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Preface

This standard was prepared by the Railway Track Material – Part 8: Dogspikes Development Group, overseen by the RISSB Infrastructure Standing Committee.

Objective

The objective of this Standard is to provide designers and manufacturers with requirements for dogspikes for use with steel rails.

Changes to the previous edition are as follows:

- (a) Changes already published in Amendment number 1 to the 1995 edition.
- (b) Change of title of the AS 1085 series (previously Railway permanent way material).
- (c) Reference to withdrawn Standards AS 1213 and K1 have been removed.
- (d) The referenced documents list has been revised.
- (e) 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:

- (f) Requirements.
- (g) Recommendations.
- (h) Permissions.
- (i) 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

Section 1	Scope and general	6
1.1	Scope	6
1.2	Normative references.....	6
1.3	Defined terms and abbreviations.....	6
Section 2	Chemical composition	9
Section 3	Method of manufacture	9
Section 4	Post-forging heat treatment.....	9
Section 5	Shape and dimensions.....	9
Section 6	Finish.....	9
Section 7	Surface roughness	9
Section 8	Tests.....	9
8.1	Production testing.....	9
8.1.1	Upward bend test for head	9
8.1.2	Downward bend test for head	10
8.2	Prototype testing.....	10
Section 9	Rounding of numbers	10
Appendix A	Hazard register (Informative)	14
Appendix B	Purchasing guidelines (Informative)	15
B.1	General	15
B.2	Information to be supplied by the purchaser	15
B.3	Independent tests	15
B.4	Certificates of compliance and test certificates	15
B.4.1	Certificates of compliance	15
B.4.2	Test certificates	15
B.5	Inspection	16
Appendix C	Means of demonstrating compliance with this Standard (Informative)	17
C.1	Scope	17
C.2	Statistical sampling.....	17
C.3	Production certification.....	17
C.4	Supplier’s quality management system	17
C.5	Other means of assessment	18
Appendix D	Guidance on typical sampling (Informative)	19
D.1	Number of tests.....	19
D.2	Retests	19
D.3	Extraction test for dogspikes (Normative)	19
D.3.1	Scope	19
D.3.2	Apparatus	19
D.3.3	Procedure	19
D.3.4	Report.....	19

Figures

Figure 9-1 16 mm Dogspike profile	11
Figure 9-2 19 mm Dogspike profile	12
Figure 9-3 22 mm Diameter round shank dogspike profile	13
Appendix Figure D-1 Test piece holder	20
Appendix Figure D-2 Support block	21

Tables

Table D-1 Length and Spacing of Ridges	19
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Section 1 Scope and general

1.1 Scope

This Standard sets out the requirements for 16 mm and 19 mm steel dogspikes with square shanks and 22 mm diameter round shank steel dogspikes for use with the steel rails specified in AS 1085.1.

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 1085.1, *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 1442, *Carbon steels and carbon-manganese steels – Hot-rolled bars and semi-finished products*
- AS 2706, *Numerical values – Rounding and interpretation of limiting values*
- 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

arithmetic mean deviation (Ra)

a measure of surface roughness, indicating the average deviation of the surface profile from the mean line

1.3.2

bend test

a test to determine the ability of a dogspike to be bent without cracking

1.3.3

chemical composition

the specific elements and their quantities that make up the steel used for manufacturing dogspikes

1.3.4

condition b or f

specific conditions under which the steel is used, as specified in AS 1442

1.3.5

cooling in air or bin

allowing hot-forged dogspikes to cool slowly in air or in a bin with other hot dogspikes

1.3.6**cracks, ragged edges, mechanical defects**

unacceptable flaws in dogspikes that can affect their performance and extraction from sleepers

1.3.7**dogspike**

a large nail used to fasten rails to wooden sleepers in railway tracks

1.3.8**downward bend test for head**

a test to determine the ability of a dogspike head to be bent downward without cracking

1.3.9**extraction force**

the force required to remove a dogspike from a sleeper

1.3.10**finish**

the final condition of the dogspike surface, which must be free from harmful defects

1.3.11**hot or cold forging**

manufacturing processes involving shaping metal using heat (hot forging) or at room temperature (cold forging)

