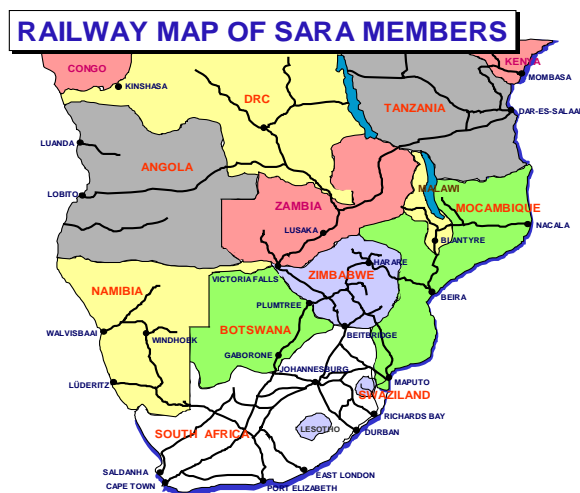




Railway Safety Management: Technical Requirements for Engineering and Operational Standards - General

FOR

SOUTHERN AFRICAN RAILWAYS ASSOCIATION



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Table of changes

Change No.	Date	Scope

Foreword

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Southern African Railway Association (SARA) Safety Standards

SARA 002:

Technical requirements for engineering and operational standards —
General

1 Scope

1.1 This section of SARA 002 gives the generic technical requirements for engineering and operational systems that form part of a railway safety management system which complies with the SARA Regional Safety Policy.

1.2 It is recognized that additional or alternative matters and requirements might need to be considered for each railway application. The level of risk imposed on each operation determines the applicability of each element of the guidelines.

1.3 SARA 002 applies to existing, modified or prospective railway operations. The existing railway operations, for which standards have been established, and which, through the implementation of these standards, have been proven to be safe, are deemed to comply with SARA 002.

NOTE The cascade of SARA standards for railway safety is diagrammatically represented in annex A.

2 Normative references

The following referenced documents are indispensable for the application of SARA 002. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from Standards South Africa.

SARA 001 - SARA Regional Safety Policy.

SANS 10007/ISO 10007, *Quality management systems – Guidelines for configuration management*.

3 Definitions

For the purposes of this document, the following definitions apply.

3.1 Asset life cycle

Design, construction/manufacturing, commissioning, operation, monitoring and maintenance, modification, decommissioning and disposal of an asset

3.2 Configuration management

Coordinated and documented activities to manage the interrelated functions and physical characteristics defined in the requirements for a product over its life cycle

3.3 Functional discipline

Sub-system within an organization with a defined area of responsibility in respect of safety

3.4 Interoperability

Ability of the railway operation to allow the safe and uninterrupted movement of trains in order to accomplish the specified levels of performance

NOTE This ability is dependent on meeting the required international protocols, statutory and regulatory requirements, and technical and operational conditions.

3.5 Intraface

Area, point or location, either physical or organizational, where the activities of two or more of the functional disciplines within an operator's organization meet and have the potential to have an effect on each other

3.6 Safe working practises

Practices that will mitigate the risk of loss or injury (or both)

3.7 Utility

Service network that impacts on safe railway operations that require servitudes, way leaves or agreements

NOTE The service networks include power, communication, water, gas and fuel networks.

4 Functional disciplines

The functional disciplines shall be set out as such that at least the items in Table 1 are covered. The roles of each functional discipline are as follows:

- a) The establishment, development or adoption, implementation and maintenance of standards in the area of responsibility; and
- b) The management of interface and intraface coordination (see clause 10), including service level agreements.

Table 1 — Functional disciplines

1	2
Functional discipline	Description
Track, civil and electrical infrastructure	All aspects relating to the provision of track, civil and electrical infrastructure
Rolling stock	All aspects relating to the provision of items of rolling stock
Train control systems and equipment	All aspects relating to the provision of train control systems and train monitoring equipment
Train operations management	All aspects relating to the provision and implementation of rolling stock movement in accordance with safe working practices, including operational standards and procedures, train movement, planning, marshalling, crewing and inspections
Inter-modal and utilities management	All aspects relating to the railway interface with other transport modes and utilities

5 Asset life cycle

It is recognized that an operator's safety management system deals with only those life cycle phases that are relevant to its operation. The assessment should take the following into consideration:

- a) The type of railway operation, including freight, passengers, mining, heritage and sidings;

- b) The function in the organization of the person, corporation, contractor or supplier who is applying this standard;
- c) Agreements, including interface, access and service level agreements;
- d) The promotion of commercial and technological innovation;
- e) Existing safety procedures and practices; and
- f) The need to determine which asset life cycle phases are applicable to an operator or functional discipline.

