AS 7704:2020

Australian STANDARD®

Train control systems change management

RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

Train Control Systems Standard

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This Australian Standard® AS 7704 Train control systems change management was prepared by a Rail Industry Safety and Standards Board (RISSB) Development Group consisting of representatives from the following organisations:

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The Standard was approved by the Development Group and the Train Control Standing Committee in Select SC approval date. On Select Board approval date the RISSB Board approved the Standard for release.

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Development of the Standard was undertaken in accordance with RISSB's accredited process. As part of the approval process, the Standing Committee verified that proper process was followed in developing the Standard

RISSB wishes to acknowledge the positive contribution of subject matter experts in the development of this Standard. Their efforts ranged from membership of the Development Group through to individuals providing comment on a draft of the Standard during the open review.

I commend this Standard to the Australasian rail industry as it represents industry good practice and has been developed through a rigorous process.

Deb Spring
Exec. Chair / CEO
Rail Industry Safety and Standards Board

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This paragraph is used to indicate if this Standard supersedes other documents in whole or in part. … only change this paragraph if it is applicable

Objective

The objective of this Standard is to describe the requirements to be applied by all rail organisations to ensure that safety risks associated with changes to railway train control systems (TCS) assets or systems are identified and eliminated or reduced so far as is reasonably practicable (SFAIRP).

This Standard is to provide the Australasian rail industry with a set of mandatory and recommended requirements for the management of change in TCS. It will provide a framework for managing change that is consistent with AS 7717 and AS 7718.

This Standard is intended to be used by rail infrastructure managers, rail operators and suppliers of railway systems.

Compliance

There are two types of control contained within Australian Standards developed by RISSB:

1. Requirements.
2. Recommendations.

Requirements – it is mandatory to follow all requirements to claim full compliance with the Standard. Requirements are identified within the text by the term ‘shall’.

Recommendations – do not mention or exclude other possibilities but do offer the one that is preferred. Recommendations are identified within the text by the term ‘should’.

Recommendations recognise that there could be limitations to the universal application of the control, i.e. the identified control is not able to be applied or other controls are more appropriate or better.

For compliance purposes, where a recommended control is not applied as written in the standard it could be incumbent on the adopter of the standard to demonstrate their actual method of controlling the risk as part of their WHS or Rail Safety National Law obligations. Similarly, it could also be incumbent on an adopter of the standard to demonstrate their method of controlling the risk to contracting entities, or interfacing organisations where the risk may be shared.

Contents

1 Introduction

1.1 Scope

Management of change (MOC) is a methodology that is used as part of the risk assessment and control process. This Standard outlines the key actions under the MOC methodology along with matters that should be considered as part of the MOC process.

This Standard applies to all organisations who are responsible for safety under the Rail Safety National Law (RSNL) Act and Regulations. Specifically, there is a requirement under the RSNL Regulations Schedule 1 clause 12. For the purpose of this Standard and to be consistent with the RSNL, all organisations are referred to as rail transport operators (RTO).

This Standard applies to proposed changes to both greenfield and brownfield sites.

The scope of this Standard includes:

(a) managing multiple changes on the one set of train control system infrastructure;

(b) Safeworking system selection;

(c) operational and technical requirements for changes and documenting operational performance of train control systems;

(d) testing requirements for different levels of changes;

(e) documentation requirements for changes including configuration management of the as-built system;

(f) transition requirements for change management of train control system infrastructure;

(g) collaboration with stakeholders;

(h) records of change management, design changes and commissioning records of the new/amended systems;

(i) rail user information of the changed systems as required for train drivers, safety personnel, rail protection officers, signaller/controllers, train operating organisations;

(j) consideration of future requirements;

(k) handover and maintenance;

(l) interface with internal and external infrastructure providers.

1.2 Exclusions

Exclusions to this Standard are:

(a) changes that involve a ‘like for like’ change (replacing one item with the same type of item) where a documented process or procedure is in place within the RIM to manage the risks associated with that change;

(b) standard repairs to restore the original functionality carried out under an approved service schedule where ‘like for like’ parts are used. It does not include the introduction of new elements.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document:

(a) AS 7472 Railway operations – Management of change

(b) AS 7702 Rail equipment type approval

(c) AS 7717 Signal testing and commissioning

(d) AS 7718 Signal design process management

(e) EN 50126 Railway applications - The specification and demonstration of reliability, availability, maintainability and safety (RAMS)

NOTE: Documents for informative purposes are listed in a Bibliography in Appendix A of the Standard.

