



# ASSOCIATION OF AMERICAN RAILROADS

**James P. Grady**  
Assistant Vice President, Technical Services  
Safety and Operations

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Mr. Robert C. Lauby  
Deputy Associate Administrator  
Federal Railroad Administration  
Regulatory and Legislative Operations  
1200 New Jersey Avenue, SE  
Third Floor West  
Washington, DC 20590

**SUBJECT: Waiver Petition Revisions to AAR MSRP Section E, S-4045, PASSENGER  
EQUIPMENT MAINTENANCE REQUIREMENTS, Formerly MSRP Standard S-045**

Dear Mr. Lauby:

The Association of American Railroads (AAR), on behalf of itself and its member railroads<sup>1</sup>, submits the following petition for a waiver from section 232.17(b)(2) in 49 CFR Part 232, Appendix B. This section states that brake equipment on passenger cars must be clean, repaired, lubricated and tested as often as necessary to maintain it in a safe and suitable condition for service but not less frequently than as required in Standard S-045 in the Manual of Standards and Recommended Practices (MSRP) of the AAR. AAR petitions FRA for a five year waiver so that AAR Standard S-4045 may be used in lieu of the obsolete Standard S-045 for the frequency requirements referenced in 49 CFR Part 232, Appendix B.

AAR's Braking Systems Committee recently revised Section E, S-4045 of the AAR MSRP. The change recommended in this waiver request maintains existing safety levels and lessens compliance confusion, by allowing uniform periodic inspection dates for railroad and privately owned passenger equipment, whether operating in a freight train, private train, or a part 238 passenger train. It also maintains safety while reducing unnecessary costs. Consequently, AAR urges FRA to act expeditiously on its requested waiver.

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<sup>1</sup> AAR is a trade association whose membership includes freight railroads that operate 82 percent of the line-haul mileage, employ 95 percent of the workers, and account for 97 percent of the freight revenues of all railroads in the United States; and passenger railroads that operate intercity passenger trains and provide commuter rail service.

Among the revisions includes a revised definition for a 'passenger equipment car' as "rail rolling equipment that is used only for excursions, recreational, or private transportation purposes (such as a vehicle designed to carry railroad personnel). It does not apply to a passenger car intended for use by members of the general public as defined in US DOT-FRA Title 49, Code of Federal Regulations, Part 238." This definition serves to address private passenger cars, particularly those operated by freight railroads that may be handled in either freight or passenger trains.

Additionally, the revised standard aligns the requirements for air brake periodic attention with 49 CFR § 238.309, to eliminate confusion for air brake dates on equipment that may be subject to both Part 238 and non-Part 238 service, i.e. passenger equipment that may be handled in either freight or passenger trains. Passenger equipment has operated in this dual service since 1999 with no significant difference in the numbers of defects found in D-22 and 26-C valve components between the service modes. Based on this fact, it is felt that there is no safety reason for having two different periodic inspection schedules for these valves in part 238 and non-part 238 service. Finally, S-4045 includes a clarification for the use of freight valves on passenger equipment by addressing the use of Rule 3 of the Field Manual of the AAR Interchange Rules as the proper reference for the maintenance of freight valves used on passenger equipment.

A copy of the revised standard is attached for your reference. Additional details of the changes incorporated with this revision are listed below.

Changes for consistency with the FRA regulations:

- The COT&S schedules for Table 2.1 have been updated to align with the durations in 49 CFR Section 238.309 for D-22 and 26-C Type brake equipment.
  - Note: Railroad business car COT&S is regulated by part 232, Appendix B; and not by part 238.
  - COTS requirements for valve type D-22 changed from 24 to 36 months and valve type 26-C changed from 36 to 48 months.

Editorial Changes:

- All references to "passenger car" or "passenger coach" are changed to "passenger equipment car" to align with the definition of "passenger equipment" in 49 CFR Part 238. Passenger equipment is defined as privately owned (or non-Part 238 railroad owned) equipment that may occasionally operate in Part 238 service, but is not maintained to part 238 requirements.
- The role of Amtrak's mechanical standards for equipment operated in Amtrak trains is clarified
- All references to former AAR Standards that are presently administered by the American Public Transportation Association (APTA) have been updated.
- Testing of freight-type valves on passenger equipment cars has been clarified.
- The isolation of auxiliary air devices from the brake pipe is defined.
- The listing of pamphlets and references for air brake maintenance has been updated.
- Cast iron brake shoe specification updated.
- Air brake stencil location clarified.

- All references to the *Field Manual* have been updated to "current edition."
- Oil-lubricated journal roller bearing oil specification updated
- Hyatt roller bearing clearance clarified
- The use of rim-stamped, straight-plate wheels clarified
- Table 5.1 has been modified
- Grounding and shut-off valve requirements for fuel tanks clarified
- Truck pedestal journal bearing stop clarified

Accordingly, AAR requests a waiver to substitute Standard S-4045 in Appendix B of 49 CFR part 232 and anywhere else it is referenced, in lieu of Standard S-045, for five years or until such time as FRA changes 49 CFR part 232 to reference the revised standard.

Sincerely,



James P. Grady

Attachment

cc: Gary Fairbanks, FRA  
Steven Zuiderveen, FRA  
David Cackovic, Chief, Technical Standards, TTCI  
Steven Belpert, BSC Manager, TTCI  
AAR Brake Systems Committee  
Tom Stahura, AAR  
Sarah Yurasko, AAR

**AAR Manual of Standards and Recommended Practices  
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**PASSENGER EQUIPMENT CAR MAINTENANCE REQUIREMENTS**

**Standard  
S-4045**

(Formerly *MSRP* Standard S-045)

**Adopted: 1983; Last Revised: 2013**

**1.0 SCOPE**

These standard maintenance practices and operating requirements must be used for passenger equipment cars operating on the railroads of the United States and Canada. These standards shall be used in conjunction with agreements between car owners and the operating railroad. They do not apply to cars or trains operated by Amtrak.

