

AS 7715:2016



## Train Detection



Train Control Systems Standard



This Australian Standard® AS 7715 Train Detection was prepared by a RISSB Development Group consisting of representatives from the following organisations:

Aitken & Partners  
ARTC

Rio Tinto  
PTA WA

Brookfield  
Queensland Rail

The Standard was approved by the Development Group and the Train Control Systems Standing Committee in June, 2016. On June 15, 2016 the RISSB Board approved the Standard for release.

This standard was issued for public consultation and was independently validated before being approved.

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.



**Paul Daly**  
Chief Executive Officer  
Rail Industry Safety and Standards Board

---

### **Keeping Standards up-to-date**

Australian Standards developed by RISSB are living documents that reflect progress in science, technology and systems. To maintain their currency, Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Australian Standards developed by RISSB may also be withdrawn.

It is important that readers assure themselves they are using a current RISSB Standard, which should include any amendments that may have been issued since the Standard was published. Information about Australian Standards developed by RISSB, including amendments, can be found by visiting [www.rissb.com.au](http://www.rissb.com.au)

RISSB welcomes suggestions for improvements, and asks readers to notify us immediately of any apparent inaccuracies or ambiguities. Members are encouraged to use the change request feature of the RISSB website at: <http://www.rissb.com.au/products/>. Otherwise, please contact us via email at [info@rissb.com.au](mailto:info@rissb.com.au) or write to Rail Industry Safety and Standards Board, PO Box 4271, Kingston, ACT 2604.

# AS 7715:2016

## Train Detection

---

### Document Details

First published as: AS 7715:2016

ISBN 978-1-76035-531-9

Published by SAI Global Limited under licence from the Rail Industry Safety and Standards Board,  
PO Box 4271, Kingston ACT 2604, Australia

### Copyright

©RISSB

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of RISSB, unless otherwise permitted under the Copyright Act 1968.

---

### 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.

## Document Control

### Identification

Document Title
AS 7715:2016 Train Detection

### Document History

Publication Version	Effective Date	Reason for and Extent of Change(s)
2016	June 15, 2016	First publication

### Approval

Name	Date
Rail Industry Safety and Standards Board (RISSB)	15/06/2016

## Contents

1	Introduction.....	7
1.1	Purpose .....	7
1.2	Scope .....	7
1.3	Exclusions .....	8
1.4	Compliance.....	8
1.5	Referenced documents.....	8
1.6	Definitions.....	10
2	General .....	11
2.1	General requirements for train detection systems .....	11
2.2	Reasons for the provision of train detection systems .....	13
2.3	Provision of train detection systems .....	13
2.4	Detectable rolling stock.....	14
2.5	Integrity and reliability of train detection systems .....	14
2.6	Suitability of train detection systems .....	15
2.7	Outputs from train detection systems .....	15
2.8	Additional requirements for train detection systems used to prove that a track section is clear of trains .....	16
2.8.1	Output states .....	16
2.8.2	Continuity of train detection.....	16
2.8.3	Minimum length of track sections .....	16
2.8.4	Clearances .....	16
2.9	Interface management .....	16
3	Requirements and types of rail based train detection systems.....	17
3.1	Purpose .....	17
3.2	General.....	17
3.3	Electrified areas "immunity to traction currents" .....	17
3.4	Non-electrified areas.....	18
3.5	Common detection systems.....	18
3.5.1	General.....	18
3.5.2	Coded track circuits .....	19
3.5.3	Track circuits (AC and DC) .....	20
3.5.4	High voltage impulse track circuits .....	20
3.5.5	Audio frequency track circuits .....	20
3.5.6	Overlay track circuits.....	22
3.6	Predictor systems .....	22
3.7	Proximity loops and switches .....	23
3.8	Treadles and "non-vital" wheel detectors .....	25
3.9	Axle counting systems .....	25
3.10	Automatic train protection (ATP) and cab signal .....	26
3.11	Bonding .....	26
3.12	Impedance bonds .....	29