1.3.12**post-forging heat treatment**

the process of treating dogspikes after forging to achieve desired mechanical properties

1.3.13**production testing**

testing carried out on manufactured dogspikes to ensure they meet specified standards

1.3.14**prototype testing**

testing new designs or dies for dogspikes to ensure compliance with performance standards

1.3.15**quenching**

rapid cooling of hot-forged dogspikes in water or oil, which is not permitted for dogspikes

1.3.16**rounding of numbers**

the method of adjusting calculated values to comply with specified limiting values, as described in as 2706

1.3.17**secondary machining**

additional machining processes after initial shaping to achieve the final dimensions and finish

1.3.18**shape, dimensions, and tolerances**

the specific form and allowable variations in size for dogspikes

1.3.19**sleeper**

a rectangular support for the rails in railway tracks, typically made of timber, concrete, or steel

1.3.20**surface roughness**

the texture of the surface of dogspikes, affecting their grip in timber sleepers

1.3.21**tests**

procedures to assess the mechanical properties and performance of dogspikes

1.3.22**tolerance**

the allowable deviation from specified dimensions

1.3.23**upward bend test for head**

a test to determine the ability of a dogspike head to be bent upward without cracking.

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

Section 2 Chemical composition

Steel used for the manufacture of dogspikes shall comply with the requirements of AS 1442, Grade U3, or Grade U5, Condition B or F.

Section 3 Method of manufacture

Dogspikes shall be produced by hot or cold forging, with or without a second heat or post-forging heat treatment, and with or without secondary machining.

Section 4 Post-forging heat treatment

After hot forging, dogspikes shall be allowed to cool slowly in air or in a bin with other hot dogspikes. Dogspikes shall not be cooled by quenching.

Section 5 Shape and dimensions

Dogspikes shall conform to the shape, dimensions and tolerances shown in:

- (a) Figure 9-1 - for 16 mm dogspikes;
- (b) Figure 9-2 - for 19 mm dogspikes; or
- (c) Figure 9-3 - for 22 mm diameter round dogspikes.

Section 6 Finish

Dogspikes shall be free from cracks, ragged edges, or other mechanical defects detrimental to their end use, including extraction from the sleeper.

Section 7 Surface roughness

Dogspikes shall retain the as-forged surface to provide grip when installed in a timber sleeper.

Round dogspikes shall achieve a minimum surface roughness of 3.2 μm (arithmetic mean deviation, R_a), however, a surface roughness of 6.3 μm is preferred.

Section 8 Tests

If required by the purchaser, a bend test for the shank may be performed.

The shank of the finished dogspike should be capable of being bent cold through 180 degrees around a pin of diameter not greater than 1.5 times the size of the shank of the dogspike without cracking on the outside of the bent portion.

8.1 Production testing

8.1.1 Upward bend test for head

The head of the finished dogspike shall be bent upward cold through 30 degrees without cracking on the outside of the bent portion.

The 30 degrees of bending shall not include any angular displacement due to bending of the shank. The head of the finished dogspike shall be bent around a mandrel of a minimum diameter of 100 mm. The diameter of the mandrel shall be chosen so that the mandrel shall not contact the corner between the head and shank of the dogspike.

8.1.2 Downward bend test for head

The head of the finished dogspike shall be bent downward cold through 25 degrees relative to the lower part of the shank without opening any cracks at the back of the head and shank when the head is held in a fixture that:

- (a) supports the back of the shank to within 6 mm of the underside of the fin; and
- (b) supports the sides of the shank but leaves the 10 mm of the shank under the intersection of the rail clamping face and the face of the shank clear to deform.

See Appendix D for the number of tests and retests that should be made.

8.2 Prototype testing

When submitting a new design or when the die is changed, in addition to tests specified in Clause 8.1, three (3) samples shall be tested for strength of extraction surfaces.

The extraction surfaces, that is, the two surfaces under and at each side of the head, shall withstand the extraction force without permanent deformation of the sides of the head when tested in accordance with Appendix D.