**1.1** For the purpose of this standard, a passenger equipment car means rail rolling equipment that is used only for excursion, recreational, or private transportation purposes (such as a vehicle designed to carry railroad personnel). It does not apply to a passenger car intended for use by members of the general public as defined in US DOT-FRA Title 49, Code of Federal Regulations, Part 238. The construction of a passenger equipment car shall be in conformance with the AAR *Manual of Standards and Recommended Practices*, Section L, Recommended Practice RP-900.

**1.2** In the application of this standard, passenger equipment cars shall be treated as belonging to the companies or individuals whose reporting marks the cars bear.

**1.3** The provisions of this standard apply to cars on which work is performed under an operating agreement between the passenger equipment car owner and one or more systems of railroads, from originating point of the operating line to destination terminal of the line.

**1.4** Inspections and maintenance practices required by this standard must be performed as specified, and repairs must be performed in accordance with agreements between the passenger equipment car owner and the operating railroads.

**1.5** Passenger equipment cars that are privately owned must be inspected, maintained, and/or repaired prior to movement, as a minimum, in accordance with this standard or agreements between the private car owner and the operating railroads. Passenger equipment cars that are operated in Amtrak trains shall be inspected and maintained in accordance with Amtrak mechanical standards, available upon request from Amtrak.

**2.0 BRAKE EQUIPMENT**

This section outlines maintenance requirements and instructions for all types of brake equipment used on passenger equipment cars.

**2.1 Air Brakes**

Maintenance, inspection, testing, and repairs of air brakes includes the following requirements:

**2.1.1** Periodic maintenance of air brakes is considered as clean, oil, test, and stencil (COT&S).

**2.1.1.1** A passenger equipment car using a passenger car type of air brake system must have COT&S performed in accordance with Table 2.1. The time limits referred to are defined as the date of month stenciled on the car. The standard stencil location and type of stencil is identified elsewhere in this standard.

Table 2.1 COT&S performance on air brakes

Passenger Car Brake Type	U Type	D-22 Type	26-C Type	PS-68 Type	All Older Types
Months as Stenciled	15	36	48	48	12

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**2.1.1.2** Any railroad passenger equipment car that is overdue for COT&S may be moved to another location for rebuilding, reconditioning, repairs, or scrapping providing the car has passed a single-car test, as shown in Standard SS-M-005-98, Rev. 2 (or latest revision) of the American Public Transportation Association (APTA).

**2.1.2** Passenger equipment cars may not be placed in service beyond the COT&S date stenciled on the car. In addition, COT&S must be performed for the following reasons:

- Stenciling missing
- Stenciling incorrect
- Stenciling indistinct
- Evidence of brake valvular equipment having been submerged, whether found operative or inoperative after submerging

**2.1.3** Testing on passenger equipment cars equipped with freight-type brake valvular equipment must be performed in accordance with requirements of the *Field Manual of the AAR Interchange Rules*, Rule 3, current edition. Any auxiliary devices (such as relay valves or modulating valves) shall be tested in accordance with the original equipment manufacturer's specifications.

**2.1.4** Air brake components requiring maintenance other than at the periodic attention cycle shall be performed as required.

**2.1.5** In the repair of brakes on passenger equipment cars, components must be replaced only in kind.

**2.1.6** Auxiliary air devices (such as a water-raising system) shall be supplied by the supply reservoir using a cutout cock, governor, and regulator valve. Direct connection to the brake pipe trainline is prohibited.

**2.1.7** Maintenance, inspection, testing, reconditioning, and repairs of all passenger equipment car air brake equipment including brake cylinders and slack adjusters must be performed in compliance with the following instruction pamphlets, leaflets, AAR standards, or government regulations, as applicable. The pamphlets and leaflets shown below are published by the air brake valve equipment manufacturers.

- Instructions on the Use of Condemning Gages for U-12-BD, U-12-BC, and U-12-B Universal Valves. Pamphlet 2356-2, 1-1960 or latest revision
- Use of Condemning Gages or D-22 Type Control Valves. Pamphlet 2356-4, 6-1956 or latest revision
- Test Code for Car Air Signal Testing Device. Pamphlet 2377-2, 7-1942 or latest revision
- Code of Tests, U-12 Type Universal Valves. The 3-USB Test Rack. Pamphlet 5039-2, 7-1953 or latest revision
- Code of Tests for Passenger Car Equipment Using Single Car Testing, APTA SS-M-005-98, Rev. 2, or latest revision
- Single Car Testing Device. Code of Tests for Passenger Equipment Pamphlet 5039-4, Sup.3, 1-1983 as referenced in APTA SS-M-005-98 or latest revision
- Code of Tests, D-22 Type Control Valves. The "AB" Test Rack. Pamphlet 5039-21, 2-1962 or latest revision
- Shop Maintenance for D-22 Type Passenger Car Brake Equipment Devices. Pamphlet 2089, latest revision
- Composite Instruction Pamphlet, 26-C Brake Equipment for Passenger Car. Pamphlet 5071-8, 12-1960 or latest revision
- Passenger Car Brake Equipment Type 26-C with Rear End Control. Pamphlet 5071-10, latest revision
- Brake equipment test racks must be in accordance with applicable standards published in the *Manual of Standards and Recommended Practices*, Section E

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- All truck-mounted brake equipment must be maintained in accordance with passenger equipment car owner's instructions
- The Power Brake Law of 1958, Publication Safety Appliance and Power Brakes dated 1-1973, revised 9-1977, and amended 10-1-1982, or current editions

**2.2 Brake Parts—Air and Foundation**

**2.2.1** Renewal of brake parts shall be performed when the following is found:

**2.2.1.1** Parts that are found inoperative, bent, broken, out of gauge, or missing.

**2.2.1.2** Air brake hose of the approved AAR non-armored type must be renewed with new approved Specification M-601 hose when defective as defined in the *Field Manual of the AAR Interchange Rules*, Rule 5. This includes brake pipe, signal pipe, main reservoir, and brake cylinder hoses.

