

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

RECONFIRMATION

OF

AS/NZS 1580.214.0:1996

Paints and related materials—Methods of test

Method 214.0: Rheological properties—Guide to test methods

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.

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The following are represented on Technical Committee CH-003:

Australasian Corrosion Association
Australian Paint Approval Scheme
Australian Paint Manufacturers' Federation
Australian Pipeline Industry Association
Institution of Professional Engineers New Zealand
Master Painters New Zealand Association
Water Corporation Western Australia

NOTES

Australian/New Zealand Standard®

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CH/3 on Paints and Related Materials, with the objective of providing background information on the various methods in the AS/NZS 1580.214 series for testing the viscosity of paint materials. It serves as an introduction and guide to the AS/NZS 1580.214 series of tests, particularly for parties involved in drawing up or responding to tenders, or those involved in the independent testing of paint products.

This Standard is essentially the same as the 1990 edition; however, reference is made to AS/NZS 1580.214.6 and Table A1 has been modified to standardize the sample temperatures and nominate periods for checking performance.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

The following references have been drawn upon during preparation of this Standard:

PATTON, T.C. *Paint flow and pigment dispersion*. Interscience, 1966.

SWARD, G.G. *Paint testing manual*. American Society for Testing and Materials, ASTM Special Publication 500.

CHATFIELD, H.W. *The science of surface coatings*. Benn, 1962.

METHOD

1 SCOPE This Standard provides guidance on the suitability of methods for determining the consistency or viscosity, or both, of paints and related liquids, from the AS/NZS 1580.214 series of tests. In addition, it describes appropriate sample preparation procedures for materials to be tested.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

3882 Rheology—Glossary of terms and classification of properties

AS/NZS

1580 Paints and related materials—Methods of test

1580.101.4 Method 101.4: Conditions of test, temperature controlled

1580.214.1 Method 214.1: Consistency—Stormer viscometer

1580.214.2 Method 214.2: Consistency—Flow cup

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- 1580.214.3 Method 214.3: Viscosity—Cone-and-plate
 1580.214.4 Method 214.4: Consistency—Rototinner
 1580.214.5 Method 214.5: Consistency—Rotational viscometer
 1580.214.6 Method 214.6: Consistency—ISO flow cups

BS

- 3900 Methods of test for paints
 3900.A6 Part A6: Determination of flow time by use of flow cups (*withdrawn 1986*)

3 DEFINITIONS For the purpose of this Standard, the definitions in AS 3882 and those below apply.

3.1 Consistency—the flow properties of a material measured in an empirical manner, typically by its resistance to a shear force.

3.2 Newtonian liquid—a liquid whose viscosity remains constant at constant temperature, irrespective of the rate of shear.

3.3 Pseudoplasticity—the property of showing a decrease in the apparent viscosity of a material with an increase in shear rate. The effect is dependent on the stress level but is independent of time.

3.4 Recovery time—the time taken for a liquid to return to its original condition after removal of the shear force.

3.5 Rheology—the study of the flow properties of materials.

3.6 Standard oil—an oil whose viscosity has been determined and certified by a laboratory registered for this purpose with the National Association of Testing Authorities.

3.7 Thixotropy—a decrease in the apparent viscosity of a liquid while under shear stress. This is followed by a gradual recovery when the stress is removed. The effect is time dependent (see also pseudoplasticity).

3.8 Viscosity—the quantifiable relationship between applied shear force and shear rate for a fluid.

4 SUITABILITY OF AVAILABLE METHODS

4.1 General The true viscosity of paints and related materials is only determinable on instruments where the shear rate and resulting shear stress are measurable and the flow conditions uniform.

Method 214.3, which describes the use of the cone-and-plate viscometer, will yield the absolute viscosity, although expressions for shear stress and shear rate can be derived for Method 214.5.

For Methods 214.1, 214.2, 214.4 and 214.6, it is not possible to determine the shear parameters from the geometry of the respective 'viscometer' and the results of determinations using such apparatus can only be regarded as arbitrary.

Most paints are non-Newtonian in nature, i.e. the viscosity varies (often, considerably) with the applied rate of shear and, therefore, the results of viscosity measurement at low rates may not be representative of those measured at high rates of shear. Methods 214.1, 214.2, 214.5 and 214.6 are low shear rate methods, Method 214.4 is a low to medium shear rate method, and Method 214.3 is a very high shear rate method ($10\,000\text{ s}^{-1}$). This last method is most representative of the conditions which operate during brush application of conventional paints, i.e. rates of $3\,000\text{ s}^{-1}$ to $15\,000\text{ s}^{-1}$.

Comparative attributes of each method are provided in Table A1 of Appendix A to this guide.