Section 9 Rounding of numbers

For the purpose of assessing compliance with this Standard, the specified limiting values herein shall be interpreted in accordance with the 'rounding method' described in AS 2706. The observed or calculated value shall be rounded to the same number of figures as in the specified or calculated value and then compared with the specified limiting values. For example, for specified limiting values of 2.4, 2.50 and 2.500, the observed or calculated value would be rounded respectively to the nearest 0.1, 0.01 and 0.001.

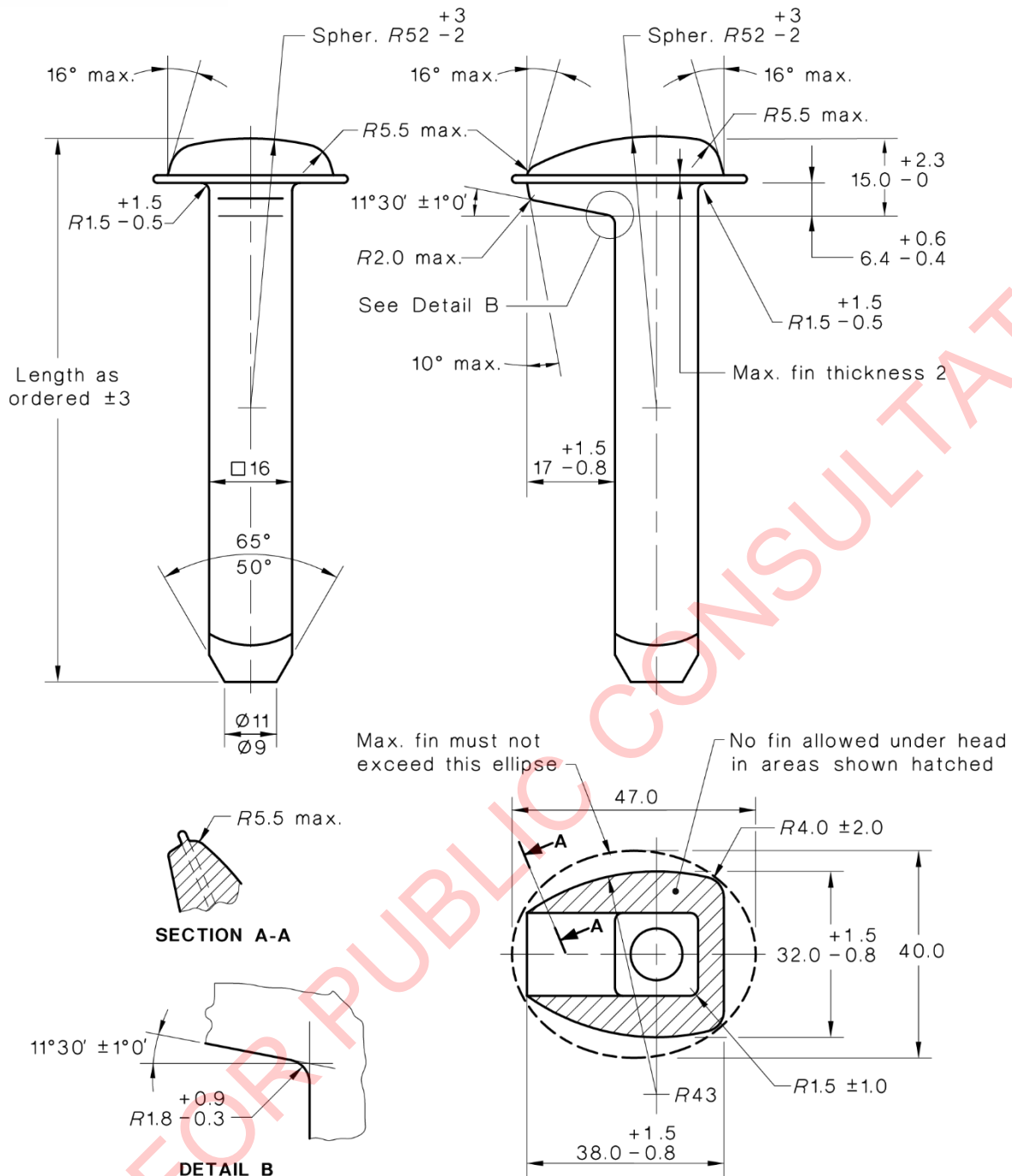


Figure 9-1 16 mm Dogspike profile

NOTE:

Tolerance on thickness of shank ± 0.4 except for first 20 length under head where plus tolerance may be increased to 0.8.

