be used, two located on each side of coupler. Each bracket shall be securely bolted to buffer beam, end sill or tank frame by not less than two 7/8-inch bolts.

(iv) If side footboards are used, a substantial handhold or rail shall be applied not less than 30 inches nor more than 60 inches above tread of footboard.

(b) *Sill steps*—(1) *Number.* Two or more.

(2) *Dimensions.* (i) Lower tread of step shall be not less than 8 by 12 inches, metal. (May have wooden treads.)

(ii) If stirrup steps are used, clear length of tread shall be not less than 10, preferably 12, inches.

(3) *Location.* One or more on each side at gangway secured to locomotive or tender.

(4) *Manner of application.* Sill steps shall be securely fastened with bolts or rivets.

(c) *End handholds*—(1) *Number.* Two.

(2) *Dimensions.* Minimum diameter, 1 inch, wrought iron or steel. Minimum clearance, 4 inches, except at coupler casting or braces when minimum clearance shall be 2 inches.

(3) *Location.* One on pilot, buffer-beam; one on rear end of tender, extending across front end of locomotive and rear end of tender. Ends of handholds shall be not more than 6 inches from ends of buffer-beam or end sill, securely fastened at ends.

(4) *Manner of application.* End handholds shall be securely fastened with bolts or rivets.

(d) *Side handholds*—(1) *Number.* Four.

(2) *Dimensions.* Minimum diameter, seven-eighths of an inch, wrought iron or steel. Clear length equal to approximate height of tank. Minimum clearance, 2, preferably 2½ inches.

(3) *Location.* Vertical. One on each side of tender near front corner; one on each side of locomotive at gangway.

(4) *Manner of application.* Side handholds shall be securely fastened with bolts or rivets.

(e) *Uncoupling levers*—(1) *Number.* Two double levers, operative from either side.

(2) *Dimensions.* (i) Handles of front-end levers shall be not more than 12, preferably 9, inches from ends of buffer-beam, and shall be so constructed as to give a minimum clearance of 2 inches around handle.

(ii) Rear-end levers shall extend across end of tender with handles not more than 12, preferably 9, inches from side of tender, with a guard bent on handle to give not less than 2 inches clearance around handle.

(3) *Location.* One on rear end of tender and one on front end of locomotive.

(f) *Handrails and steps for headlights.* Switching locomotives with sloping tenders with manhole or headlight located on sloping portion of tender shall be equipped with secure steps and handrail or with platform and handrail leading to such manhole or headlight.

(g) *End-ladder clearance.* No part of locomotive or tender except draft rigging, coupler and attachments, safety chains, buffer block, footboard, brake pipe, signal pipe, steam-heat pipe or arms of uncoupling lever shall extend to within 14 inches of a vertical plane passing through the inside face of knuckle when closed with horn of coupler against buffer block or end sill.

(h) *Couplers.* Locomotives shall be equipped with automatic couplers at rear of tender and front of locomotive.

§ 231.17 Specifications common to all steam locomotives.

(a) *Hand brakes.* (1) Hand brakes will not be required on locomotives nor on tenders when attached to locomotives.

(2) If tenders are detached from locomotives and used in special service, they shall be equipped with efficient hand brakes.

(b) *Running boards*—(1) *Number.* Two.

(2) *Dimensions.* Not less than 10 inches wide. If of wood, not less than $1\frac{1}{2}$ inches in thickness; if of metal, not less than three-sixteenths of an inch, properly supported.

(3) *Location.* One on each side of boiler extending from cab to front end near pilot-beam. (Running boards may be in sections. Flat-top steamchests may form section of running board.)

(4) *Manner of application.* (i) Running boards shall be securely fastened with bolts, rivets, or studs.

(ii) Locomotives having Wooten type boilers with cab located on top of boiler more than 12 inches forward from boiler head shall have suitable running boards running from cab to rear of locomotive, with handrailings not less than 20 nor more than 48 inches above outside edge of running boards, securely fastened with bolts, rivets, or studs.

(c) *Handrails*—(1) *Number.* Two or more.

(2) *Dimensions.* Not less than 1 inch in diameter, wrought iron or steel.

(3) *Location.* One on each side of boiler extending from near cab to near front end of boiler, and extending across front end of boiler, not less than 24 nor more than 66 inches above running board.

(4) *Manner of application.* Handrails shall be securely fastened to boiler.

(d) *Tenders of Vanderbilt type.* (1) Tenders known as the Vanderbilt type shall be equipped with running boards; one on each side of tender not less than 10 inches in width and one on top of tender not less than 48 inches in width, extending from coal space to rear of tender.

(2) There shall be a handrail on each side of top running board, extending from coal space to rear of tank, not less than 1 inch in diameter and not less than 20 inches in height above running board from coal space to manhole.

(3) There shall be a handrail extending from coal space to within 12 inches of rear of tank, attached to each side of tank above side running board not less than 30 nor more than 66 inches above running board.

(4) There shall be one vertical end handhold on each side of Vanderbilt type of tender, located within 8 inches of rear of tank extending from within 8 inches of top of end sill to within 8 inches of side handrail. Post supporting rear end of side running board, if not more than 2 inches in diameter and properly located, may form section of handhold.

(5) An additional horizontal end handhold shall be applied on rear end of all Vanderbilt type of tenders which are not equipped with vestibules. Handhold to be located not less than

30 nor more than 66 inches above top of end sill. Clear length of handhold to be not less than 48 inches.

(6) Ladders shall be applied at forward ends of side running boards.

(e) *Handrails and steps for headlights.* (1) Locomotives having headlights which can not be safely and conveniently reached from pilot-beam or steam chests shall be equipped with secure handrails and steps suitable for the use of men in getting to and from such headlights.

(2) A suitable metal end or side ladder shall be applied to all tanks more than 48 inches in height, measured from the top of end sill, and securely fastened with bolts or rivets.

(f) *Couplers.* Locomotives shall be equipped with automatic couplers at rear of tender and front of locomotive.

§ 231.18 Cars of special construction.

Cars of construction not covered specifically in the foregoing sections in this part, relative to handholds, sill steps, ladders, hand brakes and running boards may be considered as of special construction, but shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, hand brakes, and running boards as are required for cars of the nearest approximate type.

§ 231.19 Definition of "Right" and "Left."

"Right" or "Left" refers to side of person when facing end or side of car from ground.

§ 231.20 Variation in size permitted.

To provide for the usual inaccuracies of manufacturing and for wear, where sizes of metal are specified, a total variation of 5 percent below size given is permitted.

§ 231.21 Tank cars without under-frames.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and other house cars" (see § 231.1 (a) (1)).

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (a) (2)).

(3) *Location.* Each hand brake shall be so located that it can be safely operated while car is in motion. The brake shaft shall be located on end of car to the left of center.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (a) (4)).

(b) *End platforms*—(1) *Number.* Two.

(2) *Dimensions.* Minimum width, ten inches. Minimum thickness, one and three-quarters inches.

(3) *Location.* One on each end extending across car a distance equal to or greater than any other portion of car. Outside edge of end platform shall extend not less than seven inches beyond bulge of tank head and safety railing.

(4) *Manner of application.* End platforms shall be securely fastened to the draft sills and be sufficiently rigid to prevent sagging.

(c) *Sill steps.* Same as specified for "Box and other house cars" (see § 231.1 (d)).

(d) *End platform safety railing*—(1) *Number.* Two.

(2) *Dimensions.* Minimum of seven-eighths inch diameter, wrought iron or steel, or one and one-quarter inch pipe. Minimum clearance, two and one-half inches.

(3) *Location.* One safety railing at each end of car shall extend horizontally across car not less than thirty-six inches nor more than fifty-four inches above end platform and extend downward within three inches of the end of the platform. The safety railing shall be located not more than six inches from the inside edge of the platform.

(4) *Manner of application.* Safety railings shall be supported at center of car and at each end by extending downward at the ends and attaching to the platform.

(e) *Side railing*—(1) *Number.* Two.

(2) *Dimensions.* One and one-quarter inch pipe. Minimum clearance two and one-half inches.

(3) *Location.* One on each side of car, extending from end platform to end platform at a distance of not less than 51 inches from centerline of car, except that where break in side railing is necessary for side ladder or operating cabinet, the side railing shall be securely attached to such ladder and/or cabinet.

(4) *Manner of application.* Safety railings shall be securely attached to end platforms and supported from the car at intervals not exceeding ten feet.

(f) *Side handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (h) (2)).

(3) *Location.* Four horizontal; one on face of end platform end, over sill step, projecting downward or outward. Clearance of outer end of handhold shall be not more than twelve inches from end of car. Vertical portion of end platform safety railing shall be considered as a side vertical handhold.

(4) *Manner of application.* Same as prescribed for "Box and other house cars" (see § 231.1 (h) (4)).

(g) *End handholds*—(1) *Number.* Four.

(2) *Dimensions.* Same as specified for "Box and other house cars" (see § 231.1 (i) (2)).

(3) *Location.* Horizontal, one near each side of each end of car on face of end sill. Clearance of outer end of handhold shall not be more than sixteen inches from side of car.

(4) *Manner of application.* Same as specified for "Box and other house cars" (see § 231.1 (i) (4)).

(h) *Uncoupling levers.* Same as specified for "Box and other house cars" (see § 231.1 (k)).

(i) *End ladder clearance.* No part of car above end sills within thirty inches from side of car, except buffer block, brake shaft, brake-shaft brackets, brake wheel, running boards or uncoupling lever shall extend to within twelve inches of a vertical plane parallel with end of car passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of the buffer block.

(j) *Operating platform, ladder and safety railing*—(1) *Number.* One operating platform, two ladders and safety railing. Not required if all fittings used in the loading or unloading of the tank car are accessible from ground or end platform.

(2) *Dimensions.* (i) Ladder: Ladder stiles, three-eighths by two inches or equivalent, wrought iron or steel. One and one-quarter inch extra strong pipe will be considered equivalent.

(ii) Ladder treads minimum diameter, five-eighths of an inch, wrought iron or steel.

(iii) Minimum clear length of treads, fourteen inches.

(iv) Maximum spacing of treads, nineteen inches.

(v) Minimum clearance of treads and ladder stiles, two inches, preferably two and one-half inches.

(vi) Operating platform, minimum width, seven inches; minimum thickness, one and three-quarters inches.

(vii) Safety railing, one and one-quarter inch wrought iron or steel pipe.

(3) *Location.* (i) Operating platform to be sufficient length to provide access to all operating fittings. Ladder to be located on sides of car at center.

(ii) The safety railing shall enclose the operating platform, manway and fittings used in the loading and unloading of the tank. Railing shall be open only at the ladders where it shall extend in a vertical direction down to, and be securely attached to the platform. Maximum width of opening, twenty-four inches.

(4) *Manner of application.* (i) The ladders shall be securely fastened to the operating platform. The lower portion of ladder shall be braced in such a manner as to prevent any movement.

(ii) The operating platforms shall be supported to prevent sagging and be securely attached to the tank.

(iii) The safety railing shall be securely attached to four stanchions or corner posts, which shall be securely attached to the tank or operating platform.

(k) *Manner of application of safety appliances on tank cars covered with jackets.* On tanks covered with jackets, metal pads shall be securely attached to the shell proper, to which brackets shall be fastened for securing the safety appliances attached to the tanks; or, the safety appliances (with the exception of the operating platform brackets) may be secured to the jackets reinforced with metal pads at the point of attachment, which pads shall extend at least two inches from the center line of rivet holes. The operating platform brackets shall be secured to the jacket reinforced with suitable bands. When the safety appliances are attached to the jacket covering of the tank, the jacket shall be tightened so that there will be no danger of its slipping around.

§ 231.22 Operation of track motor cars.

On and after August 1, 1963, it shall be unlawful for any railroad subject to the requirements of the Safety Appliance Acts to operate or permit to be operated on its line track motor cars to pull

or haul trailers, push trucks, hand cars, or similar cars or equipment.

NOTE: At 28 F.R. 7839, Aug. 1, 1963, the effective date of § 231.22 was stayed until further order.

§ 231.23 Unidirectional passenger-train cars adaptable to van-type semi-trailer use.

(a) *Hand brakes*—(1) *Number.* Same as specified for "Passenger-Train Cars Without End-Platforms."

(2) *Location.* Each hand brake shall be so located that it can be safely operated while car is in motion. The hand brake operating device shall be located on the end of car to the left of center.

(b) *Brake step*—(1) *Number.* One (1).

(2) *Dimensions.* Not less than twenty-eight (28) inches in length. Outside edge not less than eight (8) inches from face of car, except when "A" frame is used and extends beyond end of car, a platform of anti-skid design covering the extended portion of the "A" frame may be used as brake step.

(3) *Manner of application.* Brake step shall be securely fastened to car and when additional support is necessary, metal braces having a minimum cross-sectional area three-eighths (3/8) by one and one-half (1½) inches or equivalent shall be securely fastened to body of car with not less than one-half (½) inch bolts or rivets.

(c) *Sill steps*—(1) *Number.* Two (2).

(2) *Dimensions.* Minimum length of tread, ten (10) preferably twelve (12) inches. Minimum cross-sectional area, one-half (½) by one and one-half (1½) inches, or equivalent, wrought iron, steel or other metal of equivalent strength. Minimum clear depth, eight (8) inches.

(3) *Location.* One (1) near the rear or trailing end of the car on each side, not more than twenty-four (24) inches from corner of car to center of tread of sill step.

(4) *Manner application.* Same as specified for "Passenger-Train Cars Without End-Platforms."

(d) *End-clearance.* No part of car above end sills except the brake step shall extend to within twenty (20) inches of a vertical plane parallel with end of car and passing through the outside edge of any part of an adjoining car.

(e) *Side hanlholds*—(1) *Number.* Four (4).

(2) *Dimensions.* Minimum diameter, five-eighths (5/8) of an inch wrought iron, steel or metal of equivalent strength. Minimum clear length, sixteen (16) preferably twenty-four (24) inches. Minimum clearance, two (2) preferably two and one-half (2½) inches.

(3) *Location.* Horizontal, two (2) over each sill step. Lower handhold shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler. Upper handhold shall be not less than fifteen (15) nor more than nineteen (19) inches above lower handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

(4) *Manner of application.* Side handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

(f) *Horizontal end-handholds*—(1) *Number.* Seven (7).

(2) *Dimensions.* Minimum diameter, five-eighths (5/8) of an inch, wrought iron or other metal of equivalent strength. Minimum clear length, sixteen (16) inches. Minimum clearance, two (2) preferably two and one-half (2½) inches.

(3) *Location.* End-sill: One (1) near each side at the rear or trailing end of car on face of end-sill or sheathing over end-sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

(i) Lower: One near each side of the rear of trailing end of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

(ii) Upper: One (1) near each side at the rear of trailing end of car not less than fifteen (15) nor more than nineteen (19) inches above lower handhold. Clearance of outer ends of lower and upper handholds shall be not more than eight (8) inches from side of car. Lower and upper handholds shall be spaced to coincide with corresponding side handholds, a variation of two (2) inches being allowed. On front end of car there shall be one (1) additional end handhold full length of car not less than forty (40) nor more than fifty (50) inches above center line of coupler. Clearance of each end of handhold shall be not more than eight (8) inches from side of car. When construction

will not permit the use of a single handhold, four (4) handholds, each not less than sixteen (16) inches in length may be used, provided dimensions and locations coincide.

(4) *Manner of application.* End handholds shall be securely fastened with not less than one-half (½) inch bolts with the nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets. When marker sockets or brackets are located so that they cannot be conventiently reached, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

(g) *Uncoupling levers.* Each car shall be equipped to provide means of coupling and uncoupling without the necessity of men going between the cars.

§ 231.24 Box and other house cars with roofs, 16 feet 10 inches or more above top of rail.[1]

(a) *Hand brakes*—(1) *Number.* Same as specified for "Box and Other House Cars."

(2) *Dimensions.* Same as specified for "Box and Other House Cars."

(3) *Location.* Each hand brake shall be located so that it can be safely operated from the end-platform. Each brake shaft shall be located on end of car to left of center and not more than twenty-four (24) inches from left-side of car.

(4) *Manner of application.* Same as specified for "Box and Other House Cars."

(b) *End-platforms*—(1) *Number.* Two (2).

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[1] (a) Each car of this type built or rebuilt after (January 1, 1976) or under construction prior thereto and placed in service after (effective date) shall be equipped as specified in § 231.27(a)-(h) and (j) or, if it has roof hatches, as specified in § 231.28.

(b) Each car of this type placed in service after November 23, 1964 and before (effective date) shall be equipped—
(1) As specified in § 231.24; or
(2) As specified in § 231.27(a)-(h) and (j); or
(3) It it has roof hatches, as specified in § 231.28.

(c) Each car of this type placed in service before October 22, 1964, or under construction on October 22, 1964 and placed in service before November 23, 1964, shall be equipped—
(1) As specified in § 231.1; or
(2) As specified in §§ 231.1 and 231.27(i); or
(3) As specified in § 231.27(a)-(h) and (j); or
(4) If it has roof hatches, as specified in § 231.28.

(2) *Dimensions.* Width, not less than ten (10) inches. Length, full width of car.

(3) *Location.* One (1) on each end of car not more than eight (8) inches above center sill.

(4) *Manner of application.* Each end-platform shall be securely supported by not less than four (4) metal braces having a minimum cross sectional area three-eighths (3/8) by one and one-half (1½) inches or equivalent which shall be securely fastened to body of car with not less than one-half (½) inch bolts or rivets. The outside edge of each end-platform shall be not less than six (6) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler-horn against the buffer-block or end sill and cushioning device (if used) at full buff. End-platform shall be made of running board material as specified for "Box and Other House Cars."

(c) *Sill steps.* Same as specified for "Box and Other House Cars."

(d) *End-ladder clearance.* No part of car above end-sills within thirty (30) inches from side of car, except buffer block brake-shaft, brake wheel, end-platform, horizontal end handholds, or coupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle, when closed with the coupler horn against the buffer block or end-sill and cushioning device (if used) at full buff, and no other part of end of car or fixtures on same above end-sill, other than exceptions herein noted, shall extend beyond outer face of buffer block.

(e) *Side handholds*—(1) *Number.* Sixteen (16).

(2) *Dimensions.* Same as specified for "Box and Other House Cars."

(3) *Location.* Horizontal: Four (4) near each end and on each side of car spaced not more than nineteen (19) inches apart and with the bottom handhold located not more than twenty-one (21) inches from top tread of sill step, and top handhold shall coincide in height with horizontal end-platform handhold, a variation of two (2) inches being allowed. Spacing of side handholds shall be uniform within a limit of two (2) inches from top handhold to bottom handhold. Clearance of outer ends of handholds shall be not more than eight (8) inches from end of car.

(4) *Manner of application.* Same as specified for "Box and Other House Cars," except each bottom handhold shall have foot guard or upward projection not less than two (2) inches in height near inside end.

(f) *Horizontal end handholds*—(1) *Number.* Four (4).

(2) *Dimension.* Same as specified for "Box and Other House Cars."

(3) *Location.* One (1) near each side of each end of car on outer edge of end platform, projecting downward with clearance of outer end not more than sixteen (16) inches from side of car.

(4) *Manner of application.* Same as specified for "Box and Other House Cars."

(g) *Horizontal end-platform handholds*—(1) *Number.* Two (2).

(2) *Dimensions.* Same as specified for "Horizontal End Handholds" for "Box and Other House Cars," except length shall extend across end of car.

(3) *Location.* Extending across each end of car, not less than forty-eight (48) nor more than sixty (60) inches above tread of end-platform with clearance at each end of not more than four (4) inches from side of car, supported by an extra leg near center of handholds.

(4) *Manner of application.* Same as specified for "Horizontal End Handholds" for "Box and Other House Cars."

(h) *Vertical end-handholds*—(1) *Number.* Four (4).

(2) *Dimensions.* Minimum diameter five-eighths ($\frac{5}{8}$) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half ($2\frac{1}{2}$) inches.

(3) *Location.* One (1) on each side of each end of car, not more than four (4) inches from side of car, extending downward from end of horizontal end-platform handhold to within eight (8) inches above tread of end-platform. One (1) continuous handhold with two (2) right angles, or two (2) right angle handholds, may take the place of two (2) specified vertical end-handholds and one (1) horizontal end-platform handhold, provided the dimensions and locations coincide, and extra legs at points of angle and center are provided and securely fastened to car.

(4) *Manner of application.* Same as specified for "Box and Other House Cars."

(i) *Uncoupling levers.* Same as specified for "Box and Other House Cars."

(j) *Painting and stenciling.* (1) That portion of each end of car more than fifteen (15) feet above top of rail shall be painted with contrasting reflectorized paint and shall bear the words "No running board" to the left of center and "Excess height car" to the right of center.

(2) Lettering to be not less than three (3) inches high. On each side-sill near end corner there shall be painted a yellow rectangular area with a three-fourths (¾) inch black border containing the words "This car excess height—no running board." Lettering to be not less than one and one-half (1½) inches high. When car is equipped with center sill or underframe cushioning device having more than twelve (12) inches longitudinal impact absorbing travel, and a part of the uncoupling device and—or brake pipe is located parallel to the exposed end of the center sill, such part shall provide at least two (2) inches of clearance near the coupler of sufficient length to permit use as an emergency handhold during air hose coupling operation and the top of exposed ends of sliding center sill shall be coated with anti-skid paint.

§ 231.25 Track motorcars (self-propelled 4-wheel cars which can be removed from the rails by men.)

(a) *Handbrakes (includes foot operated brake).* Each track motor car shall be equipped with an efficient handbrake so located that it can be safely operated while the car is in motion. Each handbrake shall be equipped with a ratchet or other suitable device which will provide a means of keeping the brake applied when car is not in motion.

NOTE: The requirements of this rule will be satisfied if the ratchet or other suitable device operates in connection with at least one handbrake on track motorcars that may be equipped with more than one such brake.

(b) *Handholds.* One or more safe and suitable handholds conveniently located shall be provided. Each handhold shall be securely fastened to car.

(c) *Sill steps or footboards.* Each track motorcar shall be equipped with safe and suitable sill steps or footboards conveniently located and securely fastened to car when bed or deck of track motorcar is more than 24 inches above top of rail.

