AS 1180

Australian Standard®

METHODS OF TEST FOR HOSE MADE FROM ELASTOMERIC MATERIALS

Third Group Methods 9A, 9B, 9C

METRIC UNITS

The following scientific, industrial and governmental organizations and departments were officially represented on the committee which prepared this standard:

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.

LIST OF METHODS

The methods so far published are:

No of 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
1180.7C	November 1972	Resistance to Steam
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)

STANDARDS ASSOCIATION OF AUSTRALIA

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.