

Australian Standard™

Paints and related materials—Methods of test**Method 301.1: Non-volatile content by mass**

PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia Committee CH-003, Paints and Related Materials. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

This Standard incorporates Amendment No. 1 (March 2006). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard is substantially the same as that issued in 1975, but limits the sample mass to 1.0 to 1.5 g and specifies precision data for the test method.

METHOD

1 SCOPE

This Standard sets out a procedure for determining the non-volatile matter by mass of paints and related materials, under specified conditions of time and temperature.

NOTE: Other temperatures and heating durations may be used providing the conditions are stated in the test report.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1580	Paints and related materials—Methods of test
1580.101.4	Method 101.4: Conditions of test—Temperature control
1580.102.1	Method 102.1: Sampling procedure
1580.102.2	Method 102.2: In-process sampling
1580.103.1	Method 103.1: Examination and preparation of samples for testing
1681	Safety requirements for electrically heated Type 1 ovens in which flammable volatiles can occur
2310	Glossary of paint and painting terms
2831	Thermometers—Solid stem—Long and short—For precision use

3 DEFINITIONS

For the purpose of this Standard, the definitions of AS 2310 apply.

4 PRINCIPLE

A known mass of test paint is heated in an oven at specified temperature for a specified duration, and then reweighed. The non-volatile content is calculated as a percentage of the original sample mass.

5 APPARATUS

5.1 Dish

Shallow flat-bottom, of heat resistant metal or glass that is inert to test material, and approximately 80 mm in diameter.

5.2 Oven

Fan-forced ventilated, capable of maintaining a temperature of $105 \pm 3\%$ or as specified.

5.3 Desiccator

Containing a suitable active desiccant, and capable of accommodating the dish.

5.4 Thermometer

Capable of recording the temperature of the test environment to an accuracy of at least $\pm 0.5^\circ\text{C}$ in 1°C graduations.

NOTE: AS 2831 specifies thermometers which satisfy this requirement.

5.5 Weighing balance

Capable of weighing up to at least 100 g, to an accuracy of ± 0.0001 g.

5.6 Stirring rod

Thin glass or metallic wire.

5.7 Weighing bottle

Thin walled bottle of suitable size with ground glass stopper, or a syringe.

6 TEST REQUIREMENTS

6.1 Laboratory environment

The tests shall be carried out under the conditions specified in AS 1580.101.4.

6.2 General

The following requirements shall be adhered to throughout the test:

- (a) The tests described in Clause 9 shall be performed at least twice, either by parallel duplication or by two separate procedures.
- (b) All weighings shall be determined and recorded to an accuracy of ± 0.0001 g.

7 OCCUPATIONAL HEALTH AND SAFETY GUIDANCE

- (a) Follow precautions for use outlined in suppliers Materials Safety Data Sheet (MSDS).
- (b) Precautions shall be taken to ensure that the loading is such that the concentration of volatiles within the oven does not exceed the explosive limit. AS 1681 provides a guide to the explosive limits for commonly used liquids. In most instances the solvent vapour concentration should not exceed 20 g/m^3 .
- (c) Mechanical ventilation, exhausting to the outdoor atmosphere, may need to be provided to ensure adequate ventilation of the oven and to avoid contamination of the work environment.

- (d) Appropriate safety precautions to be observed when handling hot items.

8 SAMPLING AND SAMPLE PREPARATION

A representative sample of the test product shall be taken in accordance with AS 1580.102.1 or AS 1580.102.2, and prepared in accordance with AS 1580.103.1.

9 PROCEDURE

The procedure shall be as follows:

- (a) Dry the dish and, if required, the stirring rod to constant mass at $105 \pm 3^\circ\text{C}$ or as specified and cool in the desiccator. Record the mass of the dish and stirrer to the nearest 0.0001 g (m_1).
- (b) Weigh 1.0 to 1.5 g of the prepared paint into the dish. Record the mass of paint, stirrer and dish (m_2) to the nearest 0.0001 g.

If the sample is of high volatility, weigh by difference from a stoppered weighing bottle or syringe.

If the sample is a viscous liquid or a material of known low volatility, weigh directly into the dish.

- (c) Spread the material evenly over the dish by tilting and, if necessary, by the addition of up to 3 mL of a suitable volatile diluent, and the use of the stirring rod weighed with the dish.

NOTE: Suitable diluents are mineral turpentine for oil-based paints, water for water-based paints, acetone for nitro-cellulose lacquers.

- (d) Heat the dish, contents and stirring rod in the oven for $3 \text{ h} \pm 5 \text{ min}$ at $105 \pm 3^\circ\text{C}$ or as specified.
- (e) Remove from the oven and cool the dish contents and stirring rod to room temperature in the desiccator, and weigh them in air to the nearest 0.0001 g. Record the weight (m_3).

10 CALCULATION

Calculate the non-volatile content by mass of the test material, to four significant figures, from the following equation:

$$A1 \quad NVM = \frac{(m_3 - m_1)}{(m_2 - m_1)} \quad \dots 1$$

where

NVM = non-volatile content of test material, as percent by mass

m_3 = mass of dish, stirrer and dried test material (Clause 9(e)), in grams

m_1 = mass of dish and stirrer (Clause 9(a)), in grams

m_2 = mass of dish, stirrer and test material (Clause 9(b)), in grams

11 PRECISION

11.1 General

An interlaboratory trial on this method was conducted in 2002 and involved 51 laboratories. Two samples of a water-based paint were tested.

After removal of statistical outliers, the data in Table 1 was determined.