Dimensions in millimetres

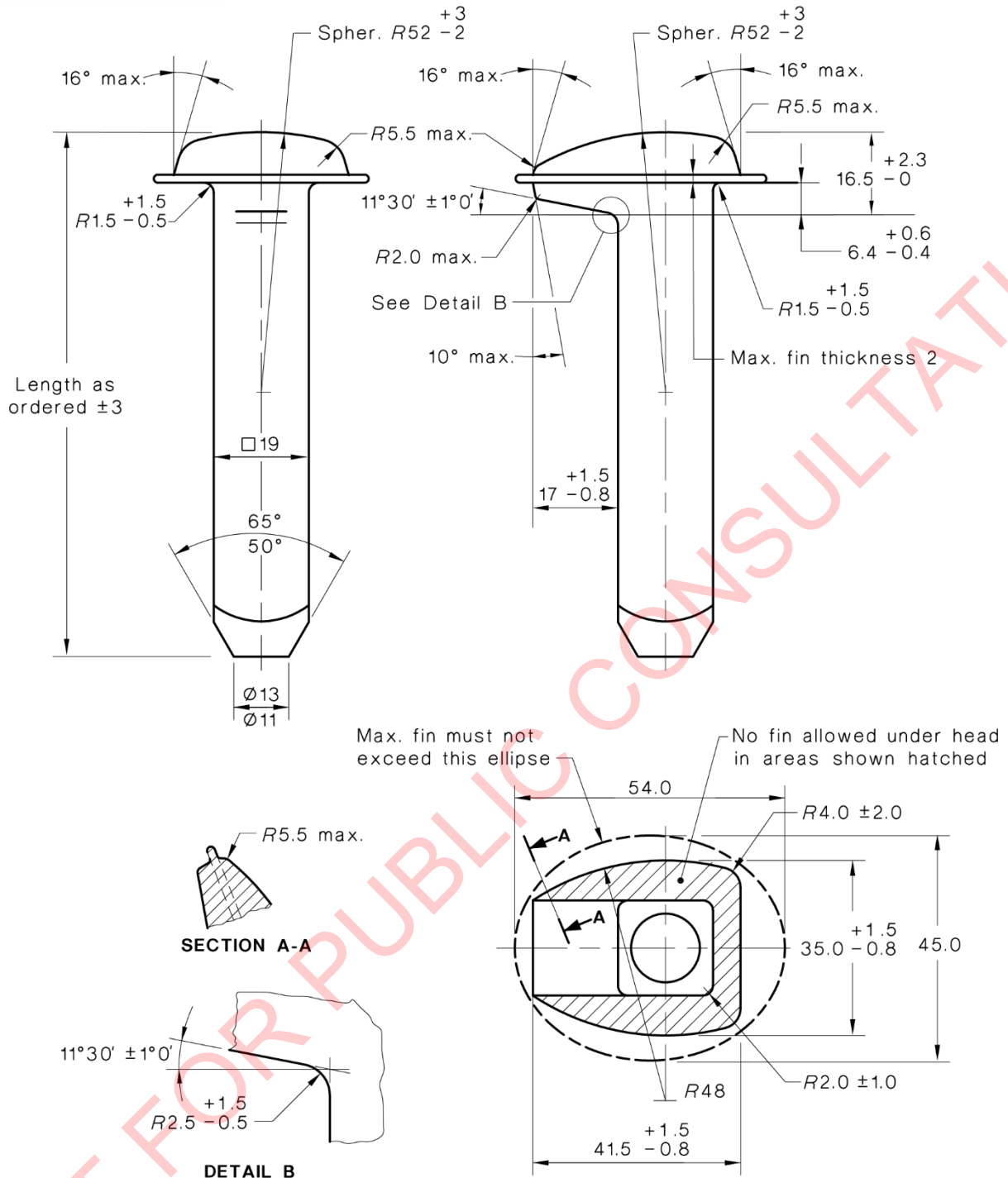


Figure 9-2 19 mm Dogspike profile

NOTES:

Tolerance on thickness of shank ± 0.4 except for first 20 length under head where plus tolerance may be increased to 0.8.