1.4 Terms and Definitions

For the purposes of this document, the terms and definitions given in RISSB Glossary: https://www.rissb.com.au/products/glossary/ and the following apply:

(a) ***change***
the process of causing a function, practice, system, asset or object to become different somehow to what is at present. RTOs can undergo changes in specific areas of the business, in its operations or as a whole. Changes can also occur in processes and technology and includes decommissioning/removal from service. Change is also a term describing the effects or outcomes after the transition or transformation of a function, method or object

(b) ***change owner***
a person or body who is responsible for managing the change process

(c) ***RAMS***
is an acronym for reliability, availability, maintainability and safety commonly used in engineering to characterize a product or system

(d) ***system integrator***
a person or body who combines a combination of interacting elements into an integral whole to achieve one or more stated purposes

(e) ***train control system (TCS)***
includes both below and above rail assets directly and indirectly related to the technology which creates and issues train movement authorities and enforcement of those authorities. It also includes those off-line support tools for the application configuration, configuration management and diagnostics

2 Introduction

To obtain and maintain accreditation, rail transport organisations (RTOs) are required to develop a safety management system.

In accordance with the Rail Safety National Law and Regulations, RTOs must develop and implement procedures for ensuring changes that can affect the safety of railway operations are identified and managed.

3 Change procedure steps

In accordance with AS 7472, the change management process comprises of several stages, which are listed below.

Stage	Description
Describe	Define and document the change and its context within the RTOs activities.
Assess	Identify the risks and assess their impact and decide how the risk, including the controls, can be managed in accordance with SFAIRP
Plan	Develop an implementation plan, including required approvals, controls, communication protocols, operational readiness, documentation and reviews
Approve	Gain approval from the appropriately authorised person/s with the RTO
Implement	Deliver against an approved implementation plan
Monitor and review	Ensure the change is fully adopted and effective. Processes for defect and fault reporting and corrective action should be adopted.

4 Risk evaluation and assessment

Proposed changes to a TCS shall be risk evaluated and assessed. The following stages should be considered as part of this process.

(a) Scope of change.

(b) Impact assessment.

(c) Impacted stakeholders.

(d) Identified interfaces.

(e) Risk assessment and evaluation.

(f) Whole of life considerations.

(g) RAMS.

5 Describe the proposed change

The proposed change should be documented as thoroughly as possible so that all risks and benefits from the implemented proposal can be fully considered and assessed prior to any works being undertaken such as design. In order that the proposal be as inclusive as possible all stakeholders should be identified and engaged to input their requirements – both actual and perceived - into the proposal document.

The description of the change should be scaleable based upon the change itself such that an effective assurance argument is developed. These can include:

(a) verification and validation;

(b) human factors interfaces;

(c) requirements definitions.

The outcome of this process should be a document that fully describes the proposed change, along with all interfaces – both internal and external – so that this can be the basis for moving to the next stage of the process.

6 Assess the proposed change

6.1 Impact assessment

The system integrator or change owner shall carry out the impact assessment and the RTO shall accept the proposed change and supporting evidence.

An impact assessment may include:

(a) risk assessment/s;

(b) cyber security assessment;

(c) RAMS assessment;

(d) operational assessment;

(e) operational readiness;

(f) stakeholder impacts;

(g) human factors impacts;

(h) electromagnetic compatibility impacts;

(i) implementation impacts;

(j) support agreements impacts;

(k) logistics impacts;

(l) hazard impacts.

6.2 Background

A TCS change or new implementation may be initiated by the asset owner or a representative of the RTO in response to a problem or identified opportunity for improvement.

A change can be a modification or deviation made to an existing physical asset, procedure, system, standard or process from its current design or state. A deviation may require additional risk evaluation where a compliant upgrade or modification will not.

When identifying a potential change, RTOs shall ensure that the person/s proposing or assessing the potential change has the required skill and competency:

(a) to assess the proposed change;

(b) in the RTOs change management process;

(c) in the technical area to which the change will apply;

(d) with domain expertise across the whole life cycle of the asset.

Persons shall not assess change proposals outside their area of competence. If more detail is required to assess the change, the person assessing the change shall seek advice from the person accountable for the asset, procedure, and system, standard or process that is to be changed.

6.3 Benefits

When assessing a change, the potential benefits should be considered and assessed. Change should only be initiated if the change will generate a positive benefit.

