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**Railway specifications –
The specification and demonstration of Reliability,
Availability, Maintainability and Safety (RAMS) –
Part 3: Guide to the application of EN 50126-1
for rolling stock RAM**

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English version

**Railway applications –
The specification and demonstration of
Reliability, Availability, Maintainability and Safety (RAMS) –
Part 3: Guide to the application of EN 50126-1
for rolling stock RAM**

Applications ferroviaires –
Spécification et démonstration de la
Fiabilité, de la Disponibilité, de la
Maintenabilité et de la Sécurité (FDMS) –
Partie 3: Guide pour l'application de la
EN 50126-1 à la fiabilité, la disponibilité,
la maintenabilité et la sécurité du matériel
roulant

Bahnanwendungen –
Spezifikation und Nachweis der
Zuverlässigkeit, Verfügbarkeit,
Instandhaltbarkeit, Sicherheit (RAMS) –
Teil 3: Leitfaden zur Anwendung der
EN 50126-1 für Bahnfahrzeuge RAM

This Technical Report was approved by CENELEC on 2008-05-09.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This Technical Report was prepared by Working Group B11 of SC 9XB, Electromechanical material on board of rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the vote and was approved by CENELEC as CLC/TR 50126-3 on 2008-05-09.

This Technical Report supersedes CLC/TR 50126-3:2006.

This Technical Report forms an informative part of EN 50126 and contains guidelines for the application of EN 50126-1 to Rolling Stock RAM.

Contents

	Page
Introduction	6
1 Scope	7
2 Definitions	7
3 Approach adopted for the Guide.....	8
3.1 General.....	8
3.2 Entities Involved In the Life Cycle Phases of Rolling Stock.....	8
4 Application of this Guide	8
4.1 Object of the application.....	8
4.2 Application of EN 50126-1	9
4.2.1 Assessment of the application of EN 50126-1.....	9
4.2.2 Mandatory requirements for the application of EN 50126-1	9
5 Specifying RAM requirements	10
5.1 Introduction	10
5.2 Preliminary RAM analysis	10
5.2.1 General	10
5.2.2 Preliminary RAM Analysis activities.....	10
5.2.2.1 General.....	10
5.2.2.2 System Identification	11
5.2.2.3 Breakdown structure and boundary limits	12
5.2.2.4 Failure Conditions	14
5.3 RAM requirements	16
5.3.1 Introduction	16
5.3.2 Reliability Targets	16
5.3.3 Maintainability Targets	18
5.3.3.1 Generic Qualitative Requirements for Maintainability	18
5.3.3.2 Preventive/Corrective Maintenance Requirements	20
5.3.3.3 Logistic Support Requirements.....	20
5.3.3.4 Maintenance Cost Requirements.....	21
5.3.4 Availability Targets.....	21
5.4 Process for choosing RAM figures.....	24
5.5 RAM Programme	24
5.5.1 Introduction	24
5.5.2 Configuration Management System	25
5.5.3 RAM Programme Outline.....	25
5.5.4 Example of RAM Analyses Document Template and Data	26
5.5.4.1 Introduction	26
5.5.4.2 Common Data for the analyses	26
5.5.4.3 Reliability Prediction Analysis Template and Data Sheets	27
5.5.4.4 Maintenance Attributes (Maintenance Levels, Skill Level and LRU definition).....	29
5.5.4.5 Preventive Maintenance Analysis Template and Data Sheets.....	31
5.5.4.6 Corrective Maintenance Analysis Template and Data Sheets	35
5.5.4.7 Failure Mode Effects and Criticality Analysis Template and Data Sheets	37

6	RAM Assurance during Life Cycle	40
6.1	RAM Programme and Phases of the Life Cycle	40
6.1.1	Introduction	40
6.1.2	Tender Phase	41
6.1.3	Design Phase	42
6.1.4	Demonstration Phase	44
6.1.4.1	Introduction	44
6.1.4.2	RAM Acceptance Criteria	45
6.1.4.3	In service checking Period	45
6.1.4.4	Data Report from field and its organisation	46
7	RAM Parameters to be incorporated into LCC Model	47
7.1	Introduction	47
7.2	Overview of LCC Modelling	47
7.3	RAM parameters for LCC	48
Annex A	Examples of breakdown structure	49
Bibliography		62

Figures

Figure 1	– Example of Reliability Prediction Analysis Sheet	28
Figure 2	– Example of Preventive Maintenance Analysis Sheet	32
Figure 3	– Example of Preventive Maintenance Sheet for a single frequency	34
Figure 4	– Example of Corrective Maintenance Analysis Sheet	36
Figure 5	– Example of items FMECA Sheet	38
Figure 6	– Example of functions FMECA Sheet	39
Figure 7	– RAM Programme and Life Cycle Phases	40
Figure 8	– Possible relationships between Customer, Main Supplier, Sub-Supplier during some phases of Life Cycle for rolling stock	41
Figure 9	– Flow diagram representing activities/documentations of Design Phase	42
Figure A.1	– Example of physical structure using organisation chart for an Electrical Multiple Unit Coach	50
Figure A.2	– Example of functional structure using organisation chart for an Electrical Multiple Unit Coach	51
Figure A.3	– Example of structure using the tree breakdown chart for an EMU (Electrical Multiple Unit) Traction Vehicle	58
Figure A.4	– Example of structure using the tree breakdown chart for an EMU (Electrical Multiple Unit) Coach	61

