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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 13: Spring Fastening Spikes for Sleeper Plates Development Group, overseen by the RISSB Infrastructure Standing Committee.

Objective

The objective of this Standard is to provide manufacturers and purchasers with requirements for spring fastening spikes for use in railway permanent way.

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) 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.

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Section 1 Scope and general

1.1 Scope

This Standard specifies requirements for steel spring fastening spikes (hereinafter referred to as 'spikes') for use with sleeper plates manufactured in accordance with AS 1085.3 on timber sleepers.

NOTES:

Failure of these spikes in tracks can remain hidden for some time as the spike can break below the level of the sleeper plate.

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 1085.3, *Railway Track Material – Part 3: Sleeper Plates*
- AS 1171, *Non-destructive testing - Magnetic particle testing of ferromagnetic products, components and structures*
- 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 1442, *Carbon steels and carbon-manganese steels - Hot-rolled bars and semi-finished products*
- AS 1815, *Metallic materials – Rockwell hardness test*
- AS 2003, *Carbon and low alloy steel – Measurement of decarburization*
- AS/NZS ISO 9001, *Quality management systems – Requirements*
- AS/NZS ISO 9004, *Quality management systems – Guidelines for performance improvements*
- HB 18, *Guidelines for third-party certification and accreditation*
- HB 18.28, *Guidelines for third-party certification and accreditation – Guide 28: General rules for a model third-party certification system 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

acceptable quality levels (AQLs)
defined quality thresholds used in quality assurance

1.3.2

anchor
device used to secure the rail to the sleeper, preventing movement

1.3.3
audit
systematic examination of a quality management system

1.3.4
bearing area
the area of the anchor that bears uniformly on the side of the sleeper

1.3.5
branding
distinct marking on each spike indicating type and manufacturer

1.3.6
coating
lead-free and chromate-free paint applied to spikes

1.3.7
compliance
adherence to the requirements specified in the standard

1.3.8
crack detection test
test to ensure spikes are free of cracks

1.3.9
decarburization
reduction of carbon content on the spike surface

1.3.10
designation
classification of spikes according to type and standard number

1.3.11
dimensional tolerance
allowable deviation from specified dimensions of spikes

1.3.12
fatigue
weakening of material due to repeated stress

1.3.13
finish
surface condition of spikes free from defects

1.3.14
function
purpose of spring fastening spikes in securing sleeper plates

1.3.15
hardness test
test to measure the hardness of spikes

1.3.16
HRC
the C-scale of the Rockwell scale for measuring the indentation hardness of a material

1.3.17
hazard register
list of potential hazards related to the product

1.3.18
heat treatment
process of quenching and tempering to strengthen spikes

1.3.19
inspection
examination of spikes to ensure they meet specified requirements

1.3.20
marking
labeling of each spike with type and manufacturer information

1.3.21
material
steel composition used for manufacturing spikes

1.3.22
microstructure
internal structure of the spike, with at least 75% tempered martensite

1.3.23
nominal rail size
designated size of the rail for which the spike is intended

1.3.24
packing requirements
specifications for packaging spikes

1.3.25
preload
initial force applied to allow the anchor to take its initial set

1.3.26
production certification
independent assurance that products comply with the standard

1.3.27
purchaser
entity buying the spring fastening spikes

1.3.28
quality assurance system
system ensuring products meet quality standards

1.3.29
quenching
rapid cooling process used during heat treatment

1.3.30
rail anchor
device used to secure rails to sleepers

1.3.31
roughness, burrs, notches, seams
surface defects to be avoided on spikes

1.3.32
sampling plan
strategy for selecting samples for testing

1.3.33
shear forces
forces causing layers to slide against each other

1.3.34
skewed sleepers
sleepers that are not perpendicular to the rails, causing torsional force

1.3.35
sleeper
support for the rails in railway tracks, typically made of wood or concrete

1.3.36
spring fastening spikes
spikes used to secure sleeper plates to timber sleepers

1.3.37
statistical sampling
procedure for quality assessment based on sample testing

1.3.38
surface defects
imperfections on the surface of spikes

1.3.39
tempered martensite
strengthened structure of the spike after heat treatment

1.3.40
tolerances
permissible limits of variation in dimensions

1.3.41
torsional force
twisting force exerted by skewed sleepers

1.3.42
withdrawal forces
forces attempting to pull the spike out from the sleeper

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

Section 2 Purpose of use

2.1 Function

Spring fastening spikes are used to secure sleeper plates to timber sleepers in railway in a permanent way.