**2.2.1.2.1** Armored air hose is prohibited.

**2.2.1.3** Brake shoes of the cast-iron type must be replaced with new approved Specification M-402 (latest revision) brake shoes when defective or when worn to the extent of 3/4 in. or less thickness.

**2.2.1.4** Brake shoes of the composition type must be replaced with new approved types when defective or worn to the extent of 1/2 in. or less thickness including the lining and the backing plate.

**2.2.1.4.1** Brake shoes used on Amtrak equipment must be Amtrak-approved type.

**2.2.1.5** Brake pad lining on disc brakes must be replaced with new approved Specification M-926 brake shoes when defective or when worn to the extent of 1/4 in. or less thickness.

**2.2.1.6** Universal control brake valve-equalizing or quick-action portions must be replaced in kind when defective.

**2.2.1.7 Cast-Iron Reservoirs**

**2.2.1.7.1** No welding is permitted on the body portion of cast-iron reservoirs. However, holes in mounting lugs when worn may be built up by welding. Mounting lugs fractured or broken off (separated) within 1/2 in. or more distance from the body portion of the cast-iron reservoir may be welded by using bronze welding procedures to replace the lug.

**2.2.1.7.2** Welding shall be in accordance with the requirements of the *Field Manual of the AAR Interchange Rules*, Rule 82, current edition.

**2.2.2** In the renewal or replacement of brake parts as shown in paragraph 2.2.1, any deviation from that shown shall be considered wrong repairs and must be corrected when found.

**2.3** Cars built new on or after January 1, 1968, must be equipped with brake piping as follows:

**2.3.1** Brake pipe size shall be 1 1/4 in., Schedule 80 type

**2.3.2** Brake pipe material shall be either of the following:

- Extra heavy wrought-iron
- Alloy steel pipe per Specification ASTM A-53, latest revision.

**2.3.3** Brake pipe branch pipe size shall be 1 in., Schedule 80 pipe

**2.3.4** Brake pipe branch pipe materials shall be either of the following:

- Extra heavy wrought-iron
- Alloy steel pipe per Specification ASTM A-53, latest revision

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**2.3.5** Brake pipe nipples when used in brake pipe at end of car must be 1 1/4 in. in size, either Schedule 40 or Schedule 80 pipe

**2.4 Handbrakes**

At time of COT&S maintenance, handbrakes (including all connections) must be inspected, lubricated, and tested to ensure safe and effective operation.

**2.5 Air Brake Stencil**

**2.5.1** Old stenciling must be removed and the area painted over with quick-drying paint.

**2.5.2** Show place, month, day, and year of COT&S per Table 2.1.

**2.5.3** Stencil shall include railroad or private-owner reporting marks and the initials of the shop or station performing the maintenance.

**2.5.4** Stencil must be applied in a suitable location for visual inspection; truck frame or air brake supply/main reservoirs are the preferred locations.

**2.5.5** Stencil must not be changed until all work has been performed.

**2.5.6** Any deviation from these standards must be corrected when found.

**3.0 COUPLER AND COUPLER PARTS**

**3.1** This section outlines maintenance requirements and instructions for all types of couplers and coupler parts used on passenger equipment cars. The maintenance requirements for couplers designed exclusively for passenger equipment cars are covered in this standard.

**3.2** The maintenance requirements for AAR Type F couplers used in both freight and passenger equipment cars are found in the *Field Manual of the AAR Interchange Rules*, Rules 17 and 18, current edition.

