RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

Wheel and Rail Profile Development

Guideline

This Rail Industry Safety and Standards Board (RISSB) product has been developed using input from rail experts from across the Rail Industry. RISSB wishes to acknowledge the positive contribution of all subject matter experts and Development Group (DG) representatives who participated in the development of this product.

The RISSB Development Group for this Guideline consisted of representatives from the following organisations:

Metro Train Melbourne	Central Queensland University	PTA
ARTC	Queensland Rail	Bluefield AMS
KiwiRail	Rio Tinto	Sydney Trains
Speno Rail Maintenance Australia	Monash University	Loram
SNC - Lavalin	Aurizon	Keolis Downer
Pacific National		

Development of this Guideline was undertaken in accordance with RISSB's accredited processes. It was approved by the Development Group, endorsed by the Standing Committee, and approved for publication by the RISSB Board.

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

Notice to users

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To maintain their currency, guidelines developed by RISSB are periodically reviewed, and new editions published when required. Between editions, amendments can be issued.

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RISSB welcomes suggestions for improvements and asks readers to notify us immediately of any apparent inaccuracies or ambiguities, please contact us via email at info@rissb.com.au or write to Rail Industry Safety and Standards Board, PO Box 518, Spring Hill, QLD 4004, Australia.

RISSB product can be found at: http://www.rissb.com.au/products/.

Document control

Document title	Version	Date
Wheel and Rail Profile Development	2.0	3 June 2021

Document history

Publication version	Date	Reason for and extent of changes
2.0	22 June 2021	New edition
1.0	11 December 2013	Aged review (Version 1.0 superseded)

Approval

Name	Date
Rail Industry Safety and Standards Board	22 June 2021

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Contents

Appendix Contents

1.1 Purpose

The objectives of the Guideline for Wheel and Rail Profile Development are to:

a) provide guidance on assessing wheel and rail profiles theoretically and in the field (in service);

b) to provide a change management process for developing, testing and implementing new wheel and/or rail profiles.

1.2 Scope

This Guideline is applicable to all Australian rail networks, including narrow, standard, and broad-gauge railways.

This guideline is not specifically intended to cover light rail networks that may have different requirements; however, could be applied if deemed appropriate by the relevant light rail manager.

The influence on wheel profile wear due to braking forces applied to the wheel via brake shoes is not considered within the scope of this guideline.

1.3 Defined terms and abbreviations

Generic rail industry terms and definitions are provided in the RISSB Glossary https://www.rissb.com.au/products/glossary/

Defined terms with specific or unique application within this guideline are listed:

a) ***α***
wheel flange angle

b) ***conformal contact***
curved contact patches, where the surface normal direction changes from one side of the contact patch to the other (See Figure 7)

c) ***conicity***
a measure of the effective cone angle of the wheelset on the rails. For example, a wheel with a coned profile that has a slope of 1:20 that is sitting on rails with a convex head would be expected to have a conicity of 0.05 (i.e. 1/20). Mathematically the conicity is calculated as one-half of the slope of the graph of rolling radius difference versus wheelset lateral shift

d) ***contact stress (p_o)***
maximum wheel/rail contact stress in the direction normal to the plane of contact

e) ***creepage***
relative movement between the wheel and rail with longitudinal, lateral and spin components

f) ***creep forces***
forces associated with longitudinal, lateral and spin creepage

g) ***ED***
instantaneous energy dissipated at a given wheel/rail contact

h) ***equivalent conicity***
(as per reference 7: BS EN- 15302:2008 + A1. Section 4.3 Definition of equivalent conicity for nonlinear profiles & 5.4 – Determining the equivalent conicity. Two possible methods for determining equivalent conicity are contained within reference 7: Annexes B & C)

i) ***F***
friction force