

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 2505.2—2004

Metallic materials

Method 2: Bars, rods and solid shapes—Bend tests

RECONFIRMATION NOTICE

Technical Committee MT-009 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 20 March 2017.

The following are represented on Technical Committee MT-009:

Australasian Institute of Surface Finishing
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Steel Institute
Bureau of Steel Manufacturers of Australia
Galvanizers Association of Australia
Galvanizing Association of New Zealand
New Zealand Metal Roofing Manufacturers

NOTES

Australian Standard™

Metallic materials

Method 2: Bars, rods and solid shapes—Bend tests

PREFACE

This Standard was prepared by Standards Australia Committee MT-006, Mechanical Testing of Metals to supersede AS 2505.2—1989, *Methods for bend and related testing of metals*, Method 2: *Bars, rods and solid shapes*.

The objective of this revision is to introduce new testing and reporting requirements for bend tests for bars, rods and solid shapes.

This Standard is Method 2 of a series of Standards on the methods of bending wire and related testing of metals. The series comprises the following Methods:

AS

- 2505 Metallic materials
- 2505.1 Method 1: Sheet, strip and plate—Bend tests
- 2505.2 Method 2: Bars, rods and solid shapes—Bend tests (this Method)
- 2505.3 Method 3: Tubular products—Bend and related tests
- 2505.4 Method 4: Wire—Reverse bend test
- 2505.5 Method 5: Wire—Simple torsion test
- 2505.6 Method 6: Wire—Wrapping test

This Standard does not cover bend testing of welds, which is dealt with in the series of Standards, AS 2205, *Methods of destructive testing of welds in metals*.

METHOD

1 SCOPE

This Standard specifies methods for simple and reverse bend testing in the longitudinal direction of coated and uncoated metal bars, rods and solid shapes.

NOTES:

- 1 Criteria for assessment of the results of tests are not included; they are specified in appropriate product Standards.
- 2 Where angles of bend of test pieces are specified in product Standards, they are deemed to be minimum angles. However, where radii of bends of mandrels or formers are specified, they are deemed to be maximum radii.

2 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

2.1 Longitudinal bend test piece

A test piece in which the length is parallel to, and the axis of the bend at right-angles to, the principal direction of extension during manufacture (see Figure 1).

2.2 Reverse bend test

A test in which a test piece is deformed by bending through 90 degrees, over a specified radius and is then straightened.

NOTE: To complete one reverse bend, the test piece is bent through 90 degrees and then straightened. To complete two reverse bends, the test piece is then bent through 90 degrees in the opposite direction and then straightened (see Figure 2).

2.3 Simple bend test

A test in which a test piece is deformed by bending through a specified angle, without reversing the direction of flexure.

2.4 Test sample

A portion of metal or product or a group of items selected from a batch by a sampling procedure.

2.5 Test specimen

A portion or a single item taken from each product in the test sample for the purpose of applying a particular test.

2.6 Test piece

A piece taken from each test specimen, and suitably prepared for testing.

3 NOTATION

The quantity symbols used in this Standard are listed below.

a = thickness or diameter of test piece in millimetres

D = diameter of mandrel in millimetres

F = Force in newtons

N_b = number of reverse bends

R = radius of supports in millimetres

A = angle of bend, in degrees

NOTE: Except where test pieces are machined, ' a ' will be the original metal thickness or diameter.

4 APPARATUS

The test apparatus shall be of such construction that test pieces can be appropriately controlled during the performance of the test, and be of adequate design, manufacture and materials to ensure reproducibility of results. The required apparatus is as shown in Figures 4, 5, 6, 7, 8, and 10, as appropriate to the specific test methods.

All support surfaces and mandrels shall be wider than the test piece.

5 TEMPERATURE OF TEST PIECE

The temperature of test pieces at the beginning of a test shall be room temperature which, unless otherwise specified in the product Standard, shall be between 10°C and 35°C.

In the event of dispute, the temperature of test pieces at the beginning of a test shall be 23 ±5°C.

6 SELECTION AND PREPARATION OF TEST PIECE

6.1 General

Test samples shall be selected and prepared for testing as specified in the appropriate product Standard or the appropriate clauses of this Standard, as applicable.

NOTE: Where the selection and preparation of test samples are not adequately specified by either the product Standard or this Standard, alternative methods may be selected.

6.2 Selection of test piece

If the position of the test piece in relation to the original bar, rod or solid shape from which it was taken is known, the test piece shall be prepared with its centre as near as practicable to the position indicated in Figure 3 for the relevant cross section type.

NOTE: When an angle bar has legs of different sizes, the test sample may be taken from either leg.