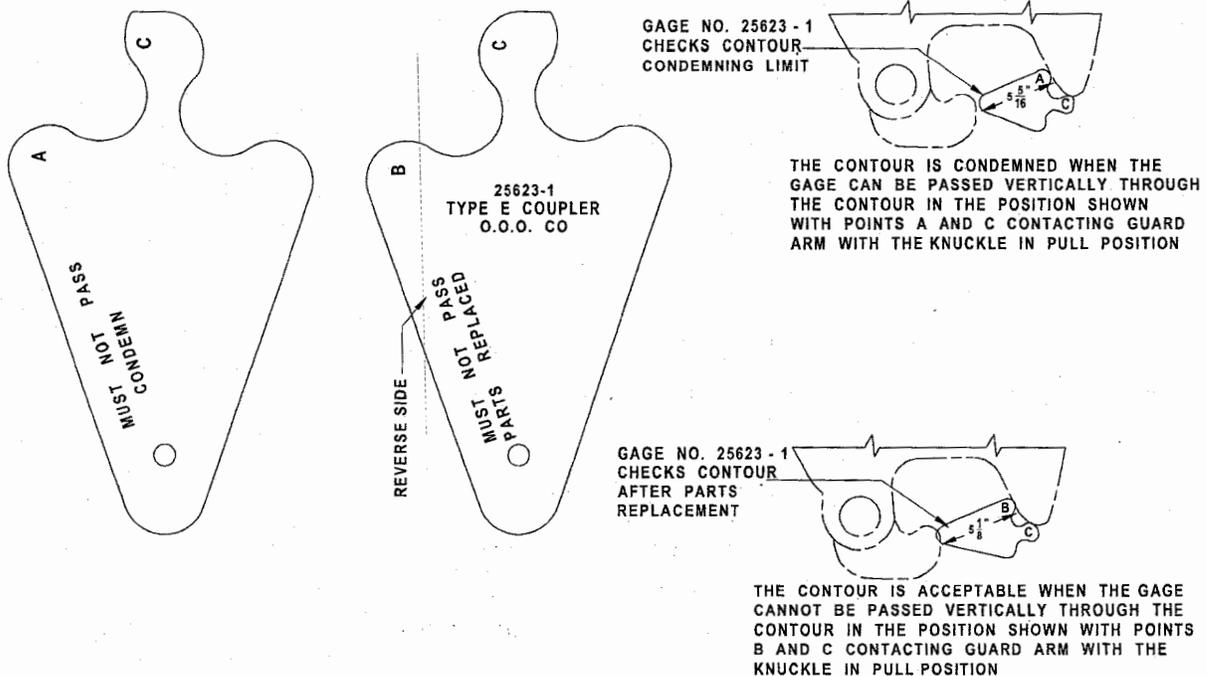
**3.3** Passenger equipment car couplers of the Type H tight-lock design and controlled-slack design must be maintained in accordance with instructions of this standard. These couplers and their design details are found in APTA RP-M-002-98, "Recommended Practice for Inspection and Maintenance of Type H-Tightlock Couplers," APTA RP-M-003-98, "Recommended Practice for Purchase and Acceptance of Type H Tightlock Couplers," and APTA RP-M-04-98 "Recommended Practice for Second Hand and Reconditioned Type H-Tightlock Couplers" (latest revisions) that supersede former *MSRP* Section A Part III.

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**3.4** Any coupler having the standard MCB 1904 contour, other than those referred to in the foregoing paragraphs, with distance between point of knuckle and guard arm exceeding  $5 \frac{1}{8}$  in. (a side of gauge), measured perpendicular to the guard arm with gauge number 25623-1 as shown in Fig. 3.1, must have the defective part or parts renewed to bring the coupler within the proper gauge limits.



**Fig. 3.1 Qualification of MCB 1904 contour couplers**

**3.5** Passenger equipment cars equipped with AAR Type E coupler and associated parts shall be operated only under special agreement between the operating railroad and the passenger equipment car owner.

**3.6** Inspection, testing, reconditioning, and repairs of all passenger equipment car couplers and associated coupler parts must be performed in accordance with these standards or applicable requirements in the *Field Manual of the AAR Interchange Rules*, current edition, for AAR Type E or F couplers.

**3.7** All couplers when replaced as "account defective" must be replaced only in kind or in accordance with a written request by owner.

**3.8** Any deviation from these standards must be corrected when found.

**3.9 Welding Requirements**

**3.9.1** For the repair or reconditioning of AAR Type H tight-lock couplers or controlled-slack couplers, welding must be performed in accordance with the requirements as shown in APTA RP-M-04-98 "Recommended Practice for Second Hand and Reconditioned Type H-Tightlock Couplers," latest revision.

**3.9.2** For the repair or reconditioning of AAR Type E or Type F couplers, welding shall be performed in accordance with the requirements of the current edition of the *Field Manual of the AAR Interchange Rules* and appropriate specifications in the *Manual of Standards and Recommended Practices*, Section B.

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**3.10 Wear Plate**

**3.10.1** For Type F couplers, shank wear plates may be applied if the coupler is removed from the car and work is performed in accordance with the *Manual of Standards and Recommended Practices*, Section S, Specification M-212.

**3.10.2** AAR Type H tight-lock couplers or control-slack couplers must have wear plates applied in accordance with appropriate specifications in APTA RP-M-002-98, "Recommended Practice for Inspection and Maintenance of Type H-Tightlock Couplers," latest revision.

**3.10.3** Coupler with shank dimensions less than the AAR standard or AAR alternate standard as shown in the *Manual of Standards and Recommended Practices*, are prohibited in passenger equipment car service.

**3.10.4** Couplers and coupler parts listed in the *Field Manual of the AAR Interchange Rules*, Freight Car Rule 90, are prohibited in passenger equipment car service.

**3.11 Coupler Contour Gauging**

For a Type F coupler that is comprised of a new coupler body and secondhand or reconditioned parts, the complete unit must meet all requirements of coupler contour gauge number 47120-2 shown in the appropriate rule of the *Field Manual of the AAR Interchange Rules*, current edition.

**3.12 Coupler Replacement**

In the replacement of couplers in any passenger equipment cars, any modification of sill construction that might include cutting or burning slots or holes must not be performed without prior approval of the operating railroad's car engineering department.

**3.13 Coupler Height Requirements**

**3.13.1** For passenger-carrying passenger equipment cars, coupler height requirements shall be as follows:

- Minimum—34 in.
- Preferred—34 1/2 in.
- Maximum—35 in.

**3.13.2** Non-passenger-carrying passenger equipment car coupler height shall be as follows:

**3.13.2.1** Empty cars shall be the same as for passenger-carrying cars in paragraph 3.13.1.

**3.13.2.2** Loaded cars shall be as follows:

- Minimum—32 in.
- Preferred—32 1/2 in.
- Maximum—33 in.

**3.13.3** The measurements for coupler height as shown in paragraph 3.13 must be made from the top of rail to center of face of the coupler knuckle.