Annex B contains typical life cycle phase descriptions and documentation requirements.

NOTE The successive phases in the asset life cycle will be covered in other technical SARA Regional Standards, namely standards regarding civil and electrical infrastructure (SARA 003), rolling stock (SARA 004), train control and authorisation equipment (SARA 005), train operations management (SARA 006), and Inter-modal and utilities management(SARA 007), , which are in course of preparation. The way in which these life cycle phases relate to the railway safety management system described in SARA 001 (SARA Safety Policy) and expanded in this standard is illustrated in annex C.

6 Communication

Safe operation of a railway system requires communication within an organization and between organizations on a variety of matters. Standards and procedures prepared in accordance with this standard shall include requirements to ensure that all required communication is carried out in an effective and reliable manner.

7 Handling of exceptions

Procedures shall be established, developed or adopted, implemented and maintained, where appropriate, for the assessment and management of the safety of operations which are considered to be feasible in a particular case but which would normally be precluded by strict observance of the specified design or operating parameters.

8 Handling of abnormal circumstances

Procedures shall be established, developed or adopted, implemented and maintained, where appropriate, for the assessment and management of the safety of operations resulting from external influences beyond the control of the railway operator.

9 Inter-modal and utilities management

Documented procedures and processes shall be established, developed or adopted, implemented and maintained for the management of safety between different modes (inter-modal) and utilities that impact or have the potential to impact on the safety of railway operations.

10 Interoperability, interface and intraface management

Documented procedures and processes shall be established, developed or adopted, implemented and maintained to ensure the safe interoperability of railway operations and for the management of safety at interfaces between operators and intrafaces between the functional disciplines within an operator's organization. The relationship between interface and intraface to be managed shall be as shown in annex D. Rolling stock and structure profiles shall be as given in annex E.

11 Configuration management

Pursuant to the requirements of SARA 001 (SARA Safety Policy), the operator's safety management system shall ensure the control of all engineering and operational safety standards under a configuration management system based on SANS 10007, or another equivalent system.

12 Risk management

12.1 General

In addition to the general requirements for risk management in SARA 001 (SARA Safety Policy), the operational risk management process, risk management principles and procedures as given in this standard shall be applied to each life cycle phase.

12.2 Design

Safety hazards and the contemplated risk controls to mitigate the risks to acceptable levels shall be registered in a hazards register/log, which shall be made available to an authority on request.

12.3 Construction/manufacturing

An evaluation shall be conducted to determine any changes to hazards identified in the design phase and any new hazards identified during the construction/manufacturing phase, followed by a re-evaluation of those risk control measures contemplated in the design phase. This information shall be made available to an authority on request.

12.4 Commissioning

The implications of any changes to a system or sub-system found necessary during the commissioning phase shall be subjected to the risk management process. This information shall be made available to an authority on request.

12.5 Operation

The identified hazards and operators risk management process shall be included in the operator's safety management system and the safety management system report, which shall accompany the application or re-application for a safety permit where applicable, as described in SARA 001 (SARA Safety Policy).

12.6 Maintenance and monitoring

The identified hazards and operators risk management process shall be included in the operator's safety management system and the safety management system report, which shall accompany the application or re-application for a safety permit, where applicable, as described in SARA 001 (SARA Safety Policy).