(d) *Couplers.* When used to haul other cars, each track motor-car shall be equipped with a coupler at each end where such cars are coupled (1) which provides a safe and secure attachment, (2) which can be coupled or uncoupled without the necessity of men going between the ends of the cars.

§ 231.26 Pushcars.

(a) *Handbrakes.* When used to transport persons, each push-car shall be equipped with an efficient handbrake so located that it can be safely operated while car is in motion.

(b) *Handholds (includes handles).* Each pushcar shall be provided with one or more secure handholds. When used to transport persons, each pushcar shall be provided with one or more safe and suitable handholds conveniently located above the top of the bed of each pushcar.

(c) *Sill steps or footboards.* When used to transport persons, each pushcar shall be equipped with safe and suitable sillsteps or footboards conveniently located and securely fastened to car, when bed or deck of pushcar is more than 24 inches above top of rail.

(d) *Couplers.* When moved together with other vehicles, each pushcar shall be equipped with a coupler at each end where such vehicles are coupled (1) which provides a safe and secure attachment, and (2) which can be coupled or uncoupled without the necessity of men going between the ends of the cars.

NOTE: Sections 231.25 and 231.26 are applicable only when the vehicles governed thereby are coupled together and moved together.

§ 231.27 Box and other house cars without roof hatches (does not include cars with roofs 16 feet 10 inches or more above top of rail).

(a) *Handbrakes.* The handbrake may be of any efficient design, but must provide the same degree of safety as, or a greater degree of safety than, the following specifications.

(1) *Number.* (i) Each box or other house car without roof hatches shall be equipped with an efficient vertical wheel hand-brake which shall operate in harmony with the power brake thereon.

(ii) The handbrake may be of any efficient design, but must provide a total braking force applied to brake shoes not less than the total force applied to the brake shoes by the brake cylinders at 50 pounds per square inch.

(2) *Dimensions.* (i) The brake wheel may be deep or shallow, of malleable iron, wrought iron, steel, or other material of equivalent strength.

(ii) Overall diameter of brake wheel nominally twenty-two (22) inches.

(iii) Depth of brake wheel hub shall be two and five-eighths (2⅝) inches with square taper shaft fit, taper two (2) inches in twelve (12) inches with small end of taper fit seven-eighths (⅞) inches.

(iv) Brake wheel and drum shall be arranged so that both will revolve when applying and gradually releasing the handbrake. Handbrake shall be provided with means to prevent application of the brake by winding in a counter-clockwise direction.

(v) Brake shaft shall be arranged with a square fit at its outer end to secure the handbrake wheel; and square fit shall be not less than seven-eighths (⅞) of an inch square. Square-fit taper: nominally two (2) in twelve (12) inches (see Plate A).

(vi) All chains shall be not less than nine-sixteenths (9/16) inch BBB coil chain.

(vii) All handbrake rods shall be not less than three-fourths (¾) inch diameter.

(3) *Location.* (i) The handbrake shall be so located that it can be safely operated from horizontal end platform while car is in motion.

(ii) The brake shaft shall be located on end of car, to the left of and not less than seventeen (17) nor more than twenty-two (22) inches from center and not less than twenty-six (26) nor more than forty (40) inches above top of end-platform tread.

(4) *Manner of application.* (i) Brake wheel shall be held in position on brake shaft by a nut on a threaded extended end of brake shaft; said thread portion shall be not less than three-fourths (¾) of an inch in diameter; said nut shall be secured by riveting over or by the use of a locknut or suitable cotter.

(ii) Outside edge of brake wheel shall be not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn gainst the buffer block or end sill.

(iii) Handbrake housing shall be securely fastened to car.

(b) *End platforms*—(1) *Number.* Two (2).

(2) *Dimensions.* Width not less than eight (8) inches; length, not less than sixty (60) inches.

(3) *Location.* One (1) centered on each end of car between inner ends of handholds not more than eight (8) inches above top of center sill.

(4) *Manner of application.* (i) Each end platform shall be securely supported by not less than three (3) metal braces having a minimum cross sectional area of three-eighths (3/8) by one and one-half (1½) inches or equivalent, which shall be securely fastened to body of car with not less than one-half (½) inch bolts or rivets.

(ii) Where conventional draft gear or cushioning device having longitudinal travel less than six (6) inches is used the outside edge of each end platform shall be not less than twelve (12), inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against buffer block. Where cushioning device having longitudinal travel six (6) inches or more is used the outside edge of each end platform shall be not less than six (6) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with end sill and cushioning device at full buff. End platform shall be made of wood or of material which provides the same as or a greater degree of safety than wood of 1⅛ inches thickness. When made of material other than wood the tread surface shall be anti-skid design and constructed with sufficient open space to permit the elimination of snow and ice from the tread surface.

(c) *Sill Steps*—(1) *Number.* Four (4).

(2) *Dimensions.* Minimum cross-sectional area one-half (½) by one and one-half (1½) inches, or equivalent, of wrought iron, steel, or other material of equivalent strength. Minimum length of tread, ten (10), preferably twelve (12) inches. Minimum clear depth, eight (8) inches.

(3) *Location.* (i) One (1) near each end of each side of car, so that there shall be no more than eighteen (18) inches from end of car to center of tread of sill step.

(ii) Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.

(iii) Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22) inches above the top of rail.

(4) *Manner of application.* (i) Sill steps exceeding twenty-one (21) inches in depth shall have an additional tread.

(ii) Sill steps shall be securely fastened with not less than one-half (1/2) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (1/2) inch rivets.

(d) *End ladder (appliances) clearance.* No part of car above end sills within thirty (30) inches from side of car, except buffer block, brake shaft, brake wheel, end platform, horizontal end handholds, or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle, when closed with the coupler horn against the buffer block or end sill and cushioning device (if used) at full buff, and no other part of end of car or fixtures on same above end sill, other than exceptions herein noted, shall extend beyond outer face of buffer block.

(e) *Side handholds*—(1) *Number.* Sixteen (16).

(2) *Dimensions.* Minimum diameter, five-eighths (5/8) of an inch, wrought iron, steel, or other material of equivalent strength. Minimum clear length, sixteen (16) inches, preferably twenty-four (24) inches. Minimum clearance, two (2), preferably two and one-half (2 1/2) inches.

(3) *Location.* Horizontal; four (4) near each end on each side of car spaced not more than nineteen (19) inches apart and with the bottom handhold located not more than twenty-one (21) inches from top tread of sill step, and top handhold shall coincide in height with top end handhold, a variation of two (2) inches being allowed. Spacing of side handhold shall be uniform within a limit of two (2) inches from top handhold to bottom handhold. Clearance of outer ends of handholds shall be not more than eight (8) inches from end of car.

(4) *Manner of application.* Side handholds shall be securely fastened with not less than one-half (1/2) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (1/2) inch rivets. Each bottom handhold shall have foot guard or upward projection not less than two (2) inches in height near inside end.

(f) *End handholds*—(1) *Number.* Sixteen (16).

(2) *Dimensions.* (i) Minimum diameter, five-eighths (5/8) of an inch, wrought iron, steel, or other material of equivalent strength.

(ii) Minimum clear length, sixteen (16) inches, preferably twenty-four (24) inches.

(iii) Minimum clearance, two (2), preferably two and one-half (2½) inches.

(3) *Location.* Horizontal: Four (4) near each side on each end of car spaced not more than nineteen (19) inches apart and with the bottom handhold located not more than twenty-one (21) inches from top tread of sill step, and top handhold shall coincide in height with end platform handholds, a variation of two (2) inches being allowed. Clearance of outer ends of handholds shall be not more than eight (8) inches from inside of car.

(4) *Manner of application.* End handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets. Each bottom handhold shall have foot guard or upward projection not less than two (2) inches in height near inside end.

(g) *Horizontal end-platform handholds*—(1) *Number.* Two (2).

(2) *Dimensions.* (i) Minimum diameter, five-eighths (⅝) of an inch, wrought iron, steel, or other material of equivalent strength.

(ii) Minimum clearance two (2), preferably two and one-half (2½) inches.

(iii) Minimum clear length sixty (60) inches. When security of attachment requires, an extra supporting leg may be applied near center of clear length.

(3) *Location.* One (1) on each end of car above end platform. Outer legs shall be not more than six (6) inches from inner legs of top end handholds. Height above tread of end platform: Not less than forty-eight (48) nor more than sixtly (60) inches.

(4) *Manner of application.* End platform handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

(h) *Uncoupling levers*—(1) *Number.* Two (2).

(2) *Dimensions.* (i) Handles of uncoupling levers, except those shown on Plate B or of similar designs, shall be not more than six (6) inches from side of car.

(ii) Uncoupling levers of design shown on Plate B and of similar designs shall conform to the following prescribed limits:

(a) Handles shall be not more than twelve (12), preferably nine (9) inches from sides of car. Center lift arms shall be not less than seven (7) inches long.

(b) Center of eye at end of center lift arm shall be not more than three and one-half (3½) inches beyond center of eye of uncoupling pin of coupler when horn of coupler is against the buffer block or end sill (see Plate B).

(c) End of handles shall extend not less than four (4) inches below bottom of end sill or shall be so constructed as to give a minimum clearance of two (2) inches around handle. Minimum drop of handles shall be twelve (12) inches; maximum, fifteen (15) inches overall (see Plate B).

(iii) Handles of uncoupling levers of the "rocking" or "push-down" type shall be not less than eighteen (18) inches from top of rail when lockblock has released knuckle, and a suitable stop shall be provided to prevent inside arm from flying up in case of breakage.

(3) *Location.* One (1) on each end of car. When single lever is used, it shall be placed on left side of end of car.

(i) *Existing box and other house cars without roof hatches.*

(1) Box and other house cars without roof hatches built on or before April 1, 1966, or under construction prior thereto and placed in service before October 1, 1966, shall be deemed equipped as nearly as possible within the intent of § 231.1 and of this section when: (i) The running board, roof handholds over side and end ladders at "A" end of car and ladder treads above the fourth tread from bottom of side and end ladder at "A" end are removed; (ii) one (1) horizontal end-platform handhold is applied on each end of car as specified in this section except the right hand end shall be not more than eight (8) inches from side of car, or where car end contour makes impractical the use of a single continuous end handhold, there is applied the equivalent consisting of two (2) handholds, the center handhold to be a minimum of thirty (30) inches in clear length and the handhold to the right to be a minimum of nineteen (19) inches in clear length and to extend to within eight (8) inches of the right side of the car, such handholds to be not more than twelve (12) inches apart; and (iii) with handbrake operated near roof of car: a brake step shall be provided as specified in § 231.1 and lettering one and one-half (1½) inches high shall be painted on a yellow background on side sill near "B" end of car with a three-fourths

(¾) inch block border containing the words "Keep Off Roof—No Running Board," or with handbrake operated from approximate level of top of end sill: roof handholds and side and end ladder treads above the fourth tread from the bottom of ladders at "B" end of car shall be removed and a brake step as specified by § 231.1 shall be used with top of tread surface being level with or not more than four (4) inches below adjacent end handhold.

(2) Subdivision (ii) of subparagraph (1) of this paragraph shall not apply to cars equipped with end platforms and end platform handholds.

(j) *Painting and Marking.* Box and other house cars with roofs 16 feet and 10 inches or more above top of rail shall be painted and marked as follows:

(1) That portion of each end of the car which is more than fifteen (15) feet above top of rail shall be painted with contrasting reflectorized paint and bear the words "excess height car" in lettering not less than three (3) inches high; and

(2) On each side sill near end corner there shall be painted or otherwise displayed a yellow rectangular area with a three-fourths (¾) inch black border containing the words "this car excess height" in lettering not less than one and one-half (1½) inches high.

§ 231.28 Box and other house cars with roof hatches.

The specifications of § 231.27 shall apply except as to the following:

(a) *Running boards.* Same as specified in § 231.1, except: the end of longitudinal running board shall be not less than six (6) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against buffer block or end sill.

(b) *Ladders*—(1) *Number.* Two (2).

(2) *Dimensions.* (i) Minimum clear length of tread: sixteen (16) inches.

(ii) Maximum spacing between treads nineteen (19) inches.

(3) *Location.* One (1) on each end of car not more than eight (8) inches from left-hand side.

(4) *Manner of application.* Same as specified in § 231.1.

(c) *Roof handholds*—(1) *Number.* Two (2), one (1) over each ladder.

(2) *Dimensions.* Same as specified in § 231.1.

(3) *Location.* On roof of car. One (1) parallel to treads of each ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof, except on refrigerator cars where ice hatches prevent, when location may be nearer edge of roof.

(4) *Manner of application.* Same as specified in § 231.1.

(d) *End handholds.* (Treads of end ladders are end handholds.) Same as specified for § 231.27.

(e) *Existing box and other house cars with roof hatches.* Box and other house cars with roof hatches built on or before April 1, 1966, or under construction prior thereto and placed in service before October 1, 1966, shall be deemed equipped as nearly as possible within the intent of § 231.1 and of this section when: Equipped as specified in § 231.1 except (1) the side ladder treads above the fourth tread from bottom of side ladder near "A" end of car and roof handhold over the side ladder near "A" end shall be removed; (2) and (1) end platform handhold shall be provided on each end of car as specified in § 231.27(i); and when handbrake is operated near roof of car a brake step shall be provided as specified by § 231.1 or when handbrake is operated from approximate level of top of end sill the roof handhold over side ladder near "B" end and treads above the fourth tread from bottom of side ladder near "B" end shall be removed and a brake step as specified in § 231.1 shall be used with top of tread surface level with or not more than four (4) inches below adjacent end handhold.

§ 231.29 Road locomotives with corner stairways.

After September 30, 1979, road locomotives with corner stairway openings must be equipped with (a) uncoupling mechanisms that can be operated safely from the bottom stairway opening step as well as ground level, and (b) the vertical handholds and horizontal end handholds prescribed in § 231.30(e) and (g). No part of the uncoupling mechanism may extend into the stairway opening or end platform area when the mechanism is in its normal position or when it is operated. Each carrier shall so equip forty percent (40 percent) of its road locomotives by October 1,

1977, seventy percent (70 percent) by October 1, 1978, and all such locomotives by October 1, 1979.

§ 230.30 Locomotives used in switching service.

(a) *General requirements.* (1) Except for steam locomotives equipped as provided in § 231.16 of this part, all locomotives used in switching service built after March 31, 1977, must be equipped as provided in this section.

(2) Except for steam locomotives equipped as prescribed in § 231.16 of this part, all locomotives built prior to April 1, 1977, used in switching service after September 30, 1979, shall be equipped as provided in this section. Each carrier shall so equip forty percent (40 percent) of such locomotives by October 1, 1977, seventy percent (70 percent) by October 1, 1978, and all such locomotives by October 1, 1979.

(3) Locomotives without corner stairway openings may not be used to perform any switching service after September 30, 1979 except passenger car switching service at passenger stations.

(b) *Definitions.* (1) "Locomotive used in switching service" means a locomotive regularly assigned to perform yard switching service.

(2) "Switching Service" means the classification of cars according to commodity or destination; assembling of cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing, placing of locomotives and cars for repair or storage; or moving of rail equipment in connection with work service that does not constitute a road movement. However, this term does not include movement of a train or part of a train within yard limits by the road locomotive and the placement of locomotives or cars in a train or their removal from a train by the road locomotive while en route to the train's desination.

(3) "Safety tread surface" means that portion of anti-skid surface of a switching step that actually is contacted by a shoe or boot.

(4) "Uncoupling mechanism" means the arrangement for operating the coupler lock lift, including the uncoupling lever and all other appurtenances that facilitate operation of the coupler.

(c) *Switching step.* (1) *Number.*—Each locomotive used in switching service must have four (4) switching steps. (See Plate A')

(2) *Dimensions.* Each such switching step must have—

(i) On locomotives built after March 31, 1977, a minimum width of twenty-four (24) inches and a minimum depth of twelve (12) inches, except when necessary to accommodate the turning arc of a six-wheel truck and its appurtenances, the inside edge of the switching step shall have a minimum width of seventeen (17) inches (See Plate B′);

(ii) On locomotives built prior to April 1, 1977, a minimum width of eighteen (18) inches, and a minimum depth of eight (8) inches;

(iii) A backstop, solid or perforated, with minimum height of backstop of six (6) inches above the safety tread surface; and

(iv) A height of not more than nineteen (19) inches, preferably fifteen (15) inches, measured from top of rail to the safety tread surface.

(3) *Location.* Switching steps must be located on each side near each end of a locomotive used in switching service. The bottom step of the stairway at these locations may also serve as a switching step if it meets all of the requirements of this section.

(4) *Manner of application.* (i) Switching steps must be supported by a bracket at each end and fastened to the bracket by two bolts or rivets of at least one-half (1/2) inch diameter or by a weldment of at least twice the strength of a bolted attachment.

(ii) Vertical clearance must be unobstructed, except for minor intrusions created by mechanical fasteners or a small triangular gusset plate at the platform level walkway, and free for use for at least a distance of eighty-four (84) inches over a portion of the switching step that is not less than seven (7) inches deep by eighteen (18) inches wide on locomotives built prior to April 1, 1977, and of not less than seven (7) inches deep by twenty-four (24) inches wide on locomotives built after March 31, 1977.

(5) *Material.* (i) Steel or other material of equivalent or better strength and deflection characteristics, anti-skid, safety design, having at least fifty percent (50%) of the tread surface as open space must be used.

(ii) When the step material creates a second level safety tread surface, the maximum difference in surface levels may not exceed three-eighths (3/8) of an inch.

(iii) The safety tread surface must extend to within one-half (½) inch of each edge of the step.

(6) *Visibility.* The outer edge of each switching step that is not illuminated must be painted a contrasting color. On locomotives built after March 31, 1977, switching steps shall be illuminated; on multiple-unit locomotive consists used in switching service, only the front switching steps of the leading unit and the rear switching steps of the trailing unit must be illuminated.

(d) *End footboards and pilot steps.* (1) Except for steam locomotives equipped as provided in § 231.16, locomotives used in switching service built after March 31, 1975, may not be equipped with end footboards or pilot steps.

(2) Except for steam locomotives equipped as provided in § 231.16, locomotives used in switching service built before April 1, 1975, may not be equipped with end footboards or pilot steps after September 30, 1978. Whenever end footboards or pilot steps are removed from a locomotive, the uncoupling mechanism and horizontal end handholds of the locomotive must be modified to comply with paragraphs (f) and (g) of this section.

(e) *Vertical handholds.* Each switching step must be provided with two (2) vertical handholds or handrails, one on each side of the switching step stairway.

(1) On locomotives built after March 31, 1977, each vertical handhold must—

(i) Be constructed of wrought iron, steel or other material of equivalent strength and durability that is at least one (1) inch diameter and be securely fastened to the locomotive with one-half (½) inch or larger bolts or rivets;

(ii) Begin not less than six (6) inches nor more than thirty-two (32) inches above the safety tread surface of the switching step; on units with high snowplows, each must begin not more than thirty-six (36) inches above the safety tread surface of the switching step;

(iii) Extend upward from switching step surface at least forty-eight (48) inches;

(iv) Be painted in a contrasting color to a height of at least forty-eight (48) inches above the safety tread surface of the switching step; and

(v) Provide at least two and one-half (2½) inches of usable hand clearance throughout its entire length.

(2) On locomotives built before April 1, 1977, each vertical handhold must—

(i) Be constructed of wrought iron, steel or other material of equivalent strength and durability that is at least seven-eighths (7/8) inch in diameter and be securely fastened with one-half (1/2) inch or larger bolts or rivets;

(ii) Begin not less than five (5) inches nor more than thirty-two (32) inches above the safety tread surface; on units with high snowplows, each must begin not more than thirty-six (36) inches above the safety tread surface;

(iii) Extend upward from safety tread surface of the switching step at least forty-eight (48) inches;

(iv) Be painted in a contrasting color to a height of at least forty-eight (48) inches above the safety tread surface of the switching step; and

(v) Provide at least two and one-half (2 1/2) inches usable hand clearance throughout its entire length.

(f) *Uncoupling mechanisms.* Each locomotive used in switching service must have means for operating the uncoupling mechanism safely from the switching step as well as from ground level. No part of the uncoupling mechanism may extend into the switching step or stairway opening or end platform area when the mechanism is in its normal position or when it is operated. (See Plate A')

(g) *Horizontal end handholds.* Each locomotive used in switching service must have four (4) horizontal end handholds.

(1) Each horizontal end handhold must—

(i) Be constructed of wrought iron, steel or other material of equivalent strength and durability that is at least five-eighths (5/8) inch in diameter and be securely fastened to the locomotive with one-half (1/2) inch or larger bolts or rivets;

(ii) Be located not less than thirty (30) inches nor more than fifty (50) inches above the top of rail with its outer end not more than 16 inches from the side of the locomotive; on units with a high snowplow that makes normal end handhold location inaccessible, end handhold shall be located on top of plow blade, with the center of the handhold not more than fifty-three (53) inches above the top of rail, and be in line with the slope of the plow blade;

(iii) Be at least fourteen (14) inches long; and

(iv) Provide at least two (2) inches, preferably two and one-half ($2\frac{1}{2}$) inches, usable hand clearance throughout its entire length.

(2) An uncoupling lever may also serve as a horizontal end handhold if it complies with the requirements of this paragraph. When an uncoupling lever also serves as the horizontal end handhold, it is considered to be securely fastened if its securement brackets are attached to the locomotive by one-half ($\frac{1}{2}$) inch or larger bolts or rivets and its movement between those brackets is limited to the rotation necessary for performance of the uncoupling function.

