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RISSB Contact details:

Head office:

Phone:	Email:	Web:
(07) 3724 0000 +61 7 3724 0000	info@rissb.com.au	www.rissb.com.au

Standard Development Manager:

Name:	Phone:	Email:
Carly Wilson	0419-916-693	cwilson@rissb.com.au

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Data entry – draft starts next page

Standard number	1085.10
Version year	2025
Standard name	Railway Track Material – Part 10: Rail Anchors
Standing Committee	Infrastructure
Development group member organisations	
Review type	
First published	AS 1085.10:1979
ISBN	
SDM name	Carly Wilson
SDM phone	0419-916-693
SDM email	cwilson@rissb.com.au

Development draft history

Draft version	Draft date	Notes
1	15/05/2024	Initial version generated from the most recently published version
2	4/06/2024	Minor changes to align with styles and voice

Preface

This standard was prepared by the Railway Track Material – Part 10: Rail Anchors Development Group, overseen by the RISSB Infrastructure Standing Committee.

Objective

The objective of this Standard is to provide tests for standard performance requirements which manufacturers' products must satisfy, and to permit flexibility in both product design and material.

Changes to the previous edition are as follows:

(a) Change of title of the AS 1085 series (previously Railway permanent way material).

(b) The referenced documents list has been revised.

(c) Reference to withdrawn Standards AS 1213 and K1 have been removed.

(d) The most recent version of the informative Appendix 'Means of demonstrating compliance with this Standard' has been included.

Compliance

There are four types of provisions contained within Australian Standards developed by RISSB:

(a) Requirements.

(b) Recommendations.

(c) Permissions.

(d) Constraints.

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 recognize 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.

Permissions – conveys consent by providing an allowable option. Permissions are identified within the text by the term 'may'.

Constraints – provided by an external source such as legislation. Constraints are identified within the text by the term 'must'.

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.

RISSB Standards address known hazards within the railway industry. Hazards, and clauses within this Standard that address those hazards, are listed in Appendix A.

Appendices in RISSB Standards may be designated either "normative" or "informative". A "normative" appendix is an integral part of a Standard and compliance with it is a requirement, whereas an "informative" appendix is only for information and guidance.

Commentary

Commentary *C Preface*

This Standard includes a commentary on some of the clauses. The commentary directly follows the relevant clause, is designated by 'C' preceding the clause number and is printed in italics in a box. The commentary is for information and guidance and does not form part of the Standard.

Table of Contents

Figures

Section 1 Scope and general

1.1 Scope

This Standard sets out the requirements for one-piece rail anchors for application to steel rails rolled in accordance with AS 1085.1. Dimensions and tolerances are not specified.

NOTES:

(a) The specified requirements may also be relevant for rail sizes not currently covered by this Standard.

(b) Dimensional tolerances should be agreed between the purchaser and the manufacturer.

(c) The purchaser shall provide the manufacturer with information as recommended in Appendix A, when enquiring about, or ordering, rail anchors to this Standard.

(d) Alternative means for demonstrating compliance with this Standard are given in Appendix B.

1.2 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:

- AS 1085, *Railway Track Material*
- AS 1085.1, *Railway Track Material – Part 1: Steel Rails*
- AS 1199, *Sampling procedures and tables for inspection by attributes*
- AS 1399, *Guide to AS 1199 - Sampling procedures and tables for inspection by attributes*
- AS/NZS 1050, *Methods for the analysis of iron and steel (all Methods)*
- ISO 9001, *Quality management systems – Requirements*
- ISO 9004, *Quality management systems - Guidelines for performance improvements*
- HB18, *Guidelines for third-party certification and accreditation*
- HB18.28, *Guidelines for third-party certification and accreditation – Guide 28: General rules for a model third-party certification scheme for products*

NOTE:

Documents for informative purposes are listed in a Bibliography at the back of the Standard.