**3.13.4** In the adjustment of coupler height, where possible the adjustments should be made when the car is empty.

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**4.0 JOURNAL ROLLER BEARING—PERIODIC LUBRICATION**

**4.1** This section outlines lubrication and maintenance requirements for all types of roller bearings used on passenger equipment cars.

**4.2** Journal roller bearings that are not designated as NFL (no field lubrication) type must have lubrication periodically applied in the amount and frequency shown in Table 4.1:

**Table 4.1 Journal roller bearing lubrication**

Type	Size	Frequency	Amount of Lubricant
Oil-lubricated	Any size	30 days	Restore oil to maximum level
Grease-lubricated bearings with housing covers	Any size	90 days	1 lb
Grease-lubricated bearings with housing covers and rotating end cap on same car	Any size	90 days	Add amount specified for type of bearing
Grease-lubricated bearings with end caps (either inboard or outboard application)	D (5 1/2 × 10)	12 months	6 oz
	E (6 × 11)	12 months	6 oz
	F (6 1/2 × 12)	12 months	8 oz
	G (6 1/2)	12 months	8 oz
	EE (5 1/2)	12 months	8 oz
	EE (6)	12 months	8 oz

**4.2.1** Other sized bearings not listed in paragraph 4.2 shall be lubricated per manufacturer's recommendations.

**4.2.2** Passenger equipment cars must not operate beyond the lubrication date stenciled on the car.

**4.2.3** Roller bearings must have filling plugs properly replaced after lubrication of oil-lubricated roller bearings.

**4.2.4** A pressure gun properly calibrated in ounces by weight must be used in the grease lubrication of grease-type journal roller bearings.

**4.2.5** Pipe plugs must be properly replaced with AAR-approved-type grease fittings when plugs are found on grease-lubricated bearings (except NFL-type roller bearings that do not require grease fittings).

**4.2.6** Roller bearings designated NFL shall not be lubricated except when the bearing is being reconditioned.

**4.3** It is recommended that all roller bearings on a passenger equipment car be of the same type.

**4.4** When necessary to replace one or both wheels off the axle, roller bearings must be replaced with new or reconditioned bearings.

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**4.5 Lubrication Stencil**

**4.5.1** When a stencil is missing, incorrect, or indistinct, the car must be lubricated in accordance with paragraph 4.2.

**4.5.2** Old stenciling must be removed and the area painted over with quick-drying paint.

**4.5.3** New stenciling should show month-day-year-location and railroad or private car shop reporting initial and "lub" for lubrication.

Example: "Lub" chg-10-20-83 ABC

**4.5.3.1** Use the same railroad station or private car shop reporting initial as used for the air brake stencil.

**4.5.3.2** Apply the stencil at one of the following locations on the car, using not less than 1 in. figures and letters:

- One side of each truck at diagonal corners of car
- Side of car body at platform end sill or step side, on diagonal corners of car

**4.5.3.3** New stenciling must not be applied until all lubrication work has been performed in accordance with this standard.

**4.6** Reconditioning and maintenance procedures for roller bearings shall be followed as shown in the *Manual of Standards and Recommended Practices*, Section H and Section H-II.

**4.7** The grade of oil used in oil-lubricated journal roller bearings must conform with former AAR Specification M-963 (traction motor support bearing oil), such as Shell Cyprina Oil 963, Conoco/Phillips AAR 963 Oil, or Chevron Journaltex HD 57.

**4.8** Grade A grease to former AAR Specification M-917 must be used in the lubrication of passenger-car-type trucks having Hyatt roller bearings equipped with thrust blocks. Approved greases are as follows:

- Southwest Grease and Oil Company Code 11810
- Texaco Incorporated RB Grease No. 2301
- Atlantic Richfield L-340 Lithium RB Grease

**4.9** Grease-lubricated roller bearings other than those shown in paragraph 4.2 must be lubricated with a manufacturer's approved grease.

**4.10** Passenger equipment car owner is responsible for periodic lubrication of roller bearings after expiration of time limits regardless of circumstances or in accordance with contractual agreement between the owner and the operating railroad.

**4.11** Failure of roller bearings is the owner's responsibility.

**4.12** Hyatt roller bearings must have the lateral clearance properly adjusted.

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**5.0 WHEELS**

**5.1** This section outlines maintenance requirements and instructions for all types of wheels used on passenger equipment car equipment. The maintenance requirements for wheels designed exclusively for passenger equipment and included in this standard shall be used in conjunction with the requirements specified in the *Manual of Standards and Recommended Practices*, Section G and Section G-II, and are included to supplement the requirements of those sections.

**5.2** The requirements for wear limits, gauging, and cause for renewal of defective passenger equipment car wheels are covered in this standard.

**5.2.1 Prohibited Wheels**

**5.2.1.1** Steel-tired wheels are prohibited in passenger equipment car service and shall be removed on sight when found.

**5.2.1.2** Cast-iron wheels are prohibited in passenger equipment car service.

**5.2.1.3** Class C steel wheels for use with on-tread brakes are prohibited in passenger equipment car service.

**5.2.1.4** Rim-stamped wheels of straight-plate design are not to be installed as original or replacement wheels for use with on-tread brakes.

**5.2.2 Wheel Defects**

**5.2.2.1** Method of gauging and illustrations outlined in the *Field Manual of the AAR Interchange Rules*, Freight Car Rule 41, shall be used on passenger equipment cars with the exception that the thin-rim condemning limit for passenger equipment cars is 1 in. or less and shall be measured as shown in Freight Car Rule 41.