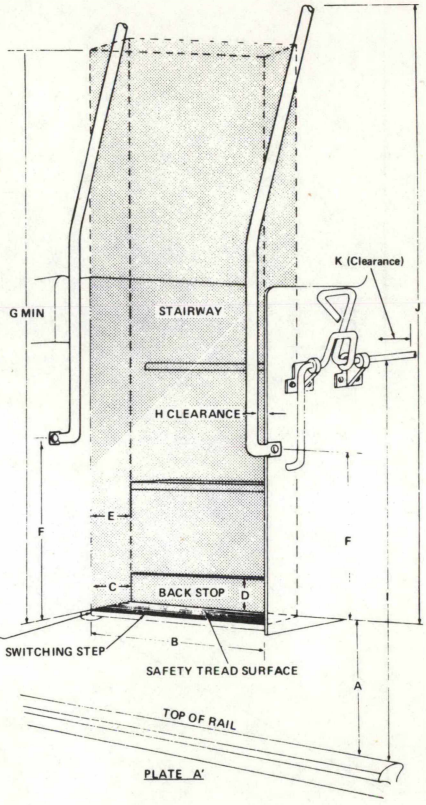
ITEM	DIMENSION NEW UNITS	EXISTING UNITS
A. Height of switching step above rail	15" preferred 19" maximum	15" preferred 19" maximum
B. Minimum width of switching step (between stairway supports)	24"	18"
C. Minimum depth of switching step	12"	8"
D. Minimum height of backstop	6"	6"
E. Minimum distance from front edge of switching step to front edge of first step above	7"	7"
F. Distance above switching step for start of vertical handholds Minimum-Maximum EXCEPTION: Maximum for units with high snowplows	6"-32" 36"	5"-32" 36"
G. Clear height above switching step	84"	84"
H. Vertical handhold clearance	2½" minimum	2¼" minimum
I. Height above top of rail for horizontal handhold or uncoupling lever if used as horizontal handhold EXCEPTION: Maximum for units with high snowplow	30"-50" 53"	30"-50" 53"
J. Minimum height above switching step of vertical handhold	48"	48"
K. Horizontal handhold clearance or uncoupling lever clearance if used as horizontal handhold	2"-2½"	2"-2½"

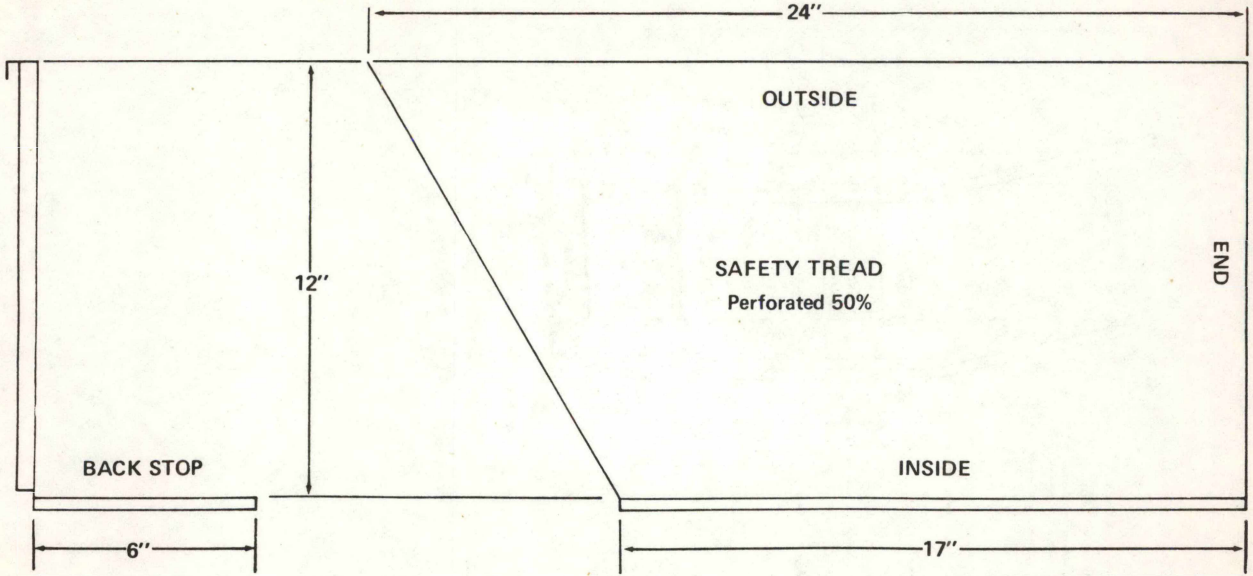
NOTES:

1. Switching steps must be supported by a bracket at each end and fastened to the bracket by two bolts or rivets of at least one-half (½) inch diameter or by a weldment of at least twice the strength of a bolted attachment.

2. The outer edge of each switching step that is not illuminated must be painted a contrasting color.

3. Vertical handholds must be painted in a contrasting color to a height of at least forty-eight (48) inches above the safety tread surface of the switching step.





SWITCHING STEP SHOWING INSIDE RELIEF FOR CLEARANCE
OF SIX-WHEEL TRUCK

PLATE B'

Part 232—Railroad Power Brakes and Drawbars

§ 232.1 Power brakes; minimum percentage.

On and after September 1, 1910, on all railroads used in interstate commerce, whenever, as required by the Safety Appliance Act as amended March 2, 1903, any train is operated with power or train brakes, not less than 85 percent of the cars of such train shall have their brakes used and operated by the enigneer of the locomotive drawing such train, and all power-brake cars in every such train which are associated together with the 85 percent shall have their brakes so used and operated.

§ 232.2 Drawbars; standard height.

Except on cars specified in the proviso in section 6 of the Safety Appliance Act of March 2, 1893 (sec. 6, 27 Stat. 532, 45 U.S.C. 6) as the same was amended April 1, 1896 (29 Stat. 85; 45 U.S.C. 6) the standard height of drawbars heretofore designated in compliance with law is hereby modified and changed in the manner hereinafter prescribed, to wit: The maximum height of drawbars for freight cars measured perpendicularly from the level of the tops of rails to the centers of drawbars for standard-gauge railroads in the United States subject to said act shall be 34½ inches, and the minimum heights of drawbars for freight cars on such standard-gauge railroads measured in the same manner shall be 31½ inches, and on narrow-gauge railroads in the United States subject to said act the maximum height of drawbars for freight cars measured from the level of the tops of rails to the centers of drawbars shall be 26 inches, and the minimum height of drawbars for freight cars on such narrow-gauge railroads measured in the same manner shall be 23 inches, and on 2-foot-gauge railroads in the United States subject to said act the maximum height of drawbars for freight cars measured from the level of the tops of rails to the centers of drawbars shall be 17½ inches, and the minimum height of drawbars for freight cars on such 2-foot-gauge railroads measured in the same manner shall be 14½ inches.

§ 232.3 Power brakes and appliances for operating power-brake systems.

(a) The specifications and requirement for power brakes and appliances for operating power-brake systems for freight service set forth in the appendix to the report on further hearing, of May 30, 1945, are hereby adopted and prescribed. (See Appendix to this Part for order in Docket 13528.)

Rules for Inspection, Testing and Maintenance of Air Brake Equipment

§ 232.10 General rules; locomotives.

(a) Air brake and hand brake equipment on locomotives including tender must be inspected and maintained in accordance with the requirements of the Locomotive Inspection and United States Safety Appliance Act and related orders and regulations of the Federal Railroad Administrator (FRA).

(b) It must be known that air brake equipment on locomotives is in a safe and suitable condition for service.

(c) Compressor or compressors must be tested for capacity by orifice test as often as conditions require but not less frequently than required by law and orders of the FRA.

(d) Main reservoirs shall be subjected to tests periodically as required by law and orders of the FRA.

(e) Air gauges must be tested periodically as required by law and orders of the FRA, and whenever any irregularity is reported. They shall be compared with an accurate deadweight tester, or test gauge. Gauges found inaccurate or defective must be repaired or replaced.

(f) (1) All operating portions of air brake equipment together with dirt collectors and filters must be cleaned, repaired and tested as often as conditions require to maintain them in a safe and suitable condition for service, and not less frequently than required by law and orders of the FRA.

(2) On locomotives so equipped, hand brakes, parts, and connections must be inspected, and necessary repairs made as often as the service requires, with date being suitably stencilled or tagged.

(g) The date of testing or cleaning of air brake equipment and the initials of the shop or station at which the work was done

shall be placed on a card displayed under transparent covering in the cab of each locomotive unit.

(h) (1) Minimum brake cylinder piston travel must be sufficient to provide proper brake shoe clearance when brakes are released.

(2) Maximum brake cylinder piston travel when locomotive is standing must not exceed the following:

	Inches
Steam locomotives:	
Cam type of driving wheel brake	3½
Other types of driving wheel brakes	6
Engine truck brake	8
Engine trailer truck brake	8
Tender brake (truck mounted and tender bed mounted)	8
Tender brake (body mounted)	9

	Inches
Locomotives other than steam:	
Driving wheel brake	6
Swivel type truck brake with brakes on more than one truck operated by one brake cylinder	7
Swivel type truck brake equipped with one brake cylinder	8
Swivel type truck brake equipped with two or more brake cylinders	6

(i) (1) Foundation brake rigging, and safety supports, where used, must be maintained in a safe and suitable condition for service. Levers, rods, brake beams, hangars and pins must be of ample strength and must not bind or foul in any way that will affect proper operation of brakes. All pins must be properly applied and secured in place with suitable locking devices. Brake shoes must be properly applied and kept approximately in line with treads of wheels or other braking surfaces.

(2) No part of the foundations brake rigging and safety supports shall be closer to the rails than specified by law and orders of the FRA.

(j) (1) Main reservoir leakage: Leakage from main air reservoir and related piping shall not exceed an average of 3 pounds per minute in a test of three minutes' duration, made after the pressure has been reduced 40 percent below maximum pressure.

(2) Brake pipe leakage: Brake pipe leakage must not exceed 5 pounds per minutes after reduction of 10 pounds has been made from brake pipe air pressure of not less than 70 pounds.

(3) Brake cylinder leakage: With a full service application of brakes, and with communication to the brake cylinders closed, brakes must remain applied not less than five minutes.

(4) The main reservoir system of each unit shall be equipped with at least one safety valve, the capacity of which shall be sufficient to prevent an accumulation of pressure of more than 10 pounds per square inch above the maximum setting of the compressor governor fixed by the chief mechanical officer of the carrier operating the locomotive.

(5) A suitable governor shall be provided that will stop and start the air compressor within 5 pounds above or below the pressure fixed.

(6) Compressor governor when used in connection with the automatic air brake system shall be so adjusted that the compressor will start when the main reservoir pressure is not less than 15 pounds above the maximum brake-pipe pressure fixed by the rules of the carrier and will not stop the compressor until the reservoir pressure has increased not less than 10 pounds.

(k) The communicating signal system on locomotives when used in passenger service must be tested and known to be in a safe and suitable condition for service before each trip.

(l) Enginemen when taking charge of locomotives must know that the brakes are in operative condition.

(m) In freezing weather drain cocks on air compressors of steam locomotives must be left open while compressors are shut off.

(n) Air pressure regulating devices must be adjusted for the following pressures:

	Pounds
(1) Minimum brake pipe air pressure:	
Road Service	70
Switch Service	60
(2) Minimum differential between brake pipe and main reservoir air pressures, with brake valve in running position	15
(3) Safety valve for straight air brake	30–55
(4) Safety valve for LT, ET, No. 8–EL, No. 14 EL, No. 6–DS, No. 6–BL and No. 6–SL equipment	30–68
(5) Safety valve for HSC and No. 24–RL equipment	30–75
(6) Reducing valve for independent or straight air brake	30–50
(7) Self-lapping portion for electro-pneumatic brake (minimum full application pressure)	50
(8) Self-lapping portion for independent air brake (full application pressure)	30–50
(9) Reducing valve for air signal	40–60
(10) Reducing valve for high-speed brake (minimum)	50
CARS	
(11) Reducing valve for high-speed brake	58–62
(12) Safety valve for PS, LN, UC, AML, AMU and AB–1–B air brakes	58–62
(13) Safety valve for HSC air brake	58–77
(14) Governor valve for water raising system	60
(15) Reducing valve for water raising system	20–30

§ 232.11 Train air-brake system tests.

(a) Supervisors are jointly responsible with inspectors, enginemen and trainmen for condition of air brake and air signal equipment on motive power and cars to the extent that it is possible to detect defective equipment by required air tests.

(b) Communicating signal system on passenger equipment trains must be tested and known to be in a suitable condition for service before leaving terminal.

(c) Each train must have the air brakes in effective operating condition, and at no time shall the number and location of operative air brakes be less than permitted by Federal requirements. When piston travel is in excess of 10 inches, the air brakes cannot be considered in effective operating condition.

 10½

(d) Condensation must be blown from the pipe from which air is taken before connecting yard line or motive power to train.

§ 232.12 Initial terminal road train air brake tests.

(a) Except for run-through and unit run-through trains covered under § 232.19, each train must be inspected and tested as specified in this section at points—

(1) Where the train is originally made up (initial terminal);

(2) Where train consist is changed, other than by adding or removing a solid block of cars, and the train brake system remains charged; and

(3) Where the train is received in interchange.

(b) Each carrier shall designate additional inspection points not more than 500 miles apart where intermediate inspection will be made to determine that—

(1) Brake pipe pressure leakage does not exceed 5 pounds per minute;

(2) Brakes apply on each car in response to a 20-pound service brake pipe pressure reduction; and

(3) Brake rigging is properly secured and does not bind or foul.

(c) Train air brake system must be charged to required air pressure, angle cocks and cutout cocks must be properly positioned, air hose must be properly coupled and must be in condition for service. An examination must be made for leaks and necessary repairs made to reduce leakage to a minimum. Retaining valves and retaining valve pipes must be inspected and known to be in condition for service. If train is to be operated in electropneumatic brake operation, brake circuit cables must be properly connected.

(d) (1) After the air brake system on a freight train is charged to within 15 pounds of the setting of the feed valve on the locomotive, but to not less than 60 pounds, as indicated by an accurate gauge at rear end of train, and on a passenger train when charged to not less than 70 pounds, and upon receiving the signal to apply brakes for test, a 15-pound brake pipe service reduction must be made in automatic brake operation, the brake valve lapped, and the number of pounds of brake pipe leakage per minute noted as indicated by brake pipe gauge, after which

brake pipe reduction must be increased to full service. Inspection of the train brakes must be made to determine that angle cocks are properly positioned, that the brakes are applied on each car, that piston travel is correct, that brake rigging does not bind or foul, and that all parts of the brake equipment are properly secured. When this inspection has been completed, the release signal must be given and brakes released and each brake inspected to see that all have released.

(2) When a passenger train is to be operated in electropneumatic brake operation and after completion of test of brakes as prescribed by subparagraph (1) of this paragraph the brake system must be recharged to not less than 90 pounds air pressure, and upon receiving the signal to apply brakes for test, a minimum 20 pound electropneumatic brake application must be made as indicated by the brake cylinder gage. Inspection of the train brakes must then be made to determine if brakes are applied on each car. When this inspection has been completed, the release signal must be given and brakes released and each brake inspected to see that all have released.

(3) When the locomotive used to haul the train is provided with means for maintaining brake pipe pressure at a constant level during service application of the train brakes, this feature must be cut out during train air brake tests.

(e) Brake pipe leakage must not exceed 5 pounds per minute.

(f) (1) At initial terminal piston travel of body-mounted brake cylinders which is less than 7 inches or more than 9 inches must be adjusted to nominally 7 inches.

(2) Minimum brake cylinder piston travel of truck-mounted brake cylinders must be sufficient to provide proper brake shoe clearance when brakes are released. Maximum piston travel must not exceed 6 inches.

(3) Piston travel of brake cylinders on freight cars equipped with other than standard single capacity brake, must be adjusted as indicated on badge plate or stenciling on car located in a conspicuous place near brake cylinder.

(g) When test of air brakes has been completed the engineman and conductor must be advised that train is in proper condition to proceed.

(h) During standing test, brakes must not be applied or released until proper signal is given.

(i) (1) When train air brake system is tested from a yard test plant, an engineer's brake valve or a suitable test device must be used to provide increase and reduction of brake pipe air pressure or electropneumatic brake application and release at the same or a slower rate as with engineer's brake valve and yard test plant must be connected to the end which will be nearest to the hauling road locomotive.

(2) When yard test plant is used, the train air brake system must be charged and tested as prescribed by paragraphs (c) to (g) of this section inclusive, and when practicable should be kept charged until road motive power is coupled to train, after which, an automatic brake application and release test of air brakes on rear car must be made. If train is to be operated in electropneumatic brake operation, this test must also be made in electropneumatic brake operation before proceeding.

(3) If after testing the brakes as prescribed in subparagraph (2) of this paragraph the train is not kept charged until road motive power is attached, the brakes must be tested as prescribed by paragraph (d) (1) of this section and if train is to be operated in electropneumatic brake operation as prescribed by paragraph (d) (2) of this section.

(j) Before adjusting piston travel or working on brake rigging, cutout cock in brake pipe branch must be closed and air reservoirs must be drained. When cutout cocks are provided in brake cylinder pipes, these cutout cocks only may be closed and air reservoirs need not be drained.

§ 232.13 Road train and intermediate terminal train air brake tests.

(a) Passenger trains: Before motive power is detached or angle cocks are closed on a passenger train operated in either automatic or electropneumatic brake operation, except when closing angle cocks for cutting off one or more cars from the rear end of train, automatic air brake must be applied. After recoupling, brake system must be recharged to required air pressure and before proceeding and upon receipt of proper request or signal, application and release tests of brakes on rear car must be made from locomotive in automatic brake operation. If train is to be operated in electropneumatic brake operation, this test must also be made in electropneumatic brake operation before proceeding. Inspector or trainman must determine if brakes on rear car of train properly apply and release.

(b) Freight trains: Before motive power is detached or angle cocks are closed on a freight train, brakes must be applied with

not less than a 20 pound brake pipe reduction. After recoupling and angle cocks are opened, it must be known that brake pipe air pressure is being properly restored as indicated by the caboose gauge and that brakes on rear car are released. In the absence of a caboose gauge, air brake test must be made as prescribed by that portion of paragraph (a) of this section pertaining to automatic brake operation.

(c) (1) At a point other than initial terminal where locomotive or caboose is changed, or where one or more consecutive cars are cut off from rear end or head end of train with consist otherwise remaining intact, after train brake system is charged to within 15 pounds of feed valve setting on locomotive but not less than 60 pounds as indicated at rear of freight train, and on a passenger train to at least 70 pounds, a 20-pound brake pipe reduction must be made and it must be determined that brakes on rear car apply and release properly.

(2) Before proceeding it must be known that brake pipe pressure as indicated at rear of freight train is being restored.

(3) On trains operating with electro-pneumatic brakes, with brake system charged to not less than 70 pounds, test must be made to determine that rear brakes apply and release properly from a minimum 20 pounds electro–pneumatic brake application as indicated by brake cylinder gauge.

(d) (1) At a point other than a terminal where one or more cars are added to a train, and after the train brake system is charged to not less than 60 pounds as indicated by a gauge at the rear of freight train and on a passenger train to not less than 70 pounds, tests of air brakes must be made to determine that brake pipe leakage does not exceed five (5) pounds per minute as indicated in the brake pipe gauge after a 15 pound brake pipe reduction. After the leakage test is completed, brake pipe reduction must be increased to full service, and it must be known that the brakes on each of these cars and on the rear car of train apply and release. Cars added to train which have not been inspected in accordance with § 232.12 (c) to (j) must be so inspected and tested at next terminal where facilities are available for such attention.

(2) (i) At a terminal where a solid block of cars which has been previously charged and tested as prescribed by § 232.12 (a) to (h) is added to a train, test must be made to determine that brakes on the rear car of train apply and release.

(ii) When cars which have not been previously charged and tested as prescribed by § 232.12 (a) to (h) are added to a train, such cars may either be given inspection and tests in accordance with § 232.12 (a) (h), or tested as prescribed by subparagraph (1) of this paragraph prior to departure in which case these cars must be inspected and tested in accordance with § 232.12 (a) to (h) at next terminal.

(3) Before proceeding it must be known that the brake pipe pressure at the rear of freight train is being restored.

(e) (1) Transfer train and yard train movements not exceeding 20 miles, must have the air brake hose coupled between all cars, and after the brake system is charged to not less than 60 pounds, a 15 pound service brake pipe reduction must be made to determine that the brakes are applied on each car before releasing and proceeding.

(2) Transfer train and yard train movement exceeding 20 miles must have brake inspection in accordance with § 232.12 (a) to (h).

(f) The automatic air brake must not be depended upon to hold a locomotive, cars or train, when standing on a grade, whether locomotive is attached or detached from cars or train. When required, a sufficient number of hand brakes must be applied to hold train, before air brakes are released. When ready to start, hand brakes must not be released until it is known that the air brake system is properly charged.

§ 232.14 Inbound brake equipment inspection.

(a) At points where inspectors are employed to make a general inspection of trains upon arrival at terminals, visual inspection must be made of retaining valves and retaining valve pipes, release valves and rods, brake rigging, safety supports, hand brakes, hose and position of angle cocks and make necessary repairs or mark for repair tracks any cars to which yard repairs cannot be promptly made.

(b) Freight trains arriving at terminals where facilities are available and at which special instructions provide for immediate brake inspection and repairs, shall be left with air brakes applied by a service brake pipe reduction of 20 pounds so that inspectors can obtain a proper check of the piston travel. Trainmen will not close any angle cock or cut the locomotive off until the 20

pound service reduction has been made. Inspection of the brakes and needed repairs should be made as soon thereafter as practicable.

§ 232.15 Double heading and helper service.

(a) When more than one locomotive is attached to a train, the engineman of the leading locomotive shall operate the brakes. On all other motive power units in the train the brake pipe cut-out cock to the brake valve must be closed, the maximum main reservoir pressure maintained and brake valve handles kept in the prescribed position. In case it becomes necessary for the leading locomotive to give up control of the train short of the destination of the train, a test of the brakes must be made to see that the brakes are operative from the automatic brake valve of the locomotive taking control of the train.

(b) The electro-pneumatic brake valve on all motive power units other than that which is handling the train must be cut out, handle of brake valve kept in the prescribed position, and air compressors kept running if practicable.

§ 232.16 Running tests.

When motive power, engine crew or train crew has been changed, angle cocks have been closed except for cutting off one or more cars from the rear end of train or electro-pneumatic brake circuit cables between power units and/or cars have been disconnected, running test of train air brakes on passenger train must be made, as soon as speed of train permits, by use of automatic brake if operating in automatic brake operation or by use of electro-pneumatic brake if operating in electro–pneumatic brake operation. Steam or power must not be shut off unless required and running test must be made by applying train air brakes with sufficient force to ascertain whether or not brakes are operating properly. If air brakes do not properly operate, train must be stopped, cause of failure asecrtained and corrected and running test repeated.

