

AS 7516:2014



Axle Bearings



Rolling Stock Standard



This Australian Railway Standard AS 7516 Axle Bearings 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.



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The following organisations were represented on the RISSB Development Group:

UGL Limited	Gemco Rail	Marais Consulting Engineers
Hardchrome Engineering	Transport for NSW	Downer
Bradken	Public Transport Authority of Western Australia	Bombardier Transportation

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.

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Justification

Specification of Standard

The Australian Rolling Stock Standard AS 7516 Axle Bearings describes the mandatory and recommended requirements for axle bearing design, use, maintenance and overhaul on Rolling Stock.

The Standard covers the requirements for axle bearings, including

- design and manufacture,
- lubrication
- inspection
- in-service defects
- actions following derailment
- mounting and removal
- overhaul
- storage, protection and handling.

The standard does not cover:

- Bearings that are mounted on the axle but do not transmit the main weight of the vehicle to the wheelset.
- Operation of rolling stock.
- Rolling stock axles used on light rail, cane railway and monorail networks.
- Axle bearings designed for operating speeds in excess of 200 km/hr.

Objective of Standard

The requirements of AS 7516 Axle Bearings aim to ensure maximum safety of the general public, passengers, workers and property against the hazards that may arise due to failure of axle bearings, axleboxes and adaptors.

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 53% of industry surveyed, with a likely future increase to 90% of potential users. Specifically, adoption rates for AS 7516 Axle Bearings will increase from 50% to 77%.

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

D-Rail 2012 Report estimated a direct damage cost of 24700€ (approximately \$35,000) per derailment.¹ The average direct economic cost of train derailments was estimated to be around \$30 million per annum, compared to the total burden of railway safety incidents at approximately \$360.1 million per annum. By helping to reduce derailment risks, AS 7516 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.²

The potential benefit from the AS 7516 Railway Rolling Stock Axle Bearings Standard 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 7516 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. It should be noted that the previous version of this standard has been extant and in-use by industry for over five years.

Case Studies

Some examples of incidents that have occurred in the past that AS7516 may help to prevent from occurring in future are provided below.

- Derailment of Freight Train 1SP2N and the Subsequent Collision of Passenger Train 8318, Chiltern, Vic, 16 March 2003
- Derailment of train 3PW4 at Wodonga, Victoria, 23 October 2010

¹ Development of the Future Rail Freight System to Reduce the Occurrences and Impact of Derailment, Report on Derailment Economic Impact Assessment, D-Rail November 2012.

² Strategex estimates based on 'Cost Benefit Analysis of RISSB and its products' report by AECOM ("CBA of RISSB Products (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 7516 Axle Bearings is expected to deliver benefits to its individual users as well as contributing to the overall rail harmonisation process.

Axle Bearings
Preview

Document Control

Identification

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AS 7516 Axle Bearings	10 November 2014

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Approval

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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.

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Axle Bearings Preview

1 Introduction

1.1 Purpose

This document identifies the mandatory and recommended requirements for axle bearing design, use, maintenance and overhaul on Rolling Stock.

The requirements in this document aim to ensure maximum safety of the general public, passengers, workers and property against the Rolling Stock Hazards that may arise due to failure of axle bearings, axleboxes and adaptors.

1.2 Scope

This document applies to all new and existing Rolling Stock used in the Australian railway industry.

Sections 2 and 3 apply to new rolling stock.

The document covers the design, maintenance and overhaul of axle bearings used on Rolling Stock.

Bearings that are mounted on the axle but do not transmit the main weight of the vehicle to the wheelset are not covered by this standard.

Operation of rolling stock is not covered.³

Rolling stock used on light rail, cane railway and monorail networks is not covered.⁴

This standard applies to axle bearings designed for operating speeds up to and including 200 km/hr.

1.3 Compliance

There are two types of control contained within RISSB Standards:

- (a) mandatory requirements
- (b) recommended requirements

Each of these types of control address hazards that are deemed to require controls on the basis of existing Australian and international Codes of Practice and Standards.

A **mandatory** requirement is a requirement that the standard provides as the only way of treating the hazard.

Mandatory requirements are identified within the text by the term shall.

A **recommended** requirement is one where the standard recognises that there are limitations to the universal application of the requirement and that there may be circumstances where the control cannot be applied or that other controls may be appropriate or satisfactory, subject to agreement with the Rolling Stock Operator, Rail Infrastructure Manager and/or Rail Safety Regulator.

Recommended requirements are to be considered when compliance with the standards is being assessed.

Recommended requirements are identified within the text by the term should.

³ Operation of rolling stock is covered in the Operations section of the Code.

⁴ Currently excluded.