

Australian Standard[®]

Methods of test for fibre ropes

Method 5: Resistance to flexion and surface abrasion

METHOD

1 SCOPE This Standard sets out methods for measuring the resistance to flexion and surface abrasion of fibre rope.

NOTES:

- 1 Certain types of rope, e.g. aramid, are very prone to abrasion and require sheathing or water lubrication. These types of ropes should not be tested for abrasion resistance by the method in this Standard.
- 2 This method is intended for use when assessing the life expectancy of ropes used as mooring lines or cargo restraints. A method for testing the resistance to abrasion of multiple-layer rope is given in AS 4143.6(Int) and it is considered by emergency services to be more appropriate for life rescue lines.

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 |
| 4143 | Methods of test for fibre ropes |
| 4143.1 | Method 1: Dimensions, linear density, breaking force and elongation |
| 4143.6(Int) | Method 6: Resistance to abrasion |

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 Resistance to flexion and surface abrasion is obtained by flexing and abrading the rope in a test apparatus. The test specimen is flexed and abraded for a certain number of cycles dependent upon its diameter. This simulates the general wear and tear which could occur during a long period of usage. Its breaking force is then determined and compared to the breaking force of an unabraded specimen.

5 APPARATUS The following apparatus is required:

- (a) A conditioning facility for providing and maintaining a standard atmosphere of temperature $20 \pm 2^\circ\text{C}$ and relative humidity $65 \pm 2\%$.
- (b) An abrasion and flexion tester (see Figures 1 and 2) consisting of the following:
 - (i) A rigid frame holding four stationary rods each of the diameter specified in Table 1, spaced by a gap which is three times the diameter of the rope being tested. The roughness of each rod shall average $0.4 \mu\text{m}$ and be no greater than $4 \mu\text{m}$.

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- (ii) A crank driven at a rate of 15 r/min by a motor and designed so that when a rope is mounted on the crank and the crank is turned, the rope moves a distance of 100 mm.
- (iii) An 80 kg mass with a suitable rope attachment point.

TABLE 1
DIAMETER OF RODS

millimetres	
Rope diameter	Rod diameter
11 to 16	25
17 to 36	37.5
37 to 80	50

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(a). Preparation of test specimens and subsequent testing shall, if possible, be conducted without removal from the standard atmosphere, otherwise testing shall be commenced within 10 min of the test specimen being removed from that atmosphere.

6.3 Test specimens Two test specimens, each 1 m in length, shall be prepared.

7 PROCEDURE The procedure shall be as follows:

- (a) Mount a test specimen in the flexion and abrasion tester as shown in Figure 1.
- (b) Abrade the rope for n cycles, with n being given by the following equation:

$$n = \frac{2000d^2}{121} \quad \dots 7$$

where

d = rope diameter, in millimetres

- (c) Examine the surface of the test specimen noting any special features.
- (d) Determine the breaking force of the test specimen in accordance with the method set out in AS 4143.1.
- (e) Repeat Steps (a) to (d) with the second test specimen.

8 CALCULATION AND EXPRESSION OF RESULTS The resistance to flexion and surface abrasion of each test specimen shall be calculated using the following equation:

$$R_{sa} = \frac{BF_A}{BF_{NA}} \times 100 \quad \dots 8$$

where

R_{sa} = the resistance to flexion and surface abrasion of a rope

BF_A = the breaking force of the abraded test specimen

BF_{NA} = the breaking force of the non-abraded test specimen

The average resistance of the two test specimens shall then be calculated.