§ 232.17 Freight and passenger train car brakes.

(a) *Testing and repairing brakes on cars while on shop or repair tracks.* (1) When a freight car having brake equipment due for periodic attention is on shop or repair tracks where fa-

cilities are available for making air brake repairs, brake equipment must be given attention in accordance with the requirements of the currently effective AAR Code of Rules[1] for cars in interchange.

(2) (i) When a freight car having brake equipment not due for periodic attention as indicated by standard stenciling is on shop or repair tracks, brake equipment must be tested by use of single car testing device as prescribed by currently effective AAR Code of Tests,[1] providing such car has not been so tested within the previous 90 days as indicated by stenciling. Piston travel must be adjusted to nominally 7 inches on cars having standard single capacity brake. Piston travel of brake cylinders on freight cars equipped with other than standard single capacity brake, must be adjusted as indicated on badge plate or stenciling on car located in a conspicuous place near brake cylinder. After piston travel has been adjusted and with brakes released, sufficient brake shoe clearance must be provided.

(ii) When a car equipped for use in passenger train service not due for periodical air brake repairs, as indicated by stenciled or recorded cleaning dates, is on shop or repair tracks, brake equipment must be tested by use of single car testing device as prescribed by currently effective AAR Code of Tests.[1] Piston travel of brake cylinders must be adjusted if required, to the standard travel for that type of brake cylinder. After piston travel has been adjusted and with brakes released, sufficient brake shoe clearance must be provided.

(iii) Before a car is released from a shop or repair track, it must be known that brake pipe is securely clamped, angle cocks in proper position with suitable clearance, valves, reservoirs and cylinders tight on supports and supports securely attached to car.

(3) (i) If triple valve, control valves or brake cylinders on a freight car do not meet requirements during single car test as specified by the currently effective AAR Code of Tests,[1] brake equipment must be given attention specified by currently effective AAR approved Code of Rules[1] for cars in interchange.

(ii) If, on passenger equipment cars, triple valves, control valves, brake cylinders, slack adjusters, high speed reducing valves, relay valves, quick service valves, vent valves, brake application valves or conductors valves do not meet requirements during single

[1] Available at Association of American Railroads.

car test as prescribed by subparagraph (2) (ii) of this paragraph, and if speed governor control, magnet valves, or wheel slide control does not operate properly when tested by a suitable test device, defective part or parts must be repaired or replaced and new cleaning date must be stenciled or recorded as required.

(4) When cars are on shop or repair tracks hand brakes and connections must be inspected, tested and necessary repairs made to insure they are in a suitable condition for safe and effective operation.

(b) *Periodical repairs.* Brake equipment on cars must be cleaned, repaired, lubricated and tested as often as required to maintain it in a safe and suitable condition for service but not less frequently than as required by currently effective AAR Code of Rules[1] for cars in interchange.

§ 232.18 (Reserved).

§ 232.19 Air brakes tests on run-through and unit run-through trains.

(a) For the purposes of this section—

(1) "Run-through train" means a train which passes from one carrier to another carrier with no change in consist (including locomotive) other than the addition or removal of a block of one or more cars; and

(2) "Unit run-through train" means a run-through train operated by more than one carrier on a continuous round-trip cycle and consisting of assigned equipment.

(b) The carriers involved shall jointly notify the Federal Railroad Administrator in writing of run-through trains and unit run-through trains operating over their tracks. The notice must identify points of interchange and all other points where equipment and air brake inspections are made.

(c) Each run-through train shall be inspected and tested as prescribed by § 232.12(c)–(j)—

(1) Where the train is originally made up (initial terminal);

(2) Where train consist is changed other than by adding or removing a solid block of cars and train brake system remains charged; and

(3) At intermediate inspection points not more than 500 miles apart, subject to the requirements of paragraph (f) of this section.

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[1] Available at Association of American Railroads.

(d) Each unit run-through train shall be inspected and tested as prescribed by § 232.12(c)–(j)—

(1) Where the train is originally made up and where it is reassembled after being broken up;

(2) Once during each round-trip cycle of less than 500 miles at an inspection point designated in writing by the carriers involved; and

(3) At intermediate inspection points not more than 500 miles apart, subject to the requirements of paragraph (f) of this section.

(e) Each carrier that adds a block of one or more cars to a run-through train or unit run-through train after the train is originally made up, shall inspect and test the block as follows:

(1) In accordance with § 232.12(c)–(j) at the point where the block is added; or

(2) In accordance with § 232.13(d)(1) at the point where the block is added, and § 232.12(c)–(j) at the next point on its line where the inspections and tests can be performed, but not beyond a designated 500-mile inspection point.

(f) For the purpose of the intermediate inspections and tests required by paragraphs (c)(3) and (d)(3) of this section—

(1) Piston travel of a body-mounted 10-inch brake must not exceed 10 inches; and

(2) Piston travel on all other brakes—

(i) Must not exceed the nominal travel specified by more than 2 inches; and

(ii) Must not exceed the maximum travel specified by the badge plate or stencil on the car.

(g) The inspections and tests made under § 232.12(c)–(j) as required by this section shall be performed by qualified carrier personnel at locations where adequate repair facilities are available to maintain power brake systems in effective operating condition in conformity with this part. Defective cars shall be repaired or removed from service at the point of inspection and testing.

(h) Each carrier shall record the inspections and tests made under § 232.12(c)–(j) as required by this section at the time they are performed by completing Form FRA F–6180–48 [1] in duplicate. This form shall be signed by the supervisor or other

[1] The Federal Railroad Administration will furnish specimen copies of Form FRA F–6180–48, which is filed as part of the original document, upon request. The reporting and/or recordkeeping requirements contained herein have been approved by the Office of Management and Budget in accordance with the Federal Reports Act of 1942.

carrier employee responsible for the inspections and tests. One copy of the form shall be kept in the cab of the locomotive until the train arrives at its final terminal, and one copy shall be retained for 3 months at the terminal where the inspections and tests are made.

(i) At locations where the crew of one carrier takes over control and operation of a run-through train or unit run-through train from the crew of another carrier, the receiving carrier shall inspect and test the train to determine that—

(1) The cab of the locomotive contains a Form FRA F–6180–48 completed as required by paragraph (h) of this section;

(2) Brake pipe leakage does not exceed 5 pounds per minute; and

(3) Brakes apply and release on the rear car from a 20-pound service brake pipe pressure reduction.

If the cab of the locomotive does not contain a completed Form FRA F–6180–48, the train must be inspected and tested as prescribed by § 232.12(c)–(j) before it proceeds.

Appendix

Specifications and Requirements for Power Brakes and Appliances for Operating Power-Brake Systems for Freight Service

Purpose

The purpose of this specification is to define and prescribe requirements for power brakes and appliances for operating power-brake systems.

Definitions

For purposes of this specification, terms used herein are defined as follows:

1. *Power brake.* A combination of parts operated by compressed air and controlled manually, pneumatically or electrically, by means of which the motion of a car or locomotive is retarded or arrested.

2. *Power-brake system.* The power brakes on locomotives and cars of a train so interconnected that they can be operated together and by means of which the motion of the train is retarded or arrested.

3. *Brake valve.* The valve of the locomotive equipment by means of which operation of the power-brake system is controlled.

4. *Equalizing reservoir.* The small reservoir connected to the brake valve only, the pressure of which is reduced by the engineer for making service applications.

5. *Brake pipe.* The line of pipe and hose extending throughout the length of the train by means of which compressed air is supplied to the brake devices on the several cars and the pressures so controlled as to effect the application and release of the brakes.

6. *Operating valve.* Device on each car, the operation of which result in: (a) Admission of air to brake cylinder, (b) release of air from brake cylinder, and (c) charging of one or more reservoirs.

7. *Service reduction.* A decrease in brake-pipe pressure, usually of from 5 to 25 pounds, at a rate sufficiently rapid to move the operating valve to service position, but at a rate not rapid enough to operate the valve to emergency position. Quick service is that feature of the operating valve which provides for local reduction of brake-pipe pressure.

8. *Service application.* A brake application which results from one or more service reductions.

9. *Full service reduction.* A service reduction sufficient in amount to cause equalization of pressure in brake cylinder with pressure in the reservoir from which compressed air is supplied to brake cylinder.

10. *Full service application.* A brake application which results from one or more brake-pipe reductions sufficient in amount to cause a full service reduction.

11. *Emergency reduction.* A depletion of brake-pipe pressure at a rate sufficiently rapid to move the operating valve to emergency position.

12. *Emergency application.* A brake application which results from an emergency reduction.

13. *Emergency brake-cylinder pressure.* The force per square inch exerted upon piston in brake cylinder by compressed air which is admitted to brake cylinder as a result of an emergency reduction. Effective emergency brake-cylinder pressure is a pressure not less than 15 percent nor more than 20 percent greater than the brake-cylinder pressure obtained from a full service reduction on the same car and from the same initial pressures.

SPECIFICATIONS

General Requirements

14. The design of the operating valve shall be such as will insure efficient and reliable operation, both in its application and release functions and when intermingled with other types of power brakes. It shall be so constructed that the rate of brake-cylinder pressure development may be adjusted to meet such changes in train operating conditions as may develop in the future.

15. The design of the service and emergency valves shall be such as to permit their removal for cleaning and repair without disturbing pipe joints.

16. The portions of the car brake which control the brake application and release, and also the brake cylinder, shall be adequately protected against the entrance of foreign matter.

17. The apparatus conforming to the requirements of these specifications shall be so constructed, installed and maintained as to be safe and suitable for service.

Service Requirements

The apparatus shall be so designed and constructed that: (based upon 70 pounds brake-pipe pressure and train length of 150 cars)

18. With a service reduction of 5 pounds in the equalizing reservoir at the brake valve all brakes will apply.

19. An initial 5-pound equaliizng reservoir reduction at the brake valve will produce substantially 10 pounds brake-cylinder pressure throughout the train, including brakes having piston travel in excess of 8 inches.

20. With an equalizing-reservoir reduction of 10 pounds, the difference in time of obtaining substantially 10 pounds pressure in the brake cylinder of the first and one hundred and fiftieth brakes will be nominally 20 seconds or less.

21. A brake-pipe reduction of 10 pounds will result in pressure in each brake cylinder of not less than 15 pounds nor more than 25 pounds.

22. A total brake-pipe reduction of 25 pounds will result in equalization of brake-cylinder pressure with pressure in the reservoir from which compressed air is supplied to the brake cylinder, and brake-cylinder pressure of not less than 48 pounds nor more than 52 pounds will be obtained.

23. Quick service activity of the train brakes will cease when the initial quick service action has been completed.

24. The quick service feature of the brake will produce substantially uniform time of quick service transmission regardless of the unavoidable variations in frictional resistance of the parts.

25. The brake will so function as to prevent a degree of wave action in brake-pipe pressure sufficient to cause undesired release of any brake while the brakes are being applied.

26. The degree of stability will be sufficient to prevent undesired service application occurring as a result of unavoidable minor fluctuations of brake-pipe pressure.

27. The brake-cylinder pressure increase resulting from quick service operations will be less when the brake is reapplied with pressure retained in the brake cylinder than with applications made when the brake-cylinder pressure is zero.

28. Undesired quick action will not result with any rate of change in brake-pipe pressure which may occur during service application or release of the brake.

29. In the normal release of train brakes, individual car brake will not start recharging from the brake pipe until brake-pipe pressure has increased sufficiently to have accomplished the release of adjacent valves.

30. The recharge of auxiliary reservoirs in the forward portion of the train will be automatically retarded while full release position of the brake valve is being used to initiate the release of train brakes.

31. After a 15-pound service reduction has been made and brake-valve exhaust has closed, in a release operation in which brake valve is moved to release position and after 15 seconds is moved to running position, all operating valves will move to release position within 40 seconds after brake valve is placed in release position.

32. After a 15-pound service reduction has been made and brake-valve exhaust has closed, in a release operation in which brake valve is moved to release position and after 15 seconds is moved to running position, brake-pipe pressure at car 150 will be increased 5 pounds within $1\frac{1}{2}$ minutes after brake valve is placed in release position.

33. The rate of release of pressure from the brake cylinder will be nominally 23 seconds from 50 pounds to 5 pounds.

Emergency Requirements

The apparatus shall be so designed and constructed that: (based on 70 pounds brake-pipe pressure and train length of 150 cars)

34. Emergency application operation will always be available irrespective of the existing state or stage or brake application or release.

35. Emergency application initiated during a release of previous brake application will produce a material increase in brake-cylinder pressure over that which would result from a full service application made under the same conditions.

36. When operating valve acts in emergency it will so function as to develop nominally 15 pounds brake cylinder pressure in not more than 1½ seconds and maximum pressure in nominally 10 seconds.

37. With an emergency reduction of brake-pipe pressure all brakes, including the one hundred and fiftieth, will start to apply within 8.2 seconds and develop not less than 15 percent nor more than 20 percent in excess of 50 pounds brake-cylinder pressure within 18.2 seconds from the movement of the brake valve to emergency position.

38. The operating valve will so function that, when an emergency application is made subsequent to a service application which has produced not less than 30 pounds brake-cylinder pressure, the maximum brake-cylinder pressure will be attained in nominally 4 seconds from the beginning of the emergency action of the valve.

39. Emergency application will produce from a charged system between 15 and 20 percent increase in brake cylinder pressure over that which results from a full service application and irrespective of any degree of prior service application.

40. With any group of three consecutive brakes cut out, an emergency reduction made with the brake valve will cause the remainder of the brakes to operate in emergency and produce normal emergency pressures in the same time as when all brakes are cut in.

41. The brake will so function as to accomplish the release of an emergency application with the same degree of certainty secured in the release of service applications.

42. When releasing brakes following an emergency application, each brake will so function as to decrease the auxiliary-reservoir pressure prior to the actual release.

43. Both service and emergency brake applications will be released when the brake-pipe pressure is increased to not more than 1¾ pounds above that of the auxiliary reservoir and irrespective of the increased frictional resistance to release movement of the piston and slide valves after a period of operation in train service.

NOTE: Order 13528, as amended, 17 F.R. 8653, Sept 30, 1952, provides as follows: That said order of September 21, 1945, as amended, be, and it is hereby, further amended so as to require that all said non-interchange cars that may be used in transporting revenue freight and all cabooses shall be so equipped on or before December 31, 1953, and that all other said non-interchang cars shall be so equipped on or before December 31, 1954.

Order 13528 was further amended, 17 F.R. 8957, Oct. 7, 1952, as follows: That the order heretofore entered herein on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in freight service be, and it is hereby, further amended so as not to require the installation of such brakes and appliances on cars that are used exclusively in switching operations and are not used in train movements within the meaning of the Safety Appliance Acts (45 U. S. C., secs. 1 to 16, inclusive).

Order 13528 was further amended, 17 F.R. 10738, Nov. 26, 1952, as follows: That the order heretofore entered on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in interchange freight service on or before December 31, 1952, be, and it is hereby, further amended so as—

To require that all such interchange cars be so equipped on or before June 30, 1953, except as indicated hereinafter:

To prohibit the movement by any respondent after June 30, 1953, of any car in interchange service, other than tank cars (including the cars of private carline companies), not so equipped except that such cars may be so moved prior to October 1, 1953, if routed to owner; and

To prohibit the movement by respondents after October 1, 1953, of any tank car in interchange service (including the tank cars of private car-line companies) not so equipped except that such tank cars may be so moved prior to January 1, 1954, if routed to owner.

That the term "interchange service" means the movement of any car that is engaged in freight service, irrespective of ownership, that is interchanged between or among two or more respondent railroads.

Order 13528 was further amended, 18 F. R. 6942, Nov. 3, 1953, as follows: That the order heretofore entered herein on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in freight service be, and it is hereby, further amended so as not to require the installation of such brakes and appliances on

a. Locomotives;

b. Scale test weight cars;

c. Locomotive cranes, steam shovels, pile drivers and similar construction and maintenance machines built prior to September 21, 1945;

d. Export, industrial, and other than railroad owned cars which are not to be used in service by respondents, except for movement as shipments on their own wheels to given destinations, provided that any such car so moved shall be properly identified by a card attached to each side of car, signed by shipper, stating that such movement is being made under authority of this order; and

e. Industrial and other than railroad owned cars which are not to be used in service by respondents except for movement within the limits of a single switching district.

And, that the effective date of said order of September 21, 1945, as amended, be, and it is hereby, extended until further order of the FRA, insofar as it applies to:

f. Narrow-gauge cars, and

g. Cars being returned from Canada or Mexico to owners in the United States, provided each such car being returned is routed directly to owner and is properly identified by a card attached to each side of car, signed by shipper, stating that the movement is being made under authority of this order.

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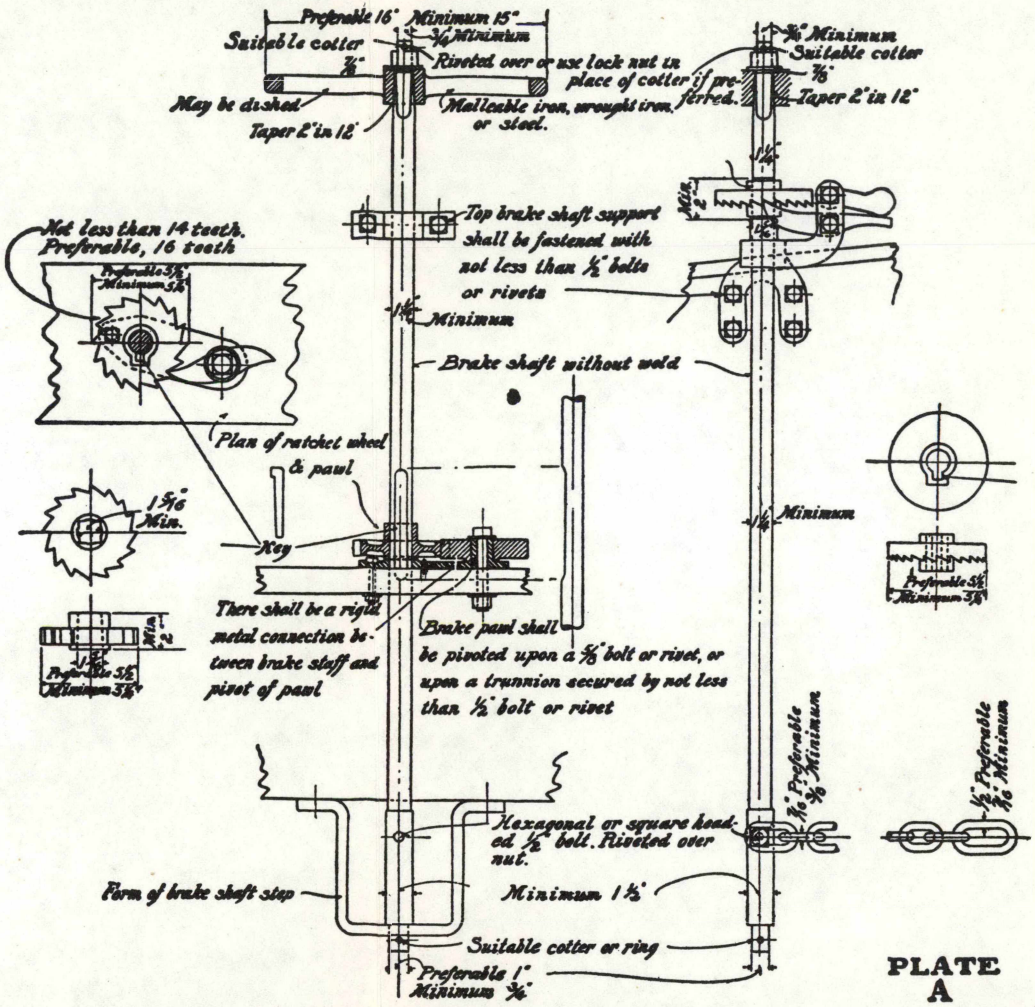
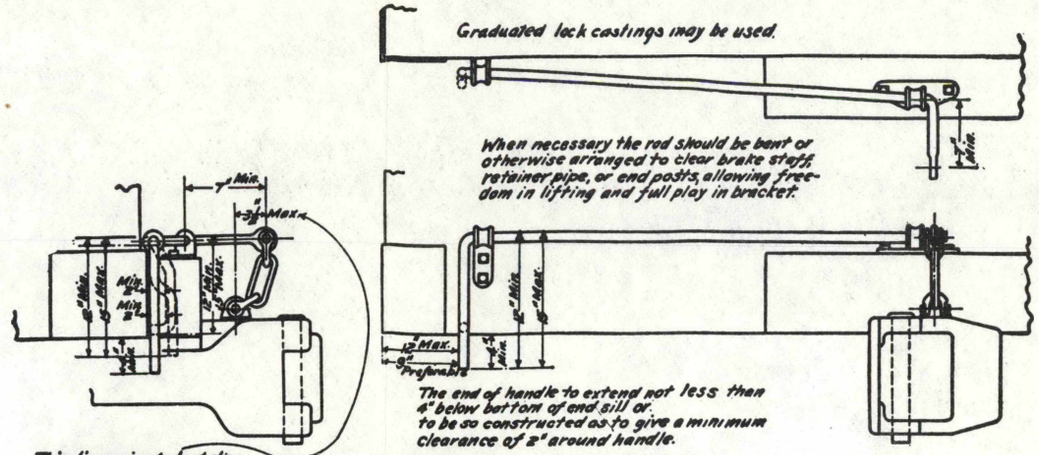
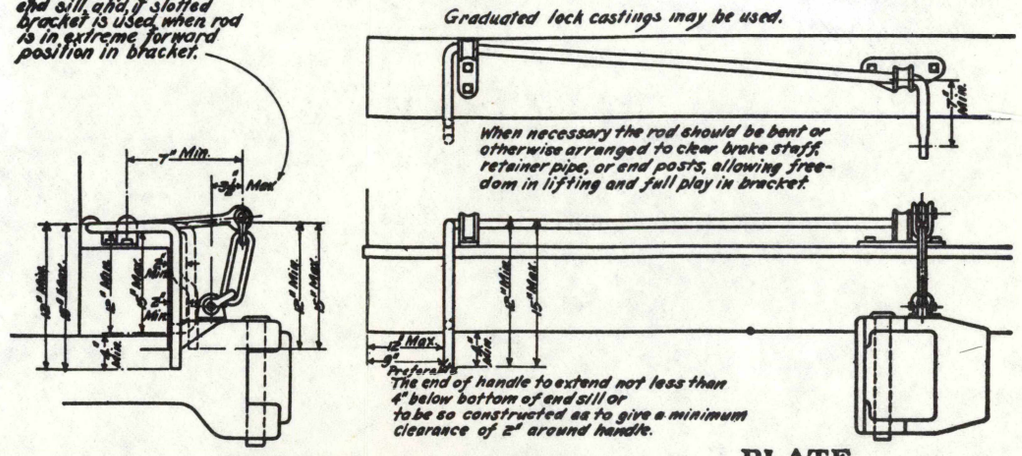


PLATE A

[*Any efficient arrangement of ratchet-wheel and pawl may be used.*]



Application to concealed endsill cars.



