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Australian Standard®

# METHODS FOR SAMPLING AND TESTING ADHESIVES

## Part 9— BROOKFIELD VISCOSITY OF LIQUID ADHESIVES

The following scientific, industrial, consumer and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Adhesives and Sealants Manufacturers Association of Australia
Associated Chambers of Manufactures of Australia
Australian Chemical Industry council
Australian Federation of Consumer Organizations
Australian Institute of Packaging
CSIRO, Division of Building Research
Department of Defence
Footwear Manufacturers Federal Executive Council
Plastics Institute of Australia
Plywood Association of Australia
Printing and Allied Trades Employers Federation of Australia
Railways of Australia Committee
Society of Automotive Engineers— Australasia
Telecom Australia

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# Part 9— BROOKFIELD VISCOSITY OF LIQUID ADHESIVES

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# PREFACE

This standard for determining the Brookfield viscosity of liquid adhesives was prepared by the Association's Committee on Adhesives under the authority of the Chemical Standards Board, as Part 9 of a set of methods of test for adhesives.

The standard is intended primarily for use in the testing of adhesives for compliance with relevant material specifications. It is intended to be part of the relevant material specification when specifically referred to in that specification and will be subject to any qualifications or modifications given therein.

Others in the series that have been published are—

Part 1— Sampling

Part 2— Corrosive Effect of Set Adhesives on Metals

Part 3— Bond Strength of Cured Wood-to-wood Adhesives in Shear

Part 4— Wearing Effects of Set Adhesives on Cutting Edges

Part 5— Behaviour of Cured Wood-to-wood Adhesives under Long Term Loading

Part 6— Preferred Conditions for Testing the Water Resistance of Adhesives
Section 1 — Cellulosic Substrates

Part 7 — pH Value of Aqueous Extracts of Uncured Adhesives and of Their Components, and of Cured Adhesive Films

Part 8— Storage Properties of Adhesives.

Viscosity determinations are of considerable importance in the evaluation of adhesives, as viscosity affects the spreadability of the adhesive and its flow in the bond line. Because the Brookfield viscometer is the most commonly used instrument in the adhesives industry, the committee decided to specify a method for the determination of viscosity by means of this instrument. In order to promote international cooperation and facilitate international comparison, ISO/R 2555 has been adopted with suitable editorial amendment. The technical content remains identical.

The standard describes a method of determining Brookfield viscosity, by means of one of the rotation spindle types of Brookfield viscometers. The standard is specifically for RV models, and all tables refer to this type which appears to be more commonly used and also covers a much greater range of viscosity than the LV model. However, other types such as LV may be used but suitable tables are not included in this standard. The Brookfield viscometers, RV models, permit viscosity measurements from 0.02 Pa.s to 8000 Pa.s. Determination of Brookfield RV viscosity of liquids, for example, is given in Appendix A.

This standard does not deal with the determination of the type of rheological behaviour of the adhesive. A method for such determination is specified in AS 1937, Methods of Test for Sealers and Adhesives for Automotive Purposes—Determination of Flow Properties in Absolute Units.

This standard refers to the following standards:

AS Z61 Glossary of Rheological Terms

ISO/R 291 Plastics — Standard Atmospheres for Conditioning and Testing.

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STANDARDS ASSOCIATION OF AUSTRALIA

# Australian Standard

# METHODS FOR THE SAMPLING AND TESTING OF ADHESIVES

## PART 9—BROOKFIELD VISCOSITY OF LIQUID ADHESIVES

**1 SCOPE.** This standard describes a procedure for determining the Brookfield viscosity of resins and adhesives in a liquid or similar state.

NOTE: The standard refers specifically to the use of RV models, which permit viscosity measurements from 0.02 Pa.s to 8000 Pa.s (see Table 1).

**2 PRINCIPLE.** A spindle, of cylindrical or related form (disc), is driven by a synchronous motor at a constant speed in the product being studied. The resistance exerted by the fluid on the spindle, which depends on the viscosity of the product and the spindle speed used, causes the tightening of a spiral spring which is indicated by the movement of a needle on a dial.

'Brookfield viscosity' is obtained by multiplying this dial reading by a coefficient which depends on the speed of rotation and on characteristics of the spindle.

The products to which this method may be applied are generally non-newtonian. With such fluids, the measured viscosity depends on the velocity gradient to which the product is subjected during measurement and is not a constant value, as in the case of the classical newtonian fluids. Thus, with non-newtonian fluids, different spindle speeds which, in turn, give different velocity gradients, will also give different viscosity values.

Further, with these types of viscometer, the velocity gradient is not the same for every point of the spindle. Thus, for a non-newtonian fluid, the result is not strictly the true 'viscosity at a known velocity gradient' and therefore is conventionally called 'Brookfield RV viscosity'.

**3 APPARATUS.**

**3.1 Brookfield 'Synchro-lectric' Viscometer.** The RV model (RVF, RVF-100 or RVT type), chosen according to the product to be tested and the desired experimental accuracy.

NOTE: The detailed working principle of this apparatus, its description, and the characteristics of the three types are given in Appendix B.

Each viscometer consists of the following:

(i) Viscometer body.

(ii) Seven interchangeable spindles, numbers 1 to 7 (No 1 being the largest), carry a mark indicating the immersion level in the liquid.