

14. APTA PR-IM-S-014-99

Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars

Approved October 27, 1999
APTA PRESS Task Force

Authorized January 8, 2000
APTA Commuter Rail Executive Committee

Abstract: This standard provides a methodology for the modification of the inspection/maintenance tasks and/or assigned frequencies contained within APTA SS-I&M-013-99, Rev. 1, Standard for Passenger Car Periodic Inspection and Maintenance.

Keywords: inspection intervals, maintenance intervals, modification methodology, passenger cars, periodic inspection and maintenance of passenger cars

Copyright © 1999 by
The American Public Transportation Association
1666 K Street, N. W.
Washington, DC 20006-1215
All rights reserved.

*No part of this publication may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of
The American Public Transportation Association.*

Introduction

(This introduction is not a part of APTA PR-IM-S-014-99, Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars.)

This introduction provides some background on the rationale used to develop this standard. It is meant to aid in the understanding and application of this standard.

This standard describes the modification methodology for the periodic maintenance and inspection of passenger cars. It is intended for the following:

- a) Individuals or organizations that maintain passenger cars;
- b) Individuals or organizations that contract with others for the maintenance of passenger cars;
- c) Individuals or organizations that influence how passenger cars are maintained.

Participants

The American Public Transportation Association (APTA) greatly appreciates the contributions of the following individual(s), who provided the primary effort in the drafting of the Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars.

Rich Conway

Jim Stoetzel

At the time that this recommended practice was completed, the Passenger Rail Equipment Safety Standards (PRESS) Maintenance Committee included the following members:

Rich Conway, *Chair*

John Condrasky

Ken Donnelly

Michael Dorsi

Tom Grant

Tom Lutz

Chuck Prehm

Tom Rowbottom

Robert Scarola

Michael Scutero

James Stoetzel

Table of Contents

1. Overview	14.4
1.1 Scope.....	14.4
1.2 Purpose.....	14.4
2. References	14.4
3. Definitions, abbreviations, and acronyms	14.5
3.1 Definitions.....	14.5
3.2 Abbreviations and acronyms	14.6
4. Modification methodology	14.6
4.1 Inspection/maintenance standard.....	14.7
4.2 Performance results	14.7
4.3 Data collection.....	14.7
4.4 Analysis.....	14.7
4.5 Change process.....	14.8
Annex A (informative).....	14.9

APTA PR-IM-S-014-99

Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Cars

1. Overview

This safety standard is divided into 4 sections. Section 1 provides an overview of this recommended practice. Section 2 lists references that must be on hand and available for the implementation of this recommended practice. Section 3 provides definitions, abbreviations, and acronyms that are either not found in other standards, or have been modified for use with this recommended practice. Section 4 describes the steps necessary to apply this methodology.

1.1 Scope

This is a safety standard for the modification of the inspection/maintenance tasks and/or the assigned frequencies contained within *APTA PR-IM-S-013-99, Rev. 1, Standard for Passenger Car Periodic Inspection and Maintenance*.¹

1.2 Purpose

This safety standard is meant to provide organizations with the basic modification methodology necessary to change the scope and/or frequencies of the periodic inspection and maintenance tasks for passenger coaches.

This safety standard is meant to identify those steps necessary to ensure that the tasks and frequencies assigned provide a high level of reliability for safety critical systems and sub-systems.

2. References

This safety standard shall be used in conjunction with the following publications. If the following publications are superseded by an approved revision, the revision shall apply.

Applicable federal, state, and local regulations.

APTA PR-IM-S-013-99, Rev. 1, Standard for Passenger Car Periodic Inspection and Maintenance.

Original equipment manufacturer instructions (OEM).

Standard maintenance procedure (SMP). (See 3.1.10)

¹ For references in Italics, see Section 2

49 CFR, Part 238, Passenger Equipment Safety Standards, Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment, Subsection 238.503, Inspection, Testing, and Maintenance Requirements, October 2000

3. Definitions, abbreviations, and acronyms

3.1 Definitions

For the purposes of this recommended practice, the following terms and definitions apply:

3.1.1 data analysis: A systematic evaluation of an item based on a statistically valid sample and an analysis of collected information. The analysis should compare the data to a standard representing acceptable performance. The data analysis may be 1) a running average; 2) a tabulation of defects; 3) removal rates for past periods; and/or 4) graphs, charts, or any other method depicting a norm.

