AS 7505:2014

Australian STANDARD®

Signalling Detection Interface

RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

Rolling Stock Standard

This Australian Railway Standard AS 7505 Signalling Detection Interface was prepared by the RISSB Development Group. It was signed off by the Development Group and the Rolling Stock Standing Committee in October, 2014 and subsequently by the Development Advisory Board (DAB) in October, 2014. The DAB confirmed that the process used to develop the standard was in accordance with the RISSB accredited development process. On November 10, 2014 the RISSB Board approved the Standard for release. This Standard was published on the RISSB website (www.rissb.com.au) on January 29, 2015.

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Chief Executive Officer
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The following organisations were represented on the RISSB Development Group:

Orion Rail	Pacific National	Brookfield Rail
RTBU	Transport for NSW	ARTC

This standard was issued on two occasions for open review and was independently validated before being signed off and the approvals granted.

RISSB wish to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the committees and through the open review periods.

Keeping Standards up-to-date

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RISSB welcomes suggestions for improvements, and encourages readers to notify it immediately of any apparent inaccuracies or ambiguities. Contact us via email at rissb@rissb.com.au or write to Rail Industry Safety and Standards Board, PO Box 4608, Kingston, ACT 2604.

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Notice to Users

This RISSB product has been developed using input from rail experts from across the Rail Industry and represents good practice for the industry. The reliance upon or manner of use of this RISSB product is the sole responsibility of the user who is to assess whether it meets their organisation's operational environment and risk profile.

Justification

Specification of Standard

The AS 7505 Standard provide requirements for compatibility of rolling stock with signalling detection systems used on Australian networks.

The standard covers the compatibility with signalling detection systems for new and modified Locomotive, Freight, Passenger and Infrastructure Maintenance rolling stock.

Objective of Standard

The requirements of AS 7505 Signalling Detection Interface aim to ensure the continuing harmonisation of signalling systems across Australian networks. Under these requirements, where practicable, new and modified rolling stock should be compatible with signalling detection systems beyond those identified for the individual networks upon which it is intended to operate.

Estimation of Benefits

There is a strong industry demand for rolling stock standards, which has been measured by their likely adoption rate.

The 2014 RISSB Products Survey found current adoption rates for RISSB rolling stock products at 34% of industry surveyed, with a likely future increase to 81% of potential users. Specifically, adoption rates for AS 7505 Signalling Detection Interface will increase from 34% to 81%.

The 2014 Products Survey reported an estimated safety risk reduction of 9%; and reductions of 8% and 9% for operational cost and training cost respectively, following adoption of RISSB products.

Valuation of the Benefit

The average annual economic burden of railway safety incidents during the past 8 years was estimated to be approximately $360.1 million. The safety incidents included in this estimation are Signals Passed at Danger (SPADs), signal restored, level crossing collisions – persons and vehicles, load irregularity, fatalities and serious injuries (excluding level crossing) and collisions (trains, rolling stock, infrastructure). By helping to reduce safety risks, AS 7505 can deliver a significant economic benefit. Further, significant indirect benefits could accrue from the rail industry implementing harmonised national standards. These cost savings were estimated to be approximately 1.4% for operational costs and 3.8% for both capital expenditure and training costs.[1]

[1] Strategex estimates based on 'Cost Benefit Analysis of RISSB and its products' report by AECOM ("CBA of RISSB Products (2012) ").

The potential benefit from the AS 7505 Signalling Detection Interface was estimated at approximately $0.5 million per year (or present value of $3.2 million over the next 10 years). This estimate was derived from the 2014 RISSB products survey which also reported that the estimated benefit of the 21 rolling stock standards survey for rail safety performance, operational cost savings and workforce training costs were $3.6 million, $28.4 million, and $150K respectively. In total, the expected benefit for adopting the 21 rolling stock standards was $32.1 million per year.

Cost of Implementation

Adoption of the AS 7505 standard is not expected to impose significant additional cost on the industry as it is consistent with existing practice and product offerings, with the equipment supply sector to respond by incorporating relevant requirement in their product development cycle.

Case Study

Some examples of incidents which have occurred as a result of failed detection include:

- Cowan rail emergency, 6 May 1990
- WMATA collision, June 22, 2009

Where the Cowan emergency was caused by a failed signal due to physical reasons (excess sand on the rail) and the WMATA collision was also due to a faulty track circuit, nevertheless the rolling stock wheelsets are an integral part of most signalling detection interface, and inadequate design or electromagnetic incompatibility may cause incidents of a similar nature to the case studies cited.