12.7 Modification

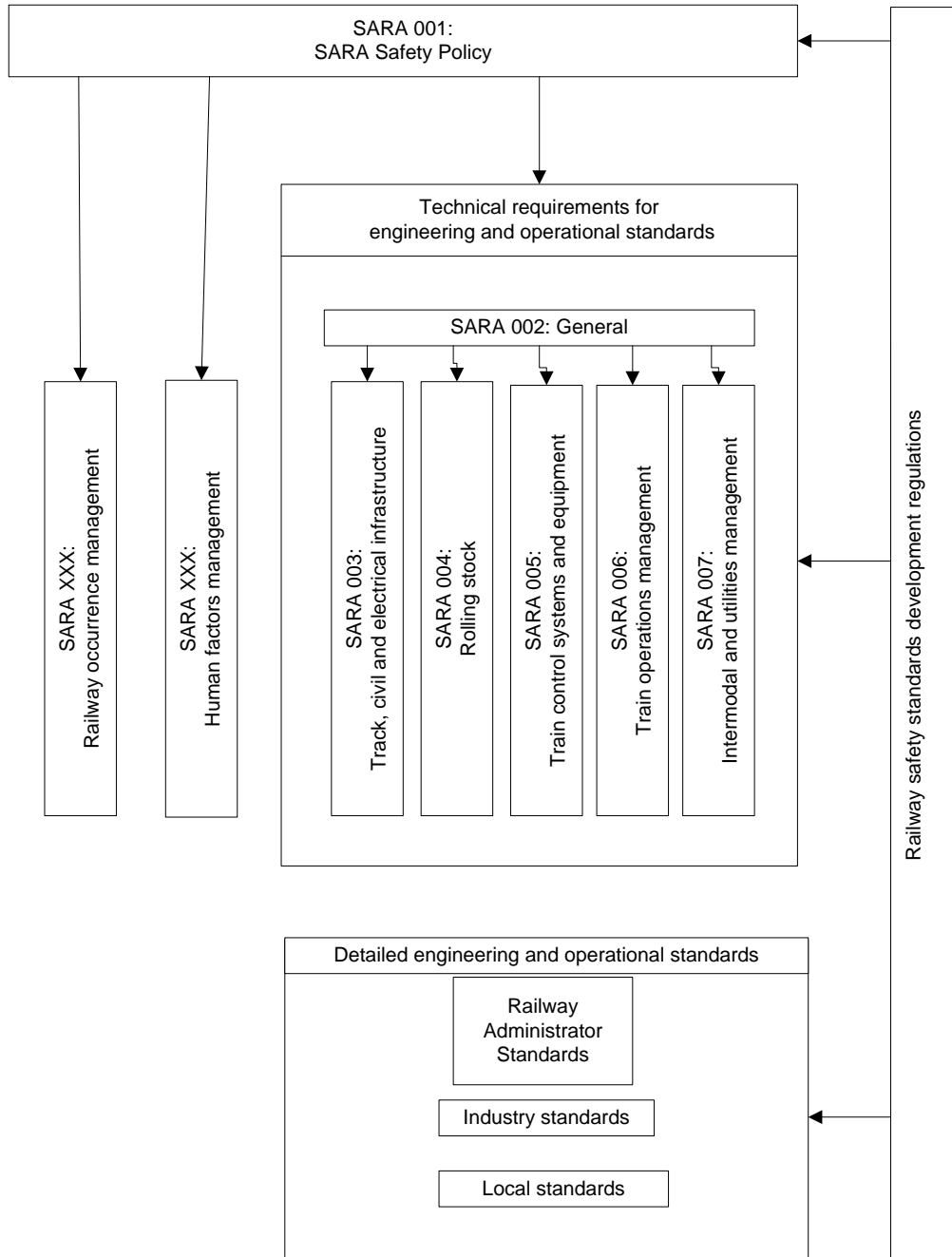
All modifications shall be subjected to the risk management process as described in SARA 001 (SARA Safety Policy). Any modification which might impact on the safety management system report shall be communicated to an authority as described in SARA 001 (SARA Safety Policy).

12.8 Decommissioning and disposal

Decommissioning and disposal of system components shall be subjected to the risk management process as described in SARA 001 (SARA Safety Policy). Particular attention shall be given to the environmental risks associated with decommissioning and disposal.

Annex A (informative)

Cascade of standards on railway safety



Annex B (normative)