1.3 Defined terms and abbreviations

For the purposes of this document, the following terms and definitions apply:

1.3.1

bearing area
the area of the anchor that bears uniformly on the side of the sleeper, not less than 2,200 mm²

1.3.2
branding
distinct marking on each anchor indicating the nominal rail size

1.3.3
dimensional tolerance
allowable deviation from specified dimensions of the rail anchors

1.3.4
drive the anchor
process of applying force to attach the anchor to the rail

1.3.5
heat treatment
process of quenching and tempering anchors after forming

1.3.6
longitudinal forces
forces exerted along the length of the rail

1.3.7
mechanical test
tests to assess the mechanical properties of the rail anchors

1.3.8
nominal rail size
the designated size of the rail with which the anchor is to be used

1.3.9
notches
sharp indentations on the rail foot area to be avoided during application

1.3.10
quality assurance system
manufacturer's or supplier's system for ensuring product quality

1.3.11
quenching
rapid cooling process used during heat treatment

1.3.12
rail anchor
device used to secure rails to sleepers, preventing longitudinal movement

1.3.13
rail base
the bottom part of the rail that contacts the sleeper and anchors

1.3.14
rail foot area
the underside area of the rail where the anchor contacts

1.3.15
rectangular bar
typical section shape of a rail anchor (as shown in Figure 10-1)

1.3.16
retests
additional tests conducted if initial tests do not meet specified requirements

1.3.17
roughness, burrs, notches, seams
surface defects to be avoided on rail anchors

1.3.18
skewed sleepers
sleepers that are not perpendicular to the rails, causing torsional force

1.3.19
sleeper
support for the rails in railway tracks, typically made of wood or concrete

1.3.20
slippage
maximum allowed movement of the anchor during testing, not to exceed 1 mm

1.3.21
torsional force
twisting force exerted by skewed sleepers

1.3.22
uniform size
consistent size requirement for rail anchors

1.3.23
vibratory action
forces caused by vibration from passing trains

General rail industry terms and definitions are maintained in the RISSB Glossary. Refer to: https://www.rissb.com.au/products/glossary/

Section 2 Designation

Anchors shall be designated according to the nominal rail size.

Example: Rail anchors to AS 1085.10 for 50 kg rail.

Section 3 Design

Rail anchors shall be designed:

(a) to function during their service life without damage to the rail base resulting from application forces, longitudinal forces, vibratory action and forces including torsional force exerted by skewed sleepers;

(b) to be capable of being applied tightly against the sleeper either manually or by machine; and

(c) to facilitate application, removal and re-application without appreciable loss of holding power as required by the test procedure in Clause 10.1.4.

The anchors shall be designed to meet the requirements specified in this Standard. The shape of the anchor shall ensure no sharp edges shall be in contact with the rail during or after application.

NOTE: Typical shape of a rail anchor is shown in Figure 10-1.

Section 4 Bearing area

The shape and size of the anchor shall be designed so that the area of the anchor that will bear uniformly on the side of the sleeper when fitted to the rail shall not be less than 2,200 mm^2.

A typical bearing area is shown in Figure 10-1.

NOTE: For anchors used with 31 kg rail or smaller, the bearing area may be agreed between the purchaser and supplier.

Section 5 Material

Anchors shall be made from steel, heat-treated, to comply with the requirements specified in this Standard.

Section 6 Heat treatment

Anchors shall be heat-treated after forming by quenching and tempering.

Section 7 Branding

Each anchor shall be distinctly branded with the nominal rail size with which it is to be used. The branding shall be on an external face, located so as not to induce fracture or in any way impair the strength of the anchor.

The minimum height of the numerals should be 10 mm high.

Manufacturers making a statement of compliance with this Australian Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.

Section 8 Finish

Anchors shall be of uniform size and free from roughness, burrs, notches, seams and other defects detrimental to their subsequent end use or which may cause damage to any part of the rail foot area.

Section 9 Tests

9.1 Mechanical

9.1.1 Rail

The dimensions of the rail used in the test shall comply with AS 1085.1.

The rail shall be dry and free of grease or oil or any foreign matter.

9.1.2 Rail anchor

The anchor used in the test shall be dry and free of grease or oil or any foreign matter.

9.1.3 Frequency of test

The frequency of testing should be in accordance with the manufacturers or supplier's quality assurance system.

In the absence of a quality assurance scheme, a minimum of one rail anchor in each lot of 5,000 should be tested.

9.1.4 Test procedure

The procedure for testing the anchor shall be as follows:

(a) Drive the anchor onto the rail by using a force not exceeding 50 kN applied in a direction perpendicular to the length and parallel to the underside of the rail.