3.1.2 data collection system: The system used to gather, store, and catalogue performance results for the purpose of analysis and regulatory compliance.

3.1.3 environmental consequences: Includes environmental damage or the breach of any known environmental standard or regulation.

3.1.4 non-operational consequences: Consequences that involve the direct cost of repair.

3.1.5 operational consequences: Includes reduced output, schedule delay, negative impacts on customer service, and/or operating costs in addition to direct repair costs.

3.1.6 original equipment manufacturer (OEM): The technical documentation produced by the organization that built or manufactured a specific piece of passenger rail equipment describing maintenance procedures and frequencies for that piece of equipment.

3.1.7 periodic maintenance: The performance of selected inspection and maintenance actions on systems or sub-systems. Regulatory agencies or the operating authority may set the frequency of these actions. The frequency may be expressed as a function of time (i.e. days, weeks, or months) or of utilization (i.e., mileage, cycles, etc.).

3.1.8 reliability: Ability of a component or system to perform a known task/function for a specified interval (time, cycles, etc.).

3.1.9 safety consequences: Injury or death or the breach of any known safety standard or regulation. The safety impacts of modifications to the inspection and maintenance standard shall be evaluated pursuant to the requirements of the railroad system safety plan and *49 CFR, Part 238.503, Inspection, Testing, and Maintenance Requirements*.²

3.1.10 standard maintenance procedure (SMP): The internal railroad document giving specific instruction on how to perform maintenance on a specific system or compound.

² For references in Italics, see Section 2.

3.2 Abbreviations and acronyms

APTA	American Public Transportation Association
CFR	Code of Federal Regulations
OEM	original equipment manufacturer instructions
PRESS	Passenger Rail Equipment Safety Standards
SMP	standard maintenance procedure (unique to individual railroads)

4. Modification methodology

The modification methodology involves five principal steps: (Refer to Figure 1)

- Step 1- Inspection/maintenance standard
- Step 2- Performance results
- Step 3- Data collection
- Step 4- Analysis
- Step 5- Change process