Tables

Table 1 – Possible sharing of responsibility	8
Table 2 – Example of minimum set of data of the header for a form representing a breakdown structure	13
Table 3 – Example of minimum set of data representing a breakdown structure	14
Table 4 – RAM Failure Categories	14
Table 5 – Significant Failure Specification	15
Table 6 – Major Failure Specification	16
Table 7 – Minor Failure Specification	16
Table 8 – Reliability Requirements for Failure Categories	17
Table 9 – Qualitative Requirements for Maintainability	18
Table 10 – Preventive/Corrective Maintenance Requirements	20
Table 11 – Logistic Support Requirements	20
Table 12 – Maintenance Cost Requirements	21
Table 13 – Availability Requirements	23
Table 14 – Example of minimum set of data of the header for RAM analyses Template	27
Table 15 – Example of minimum set of data for Reliability Prediction sheets	27
Table 16 – Example of minimum set of data for Preventive Maintenance sheets	31
Table 17 – Example of minimum set of data for Corrective Maintenance sheets	35
Table 18 – Example of minimum set of data for items FMECA sheets	37
Table 19 – Description of the main tasks of Design Phase	43

Introduction

EN 50126-1 is likely to enhance the general understanding of the issues involved in achieving RAMS characteristics within the railway field. It defines a comprehensive set of tasks for the different phases of a generic life cycle for a total rail system. Although some of the examples given in the annexes of EN 50126-1 are for rolling stock, the standard is essentially aimed as a top level railway system document.

RAMS characteristics for rolling stock (i.e. its long term operating behaviour performance), as for any other system, forms an important part of its overall performance characteristics. But the consideration of RAMS, in contractual terms, between a customer / operator and a Main Supplier for the procurement of rolling stock has been problematic. Also, in rolling stock contracts, there is now a greater emphasis on the impact on end customers of service failures and on the economic and risk considerations of RAMS (i.e. the business perspective).

Consequently, Life Cycle Cost is being used as a measure of satisfying customer needs and providing a wider perspective of RAMS importance in terms of the business economics.

Life Cycle Cost approach represents a holistic, total cost of ownership philosophy for addressing the economic considerations. The contribution of RAMS to the LCC (Life Cycle Cost) of rolling stock could be used to allow the economic considerations to be addressed.

This application guide focuses mainly on the tasks and issues from procurement, engineering and maintenance, from the tender to the operation/maintenance phase, and is intended to help in establishing a common approach for capturing the different, time dependant, performance requirements of rolling stock from an operator/business perspective.

EN 50126-1 is a standard, which treats the overall aspects of RAMS in Railway Applications.

This guide deals with the application of RAM part of EN 50126-1 to rolling stock only, as stated in the Scope and clarifies areas where EN 50126-1 could be misinterpreted.

1 Scope

This document provides guidance on applying the RAM requirements in EN 50126-1 to rolling stock and for dealing with RAM activities during the system life cycle phases from invitation to tender to demonstration in operation only. All references to EN 50126-1 concern the version of 1998.

The guide is aimed at the customers/operators and main suppliers of rolling stock. The main purpose of the guide is to:

- enable a customer/operator of rolling stock:
 - to specify the RAM requirements addressing the type of operation in terms of the end customer needs, considering service availability and economic considerations;
 - to evaluate different tenders, in terms of RAM requirements, on a common basis with the aid of specific RAM documents;
 - to gain assurance, during design/development phase, that the rolling stock being offered is likely to satisfy the RAM contractual requirements by examining step by step detailed and specific RAM documents as an output of the RAM activities performed during the development phase;
 - to validate that the rolling stock, as delivered, satisfies the specified RAM requirements
- to enable the main supplier of rolling stock
 - to understand the customers/operators RAM requirements
 - to provide substantive information/visibility in a tender to show that the product offered is likely to satisfy the RAM requirements by performing preliminary RAM analysis;
 - to provide substantive information during design/development phase to show that the product offered is likely to satisfy the RAM requirements by performing detailed RAM analysis;
 - to demonstrate that the product delivered satisfies the RAM requirements;

Regarding LCC, this application guide is restricted to providing only the key RAM parameters necessary to be incorporated into an LCC Model.

This application guide excludes:

- RAM values connected to the different RAM requirements (however, it contains a simple guide line of actions for supporting the decision making process and choosing appropriate values, see 5.4)
- specific RAM documents to be produced and activities to be performed. However, it provides, only as an example, typical data and document templates for recording the output of a RAM analysis).