Dimensions in millimetres

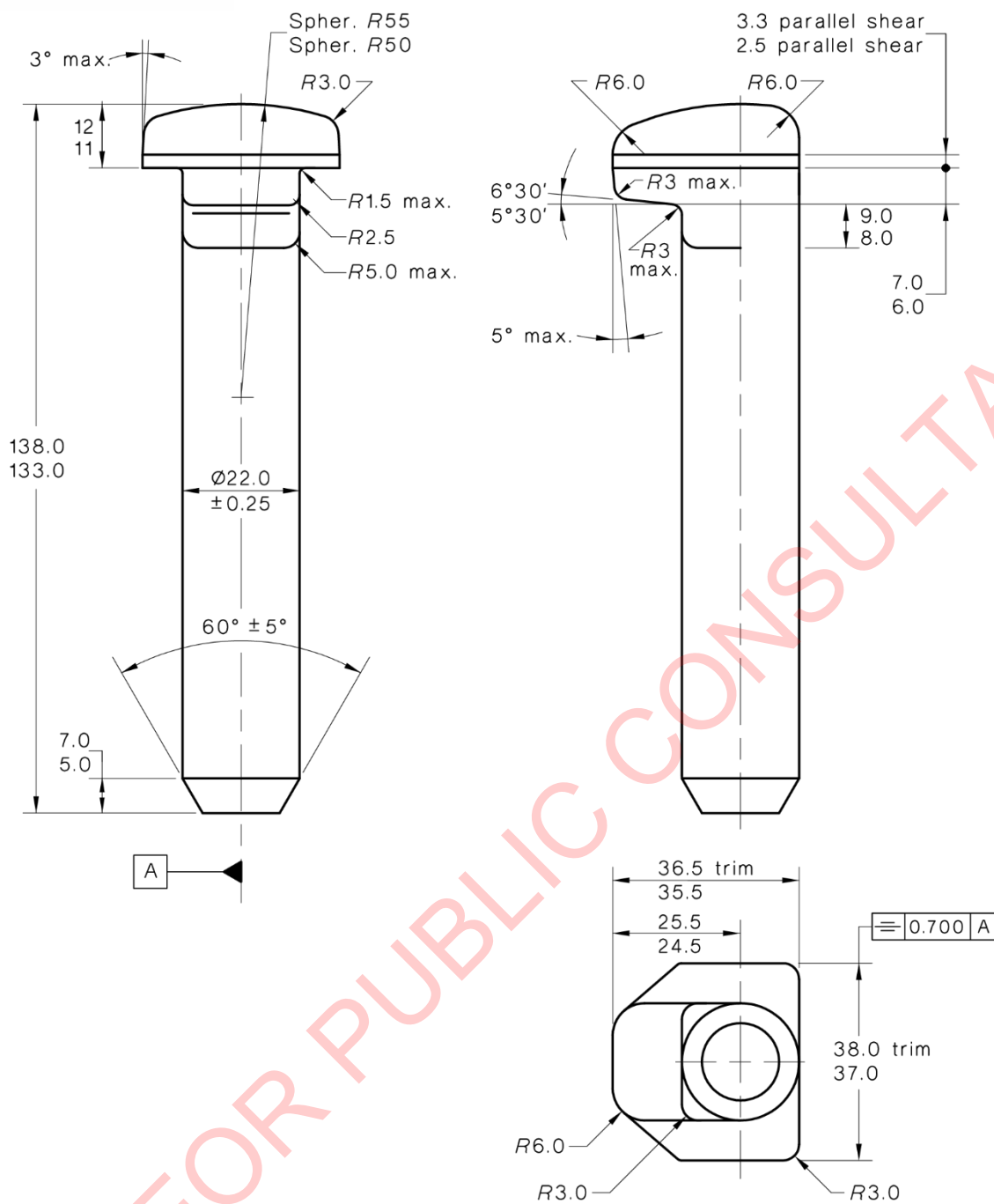


Figure 9-3 22 mm Diameter round shank dogspike profile

NOTES:

Tolerance on diameter of shank as shown except for first 20 length under head where plus tolerance may be increased to 0.8.