Application to outside endsill cars.

PLATE B

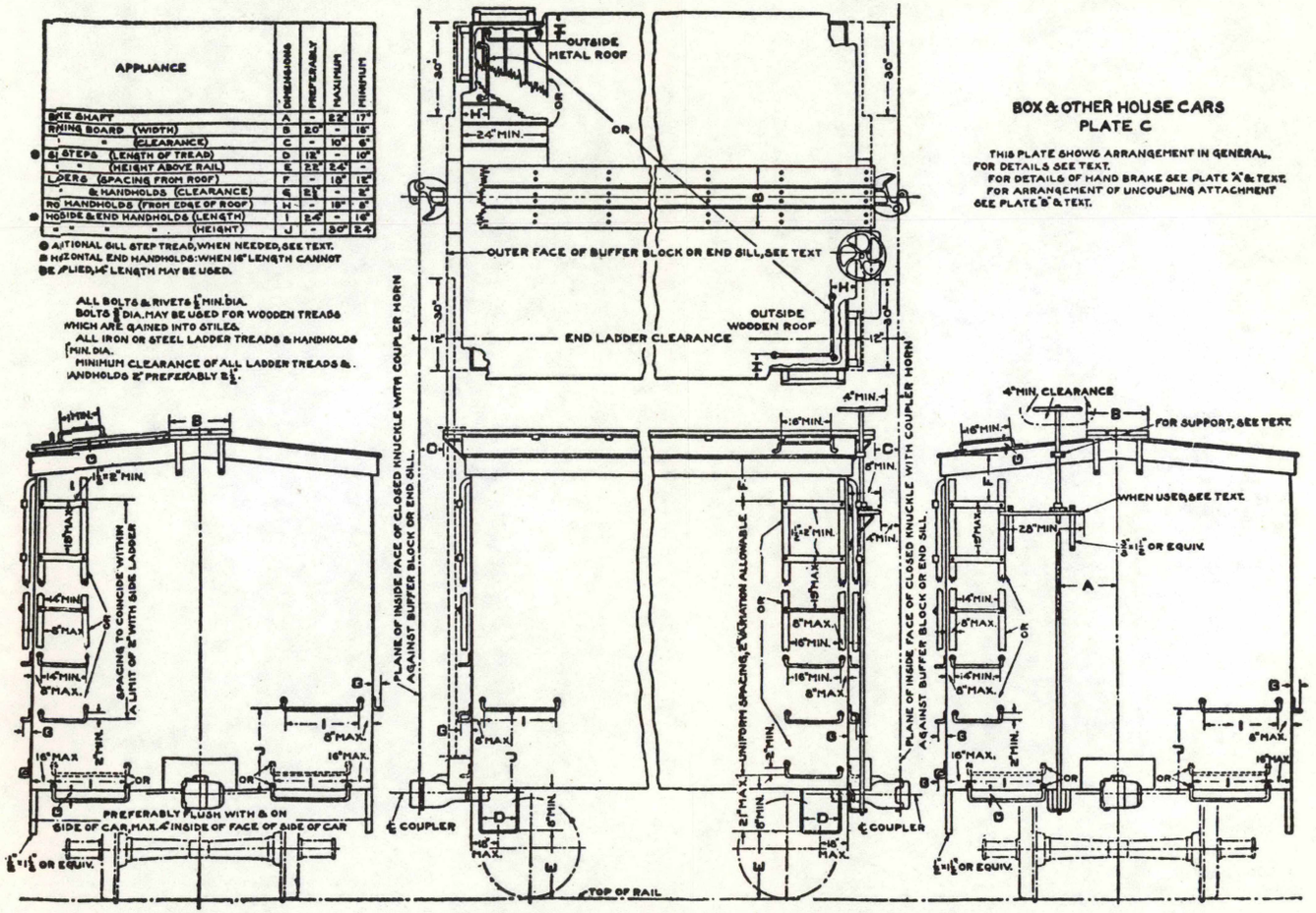
BOX & OTHER HOUSE CARS
PLATE C

THIS PLATE SHOWS ARRANGEMENT IN GENERAL.
FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
AXLE SHAFT	A	-	8'2"	7'7"
RUNNING BOARD (WIDTH)	B	2'0"	-	1'6"
" " (CLEARANCE)	C	-	10"	6"
● STEPS (LENGTH OF TREAD)	D	12"	-	10"
" (HEIGHT ABOVE RAIL)	E	2'8"	2'4"	-
LADDERS (SPACING FROM ROOF)	F	-	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	-	1½"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	-	18"	8"
●SIDE & END HANDHOLDS (LENGTH)	I	2'4"	-	1'6"
" " " " (HEIGHT)	J	-	5'0"	2'4"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
● HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 4" LENGTH MAY BE USED.

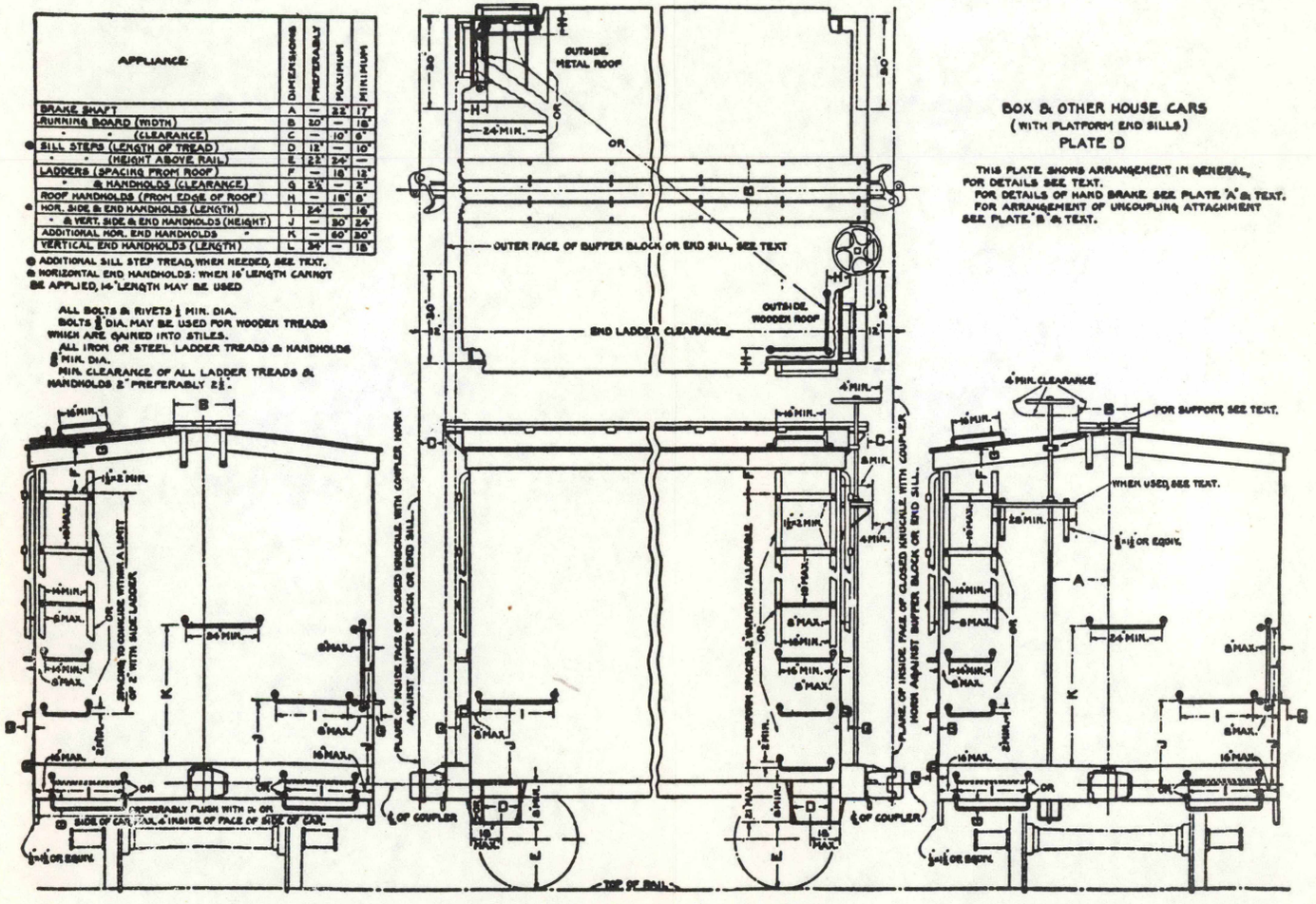
ALL BOLTS & RIVETS ⅝" MIN. DIA.
BOLTS ⅝" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
BRAKE SHAFT	A	—	22"	17"
RUNNING BOARD (WIDTH)	B	20"	—	18"
" (CLEARANCE)	C	—	10"	8"
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS (SPACING FROM ROOF)	F	—	18"	13"
" & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	—	18"	6"
● HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
" & VERT. SIDE & END HANDHOLDS (HEIGHT)	J	—	30"	24"
ADDITIONAL HOR. END HANDHOLDS "	K	—	60"	30"
VERTICAL END HANDHOLDS (LENGTH)	L	24"	—	18"

● ADDITIONAL SILL STEP TREAD WHEN NEEDED, SEE TEXT.
◎ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED

ALL BOLTS & RIVETS ½ MIN. DIA.
BOLTS ⅝ DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝ MIN. DIA.
MIN. CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



BOX & OTHER HOUSE CARS
(WITH PLATFORM END SILLS)
PLATE D

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

HOPPER CARS & HIGH-SIDE GONDOLAS WITH FIXED ENDS

(CARS WITH SIDES MORE THAN 36" ABOVE FLOOR)

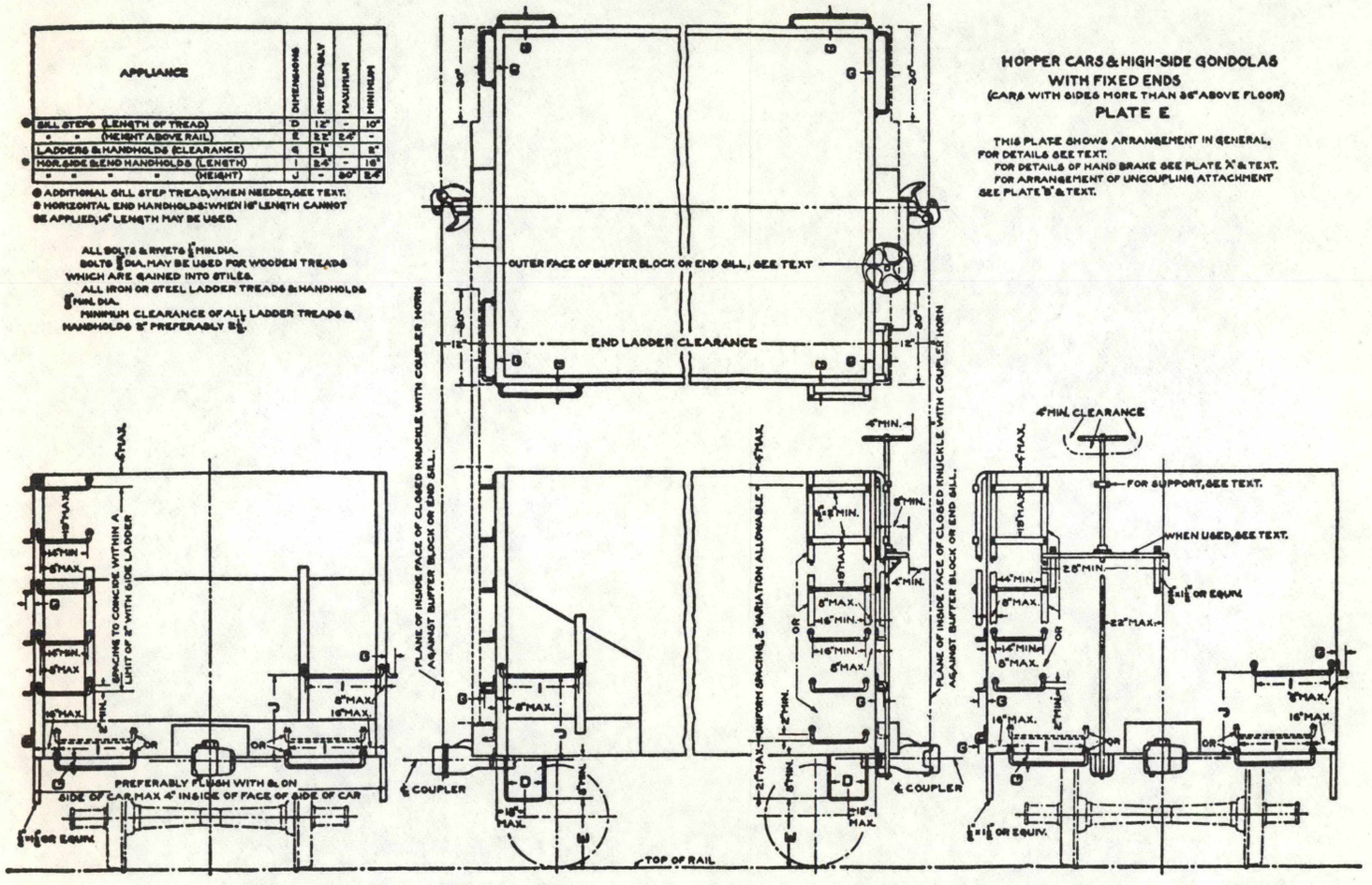
PLATE E

THIS PLATE SHOWS ARRANGEMENT IN GENERAL.
FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'K' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	R	22"	24"	-
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	-	1½"
● HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
" " " " (HEIGHT)	J	-	60"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
● HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ⅝" MIN. DIA.
BOLTS ½" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



HOPPER CARS & HIGH-SIDE GONDOLAS WITH FIXED ENDS

(CARS WITH SIDES MORE THAN 36" ABOVE FLOOR)
(WITH PLATFORM END SILLS)

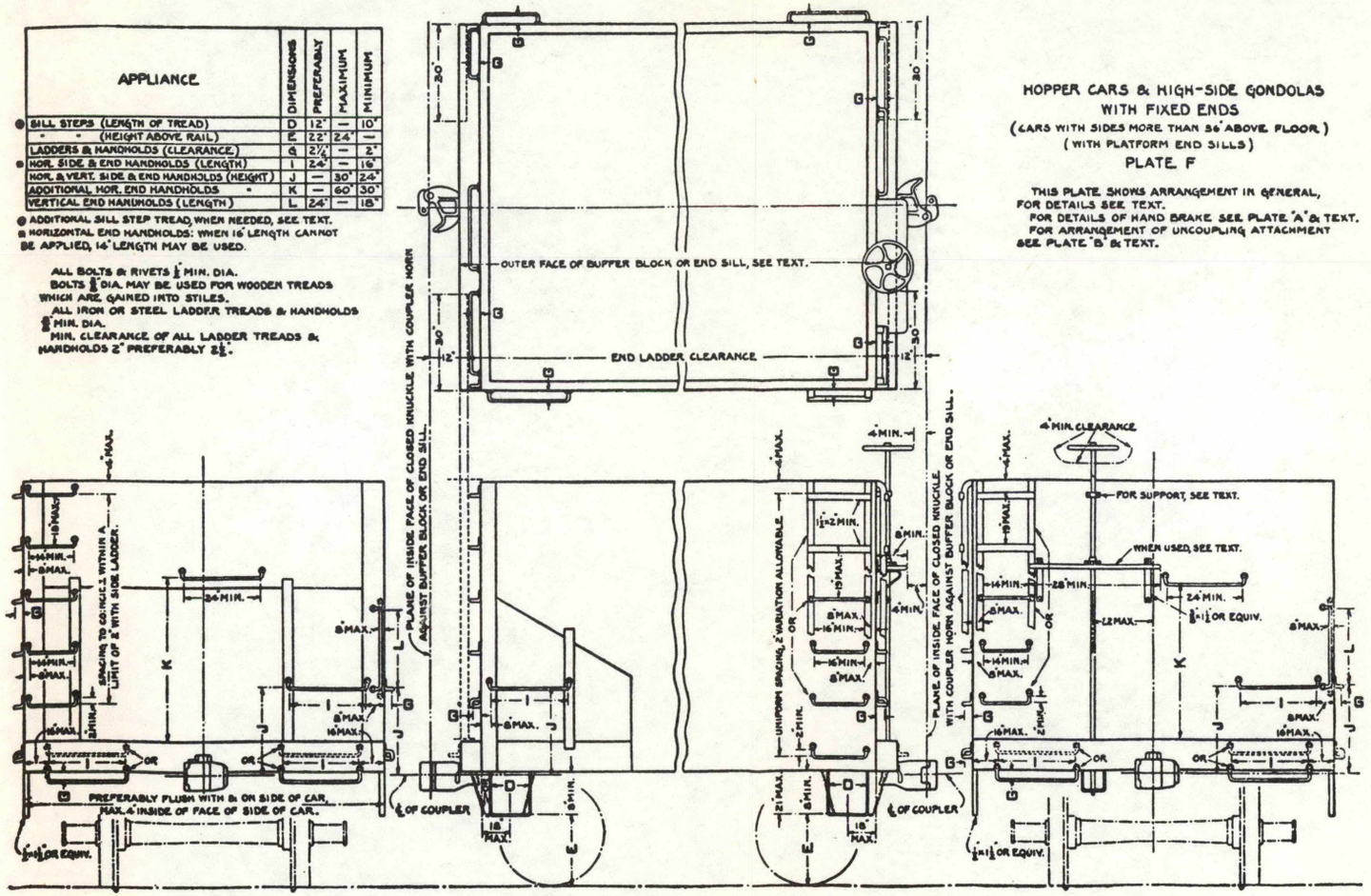
PLATE F

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	11"
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
■ HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
HOR. & VERT. SIDE & END HANDHOLDS (HEIGHT)	J	—	30"	24"
ADDITIONAL HOR. END HANDHOLDS "	K	—	60"	30"
VERTICAL END HANDHOLDS (LENGTH)	L	24"	—	18"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
■ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

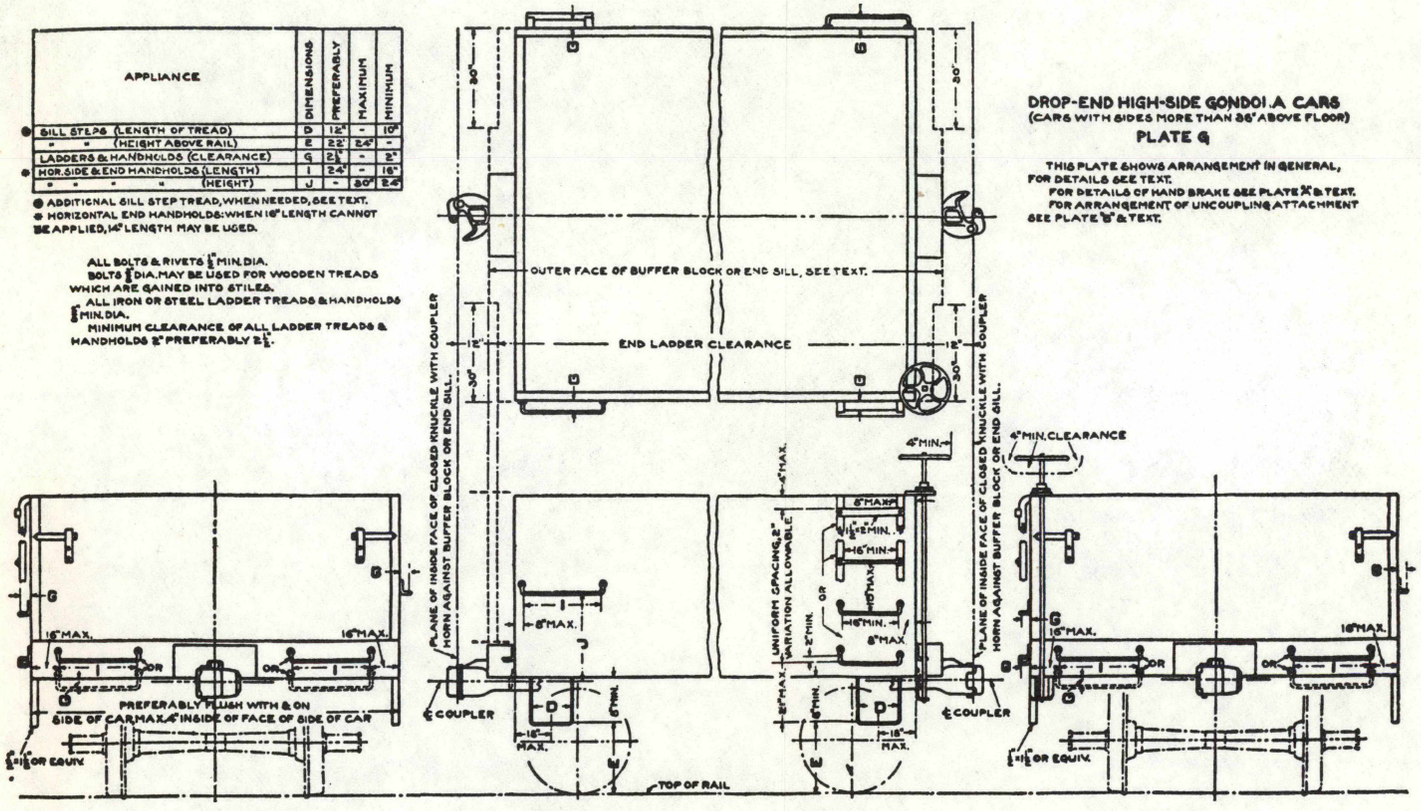
ALL BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅝" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