Typical life cycle phase descriptions and documentation requirements

Table B.1 — Life cycle phase descriptions and documentation requirements

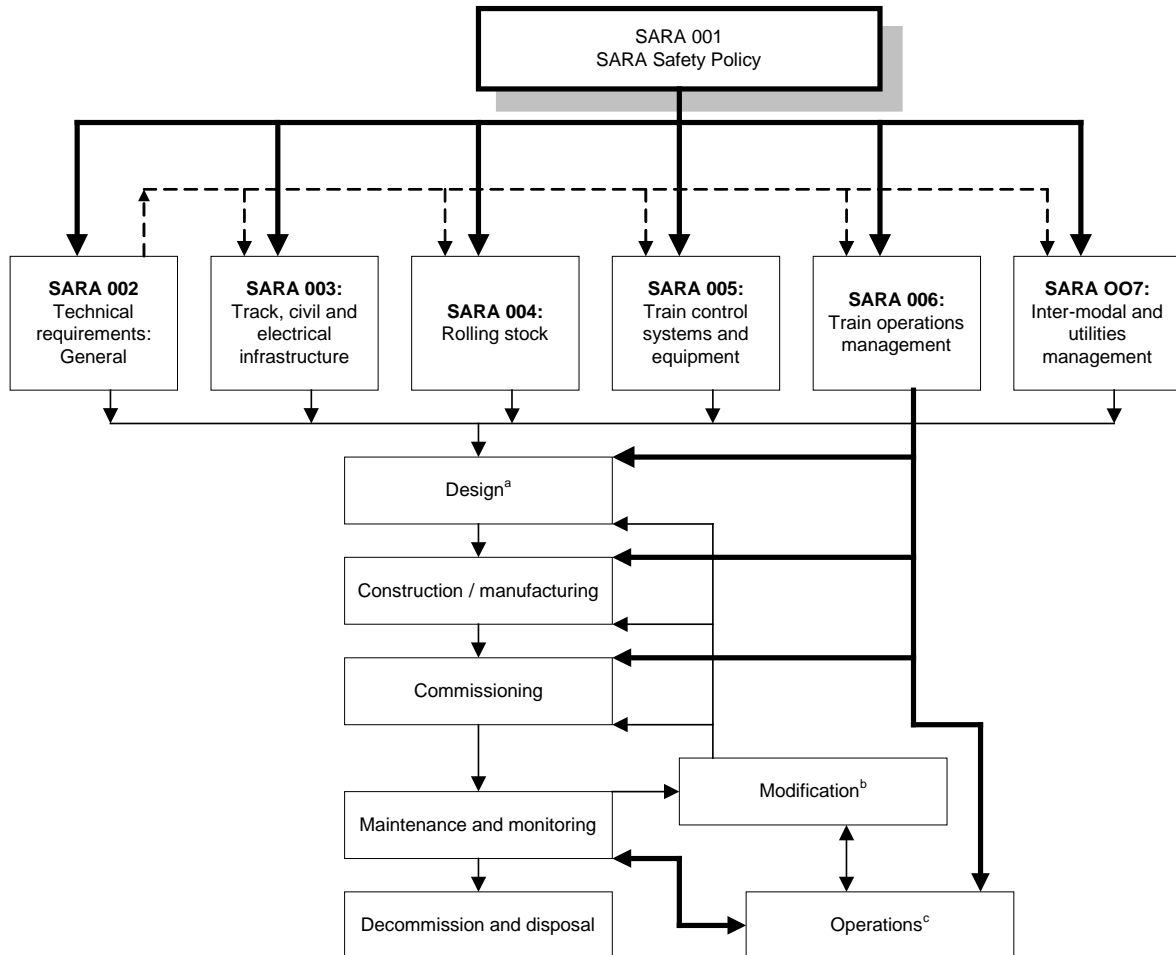
1	2	3
Life cycle phase	Description	Documentation requirements (where applicable)
Design	<ul style="list-style-type: none"> The period during which a design for a system is created and documented 	<ul style="list-style-type: none"> User requirement specification System specification Product specification Process specification Material specification Detail design documents Engineering drawings Prototype and type test result Hazards register/log Risk assessment and control register
Construction/ manufacturing	<ul style="list-style-type: none"> The period in which the system is procured and physically constructed/manufactured 	<ul style="list-style-type: none"> Safe working procedures in accordance with safety, health and environmental legislation Manufacturing drawings Construction drawings Evaluation of deviation from design parameters Re-evaluation of hazards, updating of hazards register/log Risk assessment and control register
Commissioning	<ul style="list-style-type: none"> The period in which the system is integrated into its operational environment and tested in its environment 	<ul style="list-style-type: none"> Safe working procedures in accordance with safety, health and environmental legislation Test and commissioning procedures and instructions Integration and test phase report Test/acceptance certificates “As-built” system documentation Reaffirmation of hazards, risk assessments and controls Risk assessments of modifications during commissioning
Operations	<ul style="list-style-type: none"> The period during which the system is used in its operational environment 	<ul style="list-style-type: none"> Safe working procedures in accordance with safety, health and environmental legislation Operational standards Inter/intra- and inter-modal interface agreements Training manuals Training courses Inspection reports Audit reports On-going risk assessments

Table B.1 (concluded)