NOTE: Spring fastening spikes are driven through holes in the sleeper plate into the timber sleeper. As the spike penetrates the timber, the points of the spike separate and anchor the spike into the sleeper.

2.2 Action

The spike resists withdrawal and shear forces and is subject to fatigue and corrosion.

Section 3 Designation

The spikes shall be designated as per this Standard and the appropriate type as indicated in Figure 11-1, Figure 11-2 and Figure 11-3.

Example: Spring fastening spikes in accordance with AS 1085.13, Type 6.

Section 4 Material

The steel used for the manufacture of the spikes shall be in accordance with AS 1442 designation U1070 except that the manganese shall be in the range 0.8% to 1.1%.

Section 5 Dimensions and tolerances

The spikes shall conform with the dimensions and tolerances given in Figure 11-1, Figure 11-2 and Figure 11-3.

Section 6 Microstructure

The microstructure shall be at least 75% tempered martensite. Any decarburization present shall not exceed 0.5 mm when measured in accordance with AS 2003.

Section 7 Finish

The spikes shall be free of surface defects, cracks or sharp die or tooling marks that are likely to initiate failure in service.

The spikes shall be free of burrs that could cause injury when handled or could prevent their efficient installation and extraction.

Section 8 Coating

Unless otherwise specified the spikes shall be supplied with a lead-free and chromate-free paint coating of the colour given in Figure 11-1, Figure 11-2 or Figure 11-3, as appropriate.

Section 9 Manufacture

Spring fastening spikes shall be hot formed, quenched and tempered.

Section 10 Testing

10.1 General

The spikes shall be able to pass the tests described in Clauses 10.2 and 10.3 after they have been quenched and tempered.

10.2 Crack detection test

When tested in accordance with AS 1171, spikes shall be free of cracks.

10.3 Hardness test

When tested in accordance with AS 1815, spikes shall have hardness within the range of 32 HRC to 38 HRC.

The area to be tested shall be as indicated in Figure 11-1, Figure 11-2 or Figure 11-3, as appropriate.

The area shall be prepared by the removal of the decarburized layer to a maximum depth of 0.5 mm. The underside surface shall be parallel to the upper surface and free from unsound material such as mill scale.

Section 11 Marking

Each spike shall be legibly and durably branded to designate type and manufacturer. The brands shall be located on the side of the spike so that they are visible after installation in track.

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.