APPLIANCE		DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)		D	12"	-	10"
" " (HEIGHT ABOVE RAIL)		E	22'	24"	-
LADDERS & HANDHOLDS (CLEARANCE)		G	2½"	-	2"
● HOR. SIDE & END HANDHOLDS (LENGTH)		I	24"	-	16"
" " "	(HEIGHT)	J	-	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
● HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ⅝" MIN. DIA.
BOLTS ⅝" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



DROP-END HIGH-SIDE GONDOLA CARS
(CARS WITH SIDES MORE THAN 36" ABOVE FLOOR)

PLATE G

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "K" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

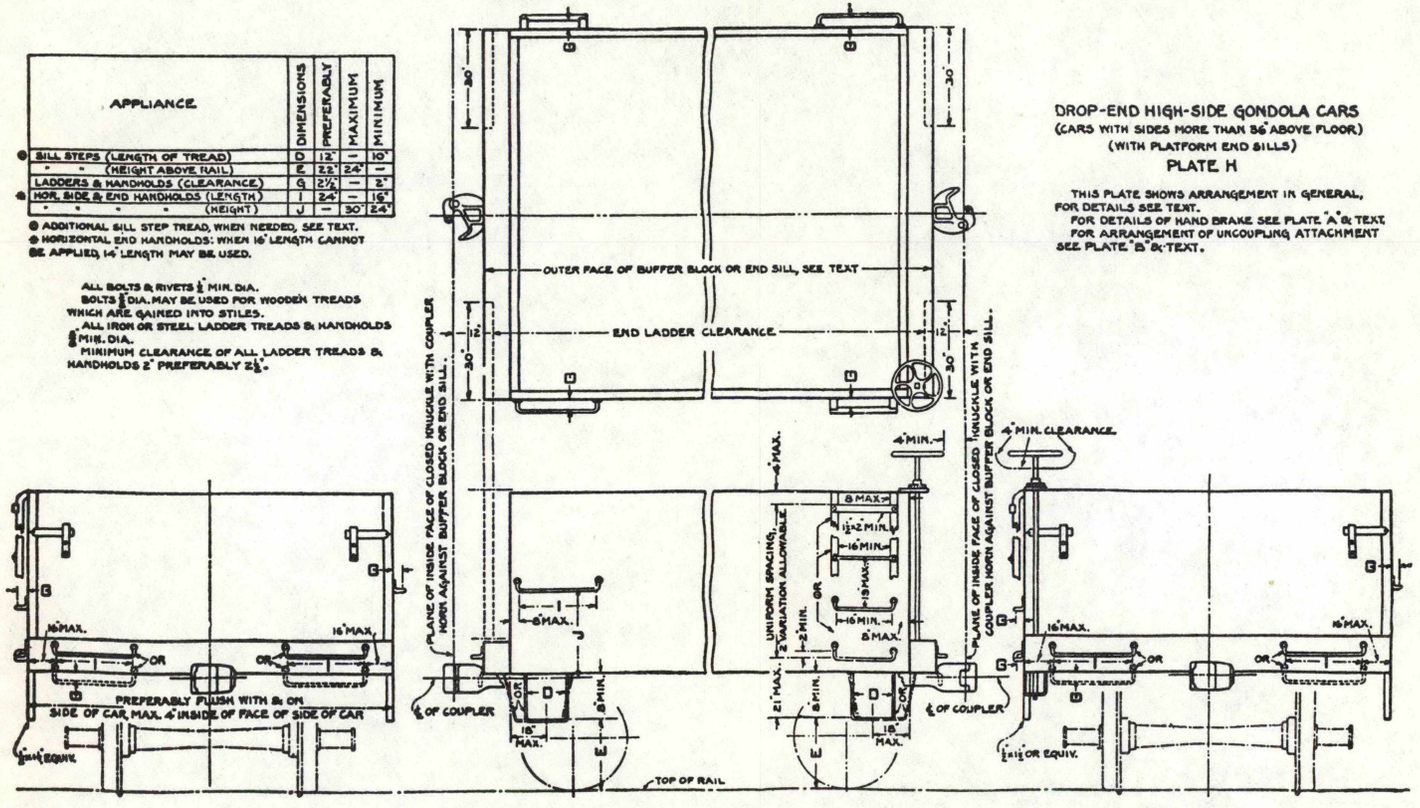
DROP-END HIGH-SIDE GONDOLA CARS
(CARS WITH SIDES MORE THAN 86" ABOVE FLOOR)
(WITH PLATFORM END SILLS)
PLATE H

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE		DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS	(LENGTH OF TREAD)	D	12"		10"
" "	(HEIGHT ABOVE RAIL)	E	22"	24"	
LADDERS & HANDHOLDS (CLEARANCE)		G	2½"		2"
⊕ HOR. SIDE & END HANDHOLDS	(LENGTH)	I	24"		16"
" " " "	(HEIGHT)	J		30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
⊕ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

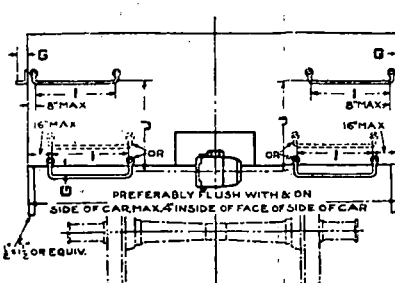
ALL BOLTS & RIVETS ⅝" MIN. DIA.
BOLTS ⅝" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".

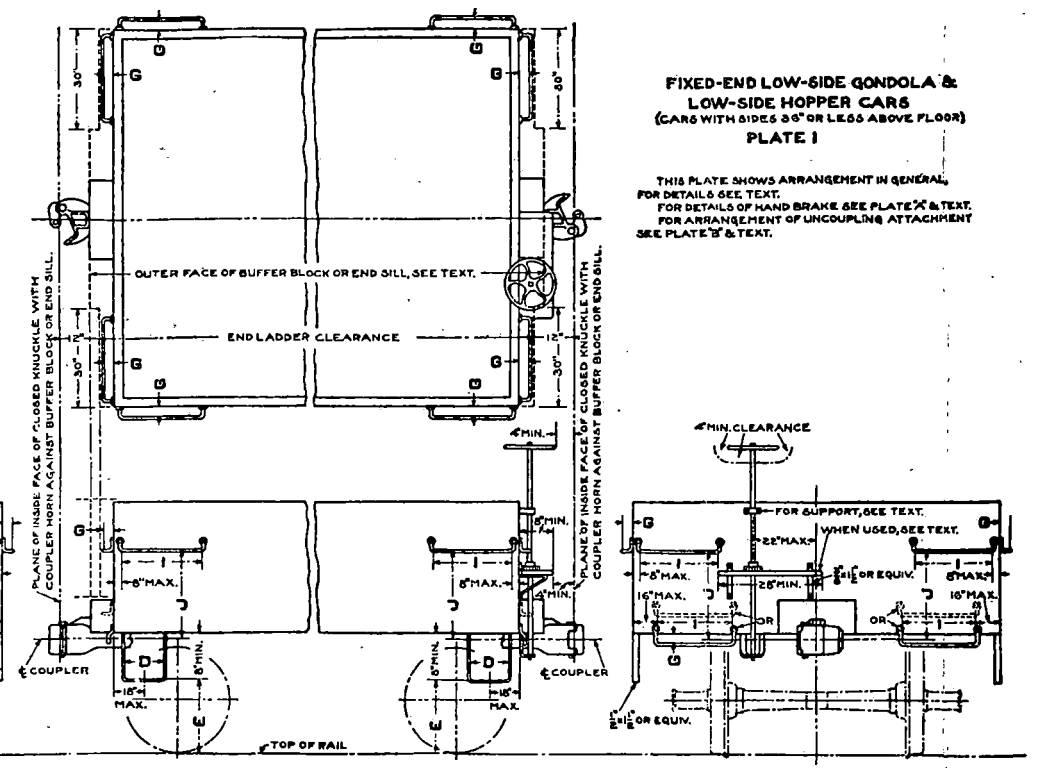


APPLIANCE		DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
⊕	SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
	" " (HEIGHT ABOVE RAIL)	F	22"	24"	-
	HANDHOLDS (CLEARANCE)	G	2½"	-	2"
*	HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
Ø	" " " " (HEIGHT)	J	-	30"	24"

⊕ ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.
Ø IF CAR CONSTRUCTION WILL PERMIT, SEE TEXT.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½".





FIXED-END LOW-SIDE GONDOLA & LOW-SIDE HOPPER CARS

(CARS WITH SIDES 36" OR LESS ABOVE FLOOR)

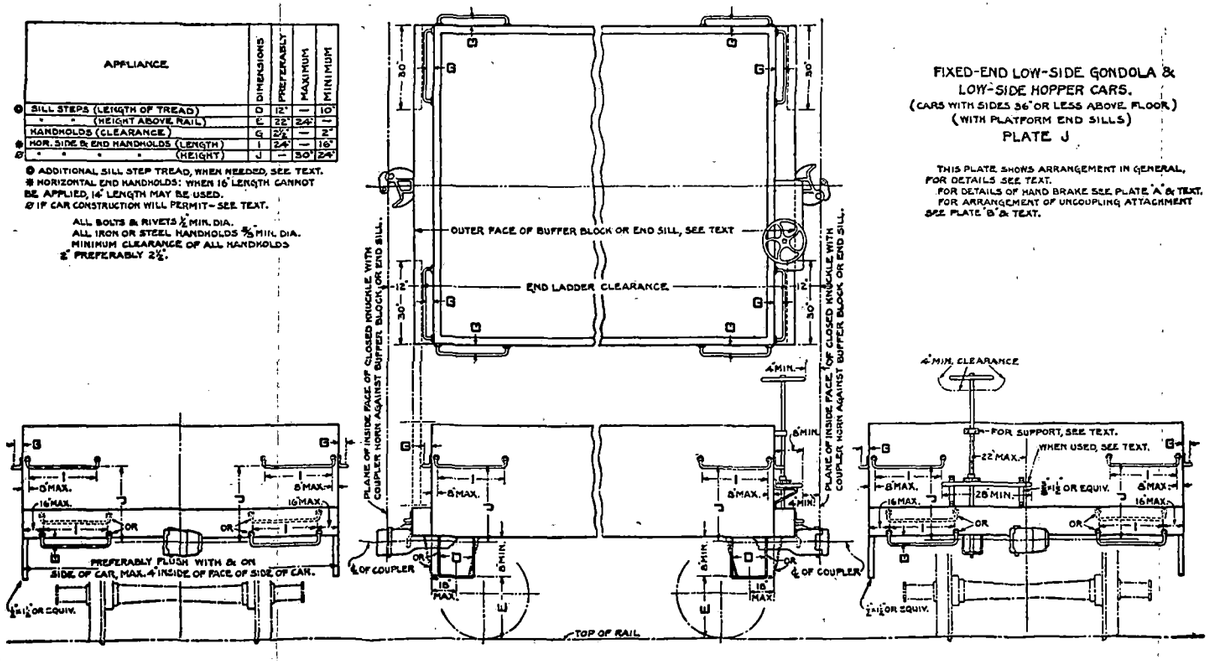
PLATE I

THIS PLATE SHOWS ARRANGEMENT IN GENERAL. FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "K" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	1"
HANDHOLDS (CLEARANCE)	G	2½"	1"	½"
✱ HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
✱ " " " " (HEIGHT)	J	1"	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
✱ HORIZONTAL END HANDHOLDS: WHEN 16' LENGTH CANNOT BE APPLIED, 14' LENGTH MAY BE USED.
@ IF CAR CONSTRUCTION WILL PERMIT - SEE TEXT.

ALL BOLTS & RIVETS ⅝" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½".



FIXED-END LOW-SIDE GONDOLA & LOW-SIDE HOPPER CARS.
(CARS WITH SIDES 36" OR LESS ABOVE FLOOR)
(WITH PLATFORM END SILLS)
PLATE J

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

DROP-END LOW-SIDE GONDOLA CARS
(CARS WITH SIDES 36" OR LESS ABOVE FLOOR)

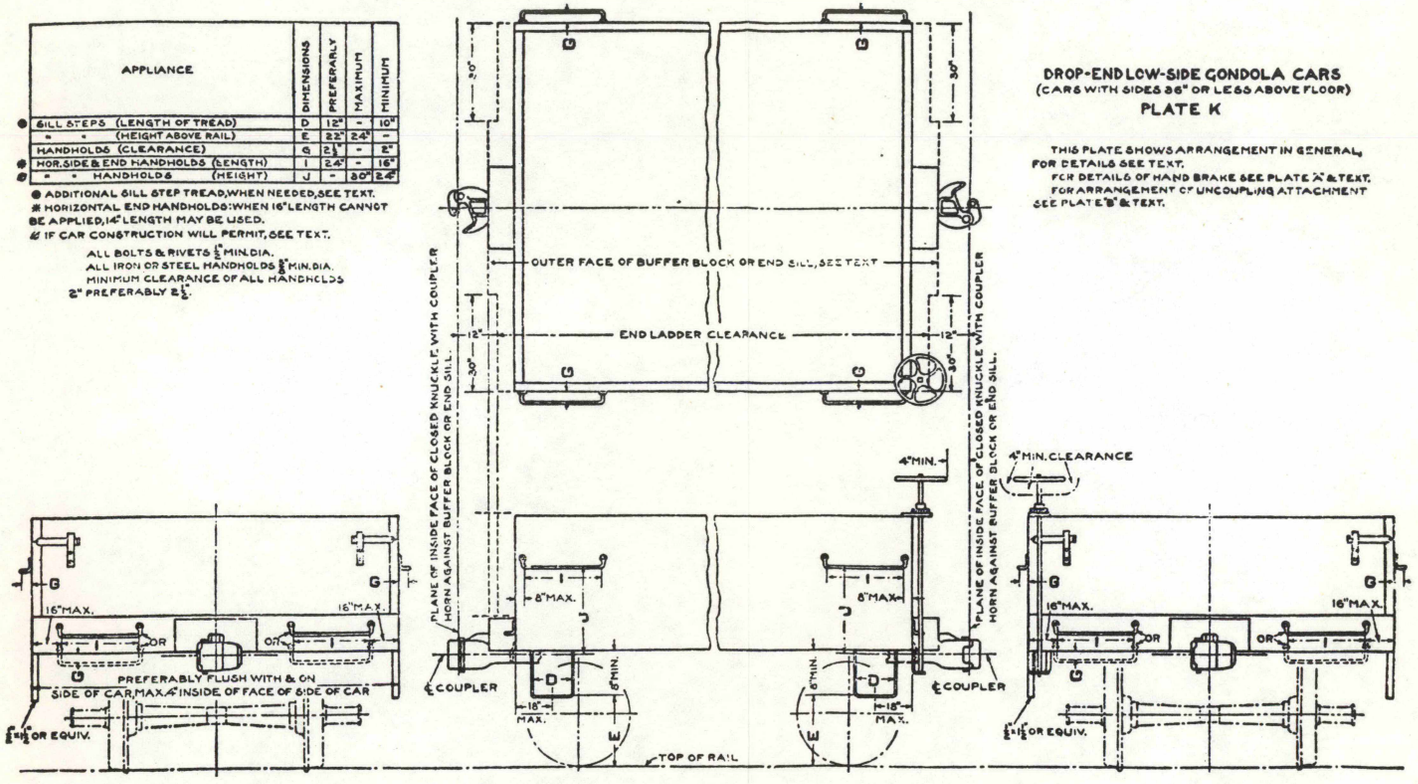
PLATE K

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

APPLIANCE		DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS	(LENGTH OF TREAD)	D	12"	-	10"
" "	(HEIGHT ABOVE RAIL)	E	22"	24"	-
HANDHOLDS	(CLEARANCE)	G	2½"	-	2"
# HOR. SIDE & END HANDHOLDS	(LENGTH)	I	24"	-	16"
" " HANDHOLDS	(HEIGHT)	J	-	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.
& IF CAR CONSTRUCTION WILL PERMIT, SEE TEXT.

ALL BOLTS & RIVETS ⅝" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ¾" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½".



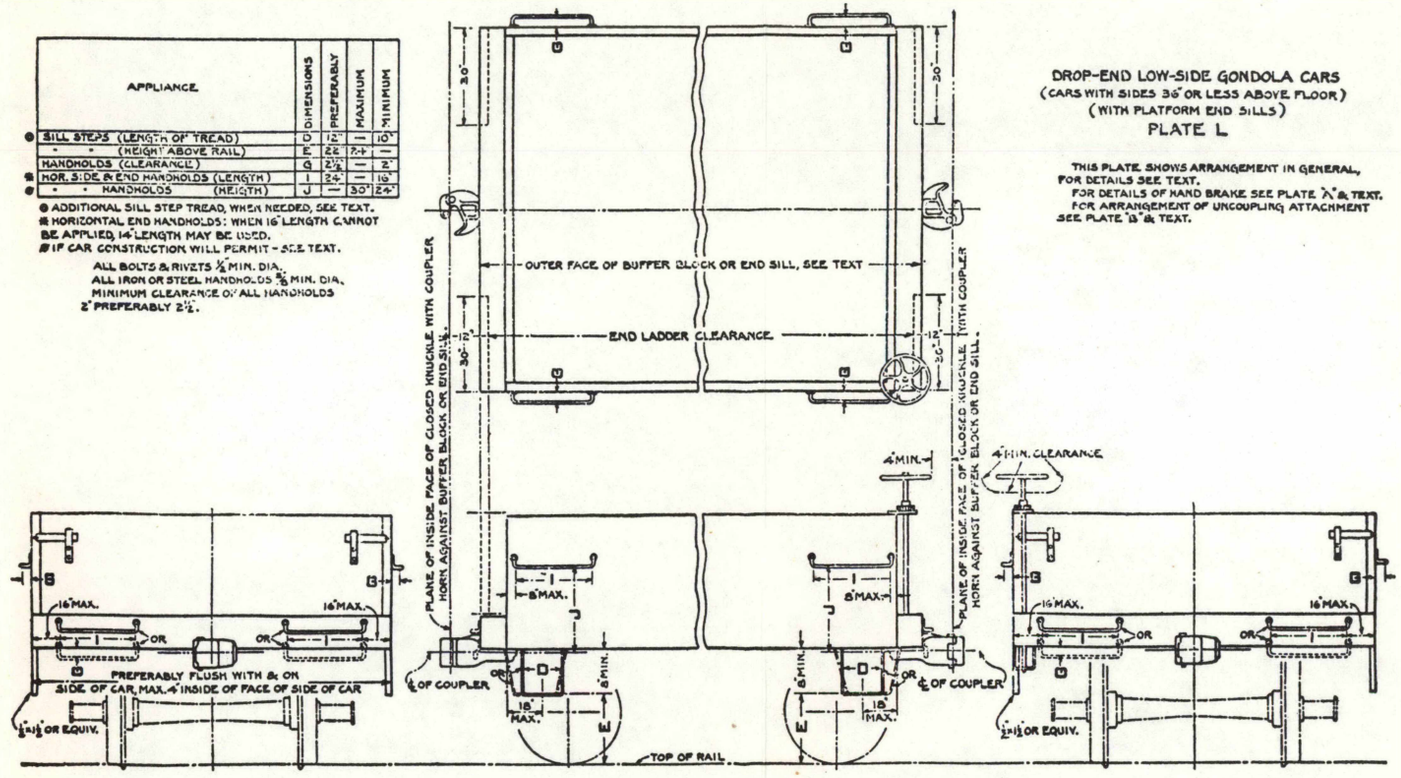
DROP-END LOW-SIDE GONDOLA CARS
(CARS WITH SIDES 36" OR LESS ABOVE FLOOR)
(WITH PLATFORM END SILLS)
PLATE L

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE		DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS	(LENGTH OF TREAD)	D	12"	—	10"
" "	(HEIGHT ABOVE RAIL)	E	22"	24"	—
HANDHOLDS	(CLEARANCE)	G	2½"	—	2"
※ HOR. SIDE & END HANDHOLDS	(LENGTH)	I	24"	—	16"
● " " HANDHOLDS	(HEIGTH)	J	—	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
※ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.
IF CAR CONSTRUCTION WILL PERMIT - SEE TEXT.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½".