Maintenance and monitoring	<ul style="list-style-type: none"> The period during which the system is maintained and monitored in line with business, operational and safety requirements 	<ul style="list-style-type: none"> Safe working procedures in accordance with safety, health and environmental legislation Maintenance standards Interface/intraface and inter-modal agreements Maintenance procedures Maintenance manuals Drawings Training manuals Training courses Inspection reports Audit reports On-going risk assessments
Modification	<ul style="list-style-type: none"> The period during which the system undergoes modification, if required 	<ul style="list-style-type: none"> The required documents, depending on the scope of work, are the same as those for design, construction/manufacturing and commissioning Revised applicable operational documents Revised applicable maintenance documents Risk assessments of proposed changes
Decommissioning and disposal	<ul style="list-style-type: none"> The period during which the system is removed from active service or disposed of (or both) 	<ul style="list-style-type: none"> Safe working procedures in accordance with safety, health and environmental legislation Decommissioning and disposal strategy Test and decommissioning procedures and instructions Decommissioning and disposal report Risk assessment of implication to existing operations

Annex C (informative)

Relationship between SARA 001 and various sections of SARA 002 to SARA 007



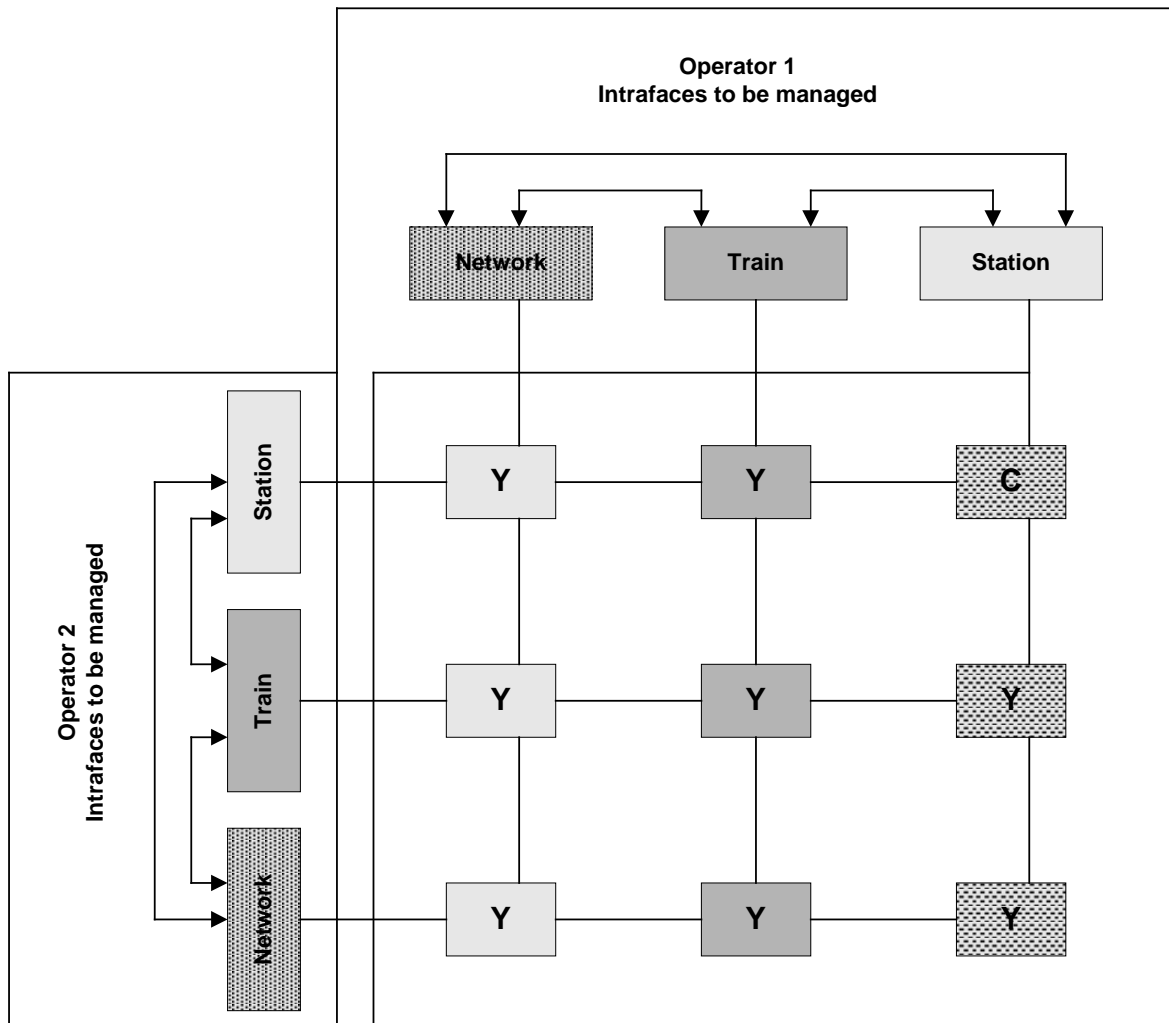
^a Designs shall be compatible for interoperability.

