AS 1180

Australian Standard®

METHODS OF TEST FOR HOSE MADE FROM ELASTOMERIC MATERIALS

Third Group Methods 9A, 9B, 9C

METRIC UNITS

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Associated Chambers of Manufactures of Australia
Australian and New Zealand Railways Conferences
Country Roads Board, Victoria
Electricity Trust of South Australia
Government Stores Department, N.S.W.
The Institution of The Rubber Industry
Metropolitan Water, Sewerage and Drainage Board, Sydney
Petroleum Marketing Engineers Advisory Committee
Society of Automotive Engineers, Australasia
State Electricity Commission of Victoria

This standard is under continuous preparation by Committee RU/1, Rubber Hose, and methods are being progressively approved for publication.

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Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

LIST OF METHODS

The methods so far published are:

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Method	Date	Title	
1180.1	June 1972	Dimensions	
1180.2	June 1972	Tensile Strength and Elongation	
1180.3	June 1972	Accelerated Ageing	
1180.4A	June 1972	Ply Adhesion— Dead Weight Method	
1180.4B	June 1972	Ply Adhesion— Autographic Method	
1180.5A	June 1972	Hydrostatic Pressure —Burst Test	
1180.5B	June 1972	Hydrostatic Pressure —Proof Test	
1180.5C	November 1972	Hydrostatic Pressure — Change-in-Length Test	
1180.5D	June 1972	Hydrostatic Pressure —Leak Test	
1180.5E	June 1972	Hydrostatic Pressure —Expansion and Distortion Test	
1180.6	June 1972	Impulse Test	
1180.7A	November 1972	Resistance of Hose Lining and Cover to Liquids	
1180.7B	November 1972	Resistance to Liquids—Physical	
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1180.7D	November 1972	Resistance to Detergent	
1180.7E	November 1972	Resistance to Oil	
1180.7F	November 1972	Resistance of Hose Lining and Cover to Ozone	
1180.7G	November 1972	Corrosion Resistance	
1180.7H	November 1972	Electrical Conductivity	
1180.7J	November 1972	Resistance to Vacuum	
1180.8A	November 1972	Resistance to Cold Flexing of Hose Assembly	
1180.8B	November 1972	Resistance to Cold Flexing of Hose Lining and Cover	
1180.9A	June 1973	Hardness of Vulcanized Rubbers of Standard	
		Hardness (35 to 85 IRHD)	
1180.9B	June 1973	Hardness of Vulcanized Rubbers of Low Hardness	
		(10 to 35 IRHD)	
1180.9C	June 1973	Hardness of Vulcanized Rubbers of High Hardness	
		(85 to 100 IRHD)	

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Australian Standard Methods of Test for HOSE MADE FROM ELASTOMERIC MATERIALS

METHOD 9A. HARDNESS OF VULCANIZED RUBBERS OF STANDARD HARDNESS (35 TO 85 IRHD)

FOREWORD

The hardness test described herein is based on a measurement of the indentation of a rigid ball into the rubber test piece under specified conditions. For the normal test the standard test piece is between 8 and 10 mm thick; test pieces less than 8 mm thick give smaller indentation than the standard. For tests on thin pieces of rubber a scaled-down version (hereinafter referred to as the micro-test) of the normal test is therefore used, in which the apparatus dimensions are reduced to one-sixth. When used on a piece 1.6 to 2.0 mm in thickness, the result of the micro-test will be about the same as that obtained by the normal test.

It is considered unrealistic to fix a precise thickness above which the normal test should be used and below which the micro-test should be used, but, in general, the latter test should be used for thicknesses below about 4 mm. There will, however, be exceptions; for instance, the micro-test would be preferable even on thicknesses above 4 mm if the lateral dimensions of the test piece are much less than those specified for the normal test (see Table 2), because the latter test would then be inaccurate. The micro-test would also be preferable for testing some small awkwardly-shaped rubber articles. The figure of 4 mm has been chosen for the following reasons:

- (a) At this thickness the normal test will give readings in international rubber hardness degrees (IRHD) higher than the 'standard' reading (i.e. on 8 to 10 mm thickness), and the micro-test will give readings lower than this (because this test gives the 'standard' reading on a thickness of about 1.6 to 2.0 mm). These two errors are about equal when the thickness tested is 4 mm.
- (b) 4 mm is the greatest thickness on which the micro-test could be made without increasing the lateral dimensions of the test piece above that now specified (i.e. 2 mm minimum between the indenter and the edge of the test piece).

In either the normal test or the micro-test, tile measured indentation is converted into international rubber hardness degrees, the scale of degrees being so chosen that

0 represents the hardness of a material having an elasticity modulus of zero and 100 represents the hardness of a material of infinite elasticity modulus, and so that the following conditions are fulfilled over most of the normal range of hardness:

- (i) One international rubber hardness degree always represents approximately the same proportionate difference in Young's modulus.
- (ii) For highly elastic rubbers, the scales of international rubber hardness degrees and the Shore A durometer are comparable.

For substantially elastic isotropic materials, e.g. well-vulcanized natural rubbers, the hardness in international rubber hardness degrees bears a known relation to Young's modulus, although for markedly plastic or anisotropic rubbers the relationship will be less precisely known.

NOTE: The need for this method stems from a requirement in AS 1180.7A, Resistance of Hose Lining and Cover to Liquids, which calls for determination of change in hardness. This necessitated the preparation of three methods of test for hardness in the standard, low (method 1180.9B) an high (method 1180.9C) ranges.



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