

Australian Standard®

Methods of test for fibre ropes

Method 4: Impact strength index

PREFACE

This Standard was prepared by the Standards Australia Committee on Ropes and Cordage. The Standard is based on the method used by the International Union of Alpinist Associations (UIAA) for testing ropes for mountaineering.

METHOD

1 SCOPE This Standard sets out a method for measuring the impact strength index of fibre rope.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

4142 Fibre ropes

4142.1 Part 1: Care and safe usage

4142.2 Part 2: Three-strand hawser-laid and eight-strand plaited

4142.3 Part 3: Man-made fibre rope for static life rescue lines

3 DEFINITIONS For the purpose of this Standard, the definitions given in AS 4142.1, AS 4142.2 and AS 4142.3 apply.

4 PRINCIPLE The impact strength index of the rope is obtained by recording the number of times the test specimen can be used to arrest the fall of a dropped mass until either the core or the sheath breaks, and then until the entire rope breaks.

5 APPARATUS The following apparatus, arranged as shown in Figure 1, is required:

- (a) A block of mass 80 kg with a smooth 15 mm diameter pin fixed to its upper portion. The roughness of the pin shall average 0.8 μm and shall be no greater than 6.3 μm .
- (b) An orifice plate (see Figure 2) made of 10 mm thick hardened steel and having an orifice 40 ± 1 mm in diameter. The surface of the orifice shall be rounded to a 5 mm radius and smooth, with an average roughness of 0.4 μm and no greater than 4.0 μm . The orifice plate is mounted with the plate vertical.
- (c) A fixed pin having a diameter of 30 mm. This pin is secured horizontally to a wall or other strong point. The roughness of the pin shall average 0.8 μm and shall be no greater than 6.3 μm .

- (d) A securing clamp placed 50 ± 10 mm below the lower surface of the fixed pin.
- (e) A fixture for suspending the block described in Item (a) 2300 ± 10 mm above the lower internal curve of the orifice plate.
- (f) A conditioning facility for providing and maintaining a standard atmosphere of temperature $20 \pm 2^\circ\text{C}$ and relative humidity of $65 \pm 2\%$.

6 SAMPLES AND TEST SPECIMENS

6.1 Sample A test sample shall be taken from one end of a coil selected for testing. Each sample shall be representative of the balance of the coil.

6.2 Conditioning Condition the sample for 24 h in the atmosphere described in Clause 5(f). Preparation of test specimens and subsequent testing shall, if possible, be conducted without removal from the standard atmosphere, otherwise the first drop shall be made within 10 min of the test specimen being removed from that atmosphere.

6.3 Test specimens The length of test specimens shall be 3 m.

7 PROCEDURE The procedure shall be as follows:

- (a) Secure one end of the test specimen to the block by a figure-of-eight loop 50 ± 10 mm long and tighten the knot by hand (see Figure 3).
- (b) Lead the other end of the test specimen through the orifice plate, around the fixed pin and to the securing clamp.
- (c) Adjust the length of the test specimen so that the block hangs approximately 2500 mm below the orifice plate.
- (d) Allow the block to hang freely for 60 s to 90 s.
- (e) Adjust the test specimen so that the distance from the lower internal curve of the orifice plate to the lower surface of the pin in the block is 2500 ± 30 mm.
- (f) Tighten the securing clamp to maintain this distance and mark the test specimen at the upper edge of the securing clamp.
- (g) Suspend the block so that the upper surface of the pin in the block is 2300 ± 10 mm above the lower internal curve of the orifice plate and so that, on falling, the block will just clear the plate.
- (h) Release the block and allow the test specimen to fall freely and to hang suspended for 50 s.
- (i) Lift the block up, suspend it from the fixture provided, and allow the test specimen to relax untensioned. Examine the test specimen noting any signs of breakage or movement of the mark on the test specimen.
- (j) Repeat Steps (g) to (i) at intervals of $5 \text{ min} \pm 30 \text{ s}$ until the test specimen breaks. Record the number of drops for—
 - (i) failure of either sheath or core; and
 - (ii) breakage of the entire test specimen, i.e. breakage of both the sheath and core in one or more regions.

If movement of the mark is observed at any stage during testing and is greater than 20 mm, the series of tests shall be considered invalid. In this case the test shall be repeated with a new test specimen after the apparatus has been thoroughly checked for faults.

8 EXPRESSION OF TEST RESULTS Impact strength index shall be expressed as the number of drops to cause failure of the sheath or core and breakage of the entire test specimen.

9 TEST REPORT The following information shall be reported:

- (a) Reference to this Australian Standard, i.e. AS 4143.4.
- (b) The impact strength index for the sheath or core.
- (c) The impact strength index for the entire test specimen.
- (d) Whether the sheath or the core failed first or whether they both failed at the same time.