FLAT CARS
(CARS WITH SIDES 12" OR LESS ABOVE FLOOR MAY BE EQUIPPED SAME AS FLAT CARS)

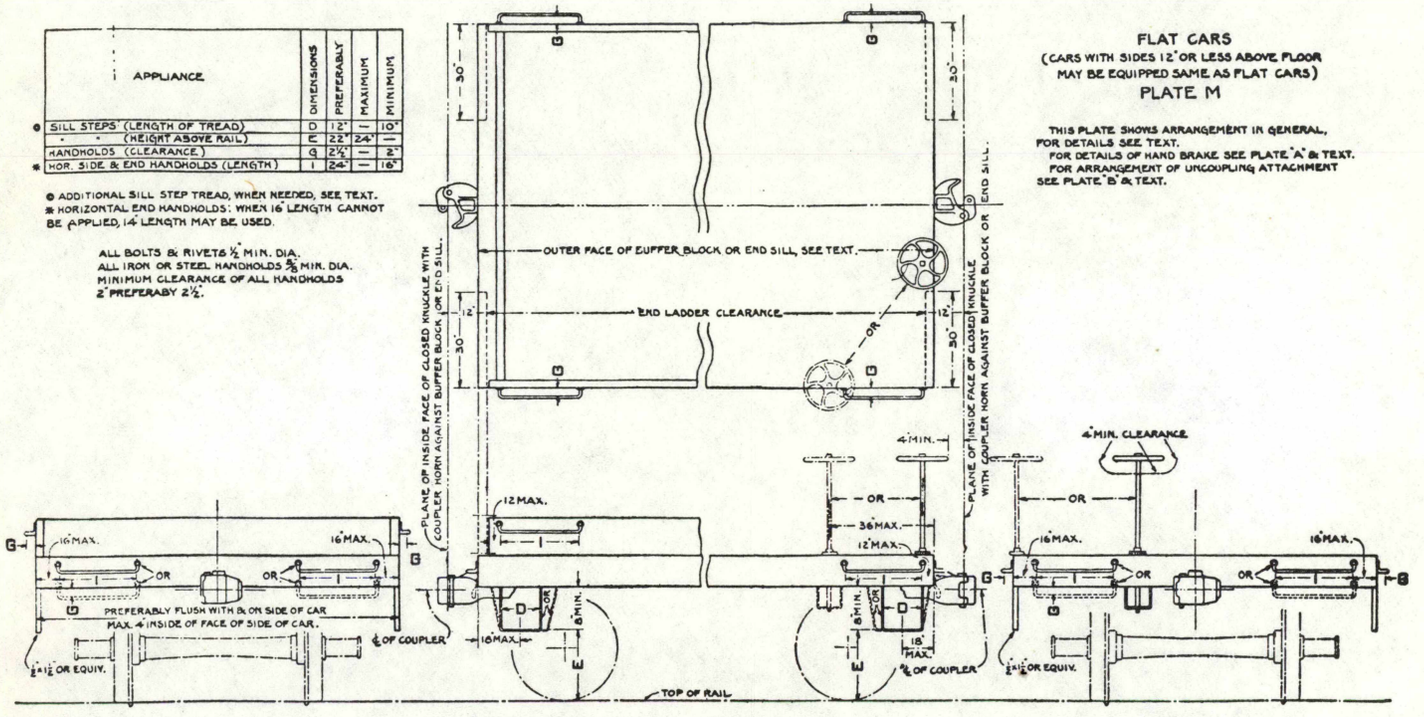
PLATE M

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

	APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
@	SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
	" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
	HANDHOLDS (CLEARANCE)	G	2½"	—	2"
*	HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"

@ ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABY 2½".



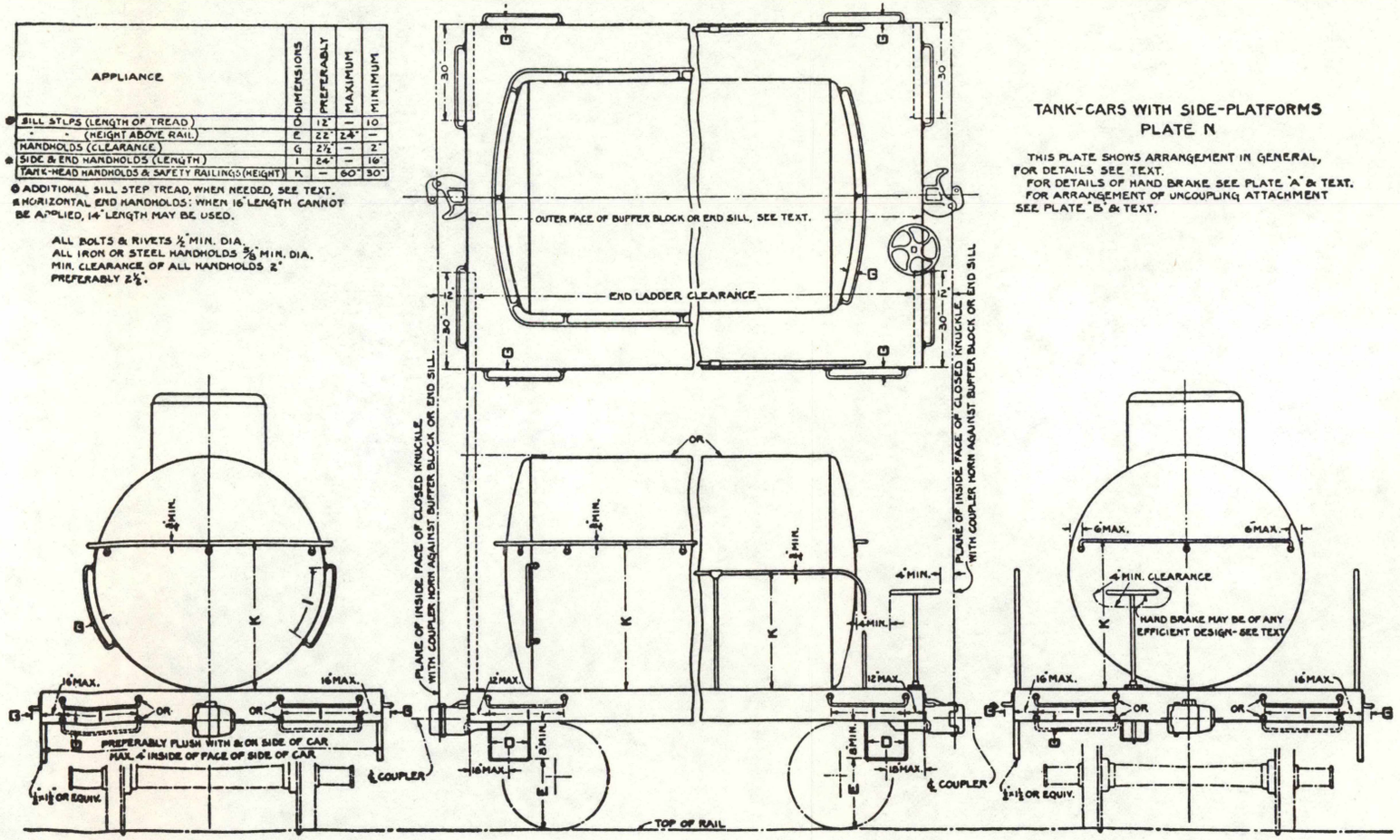
TANK-CARS WITH SIDE-PLATFORMS
PLATE N

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
* SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
HANDHOLDS (CLEARANCE)	G	2½"	—	2"
& SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
TANK-HEAD HANDHOLDS & SAFETY RAILINGS (HEIGHT)	K	—	60"	30"

* ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
& HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL HANDHOLDS 2"
PREFERABLY 2½".



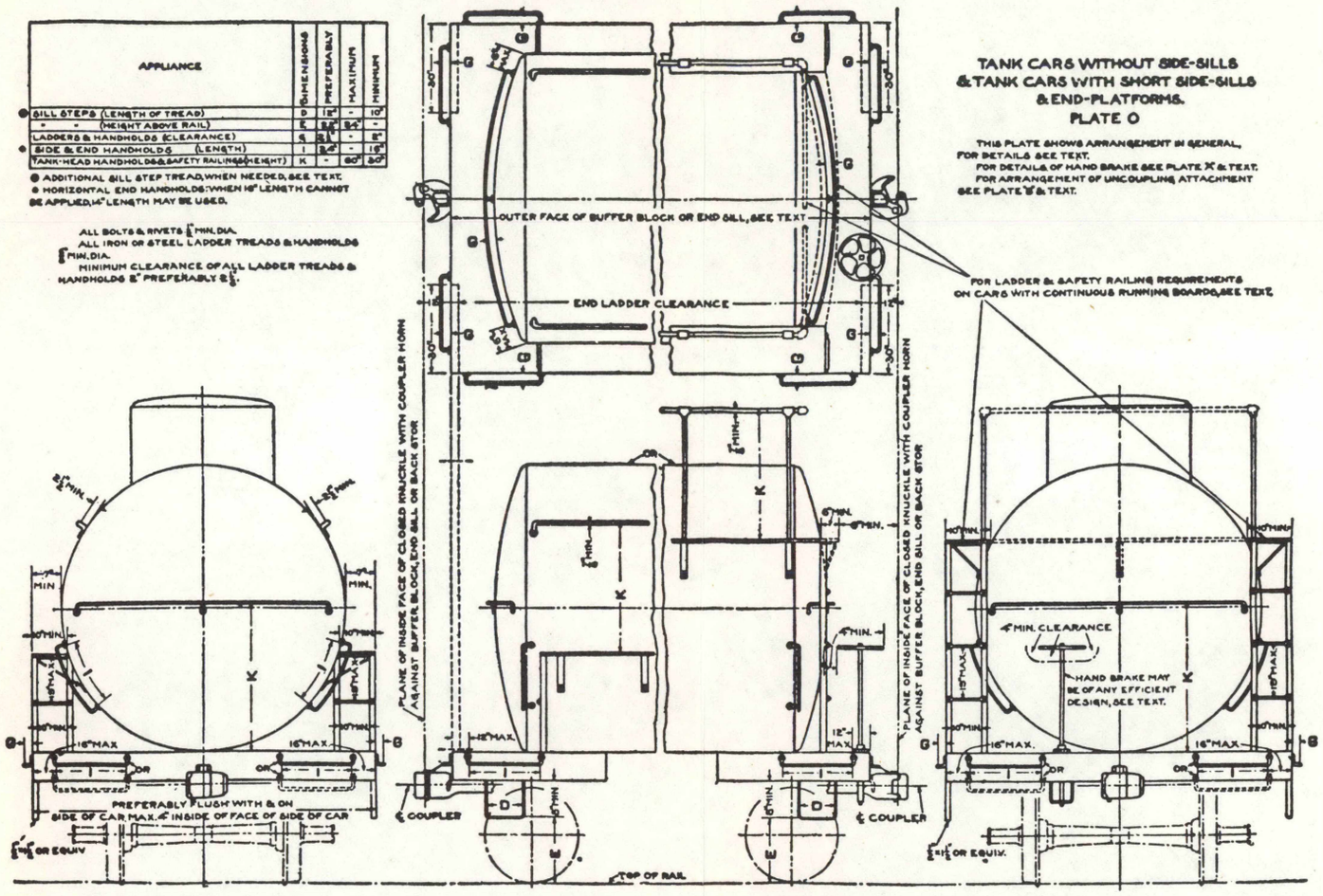
TANK CARS WITHOUT SIDE-SILLS & TANK CARS WITH SHORT SIDE-SILLS & END-PLATFORMS. PLATE O

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE X & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE S & TEXT.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
LADDERS & HANDHOLDS (CLEARANCE)	G	2"	-	2"
● SIDE & END HANDHOLDS (LENGTH)	I	20"	-	16"
TANK-HEAD HANDHOLDS & SAFETY RAILING (HEIGHT)	K	-	80"	60"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
● HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

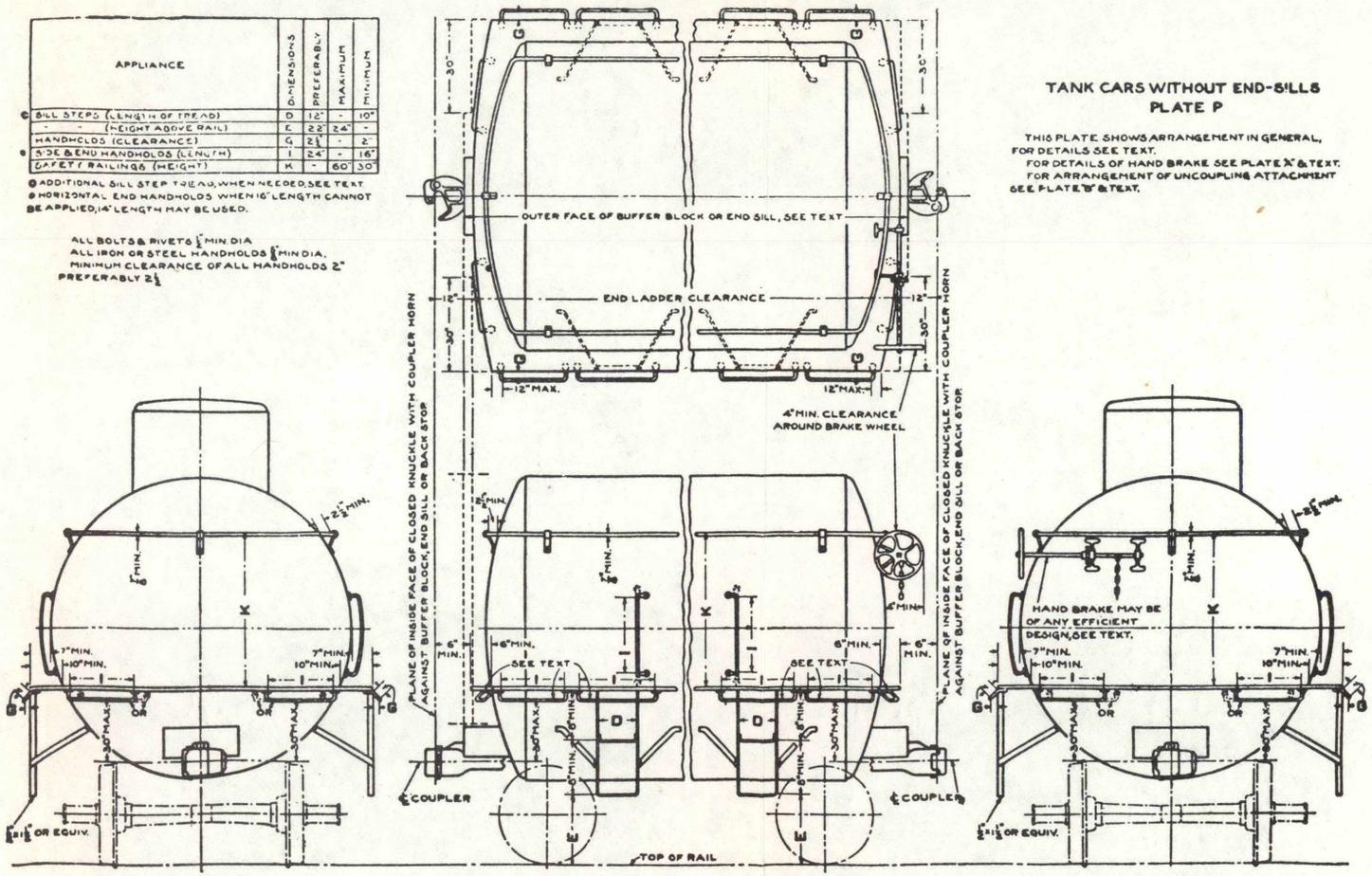
ALL BOLTS & RIVETS ⅝" MIN. DIA.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
© SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
HANDHOLDS (CLEARANCE)	G	2½"	-	2"
• SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
SAFETY RAILINGS (HEIGHT)	K	-	60"	30"

© ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT
• HORIZONTAL END HANDHOLDS WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ⅝" MIN. DIA
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2"
PREFERABLY 2½"



TANK CARS WITHOUT END-SILLS
PLATE P

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

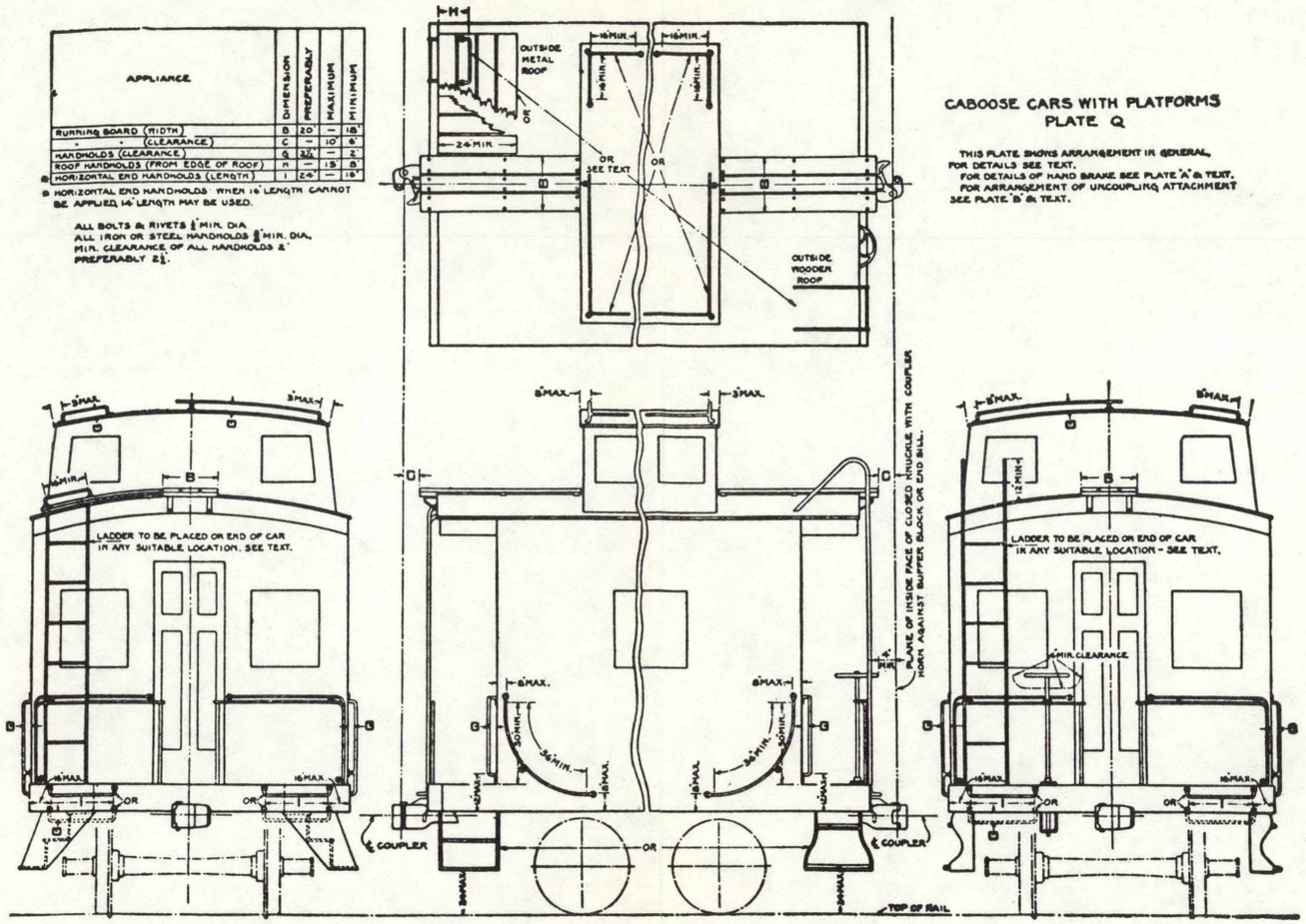
CABOOSE CARS WITH PLATFORMS
PLATE Q

THIS PLATE SHOWS ARRANGEMENT IN GENERAL.
FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' & TEXT.

APPLIANCE	DIMENSION	PREFERABLY	MAXIMUM	MINIMUM
RUNNING BOARD (WIDTH)	B	20	1	18
" (CLEARANCE)	C	—	10	6
HANDHOLDS (CLEARANCE)	G	2½	—	2
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	11	19	8
HORIZONTAL END HANDHOLDS (LENGTH)	I	24	—	16

@ HORIZONTAL END HANDHOLDS WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

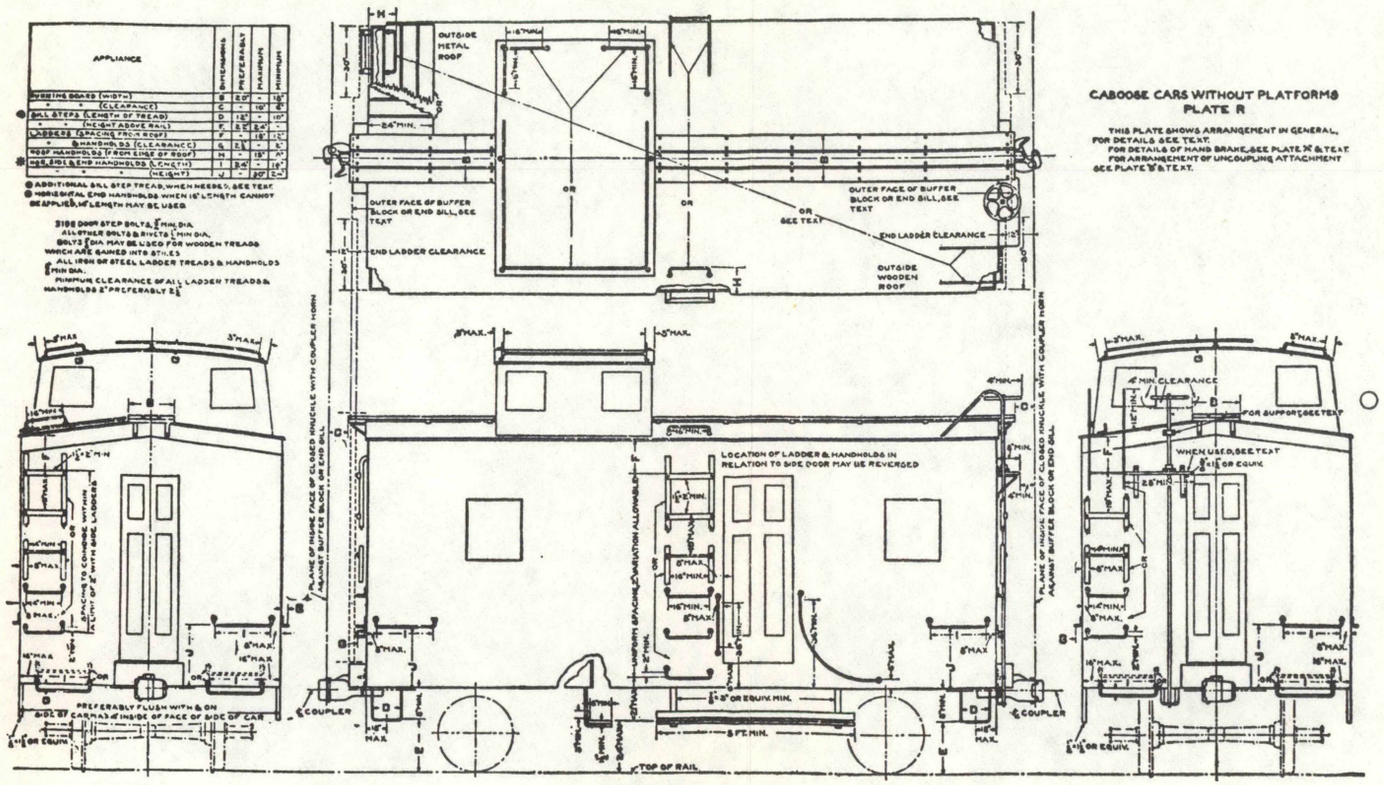
ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL HANDHOLDS 2"
PREFERABLY 2½".