(b) Apply a preload of 10 kN force to allow the anchor to take its initial set including anchor lean. This force shall be transmitted through a former that bears uniformly on the total area of that part of the anchor face that is below the flange of the rail and normal to the rail.

(c) The location of the anchor at the drive-on or applied side of the rail base shall be marked or fixed by a dial gauge.

(d) Apply a force to a total of 22 kN parallel to the length of the rail when the anchor is normal to the rail. The force shall be transmitted as described in Step (b) above.

(e) Remove the anchor from the rail and inspect the rail foot area.

(f) Repeat Steps (a) to (e) twice, for a total of three tests.

9.1.5 Test requirement

When tested in accordance with Clause 9.1.4, slippage of the anchor shall not exceed 1 mm for each test and the rail test area shall be free of sharp notches attributed to the application of the anchor.

9.2 Dimensional tolerance

The minimum rail anchors to be tested for compliance with dimensional tolerances shall be in accordance with the manufacturers or supplier's quality assurance system.

In the absence of a quality assurance scheme, a minimum of four rail anchors in each lot of 1,000 should be tested for compliance with dimensional tolerance specified in the drawing used for manufacture (see Paragraph A1(c), Appendix A).

The tolerances are a matter for agreement between the purchaser and the manufacturer.

9.3 Hardness

9.3.1 Number of tests

The frequency of testing should be in accordance with the manufacturer's or supplier's quality assurance system.

NOTE: In the absence of a quality assurance scheme, a minimum of one rail anchor in each lot of 1,000 may be tested for hardness.

9.3.2 Test requirement

The hardness of the rail anchor shall be within the range 331 HB to 401 HB.

Section 10 Retests

If the result of the mechanical test, dimensional tolerance test or hardness test does not comply with the specified requirements, double the number of specimens from the same batch shall be taken and subjected to the same test, and unless all of these meet the relevant requirements, the batch of rail anchors shall be deemed not to comply with this Standard.

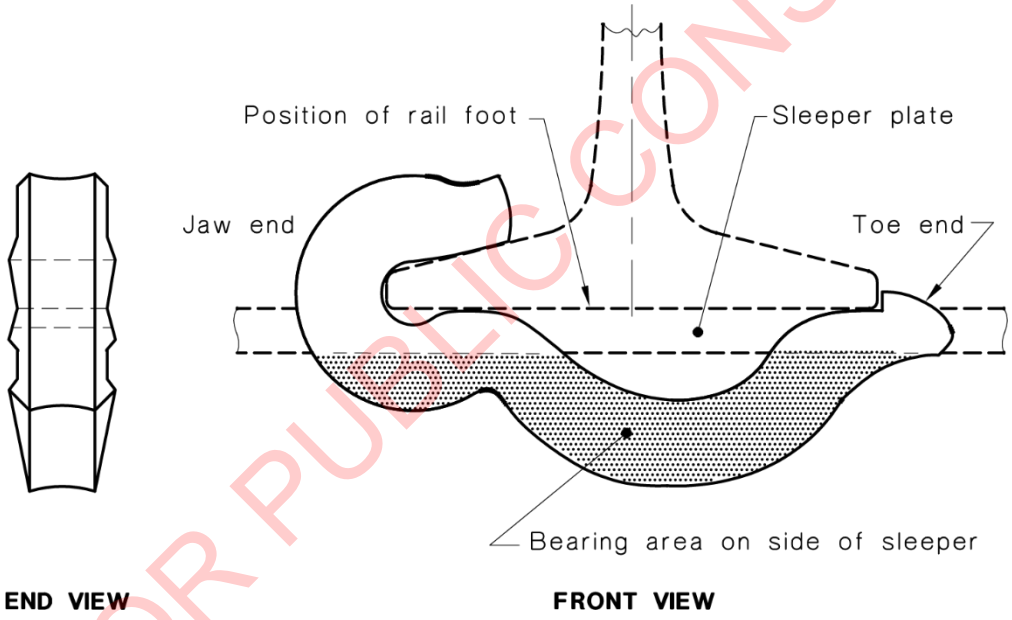

Figure 10-1 Typical rail anchor

Note: Rectangular bar shown. Other section may be used.

Appendix A Hazard register (Informative)

Hazard number	Hazard	Heading number(s)

Appendix B Purchasing guidelines (Informative)

B.1 Information to be supplied by the purchaser

The following information should be supplied by the purchaser:

(a) Designation of the rail anchor as per Section 3 including the number of this Australian Standard, i.e., AS 1085.10.