**5.2.2.2** Slid-flat wheels having the slid-flat area over 1 in. in length must be replaced. Also, the mate wheel must be replaced. The slid-flat defect must be measured as shown in the *Field Manual of the AAR Interchange Rules*, Freight Car Rule 41.

**5.2.2.3** Wheels that have been overheated as a result of being in a fire must be replaced.

**5.2.2.4** Wheels removed from service must be replaced in kind, excepting the requirements of paragraph 5.2.1.

**5.2.2.4.1** When untreated wheels are substituted for heat-treated wheels, the passenger equipment car owner must be advised within 30 days after date of substitution and reason given for the substitution.

**5.2.2.4.2** Wheels must not be painted with any opaque material.

**5.2.2.5** Wheels applied must have at least 1 1/4 in. minimum rim thickness and full narrow flange thickness.

**5.2.2.6** For cars having wheels not listed in Table 5.1, the owner must be contacted for the types of wheels to be applied.

**5.2.2.7** Machining and mounting of wheels for passenger equipment cars must be in accordance with the *Manual of Standards and Recommended Practices*, Section G-II, "Wheel and Axle Manual." The shop performing the wheel change is responsible for scrapping dismantled wheels found with oversized axle bore or found with insufficient wheel hub wall thickness.

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**5.3 Wheel Types Commonly Used on Passenger Equipment Cars**

Table 5.1 lists wheels commonly used on passenger equipment cars.

Table 5.1 Wheels commonly used on passenger equipment cars

AAR Wheel Type	Date Standard	Intended Maximum Axle Size	Maximum Finish Bore (in.)	Notes	Companies Requiring
A-32	1972		6 1/8		CR
CA-32	1972		6 1/8		CR
C-33	1946	5 1/2 × 10	7 3/4	22,125 lb maximum rating	BN
CC-33	1968	5 1/2 × 10	7 3/4		BN
A-34	1955	6 1/2 × 12	9 1/4	Diesel rail car, also	CR, CP
CA-34	1968	6 1/2 × 12	9 1/4		
A-36	1950		7 3/4		SOU, ONT, DRGW, CHESSIE, CR, CP, MP, WP
CA-36	1968		7 3/4		WP
B-36	1946		8 1/2		ONT, MKT, ICG, DRGW, SCL, CR, BN, CP, NW, AL, MP, CHESSIE, GTW
CB-36	1968		8 1/2		NW, AC, GTW
D-36	1946		8 1/2		CR, BN, SP, UP, MILW, ATSF
CD-36	1968		8 1/2		BN, UP, SP, MILW
E-36			10 1/4	For disc brake axles	CR, BN, CP, SP, NW, UP, AL, ICG, AC, GTW, SCL, MILW, ONT, ATSF, MP, DRGW
CE-36			10 1/4		BN, NW, UP, SP, MILW, GTW
M-36	1980			Inboard bearing	BN
CM-36	1980				BN

**5.4 Wheel Identification**

**5.4.1** Wheels of various classes, including Classes A, B, C, or L, are commonly used in passenger equipment car equipment service. These may be identified as shown in Figs. 5.1 and 5.2. Material specifications for various classes of passenger equipment car wheels must be in accordance with the specifications found in the *Manual of Standards and Recommended Practices*, Section G and Section G-II.

**5.4.2** Wheel heat treatment relates to the service for which the various classes of wheels are generally intended as follows:

- Class U—general service where an untreated wheel is satisfactory
- Class L—high-speed service with more severe braking conditions than other classes and light wheel loads
- Class A—high-speed service with severe braking conditions, but with moderate wheel loads
- Class B—high-speed service with severe braking conditions and heavier wheel loads
- Class C—service with heavier braking conditions where off-tread brakes are employed

**5.4.3** Class markings of wheels are identified by stamping on either the back face of the rim of the wheel or on the hub of the wheel as shown in Figs. 5.1 and 5.2.

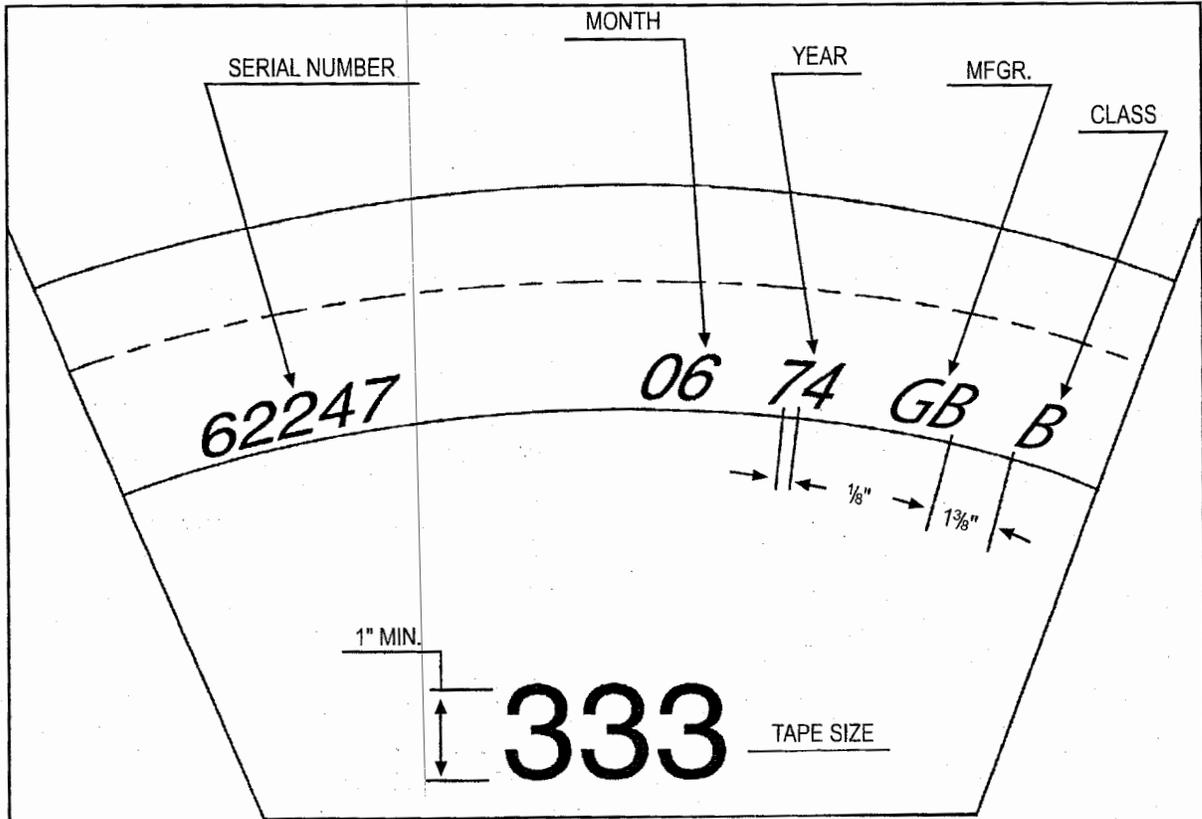
**5.4.3.1** Class C wheels must not be applied to any passenger equipment cars that are equipped with on-tread brakes.