Unless otherwise specified, ±1 tolerance applies.

Dimensions in millimetres.

Appendix A Hazard register (Informative)

Hazard number	Hazard	Heading number(s)
To be added		

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Appendix B Purchasing guidelines (Informative)

B.1 General

Australian Standards are intended to include the technical provisions necessary for the supply of a product referred to in a particular Standard, but do not purport to contain all the necessary provisions of a contract. In a number of cases, the purchaser is either asked to state the requirements or given a choice of optional requirements, and these are contractual matters to be agreed upon between the purchaser and the manufacturer.

This Appendix contains explanations, advice, and recommendations on the information to be supplied by the purchaser at the time of enquiry or order and by the manufacturer after an order has been placed. Its aims are to prevent misunderstanding and to result in the purchaser receiving satisfactory products and service.

B.2 Information to be supplied by the purchaser

The purchaser should supply the following information at the time of calling for tenders or quotations for the manufacture and supply of steel dogspikes:

- (a) The number and part of this Australian Standard, i.e. AS 1085.8.
- (b) Nominal size, where this applies, or the number of the appropriate drawing, or both.
- (c) Quantity (mass or number of pieces).
- (d) Whether a test certificate or certificate of compliance is required as per Paragraph B4.
- (e) Whether it is the intention of the purchaser to inspect the material at the manufacturer's works as per Paragraph B5.
- (f) Special or supplementary requirements including finish and protective coating for identifying paint colour.
- (g) Whether a shank bend test is required as per section 8.1 .
- (h) Any requirements not covered by this Australian Standard.
- (i) Surface condition B or F as per Section 2.
- (j) Steel grade U3 or U5 (AS 1442) if required.

B.3 Independent tests

In the event of a dispute over the compliance of the material with the composition or mechanical property requirements of the 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.4 Certificates of compliance and test certificates

B.4.1 Certificates of compliance

A Certificate of compliance states that the material has been tested and that the results comply with the requirements of this Standard, i.e., AS 1085.8.

B.4.2 Test certificates

A test certificate shows the results of testing related to:

- (a) tests performed by the manufacturer for the purpose of establishing compliance with the appropriate material specification; or
- (b) additional tests required by the purchaser.

B.5 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 materials.
- (b) Inspection of production process.
- (c) Selection and identification of the test samples.
- (d) Witnessing of the tests being made.

The manufacturer should afford the purchaser all reasonable facilities to satisfy the purchaser that the dogspikes are 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 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.

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Appendix D Guidance on typical sampling (Informative)

D.1 Number of tests

One upward and one downward bend test of the head should be made from each batch of dogspikes of 5 t or fraction thereof.

D.2 Retests

If the result of any of the bend tests on the test batch does not comply with the requirements of Section 8.1, two additional sets of tests should be carried out. If these are satisfactory, the batch is deemed to comply with this Standard. If any tested batch fails any of the additional tests, the batch is not deemed to comply with this Standard.

D.3 Extraction test for dogspikes (Normative)

D.3.1 Scope

This Appendix sets out the method for the strength test of the extraction surfaces of the dogspike.

D.3.2 Apparatus

A test assembly is required to support the dogspike. The support block shall have two parallel ridges having a radius of 2.5 mm (approximately), symmetrically spaced each side of the hole. The length and spacing of the ridges are given in Table D-1. Appendix Figure D-1 and Appendix Figure D-2 show an assembly suitable for testing 19 mm square dogspikes.