(b) The nominal rail size with which the rail anchor is intended for use.

(c) Dimensions and tolerances, if required.

(d) Quantity.

(e) Whether a test certificate or certificate of compliance is required (see Section C3).

(f) Whether it is the intention of the purchaser to inspect the materials at the manufacturer's works (see Section C4).

(g) Any exceptions to the requirements specified in this Standard, or any special or supplementary requirements, e.g., packaging, colour coding, protective coatings.

B.2 Independent tests

In the event of a dispute as to the compliance of the steel with requirements of this Standard, the purchaser and the manufacturer should agree to have referee testing carried out by an independent laboratory, whose results should be accepted as final.

In such a case, sampling, preparation and testing should be in accordance with AS/NZS 1050, unless otherwise agreed between the purchaser and the supplier.

B.3 Certificate of compliance and test certificate

B.3.1 Certificate of compliance

A certificate of compliance states that the material has been tested and results comply with the requirements of this Standard, i.e. AS 1085.10.

B.3.2 Test certificate

A test certificate shows such results as may be required by agreement between the purchaser and the manufacturer, relating to:

(a) tests performed by the manufacturer for the purpose of establishing compliance with the appropriate Standard; or

(b) additional tests as agreed between the purchaser and the manufacturer.

B.4 Inspection

If it is the purchaser's intention to undertake any of the following functions at the manufacturer's works, this should be notified at the time of enquiry or order, and should be accomplished in a manner that will not interfere with the operation of the works:

(a) Inspection of the rail anchors.

(b) Inspection of the production process.

(c) Selection and identification of the test samples.

(d) Witnessing of the tests.

The manufacturer should afford the purchaser all reasonable facilities to satisfy the purchaser that the product is in accordance with the Standard.

Appendix C Means of demonstrating compliance with this Standard (Informative)

C.1 Scope

This Appendix sets out the following different means by which compliance with this Standard can be demonstrated by the manufacturer or supplier:

(a) Evaluation by means of statistical sampling.

(b) The use of a product certification scheme.

(c) Assurance using the acceptability of the supplier's quality system.

(d) Other such means proposed by the manufacturer or supplier and acceptable to the customer.

C.2 Statistical sampling

Statistical sampling is a procedure which enables decisions to be made about the quality of batches of items after inspecting or testing only a portion of those items. This procedure will only be valid if the sampling plan has been determined on a statistical basis and the following requirements are met:

(a) The sample needs to be drawn randomly from a population of product of known history. The history needs to enable verification that the product was made from known materials at essentially the same time, by essentially the same processes and under essentially the same system of control.

(b) For each different situation, a suitable sampling plan needs to be defined. A sampling plan for one manufacturer of given capability and product throughput may not be relevant to another manufacturer producing the same items.

In order for statistical sampling to be meaningful to the customer, the manufacturer or supplier needs to demonstrate how the above conditions have been satisfied. Sampling and the establishment of a sampling plan should be carried out in accordance with AS 1199, guidance to which is given in AS 1399.

C.3 Product certification

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with the stated Standard.

The certification scheme should meet the criteria described in HB18.28 in that, as well as full type testing from independently sampled production and subsequent verification of conformance, it requires the manufacturer to maintain effective quality planning to control production.

The certification scheme serves to indicate that the products consistently conform to the requirements of the Standard.

C.4 Supplier's quality management system

Where the manufacturer or supplier can demonstrate an audited and registered quality management system complying with the requirements of the appropriate or stipulated Australian or international Standard for a supplier's quality management system or systems, this may provide the necessary confidence that the specified requirements will be met. The quality assurance requirements need to be agreed between the customer and supplier and should include a quality or inspection and test plan to ensure product conformity.

Information on establishing a quality management system is set out in AS/NZS ISO 9001 and AS/NZS ISO 9004.

C.5 Other means of assessment

If the above methods are considered inappropriate, compliance with the requirements of this Standard may be assessed from the results of testing coupled with the manufacturer's guarantee of product conformance.

Irrespective of acceptable quality levels (AQLs) or test frequencies, the responsibility remains with the manufacturer or supplier to supply products that conform to the full requirements of the Standard.