^b Modifications will involve the design, construction/manufacturing and commissioning life cycle stages.

^c Operational interfaces and intrafaces shall be coordinated.

Annex D
(normative)

**Matrix of interface and intraface relationships
that need to be managed**



Key

- Y Interface to be managed in normal daily operations.
- C Interface to be managed in abnormal circumstances (covered in contingency plan).

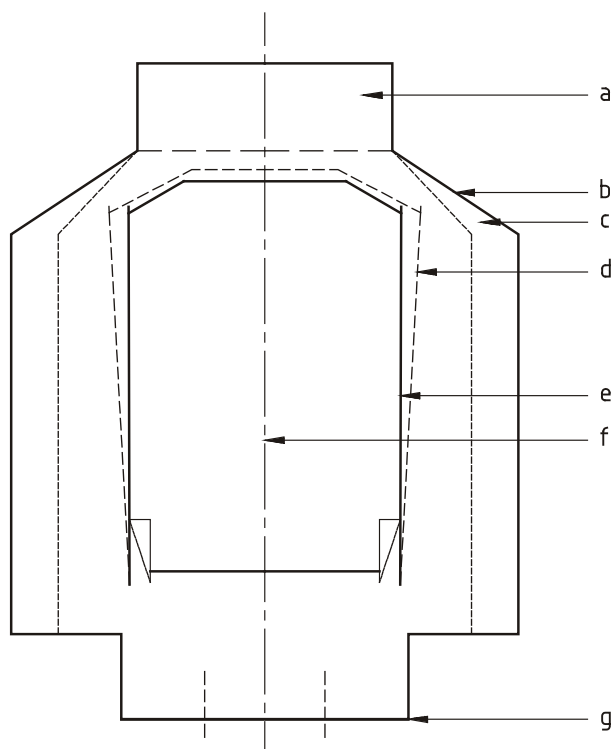
Interfaces occur between operators and intrafaces occur within an operator. Both interfaces and intrafaces shall be managed by ensuring that they are identified, that compatible standards are developed and implemented, and that hazards and resultant risks are managed.

Annex E (normative)

Rolling stock and structure profiles

E.1 A schematic diagram of a rolling stock and structure profiles is shown in figure E.1.

E.2 The profiles on tracks shall make allowances to increase the horizontal clearances to allow for the chording effect.



Drg.663

- a Electrification zone.
 - b Fixed-structure profile that defines the vertical and horizontal clearances, measured horizontally from the centre line of the track and vertically from the low leg of the track, and on which no part of any structure or trackside fixture may infringe.
 - c Workshop- and temporary-structure profile that defines the vertical and horizontal clearances, measured horizontally from the centre line of the track and vertically from the low leg of the track, that allows for the erection and construction of structures adjacent to the track and also for workshop situations, and on which no part of any such temporary structure or workshop structure may infringe.
 - d Kinematic rolling-stock profile that defines the limiting cross-sectional geometry for rolling stock and its load, measured horizontally from the centre line of the track and vertically from the low leg of the track.
- NOTE The kinematic effects are included in the measurement of the limiting cross-sectional geometry for rolling stock and its load.
- e Rolling-stock profile at rest that defines the limiting cross-sectional geometry for rolling stock and measured horizontally from the centre line of the track and vertically from the low leg of the track.
 - f Centre line of track and rolling stock.
 - g Rail level.

Figure E.1 — Schematic diagram of rolling stock and structure profiles

SARA 001: SARA Safety Policy.

SARA 003: Technical requirements for engineering and operational standards – Track, civil and electrical infrastructure.

SARA 004: Technical requirements for engineering and operational standards – Rolling stock.

SARA 005: Technical requirements for engineering and operational standards – Train control systems and equipment. (In course of preparation)

SARA 006: Technical requirements for engineering and operational standards – Train operations management. (In course of preparation)

SARA 007: Technical requirements for engineering and operational standards – Interoperability, inter-modal and utilities management. (In course of preparation)

SARA 008: Railway occurrence management. (In course of preparation)

SARA 009: Human factors management. (In course of preparation)