The need for signalling detection interface compatibility increases with a growing mix of rolling stock operating on different Australian networks. These requirements mitigate risk factors in the interface between rolling stock and the signalling system, as implemented for the NSW rail networks.[2]

- Train detection ensures the signalling system ‘knows’ where a train is, to manage the risks associated with trains’ ability to make effective electrical contact between wheel and rail, and the sensitivity of adjustment of the track circuit.
- Sufficient warning for required braking effort by all trains approaching a ‘stop’ signal.
- Misalignment between the train mounted trip gear and the ground mounted trainstop.
- Mismatched wheel geometry may not effectively cause the train to follow a diverging route at rail junctions.
- Risk that the driver may not adequately perceive or respond to signalling indication.

[2] ESG 006 Rolling Stock Signalling Interface Requirements, Version 1.4 Issued July 2012

Broader Industry and Economic Benefits

Development of a more complete suite of RISSB rolling stock products is expected to promote their recognition and further adoption by industry members, leading to greater harmonisation in the rail industry. A more harmonised national rail industry can become more competitive with other modes of transport, road in particular, by becoming more cost efficient through lower equipment cost and lower operating costs. Induced mode transfer (shifting passengers and freight from road to rail) can result in reduction of harmful emissions and road congestion.

The cost benefit analysis of RISSB Products Report (2012) estimated the benefit cost ratio of investment in RISSB products for the industry at approximately 17 to 1 (i.e. for every $1 spent, the industry receives $17 of benefits). In addition, the broader economic benefits to the national economy have been estimated at between $92-142 million per year.

Application of AS 7505 Signalling Detection Interface is expected to deliver benefits to its individual users as well as contributing to the overall rail harmonisation process.

Document Control

Identification

Document Title	Date
AS 7505:2014 Signalling Detection Interface	29/01/2015

Document History

Publication Version	Effective Date	Page(s) Affected	Reason for and Extent of Change(s)
Version 2	29/01/2015	All	Revised and amalgamated in 2014
Version 1	30/04/2008	All	First version

Approval

Name	Date
Development Advisory Board (DAB)	30/10/2014
Rail Industry Safety and Standards Board (RISSB)	10/11/2014

Standard Change Procedures

RISSB maintains the master for this document and publishes the current version on the RISSB website.

Any changes to the content of this publication require the version number to be updated.

Changes to this publication must be approved according to the procedure for developing management system documents.

RISSB will identify and communicate changes to this publication.

Contents

Appendix Contents

1 Introduction

1.1 Purpose

This document is to provide requirements for compatibility of rolling stock with signalling detection systems used on Australian networks.

This standard aims to guide the future performance requirements of rolling stock and is to be considered in line with international best practices for compatibility and testing.

With the continuing harmonisation of signalling systems across Australian networks, where practicable, new and modified rolling stock are to be compatible with signalling detection systems beyond those identified for the individual networks upon which it is intended to operate.

1.2 Scope

This documents applies to new and modified Locomotive, Freight, Passenger and Infrastructure Maintenance rolling stock.

Sections 4, 5, 6 and 7 apply to new, modified rolling stock and existing, unmodified rolling stock introduced to a new line.

Sections 4 and 5 apply to existing rolling stock retrospectively.

The document covers the compatibility with signalling detection systems for new and modified Locomotive, Freight, Passenger and Infrastructure Maintenance rolling stock.

At the time of publication, the standard AS7502 remained under development. AS7502 will cover the basic requirements for Road Rail vehicles across their life cycle, including design, construction, testing/certification, operation, maintenance, modification and disposal. Upon publication the requirements of AS7502 in respect of Infrastructure Maintenance (Road Rail) rolling stock, will supersede the requirements of this standard.

New rolling stock or modification of rolling stock shall require implementation of appropriate change management procedures.

Change management should be in accordance with the requirements of AS 4292.1 Clause 2.11.

Whilst this standard specifically pertains to Australian rail systems, some details relating to detection systems used on the New Zealand network operated by KiwiRail are also captured.

This standard provides information on the Rail Infrastructure Managers responsible for various Australian networks and the equipment in-use on those networks at the date of publication. This information is provided as background only. Users should consult the Rail Infrastructure Manager concerned before placing reliance on network-specific information contained within this standard.

Duties of designers, manufacturers, suppliers and operators shall be in accordance with the Rail Safety National Law (South Australia) Act Part 3, Division 3, Rail safety duties.

1.3 Compliance

There are two types of control contained within RISSB Standards:

(a) mandatory requirements

(b) recommended requirements