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**Note 1.** Stamping shall consist of manufacturer's serial number, date of manufacture, manufacturer's identification, and class of heat treatment. Stamping is limited to 14 characters, and the design designation shall be stencilled on the back plate with paint using characters at least 1 in. high.

**Note 2.** Stamping shall be spaced a minimum of 1/8 in. between characters and 1 3/8 in. between groups. The stamping shall be located not less than 1/4 in. from the inner edge of the rim.

**Note 3.** Manufacturer's identification is limited to two initials that shall be as follows:

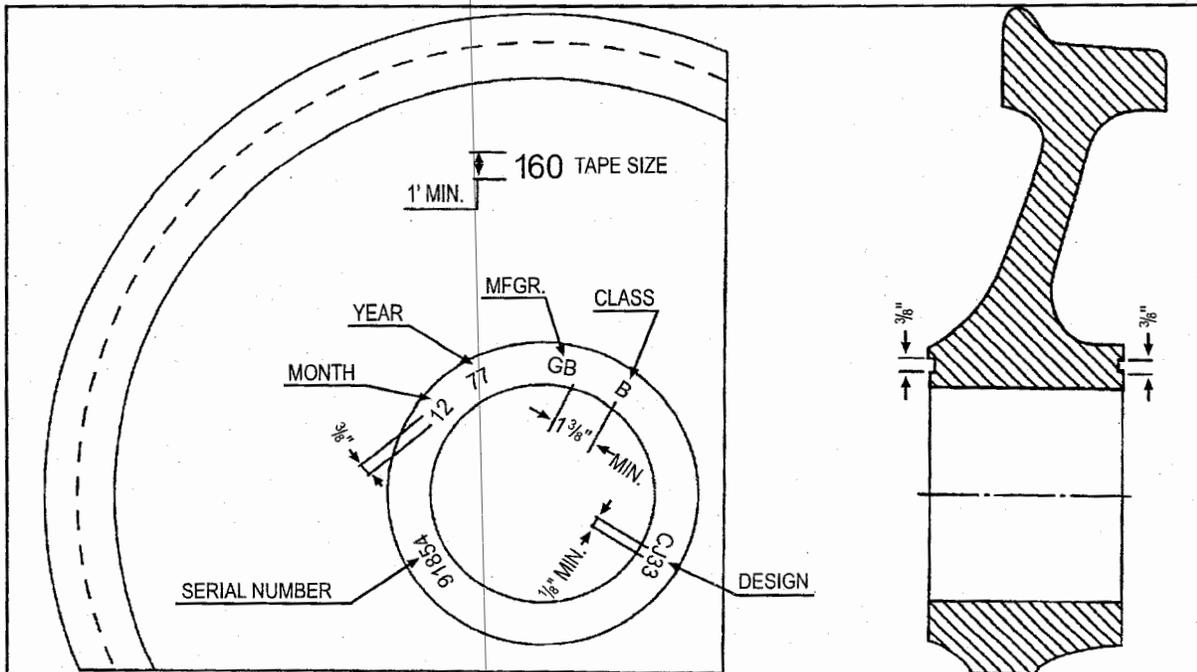
A ARMCO <sup>a/</sup>	G U.S. Steel (Gary Plant) <sup>a/</sup>
BW Bethlehem <sup>a/</sup>	JW Sumitomo Metal Industries
CW U.S. Steel (Pittsburgh Plant) <sup>a/</sup>	SW Standard Steel
EW Edgewater	ZW Canadian Steel Wheel

<sup>a/</sup> No longer in production.

**Note 4.** Dies used to produce characters shall be not less than 3/8 in. in nominal height at crest, and hot-stamping shall be nominally 3/64 in. in depth. Italicized characters (sloped upward to right) shall be used.