6.3 Preparation of test piece

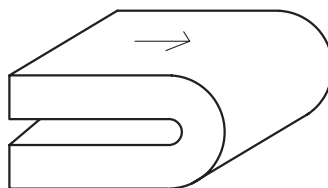
Test pieces may be full section, stamped, sheared, sawn, flame-cut, machined, or any combination of these. If necessary, they may be straightened, provided that any distortion or heating does not significantly affect the test result. For test pieces that are not of full product cross-section there shall be no burrs, scratches or marks which can adversely affect the result. Unless otherwise specified in the product Standard, the edges of rectangular test pieces may be rounded to a radius as follows:

- (a) For thickness up to 10 mm not greater than 1.0 mm.
- (b) For thicknesses above 10 mm..... 0.1 times the thickness but not greater than 3 mm.

Slight curvature of the test piece is acceptable.

If the test piece is produced by machining a single surface of the product (see Clause 6.4.2(b)), a simple bend test shall be carried out with the unmachined surface in tension. In a reverse bend test, the unmachined side shall be in tension in the first bend of the test.

In the event of dispute, any effect produced by the method of preparation on the metal structure along a cut edge shall be removed by longitudinal milling) planing or grinding, unless otherwise specified in the product Standard.



NOTE: Arrow indicates principal direction of extension during manufacture.

FIGURE 1 LONGITUDINAL BEND TEST

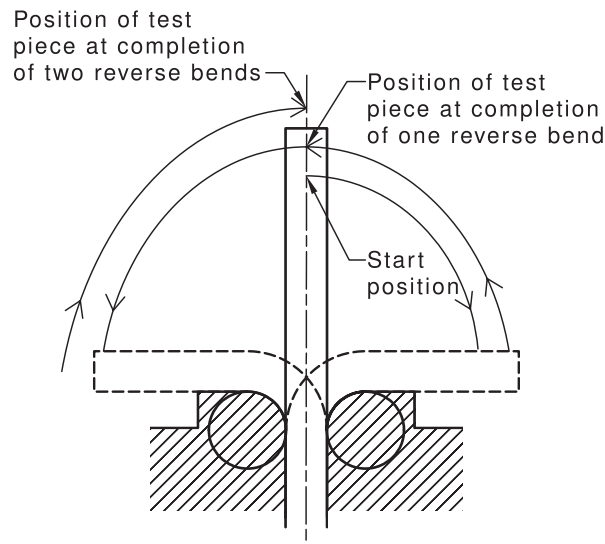


FIGURE 2 METHOD OF COUNTING REVERSE BENDS

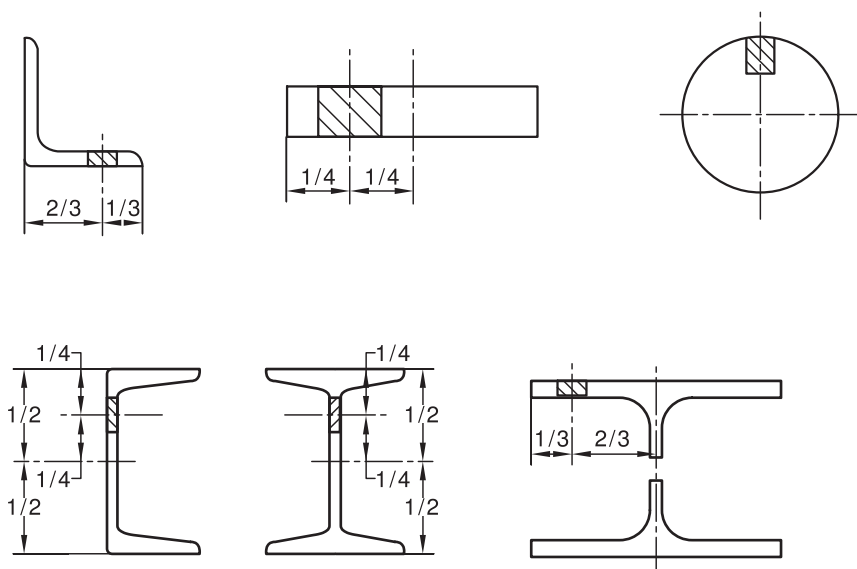


FIGURE 3 POSITION OF TEST PIECES

6.4 Dimensions

6.4.1 Length of test pieces

The length of test piece shall be suitable for the test method selected.

6.4.2 Width of test piece

Width of the test piece shall be in accordance with the following:

(a) Flats and solid shapes

Test pieces shall have the following widths, as appropriate to the thickness of the product being tested:

- (i) For product thickness of less than 3.0 mm, test pieces shall be of rectangular cross section and of full product thickness.

The width of the test pieces shall not be less than 20 mm, or not less than the full product width if this is less than 20 mm wide.