Table D-1 Length and Spacing of Ridges

Dogspike size	Length of ridge (mm)	Spacing between ridges (mm)
16 mm square	20	23
19 mm square	23	26
22 mm square	30	26

D.3.3 Procedure

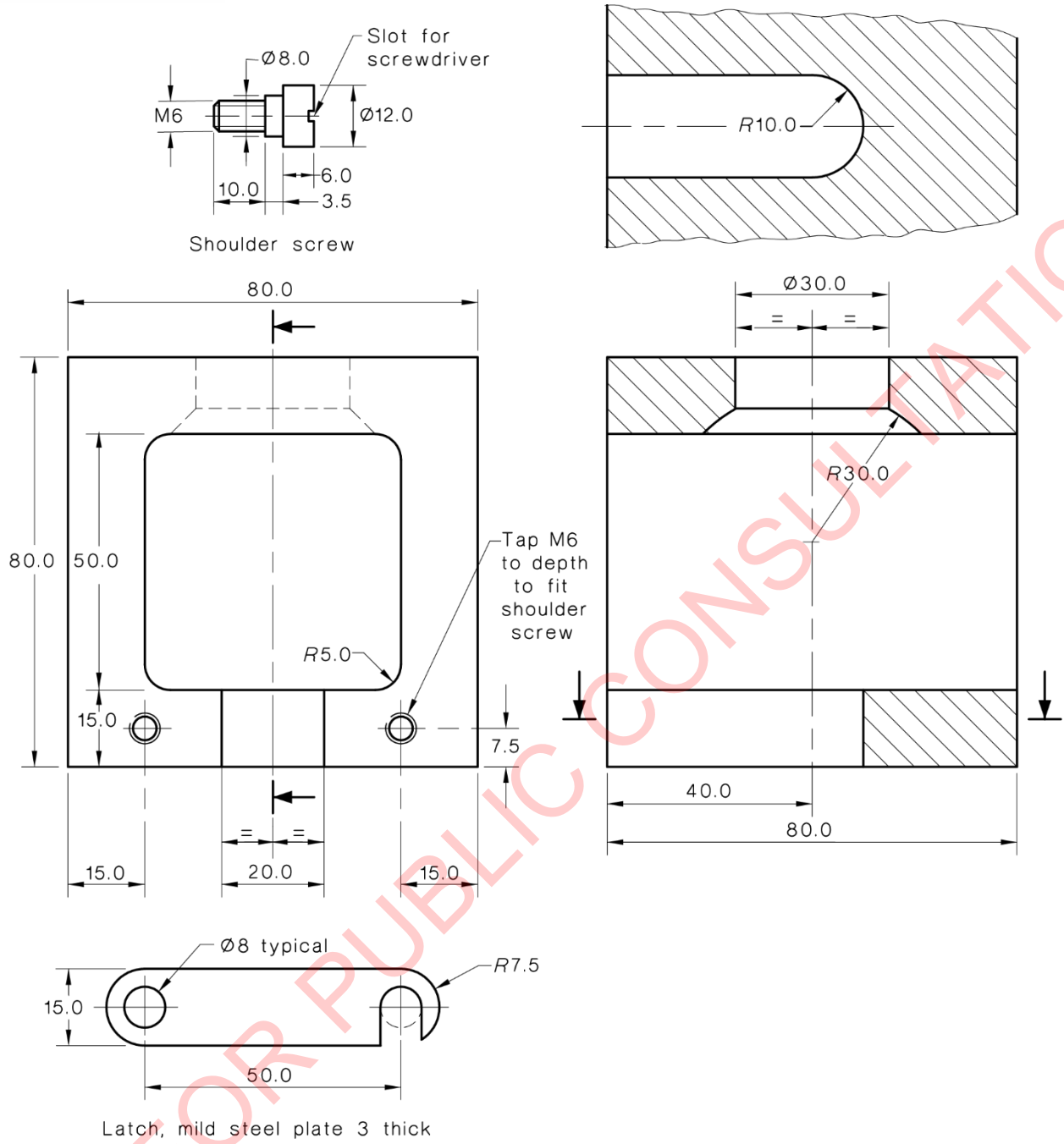
The procedure shall be as follows:

- (a) Place the dogspike in the apparatus.
- (b) Grip the shank in the jaws of a testing machine and load to 70 kN and hold for a minimum of 15 s.
- (c) Release the load.
- (d) Inspect for permanent deformation to the surfaces under and at each side of the head.

