STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

RECONFIRMATION

OF
AS/NZS 1580.214.6:1995
Paints and related materials–Methods of test
Method 214.6: Consistency—ISO flow cups

RECONFIRMATION NOTICE

Technical Committee CH-003 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 30 May 2013.

Approved for reconfirmation in New Zealand on behalf of the Standards Council of New Zealand on 26 August 2013.

The following are represented on Technical Committee CH-003

Australasian Corrosion Association
Australian Paint Approval Scheme
Australian Paint Manufactures' Federation
Australian Pipeline Industry Association
Institution of Professional Engineers New Zealand
Master Painters New Zealand Association
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ISO 2431:1993
ISO 2431:1993/Cor.1:1994
Reconfirmed 2013

Australian/New Zealand Standard®

Paints and related materials—Methods of test

Method 214.6: Consistency—ISO flow cups

PREFACE

This Standard was prepared by the Joint Standards Australia/New Zealand Committee CH/3 on Paints and Related Materials. It is issued as a Joint Standard under the terms of the Active Cooperation Agreement between Standards Australia and Standards New Zealand.

This Standard is identical with, and has been reproduced from ISO 2431:1993, *Paints and varnishes—Determination of flowtime by the use of flow cups.*

The objective of this Standard is to provide a method of testing the consistency of paint using ISO type flow cups. The Standard is an alternative method to that specified in AS 1580.214.2, *Paints and related materials—Methods of test*, Method 214.2: *Consistency—Flow cup,* which uses flow cups based on the obsolete BS 3900: Part A6: 1971.

It is recognized that the flow times are reproducible only for products of Newtonian or near-Newtonian flow properties, effectively limiting the practical use of flow cups. Nevertheless, for checking purposes, flow cups do serve a useful purpose. Furthermore, the measurement of flow time is often used to confirm the application consistency.

Paints often contain flow-arresting agents to confer increasing viscosity. Such paints exhibit anomalous flow properties. Their viscosity during application can only be properly assessed using viscometers operating at high velocity gradients, such as that described in AS 1580.214.3.

Resins and varnishes may exhibit Newtonian or near-Newtonian flow at much higher viscosities than most paints and, where this applies, flow cups can provide a useful means of controlling the consistency. To meet this requirement, this Standard provides flow cups suitable for viscosities up to about 700 mm^2/s.

Recommendations for the use of flow cups for the adjustment of paint consistency are given in Annex A.

The term ‘informative’ has been used in this Standard to define the application of the Appendix. An ‘informative’ appendix is only for information and guidance.

For the purpose of this Standard, the source text of ISO 2431 should be modified as follows:

(a) *Terminology* The words ‘this Australian/New Zealand Standard’ should replace the words ‘this International Standard’ wherever they appear.

(b) *Decimal marker* Substitute a full point for a comma where it appears as a decimal marker.

(c) *References* The references to international Standards should be replaced by references, where appropriate, to the following Australian or Joint Australian/New Zealand Standards:

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Reference to International Standard or other publication		*Australian/New Zealand Standard*	
ISO		AS/NZS	
1512	Paints and varnishes — Sampling of products in liquid or paste form	1580	Paints and related materials — Methods of test
		1580.102.1	Method 102:1 Sampling procedure
1513	Paints and varnishes — Examination and preparation of samples for testing	1580.103.1	Method 103.1: Preliminary examination and preparation for testing
2884	Paints and varnishes — Determination of viscosity at a high rate of shear	1580.214.3	Method 214.3: Viscosity — Cone and-plate

(d) *Test temperature* In Clause 4 and Clause 7.2.2 *delete* (23 ±0.5)°C and *substitute* (25 ±0.5)°C.

This Standard incorporates the Technical Corrigendum ISO 2431:1 993/Cor. 1:1994 for Figure 1 and is highlighted by a vertical bar.

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METHOD

1 Scope

1.1 This International Standard is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

1.2 This International Standard specifies a method for determining the flow time of paints, varnishes and related products that may be used to control consistency. A method for the adjustment of paints to the correct application consistency at the application temperature is described in annex A.

1.3 Four flow cups of similar dimensions, but having orifice diameters of 3 mm, 4 mm, 5 mm and 6 mm, are specified. The method for their calibration is given.