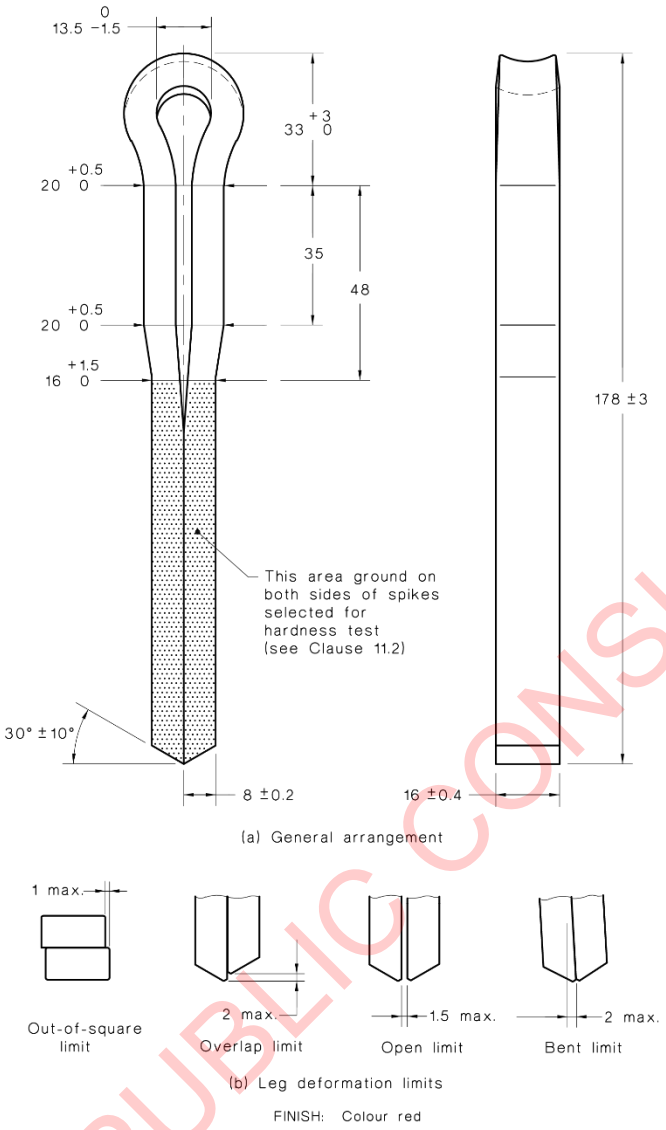

Figure 11-1 Spring-fastening spike – Type 1

Dimensions in millimetres

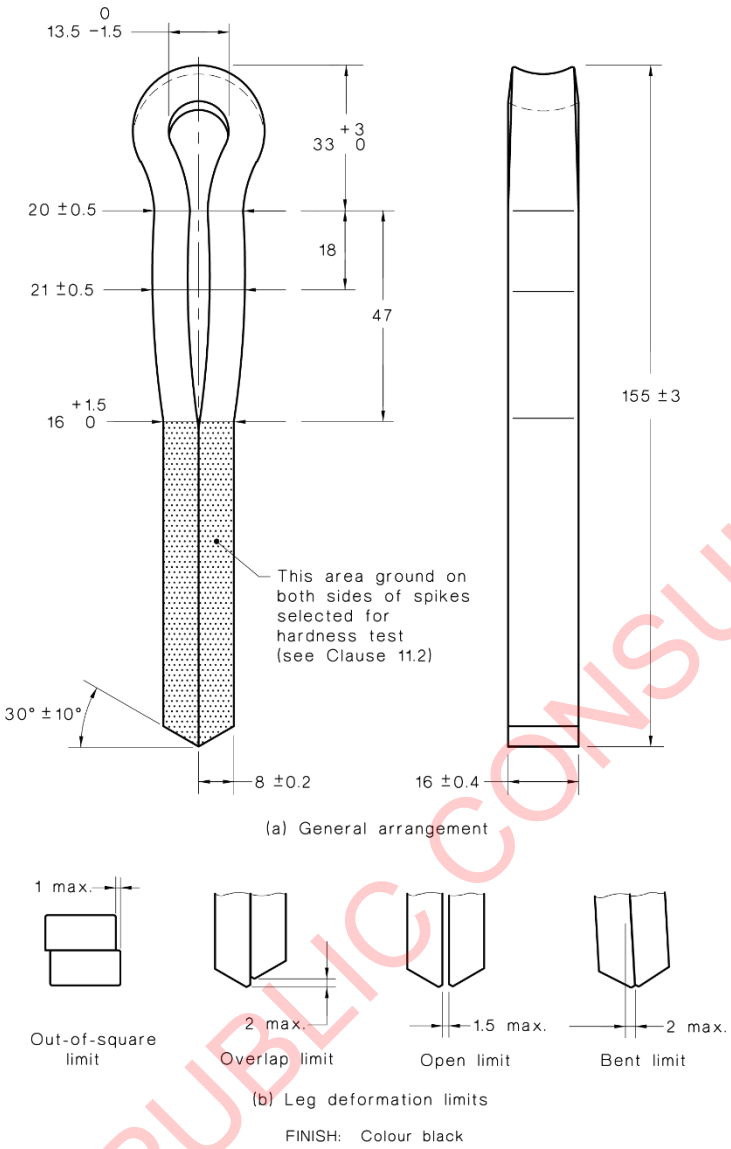

Figure 11-2 Spring-fastening spike – Type 6

NOTE: Dimensions in millimetres

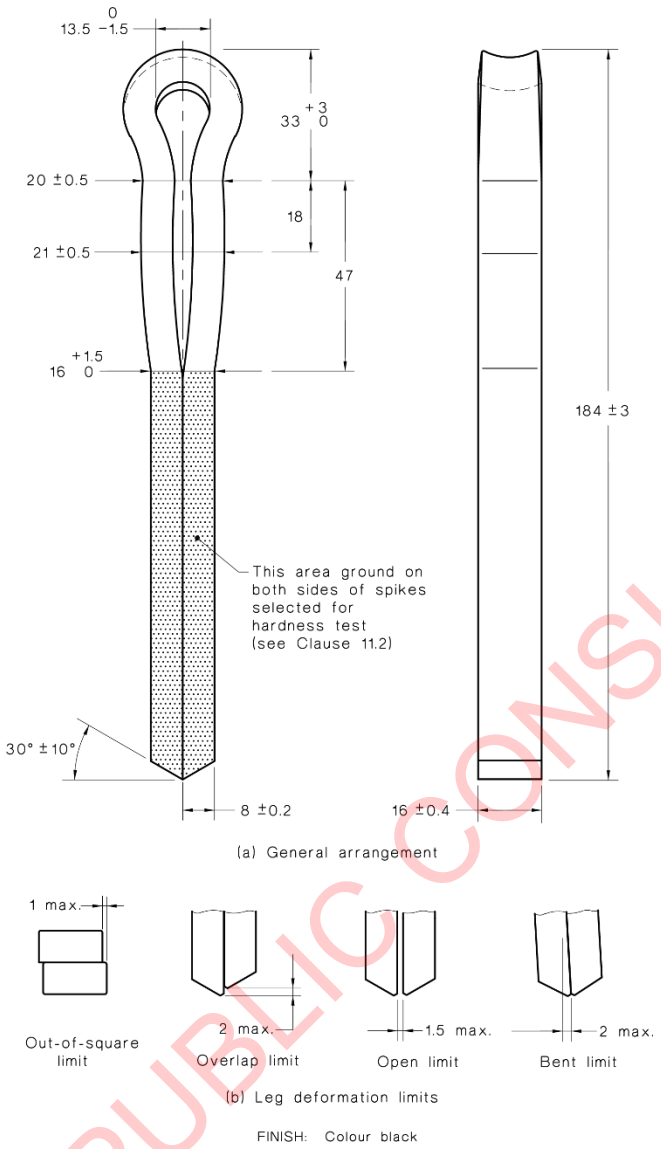

Figure 11-3 Spring-fastening spike – Type 8

NOTE: Dimensions in millimetres

Appendix A Hazard register (Informative)

Hazard number	Hazard	Heading number(s)
Insert number from Hazard Register	Insert hazard text	Insert cross-references to document text

Appendix B Information to be supplied by the purchaser

The following information should be supplied by the purchaser:

(a) The designation of the spring fastening spike (see Clause 3) including the number of this Australian Standard, i.e., AS 1085.13.

(b) Relevant designation of the spike required (see Clause 3).

(c) Quantity.

(d) Quality requirements.

(e) Whether no coating is required.

(f) Packing requirements.

(g) Any exceptions to the requirements specified, and any special or supplementary requirements.

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 Production 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 HB 18.28 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.