A positive benefit may include:

(a) risk mitigation;

(b) operational improvements/efficiencies;

(c) rationalisation;

(d) technological improvements/efficiencies;

(e) economic efficiencies;

(f) human resource deployment improvements/efficiencies;

(g) safety improvement.

6.4 Change proposal

6.4.1 General

The person identifying the change shall initiate a new change request in accordance with an RTO's documented change management process.

When initiating a new change request for a TCS, the following should be considered.

(h) The reason the change is required (inclusive of benefits).

(i) Identification of the change owner.

(j) Resources required.

(k) Roles and responsibilities for the change.

(l) Affected stakeholders.

(m) Regulatory implications.

(n) Safeworking system safety level justification.

(o) Anticipated impact level.

(p) Change type (permanent or temporary).

(q) Affected documentation.

(r) Affected interfaces, including engineering and operational.

(s) Expected duration to complete the change.

(t) Expected outcome.

(u) Method to test or evaluate results.

(v) Technical Safety including the operation, design and integration of the system.

Once the change proposal is complete, the change initiator shall submit the change proposal in accordance with the RTOs documented change management process.

6.4.2 Systems

Any new or novel system shall be assessed in accordance with the RTO's type approval or assurance process, if not already type approved. Systems shall have the following processes developed to support the hardware and software systems.

(a) Equipment type approval.

(b) Maintenance regime and service schedules.

(c) Training materials and accreditation of personnel – operational and infrastructure.

(d) Special test equipment and/or tools.

6.4.3 Process

All processes shall be generic in nature and scaleable, adopting a systems engineering approach to manage change. This may include:

(a) training, reaccreditation, refresher training. New training material to reflect new and different equipment and systems types, changes to safeworking requirements and/or periods between reaccrediatation and refresher sessions;

(b) system reporting. New systems outputs can include train running and 'on time running' reports and billing and train information transferred directly into support systems;

(c) customer interface. Passenger information systems, mobile device apps or service information to interfacing transport systems such as busses and/or light rail.

6.5 People

Any personnel undertaking any safety critical tasks and activities associated with the change shall be deemed competent to be in-line with specific RTO's competency requirements.

6.6 Impacted configuration items

RTOs shall have established configuration and change management arrangements that cover changes to all the assets, processes and procedures relative to TCS.

When identifying and proposing a change to a TCS, the change owner or system integrator shall identify any impacted configuration items.

Impacted configuration items may include (but are not limited to):

(a) individual requirements documents;

(b) risk registers;

(c) software and/or firmware;

(d) circuit design;

(e) application data;

(f) simulators and models; and

(g) drawings, schematics and plans.

Management of configuration items shall be included in change management planning and documentation.

6.7 Risk assessment

Risk assessments for any change to a critical TCS shall specifically address the anticipated impact to any specific sub-system and the overall the system. The change owner or system integrator shall undertake a risk assessment of the proposed change in accordance with the organisations risk management processes and procedures.

All controls for risks identified through this process shall be clearly stated and assessed against the hierarchy of control methodology in accordance with SFAIRP principles.

All risk mitigation strategies proposed under this process should be implemented prior to proceeding with the change.

6.8 Operational and safety risk assessment

Prior to the execution of change, RTOs shall assess the impact of the change on current operating practices and methodologies.

The risk assessment shall include:

(a) degraded modes of operation, safeworking or both while alteration works are in progress;

(b) possible effects on the operation of equipment while alterations are in progress and in particular, avoiding wrong-side failures; and

(c) the effect of equipment failures in normal operation if changes in technology or equipment type are involved.

All controls for risks identified through this process shall be clearly stated and assessed against the hierarchy of control methodology in accordance with SFAIRP principles.

All risk mitigation strategies proposed under this process should be implemented prior to proceeding with the change.

The preparation of a safety case can address the safety risk requirements and support the outcome of any risk assessments that have been undertaken.

7 Plan for the proposed change

7.1 Requirements management

In preparing for the change to a TCS RTOs shall have a thorough understanding of the requirements for the project and have a documented process in place to manage the requirements.

The user and technical requirements should be developed in accordance with AS 7718.

The requirements management may include:

(a) process requirements for addressing changes to the signalling and train control systems;

(b) interface definition;

(c) consideration of future requirements;

(d) transition requirements for change management of the signalling infrastructure:

(e) live or shadow trials required prior to testing for revenue service;

(f) testing requirements for different levels of infrastructure; and

(g) operational requirements for changes and documenting operational performance of the system.