D.3.4 Report

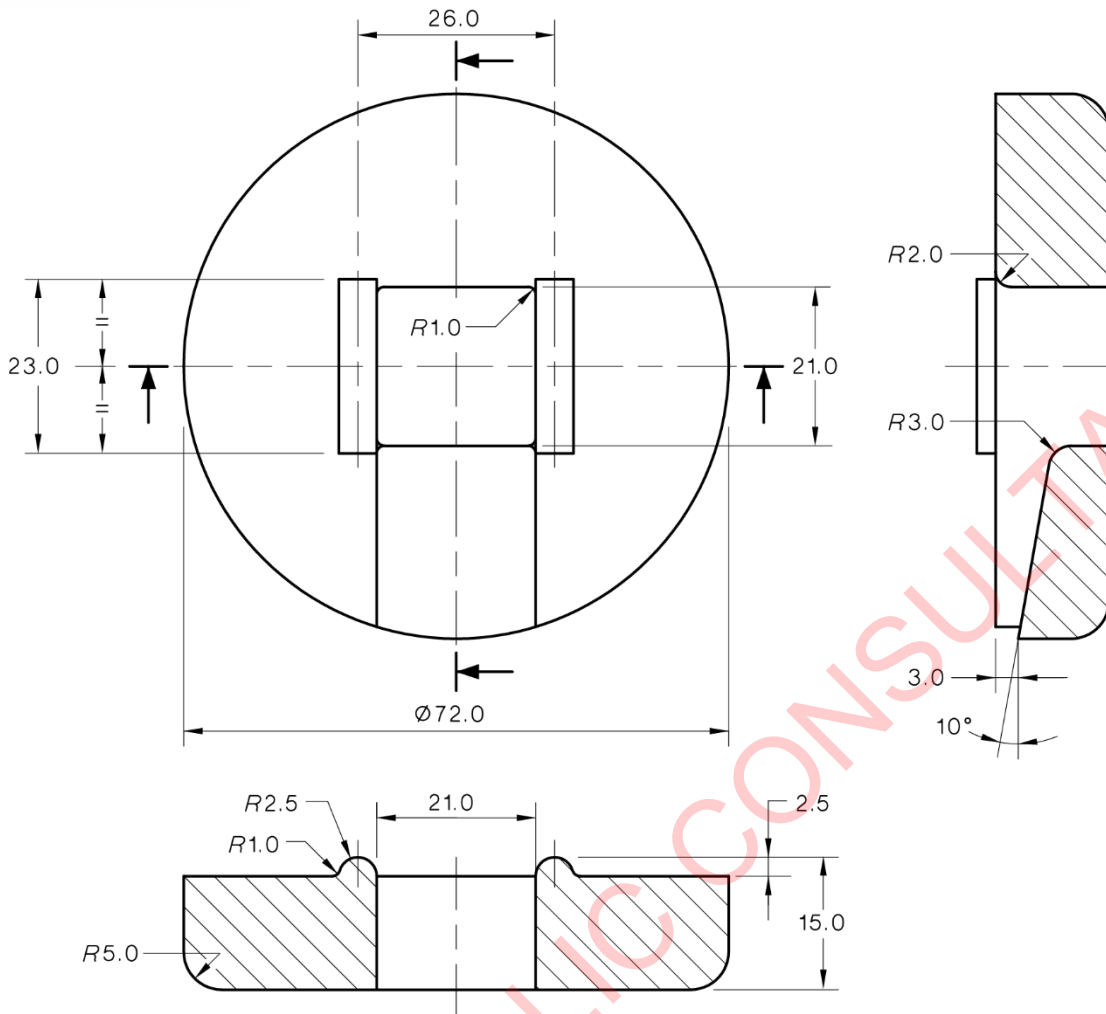
The following shall be reported:

- (a) Any permanent deformation.
- (b) Reference to this Australian Standard, i.e., AS 1085.8.



Appendix Figure D-1 Test piece holder

NOTE: Dimensions in millimetres



Appendix Figure D-2 Support block

NOTE: Dimensions in millimetres