3.13	Insulated rail joints .....	29
4	"On train" detection systems.....	29
4.1	Purpose .....	29
4.2	General.....	29
4.3	System types .....	30
4.3.1	Automatic train protection (ATP) .....	30
4.3.2	GPS / odometry systems .....	30
5	Design requirements .....	31
5.1	Purpose .....	31
5.2	Performance requirements.....	31
5.3	Suitability and selection of train detection systems .....	33
5.4	Power supply .....	34
5.5	Communications .....	35
5.6	Minimum configuration (examples of length and joints).....	36
6	Interfaces to other systems and signals equipment .....	36
6.1	Purpose .....	36
6.2	Input / output requirements .....	37
6.3	Rollingstock and wheel interface.....	37
7	Track, civil and interface .....	37
7.1	Purpose .....	37
7.2	Performance requirements.....	38
7.3	Track.....	38
7.3.1	Rails .....	38
7.3.2	Sleepers .....	38
7.3.3	Rail Surface Contamination .....	39
7.3.4	Ballast Contamination .....	39
7.3.5	Flood mitigation .....	39
7.4	Civil.....	40
7.5	Infrequent use and track work changes.....	40
7.6	Processes for managing hazards such as rail surface contamination .....	40
8	Installation requirements.....	41
8.1	Purpose .....	41
8.2	Installation .....	41
9	Set up, test and commissioning requirements .....	43
9.1	Purpose .....	43
9.2	Performance requirements.....	43
9.3	Commissioning .....	43
9.4	Set up & configuration.....	44
9.5	Testing.....	44
10	Maintenance and monitoring requirements .....	44
10.1	Purpose .....	44
10.2	Maintenance requirements.....	44

10.2.1	General.....	44
10.2.2	Modification.....	46
10.3	Track and civil maintenance.....	46
10.4	"Rail based" train detection system maintenance.....	46
10.5	"On train" detection system maintenance.....	48
10.6	Reactivation of seasonal or out-of-service train detection systems.....	48
11	Fault finding requirements of train detection systems.....	48
11.1	Purpose.....	48
11.2	General requirements.....	49
11.3	Fault reporting and management.....	49
12	Decommissioning and disposal of train detection systems.....	50
12.1	Purpose.....	50
12.2	Performance requirements.....	50

Train Detection  
Preview

## 1 Introduction

### 1.1 Purpose

The purpose of this standard is to provide the Australian rail industry with a set of mandatory and recommended requirements for the detection of all trains/rolling stock/rail vehicles to ensure that the signalling system receives reliable, accurate, sufficient and up-to-date information regarding the position and movement of all detectable trains/rolling stock/rail vehicles necessary for the safe control of the railway.

The standard addresses the requirements of the train detection system for the use of signallers and other operators. It spans accuracy and detail of train detection information and sufficiency of update frequency such that the signaller or other operator can safely control the movement of trains, including (so far as is reasonably practical) during periods of failure.

The use of this standard will allow a uniform approach to be applied to: the design, installation, set up, testing and commissioning, modification, use, fault finding and disposal of train detection systems.

The standard is intended to –

- provide a uniform basis for compliance with AS 4292 Railway Safety Management;
- be adaptable to different railway environments; and
- identify the risks (hazards) being controlled.

This standard specifies the accepted criteria to be employed when designing, procuring, installing, maintaining, fault finding and monitoring train detection systems to ensure technical and safety integrity.

### 1.2 Scope

This standard specifies the safety, functional, reliability, availability, maintainability requirements for any member or participant of the Australian rail industry that is involved in any phase of the life cycle (as per the structure of the standard) for train detection systems both rail based and on train.

This standard applies to all heavy railways over 600mm track gauge.

This standard provides the minimum requirements for the application design of train detection systems for both rail based and on train systems. It does not preclude the application of higher performance standards (e.g. based on local experience and good engineering practice which may be contained in the management of train detection systems standards, codes, guidelines and procedures of individual States or Rail Transport Operators).

A train detection system is equipment and systems forming part of, or providing input to, the Interlocking System to detect —

- (a) the presence or absence of detectable rolling stock within the limits of a track section; or
- (b) that a train has reached, is passing, or has passed a specific position.

Clauses in this standard relating to electrified networks are predominantly focussed on DC electrification. Clause 3.2.3 is intended to extend the scope to AC networks as well.