**Note 5.** All wheels shall be marked for class using the letters U, L, A, B, or C, as appropriate.

**Fig. 5.1 Marking of steel wheels rim stamping**



**Note 1.** When ordered, wheels may be stamped on front or back (as specified by purchaser) hub face.

**Note 2.** Stamping shall consist of the manufacturer's serial number, date of manufacture, identification of manufacturer, class, and design designation. The hub stamping of locomotive wheels may be applied by the purchaser after final machining of the hub. Wheels that are to be marked by the purchaser should be furnished with all marking stencilled on the front plate with paint using characters at least 1 in. high.

**Note 3.** Manufacturer's identification is limited to two initials that shall be as follows:

A ARMCO <sup>a/</sup>	G U.S. Steel (Gary Plant) <sup>a/</sup>
BW Bethlehem <sup>a/</sup>	JW Sumitomo Metal Industries
CW U.S. Steel (Pittsburgh Plant) <sup>a/</sup>	SW Standard Steel
EW Edgewater	ZW Canadian Steel Wheel

<sup>a/</sup> No longer in production.

**Note 4.** Stamping shall be spaced a minimum of 1/8 in. between characters and a minimum of 1 3/8 in. between groups and located approximately central of the hub face.

**Note 5.** Stamps used to produce characters shall be not less than 3/8 in. in height and shall not have sharp edges. Italicized characters (sloped upward to right) shall be used.

**Note 6.** All wheels shall be marked for class using letters U, L, A, B, or C, as appropriate.

**Note 7.** The three groups—1) design; 2) serial number; and 3) date of manufacture, manufacturer and class—shall be spaced approximately equidistant around the hub face.

Fig. 5.2 Marking of carbon steel wheels hub stamping

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**6.0 AXLES**

**6.1** This section outlines maintenance requirements and instructions for roller-bearing-type axles used on passenger equipment cars. The maintenance requirements of this standard shall be used in conjunction with the standards, specifications, and recommended practices contained in the *Manual of Standards and Recommended Practices*, Section G and Section G-II, and are meant to supplement the requirements of these sections.

**6.2** Axles used on passenger equipment cars must be of the raised wheel seat (RWS) roller-bearing type identified and specified in the *Manual of Standards and Recommended Practices*, Section G and Section G- II.

**6.3** Hollow axles must not be used in intercity passenger equipment car service unless approved by the operating railroad.

**6.4** Axles must be replaced when the limits of wear have been reached as shown in Fig. 6.1:

Journal Size Standard to Car (in.)	Wheel Seat Limit Location I	Axle Center Limit Location K (in.)
5 × 9	When less than 6 3/4 in.	When less than 5 1/4 in.
5 1/2 × 10	When less than 7 5/16 in.	When less than 5 3/4 in.
6 × 11	When less than 8 in.	When less than 6 5/16 in.
6 1/2 × 12	When less than 8 1/2 in.	When less than 6 3/4 in.

Fig. 6.1 Axle wear limits

**6.4.1** Axles must be replaced when the following conditions are found:

- Broken
- Damage caused by overheating
- Damage between wheel seats of a depth of 1/8 in. or deeper
- Journal found rusted or pitted
- Axle bent when determined at wheel shop
- Axle damaged as a result of being in fire

**6.4.2** Plain bearing axles must not be substituted for roller bearing axles. Plain bearing axles are prohibited in passenger equipment car service.

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**6.4.3** Raised wheel seat (RWS) roller bearing axles must be replaced in kind to maintain size standard to the car.

**6.4.3.1** Secondhand axles, when used, must meet the dimensions shown in Fig. 6.2:

Journal Size Standard to Car (in.)	Wheel Seat Diameter Location I	Axle Center Diameter Location K (in.)
5 × 9	6 3/4 in. or more	5 1/4 in. or more
5 1/2 × 10	7 5/16 in. or more	5 3/4 in. or more
6 × 11	8 in. or more	6 5/16 in. or more
6 1/2 × 12	8 1/2 in. or more	6 3/4 in. or more

**Fig. 6.2** Secondhand axle dimensions

**6.4.3.2** Axles, when reclaimed, must be in accordance with the *Manual of Standards and Recommended Practices*, Section G-II, “Wheel and Axle Manual.”

**6.4.4** Axles removed from service as “account overheated” must not be reconditioned and must be immediately stenciled in 1 in. letters “overheated scrap” and the journal mutilated to prevent reuse.

**7.0 CARS AND CAR BODY**

**7.1** Cars must meet the requirements of the operating railroad as to type of construction, soundness of condition, safety, and clearances to be acceptable in passenger equipment car service.

**7.2** All cars must be equipped with safety appliances conforming to US DOT-FRA Regulation Title 49 Code of Federal Regulations, Part 231.

**7.3** All exterior and underneath equipment on passenger equipment cars must be securely attached and supported in a safe manner for cars to be acceptable in passenger equipment car service. Underfloor equipment with exposed moving parts (such as fan blades or drive belts) shall be shielded by covers or safety guards. Any fuel tank shall be grounded, and its fuel-line connection shall have a shut-off valve. All fuel, oil, and coolant systems shall be free of leaks.

**7.4** Cars must be equipped with an approved air brake system to be considered acceptable in passenger equipment car service.

**7.5** All cars with underneath exposed wood parts must be equipped with a brake shoe spark shield over each wheel. These spark shields must be made of sheet steel or galvanized iron approximately 1/16 in. thick in an area 36 in. wide by 48 in. long.

**7.6** Cars equipped with electric heat furnished from head-end power shall use 3-phase, 480 V service for train line power, as approved by the operating railroad.

**7.7** Cars must be equipped with all steel or aluminum underframes and draft sills. These underframes must be of such design and condition to adequately support underneath equipment of the car.

**7.8** All truck pedestals shall have a journal bearing stop. Any axle drive system shall be in sound condition and properly lubricated.

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