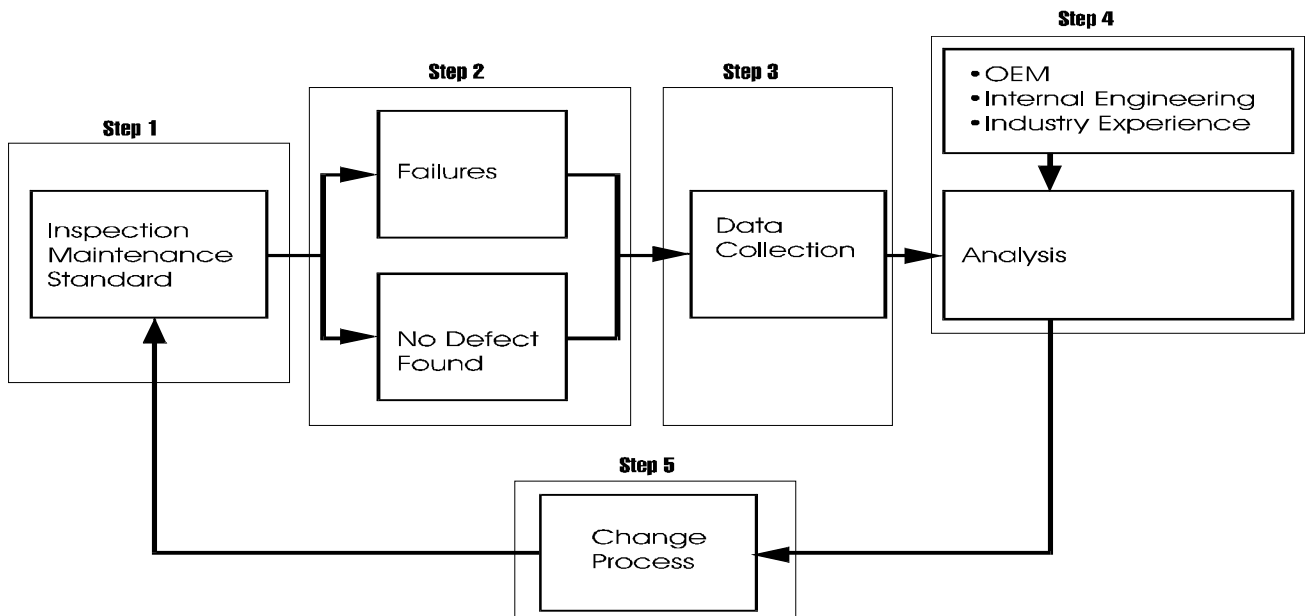


Figure 1 - Modification methodology

4.1 Inspection/maintenance standard

The inspection/maintenance standard requires inspection and maintenance tasks on systems or sub systems of passenger coaches in accordance with the assigned frequencies for the performance of those tasks as contained within *APTA PR-IM-S-013-99, Rev. 1*.³

4.2 Performance results

Compile the findings of actions taken during the inspection/maintenance process. These findings may include, but are not limited to:

- a) Failures uncovered during the inspection/maintenance process or outside of the scheduled inspection
- b) A finding of "no defects"

4.3 Data collection

Collect inspection data obtained from sampling, surveys, inspections, and from manufacturers and operators, identified by each inspection system, component, or item.

Below is the information collected and derived from both inspection and operating in order of importance in the maintenance program:

- a) Failures that could affect operating safety
- b) Failures that have operational consequences
- c) Failure modes of units removed as a result of failures
- d) The general condition of unfailed parts in units that have failed
- e) The general condition of serviceable units inspected as samples

4.4 Analysis

Systematically evaluate the system, subsystem, or component based on a statistically valid sample and an analysis of information (including inspection data). The analysis shall compare the information to the inspection/maintenance standard (Section 4.1) and to any other American Public Transportation Association (APTA) or applicable federal, state, and local regulations on minimum levels of system, subsystem, or component reliability and safety.

Information for the required evaluation may be gathered from numerous sources, including:

- a) Inspection data (Section 4.3)
- b) Original equipment manufacturer instructions (OEM)
- c) Internal engineering

³ For references in Italics, see Section 2.

d) Industry operational experience

The results of the analysis will include a data display and report, with appropriate displays summarizing the period's activities in sufficient depth to evaluate the effectiveness of the inspection and maintenance program. The report shall highlight systems, components and/or items that exceed the established performance standards and those that do not. The report shall also document and detail the repairs and modifications that were made to systems, components, and items that were operating below an acceptable design level of reliability and safety.

As part of the analysis and reporting, a change recommendation may be made including:

- Increased or decreased inspection scope and interval;
- Altering the inspection/maintenance program(s) methods, processes, or procedures;
- Combinations of interval, scope, and program changes.

4.5 Change process

Adjust the inspection interval and/or the inspection program (such as the methods used to collect data, process change, or procedures related to reliability measurements and/or performance standards).

Start with the evaluation of recommendations from the analysis in Section 4.4. In the consideration of any recommendations for change, regulatory compliance must be assured. In determining the impact of any recommended change, a risk analysis process must be utilized. The risk analysis process includes consideration of:

- a) Visibility of a functional failure (whether a failure is hidden or evident to the operating crew under normal circumstances);
- b) Visibility of reduced resistance to failure (evidence that a failure is imminent);
- c) Life or age-reliability characteristics of each item;
- d) The category of evident failure consequences (i.e. safety and environmental consequences, operational consequences, or non-operational consequences).

After consideration of the consequences (see Figure A.1 in Annex A), the risk assessment will evaluate how likely a failure is based upon the analysis in Section 4.4. The risk assessment will determine if the risk is tolerable based on corporate guidelines as well as any other APTA or regulatory guidance on minimum levels of system, subsystem, and component reliability and safety. The economic tradeoff between the cost of scheduled maintenance and the benefits to be derived from it is also evaluated in the risk assessment.

The safety impacts of this recommended change shall be evaluated pursuant to the requirements the railroad system safety plan and *49 CFR, Part 238.503, Inspection, Testing, and Maintenance Requirements*.

Annex A (informative)

Consideration of failure consequences