1.4 The method is limited to testing materials for which the breakpoint of the flow from the orifice of the flow cup can be determined with certainty. This point is difficult to determine and reproduce for materials with flow times in excess of 100 s due to slowing-down effects.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1512:1991, *Paints and varnishes — Sampling of products in liquid or paste form.*

ISO 1513:1992, *Paints and varnishes — Examination and preparation of samples for testing.*

ISO 2884:1974, *Paints and varnishes — Determination of viscosity at a high rate of shear.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 flow time: Time that elapses from the moment when the material under test starts to flow from the orifice of the filled cup to the moment when the flow stream of material first breaks close to the orifice.

3.2 Newtonian flow: Type of flow exhibited by a material in which the ratio of the shear stress to the velocity gradient does not vary either with time or with the velocity gradient. When variations in this ratio are small, the effect on viscosity of mechanical disturbance, such as stirring, is negligible and the material is said to have near-Newtonian flow.

3.3 anomalous flow: Type of flow exhibited by a material in which, at a constant temperature, the ratio of the shear stress to the velocity gradient varies either with time or with rate of shear. For example, with so-called thixotropic materials, stirring or other such mechanical disturbance immediately before test will reduce the flow time below that for an unstirred sample. With such materials, uncertain and variable values for flow time are obtained in all flow cups.

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3.4 dynamic viscosity: Ratio of the applied shear stress to the velocity gradient.

NOTE 1 The SI unit for dynamic viscosity is the pascal second (Pa·s). The traditional unit is the centipoise (cP); 1 cP = 1 mPa·s.

3.5 kinematic viscosity: Ratio of the dynamic viscosity to the density of the liquid.

NOTE 2 The SI unit for kinematic viscosity is the square metre per second (m^2/s). The traditional unit is the centistokes (cSt); 1 cSt = 1 mm^2/s.

4 Temperature considerations

The effect of temperature on flow time is highly significant with respect to application properties and varies with the type of product.

For international reference purposes, it is essential to standardize one test temperature and (23 ± 0,5) °C is specified in this International Standard. However, it may be more convenient to carry out comparative testing at some other agreed temperature (for example, 25 °C) because of prevailing temperature conditions.

For control by flow time, the test sample and flow cup shall be conditioned to an agreed or specified temperature and it shall be ensured that the temperature variation does not exceed 0,5 °C during testing.

5 Apparatus

5.1 Flow cups

5.1.1 Dimensions

The dimensions of the ISO flow cups and the tolerances allowed in manufacture shall be as shown in figure 1.

NOTE 3 The most critical tolerance is the internal diameter of the jet of the cup, because the flow time is inversely proportional to the fourth power of this dimension.

The jet of the cup shall be made of stainless steel or sintered carbide, unless otherwise specified, and the body of the cup shall be made of a material which is corrosion resistant and is not affected by the products to be tested.

5.1.2 Construction

The dimensions not specified, such as wall thickness, shall be such that no distortion of the cup can occur in use. The external shape shown in figure 1 is recommended, but may be modified for convenience of use, or manufacture, provided that the protruding jet of the cup is protected from accidental damage as far as possible by an external protective sleeve. Such a protective sleeve shall not be immediately adjacent to the jet, so as to prevent a capillary action when the material under test flows out.

NOTE 4 Flow cups having a casing for temperature control are preferred.

5.1.3 Finish

The interior surfaces of the cups, including the orifice, shall be smooth and free from turning marks, crevices, ledges and burrs which may cause random flow or trap sample or cleaning material.

NOTE 5 The standard of finish required is equivalent to a maximum roughness [1] of not more than 0,5 µm.

5.1.4 Calibration

Dimensionally similar cups will give, with Newtonian liquids, similar flow times, provided that the temperature of testing is precisely the same. The use of such liquids to calibrate cups provides a useful means of initially checking that dimensionally similar cups are within the accepted tolerances of performance and also for checking from time to time whether any wear or damage has taken place sufficient to bring a cup outside the accepted tolerances.

For calibration of any particular cup, use a standard oil [2] of known kinematic viscosity and draw a graph of kinematic viscosity versus temperature from the data given by the supplier for the oil.

Using the procedure described in clause 7, determine the flow time of the oil at a known temperature within the range 20 °C to 30 °C, measured to the nearest 0,1 °C.

Record this flow time, which should be in the range 30 s to 100 s and preferably near the mid-point of this range, to an accuracy of 0,2 s.

From the prepared graph, read the kinematic viscosity at the test temperature.

Using the appropriate equation, calculate the flow time corresponding to this kinematic viscosity.

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1) In the sense defined in ISO 468:1982, *Surface roughness — Parameters, their values and general rules for specifying requirements;* i.e. the arithmetical mean deviation R_a from the mean line of the profile.

2) Information on suppliers of suitable oils can be obtained from national standards organizations.

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