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
RUNNING BOARD (WIDTH)	A	20"	-	16"
" " (CLEARANCE)	C	-	10"	6"
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	K	8½"	9½"	-
LADDERS (SPACING FROM ROOF)	F	-	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	-	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	-	18"	12"
● END SILL & END HANDHOLDS (LENGTH)	I	24"	-	18"
" " " (HEIGHT)	J	-	20"	14"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
● HORIZONTAL END HANDHOLDS WHEN 18" LENGTH CANNOT BE APPLIED, 16" LENGTH MAY BE USED

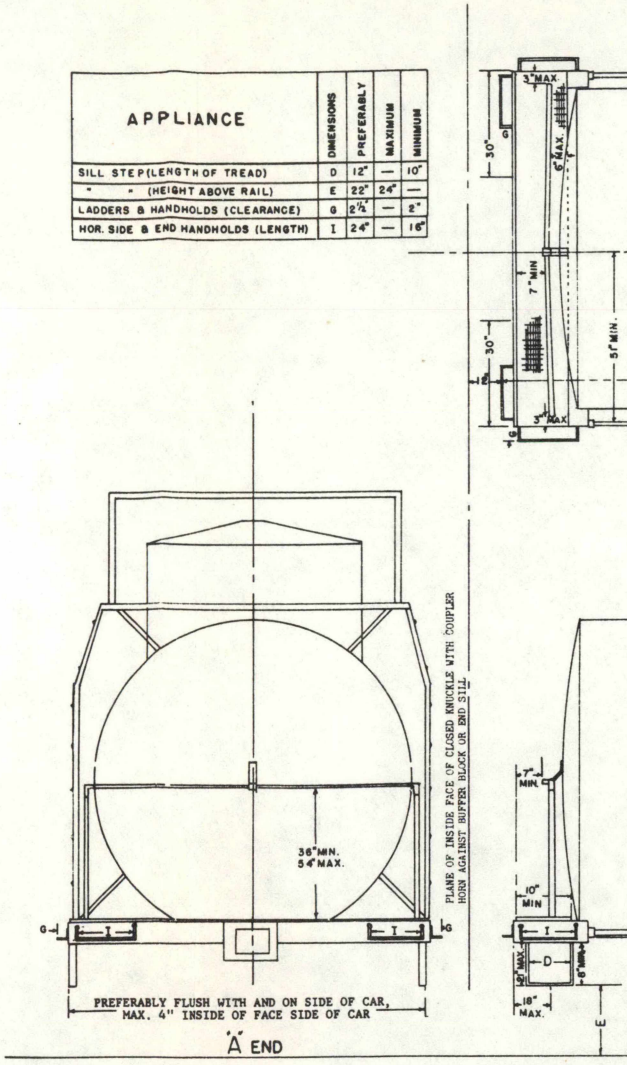
3186 DOOR STEP BOLTS ⅝" MIN. DIA.
ALL OTHER BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅜" DIA MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ½" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½"



CABOOSE CARS WITHOUT PLATFORMS
PLATE R

THIS PLATE SHOWS ARRANGEMENT IN GENERAL. FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE, SEE PLATE 'K' & TEXT
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'S' & TEXT.

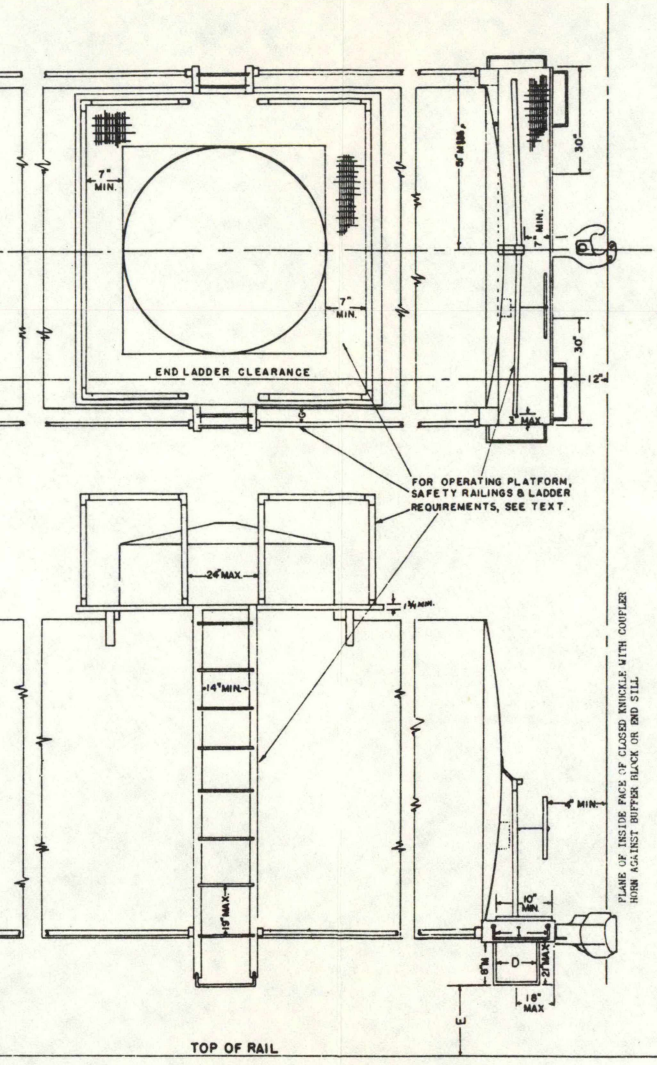
APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
SILL STEP (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"

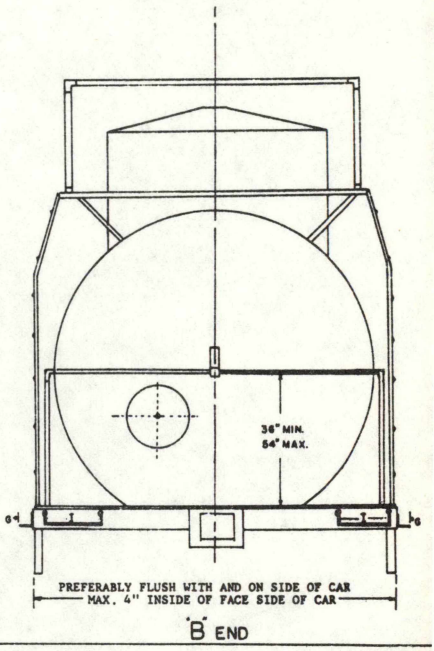


TANK CARS WITHOUT UNDERFRAMES

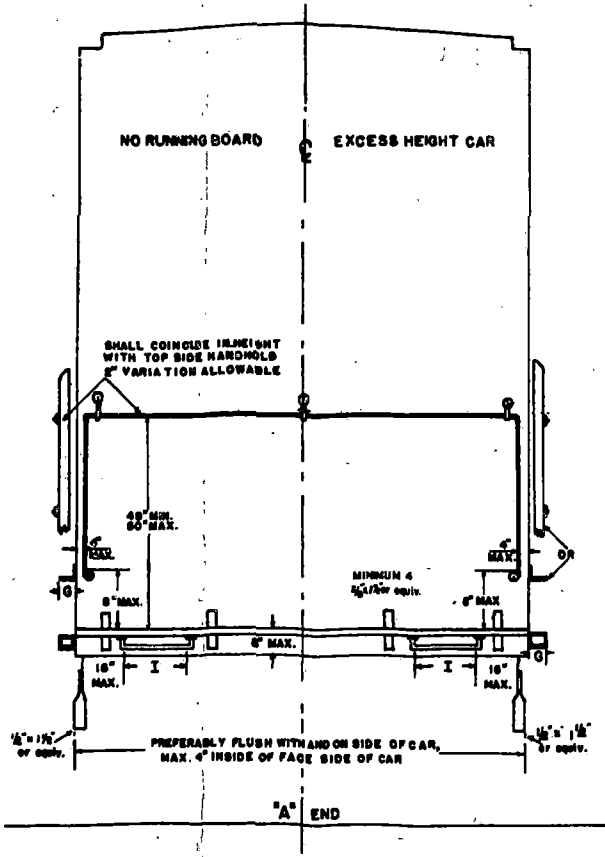
PLATE S

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE 'A' & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'B' AND TEXT.





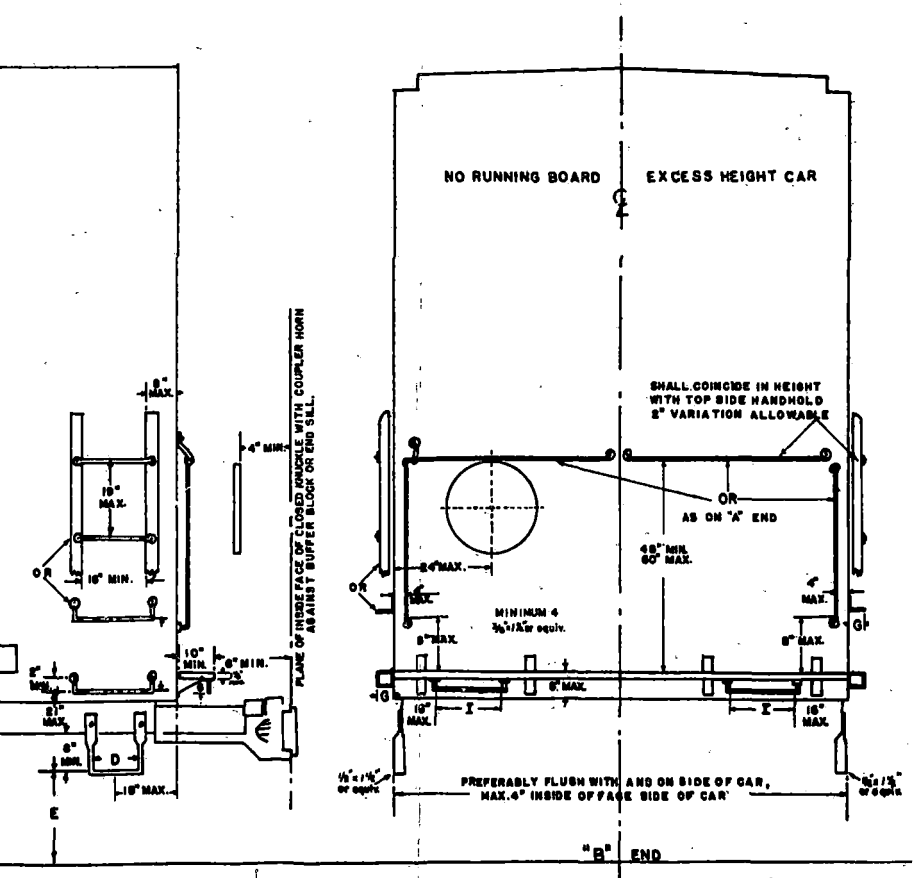
APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
SILL STEP (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	—	1½"
HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"

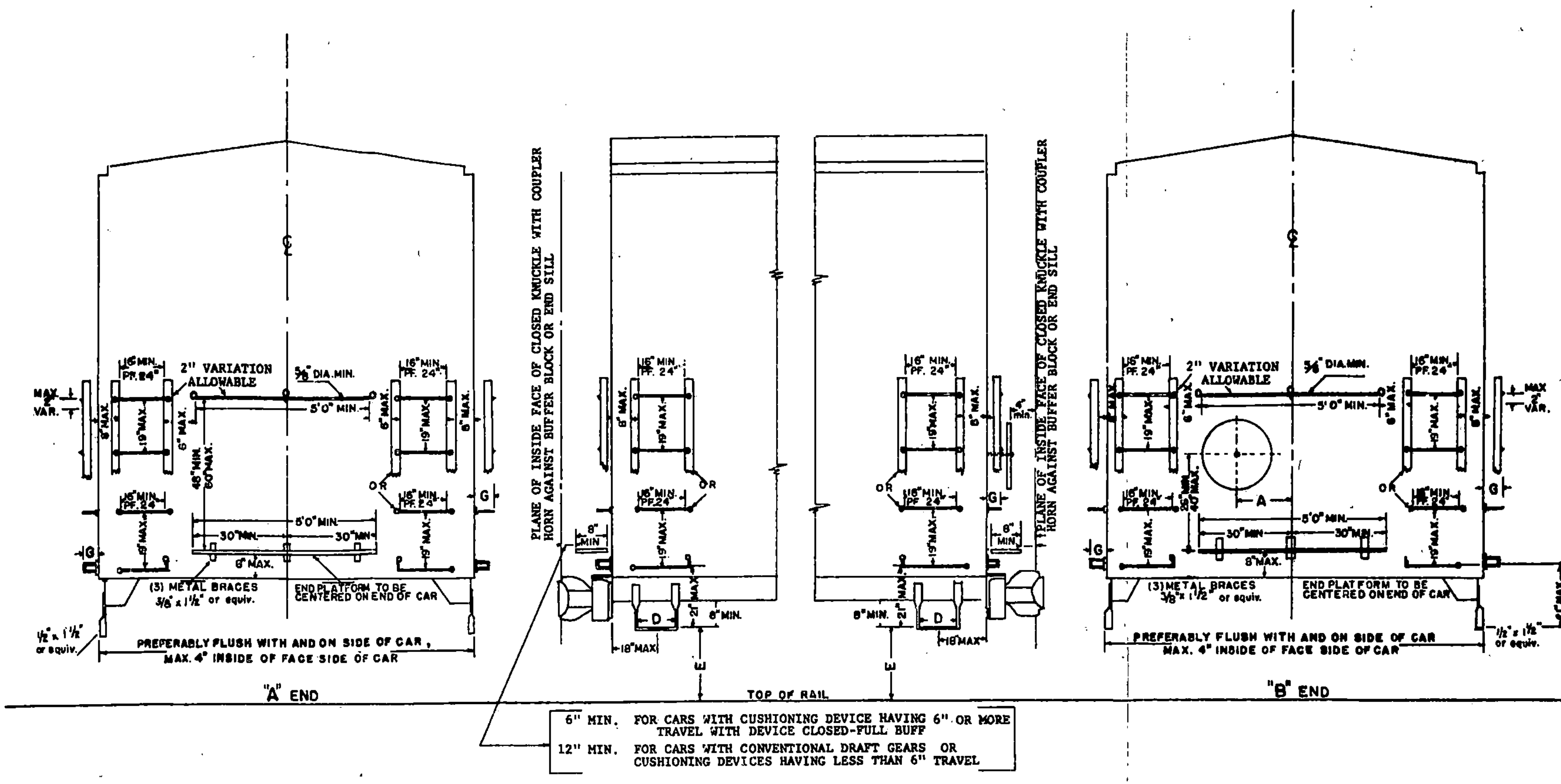


BOX AND OTHER HOUSE CARS WITH ROOFS 16 FEET 10 INCHES OR MORE ABOVE TOP OF RAIL

PLATE T

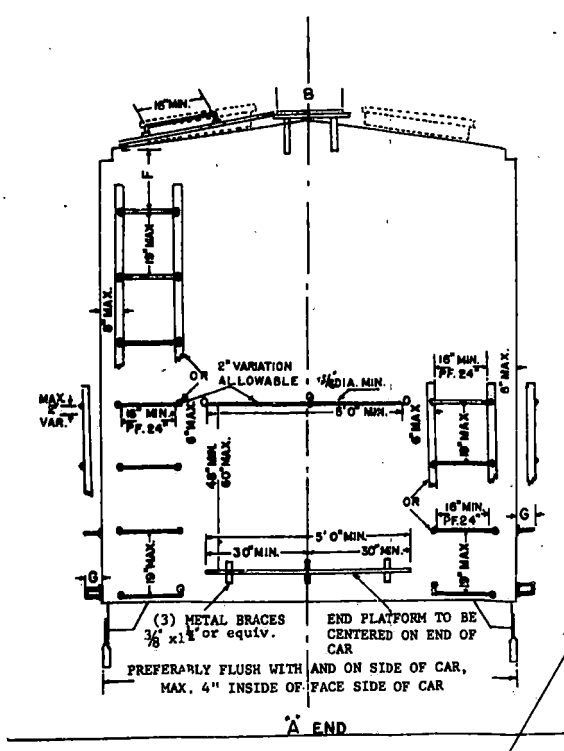
THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE 'S' & TEXT
FOR STENCILING DETAILS SEE TEXT





"A" END
"B" END
TOP OF RAIL
PLANE OF INSIDE FACE OF CLOSED KNUCKLE WITH COUPLER HORN AGAINST BUFFER BLOCK OR END SILL
6" MIN. FOR CARS WITH CUSHIONING DEVICE HAVING 6" OR MORE TRAVEL WITH DEVICE CLOSED-FULL BUFF
12" MIN. FOR CARS WITH CONVENTIONAL DRAFT GEARS OR CUSHIONING DEVICES HAVING LESS THAN 6" TRAVEL
PREFERABLY FLUSH WITH AND ON SIDE OF CAR, MAX. 4" INSIDE OF FACE SIDE OF CAR
(3) METAL BRACES 3/8" x 1 1/2" or equiv.
END PLATFORM TO BE CENTERED ON END OF CAR
2" VARIATION ALLOWABLE
5/8" DIA. MIN.
5'0" MIN.
30" MIN.
8" MAX.
19" MAX.
16" MIN. PF. 24"
OR
G
E
D
A
21" MAX.
18" MAX.
8" MIN.
1/2" x 1 1/2" or equiv.

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
BRAKE SHAFT	A	—	22"	17"
RUNNING BOARD (WIDTH)	B	20"	—	16"
" " (CLEARANCE)	C.	—	—	6"
SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS (SPACING FROM ROOF)	F	—	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	—	15"	8"

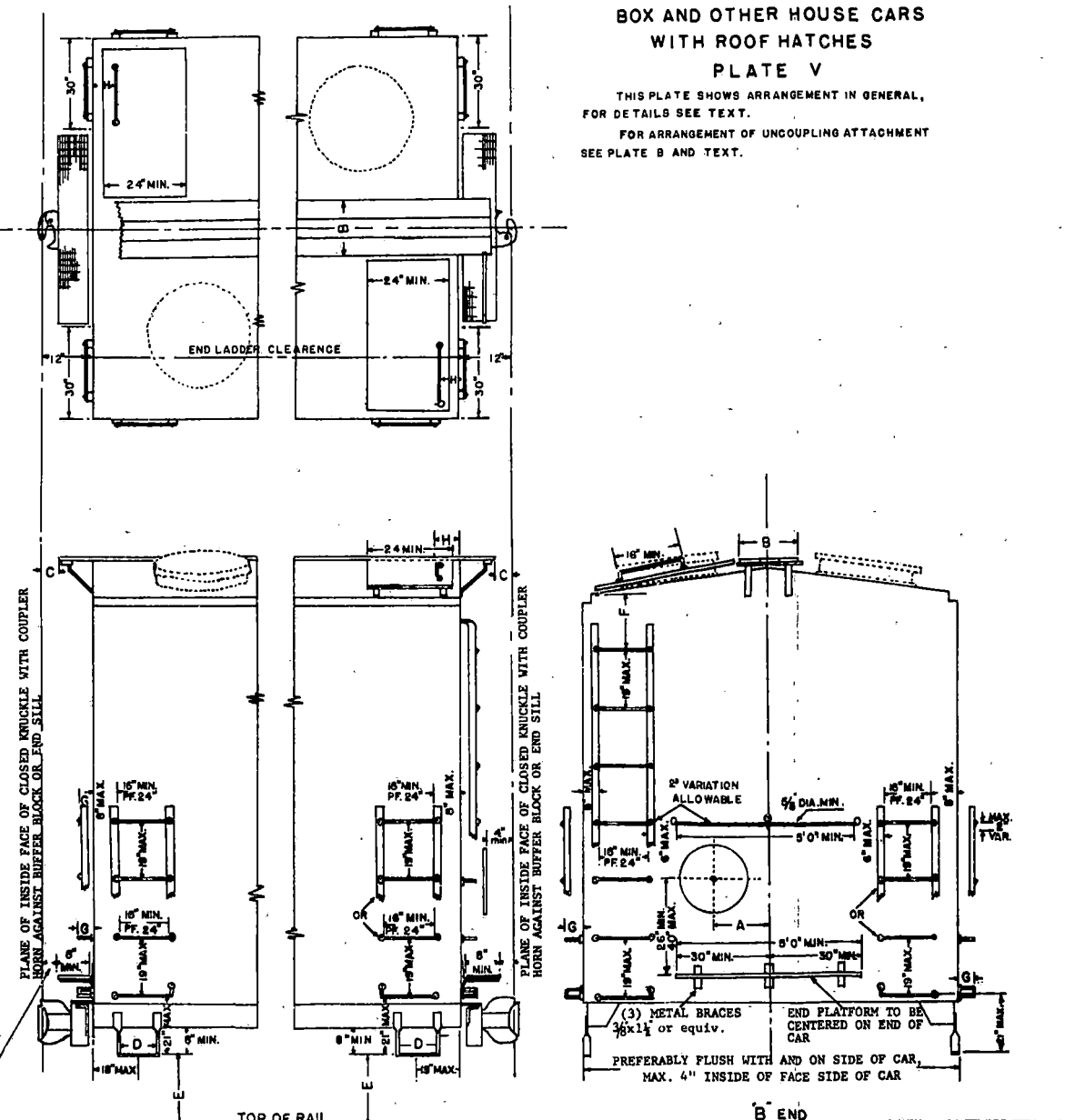


BOX AND OTHER HOUSE CARS WITH ROOF HATCHES

PLATE V

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.

FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE B AND TEXT.



6" MIN. FOR CARS WITH CUSHIONING DEVICE HAVING 6" OR MORE TRAVEL WITH DEVICE CLOSED-FULL BUFF

12" MIN. FOR CARS WITH CONVENTIONAL DRAFT GEARS OR CUSHIONING DEVICE HAVING LESS THAN 6" TRAVEL

Safety Appliances & Power Brakes, US Department of Transportation, US DOT, FRA - Office of Safety, Sept. 1977 -12-Safety