7.2 Design

Designs and verifications shall be in accordance with the RTO's standards and procedures to assure that the safety integrity is achieved.

Designer(s) undertaking the associated tasks shall hold the appropriate competencies in accordance with the RTO's competency requirements.

The design should also consider the requirements of AS 7718.

The design should consider OEM processes for a detailed design that are not covered by a RTO standard or process but by OEM systems and processes under their own quality system, and, their requirements to achieve any SIL rating for their product.

7.3 Operational readiness preparation

In planning for change, RTOs shall evaluate the operational readiness impacts.

Operational readiness considerations may include:

(a) operational impacts on the network;

(b) people transition management;

(c) stakeholder engagement;

(d) configuration management:

i. maintenance data and artefacts;

ii. inventory data and artefacts;

iii. training;

iv. change control.

When addressing operational readiness impacts associated with train control system change management, RTOs should apply mitigation strategies appropriate to their safety management systems.

7.4 Configuration management

The RTO shall have configuration and asset management processes. These should be in accordance with AS 7718

RTO's configuration management process should go to sufficient detail to demonstrate assurance activities involved in TCS change management are being managed safely.

7.5 Construction and testing management

All construction and testing activities shall be in accordance with an RTO's standards and procedures. These should be in accordance with AS 7717.

The installed equipment shall be verified against the design.

The construction verification shall be performed by personnel who are independent from those performing the construction activities.

The testing shall verify that the installed system conforms to the design and the user requirements and validate that the installed system conforms to the required safety standards and user requirements.

The testing verification and validation activities shall be performed by personnel who are independent from those performing the design and construction works.

7.6 Implementation plan

In accordance with the RTO's change management processes, the person responsible for the change shall develop an implementation plan.

An implementation plan may include:

(a) project management plans for introducing the change;

(b) communication strategies:

  i. stakeholder engagement;

  ii. regulator (ONRSR) notification (if necessary);

  iii. methods and timings;

  iv. co-dependant projects and/or works.

(c) training and competencies;

(d) resourcing:

  i. people;

  ii. material;

  iii. equipment.

(e) integration of human factors and environment into planning and design;

(f) identification of document management:

  i. organisational documents;

  ii. the RTOs SMS;

  iii. operating procedures;

  iv. risk registers;

  v. interface agreements;

  vi. emergency plans.

(g) restrictions to operations;

(h) monitoring and review;

(i) risk and risk mitigation;

(j) assurance and governance;

(k) validation and handover.

The intent is the implementation plan is a living document and should be adaptable to react to change.

8 Approval of the proposed change

This involves consolidating documentation on the change including any supporting records (such as external reports, reference designs, impact and risk assessment outcomes, quotes, or findings).

The change shall be clearly documented and gain internal sign off from the appropriately authorised person within the RTO.

9 Execution of the proposed change

9.1 Change notifications

To make sure all affected and interested stakeholders are aware of the change, RTOs shall have documented processes in place to communicate the change.

Methods for notification of change may include (but is not limited to):

(a) operating notices;

(b) operating instructions;

(c) internal advertising;

(d) stakeholder notification;

(e) public notification;

(f) ONRSR notification.

In all instances, RTOs should consider the development and application of a communications plan as part of the change management process.

10 Monitor and review the change

RTOs shall have processes in place to monitor and review the outcomes of TCS change management projects. The RTO should carry out a post-implementation review. The review timeframe is to be defined by the change approver.

The review should:

(a) ensure all actions from the review process are completed;

(b) assess the actual against the intended change impact, and any reasons for deviation;

(c) the identified controls are effective, and no other unforeseen risk has been introduced; and

(d) where applicable, ensure that temporary changes have been removed as intended.

Appendix A Bibliography

The following referenced documents are used by this Standard for information only:

(a) AS 7711 Signalling principles.

(b) AS/NZS ISO 9001 Quality management systems – requirement.

(c) AS/NZS ISO 45001 Occupational health and safety management systems – requirements with guidance for use.

(d) AS/NZS ISO 31000 Risk management – principles and guideline.

(e) EN 50128 Railway applications – Communication, signalling and processing systems – Software for railway control and protection systems.

(f) iESM International handbook for engineering safety management.

(g) RISSB Guideline systems safety assurance.

(h) RISSB Hazard register.

(i) Various ONRSR guidelines e.g. Preparation of a rail safety management system, major projects.

(j) https://orr.gov.uk/_data/assets/pdf_file/0006/3867/common-safety-method-guidance.pdf

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