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Methods of

Test for paints —

Part F2: Determination of resistance to humidity (cyclic condensation)

It is recommended that this Part be read in conjunction with the general information in the Introduction to BS 3900 issued separately (revised edition published March 1969).

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Foreword

This Part of BS 3900 was first published in 1966 and is based on DEF-1053 Method No. 25 "Resistance to humidity under condensation conditions". More recently, with the implementation of ISO 6270:1980 as BS 3900-F9 "*Determination of resistance to humidity (continuous condensation)*", it was decided that this Part of BS 3900 should be retained for a limited period while there is still some requirement by users.

While the two methods have some common features, the method described in this Part is carried out using cyclic condensation conditions, and this is reflected in the difference in the titles. Because of the likelihood of the withdrawal of this Part following the decision by ISO not to accept this method, users are recommended to consider the adoption of the method described in Part F9.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 and 2 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date of issue	Comments

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1 Scope

This Part of BS 3900 describes a procedure for determining the resistance to humidity under condensation conditions, induced by cyclic temperature changes between 42 °C and 48 °C, of a single coat film or multicoat system of paint, varnish or related product.

2 Supplementary information

The method of test described below requires to be completed, for any particular application, by the following supplementary information. This information is to be derived from the British Standard or other document for the product under test or, where appropriate, is to be the subject of agreement between the parties to the test.

- 1) Material and surface preparation of substrate.
- 2) Method of application of test coating to substrate.
- 3) Thickness, in micrometres, of dry coating, including method of measurement in accordance with BS 3900-C5¹⁾ and whether it is a single coat film or a multicoat system.
- 4) Duration and conditions of drying of the coated panel before testing (or conditions of stoving and ageing, if applicable) before testing.
- 5) Duration of test.
- 6) How inspection of the test coating is to be made and what characteristics are to be considered in evaluating its resistance properties.

3 Apparatus

3.1 The apparatus shall consist of a closed cabinet in which the relative humidity is maintained at approximately 100 % and the temperature is cycled continuously over the range 42 °C to 48 °C, thereby ensuring that copious condensation occurs on test panels positioned vertically within the cabinet.

NOTE If the cabinet is copper lined, the copper should be tinned or coated with a suitable organic coating to prevent the solution of small amounts of copper in the water.

3.2 The design and dimensions of the apparatus are left to the user's discretion, provided that the following conditions are observed.

3.2.1 Humidification. The humidity shall be maintained by evaporation of distilled water²⁾ from a reservoir covering (or situated in) the bottom of the cabinet. The water shall be maintained free from grease or oil.

3.2.2 Heating. The cabinet shall be heated through the medium of the water by a heater placed immediately below the water reservoir or, alternatively, by a heater completely immersed in the water.

3.2.3 Temperature cycle. The heater shall be controlled by two thermostats (placed in the air space above the water) in such a way that the temperature of the air space is cycled continuously from 42 °C to 48 °C and back to 42 °C in 60 ± 5 minutes.

The times required for heating and cooling shall be approximately equal. A recording thermometer is desirable for ensuring that the temperature cycle is correct.

3.2.4 Air circulation. The air in the cabinet shall be circulated by means of a fan in such a way that the temperatures at any two points in the air space do not differ by more than 1.0 °C at any given moment.

3.2.5 Spacing of panels. With cabinets as usually constructed, it is inadvisable to place the panels less than 40 mm apart or less than 40 mm from any side of the cabinet.

3.2.6 Suspension of panels. If the panels hang in the cabinet, it is essential that the hooks and rods from which they are suspended shall be made of glass or plastics material. If racks are used, the panels shall stand vertically and be suitably insulated from any metal parts.

The position of the panels in the cabinet shall be interchanged throughout the test period, once every 24 hours.

NOTE The cabinet should be opened only at intervals of 24 hours, for inspection of panels, maintenance of the water level, rotation of panels, etc.

4 Sampling

A representative sample of the product to be tested (or of each product in the case of a multicoat system) shall be taken as described in BS 3900-A1³⁾. The sample(s) shall then be examined and prepared for testing as described in BS 3900-A2⁴⁾.

5 Test panel

5.1 Materials and dimensions. Unless otherwise specified or agreed the test panel shall be of burnished steel complying with the requirements of BS 3900-A3⁵⁾, of approximate dimensions 150 mm × 100 mm × 1.25 mm.

NOTE Results of tests carried out on different substrates do not necessarily correlate with each other.

¹⁾ BS 3900-C5, "Determination of film thickness".

²⁾ BS 3978, "Water for laboratory use".

³⁾ BS 3900-A1, "Sampling".

⁴⁾ BS 3900-A2, "Examination and preparation of samples for testing".

⁵⁾ BS 3900-A3, "Standard panels lot paint testing".

5.2 Preparation and coating of test panel. The test panel shall be prepared in accordance with BS 3900-A3,⁶⁾ unless otherwise specified, and shall then be coated by the specified method with the product or system under test in accordance with BS 3900-A4⁷⁾.

The back and edges of the panel shall also be coated, using a good quality protective paint not containing zinc chromate or any similarly water-soluble pigment.

5.3 Drying of test panel. The coated panel shall be dried (or stored) for the specified time and under the specified conditions and, unless otherwise specified, shall be conditioned at a temperature of 23 ± 2 °C and relative humidity of 50 ± 5 % for a minimum of 16 hours, with free circulation of air and not exposed to direct sunlight.

5.4 Thickness of coating. The thickness of the dry coating shall be determined by the method specified, in accordance with BS 3900-C5⁸⁾.

6 Procedure

6.1 General. The test procedure shall be carried out immediately upon completion of the conditioning period.

6.2 Exposure procedure. Expose the panel in the cabinet for the specified period.

6.3 Interim inspections. For interim inspections during the test period, if specified, the panel shall be removed from the cabinet, blotted with absorbent paper, examined for blistering or other signs of deterioration and immediately returned to the cabinet.

6.4 Final inspection. At the end of the specified test period, remove the panel from the cabinet, blot it with absorbent paper and immediately examine the whole test surface for blistering or other signs of deterioration. Allow the panel to stand at room temperature for 24 hours and examine the test surface again for loss of adhesion, rust staining, change of colour, embrittlement or other characteristics which may be specified.

Carefully remove a 150 mm × 50 mm strip from the test surface with a non-corrosive paint remover⁹⁾ and examine the exposed metal for signs of corrosion. Where panels are required to be kept for reference purposes the exposed area shall be protected by a suitable transparent lacquer.

7 Test report

The test report shall include at least the following information:

- 1) A reference to this British Standard.
- 2) Type and identification of the coating under test.
- 3) The items of supplementary information referred to in 2.
- 4) The British Standard or other document supplying the information referred to in 7 3) above.
- 5) Any deviation, by agreement or otherwise, from the test procedure described.
- 6) The thickness of the coating(s) tested, determined in accordance with 5.4.
- 7) The results of the test in terms of the stated requirements.
- 8) Date of the test.

⁶⁾ BS 3900-A3, "Standard panels lot paint testing"

⁷⁾ BS 3900-A4, "Notes for guidance on paint application".

⁸⁾ BS 3900-C5, "Determination of film thickness".

⁹⁾ See BS 3761, "Non-flammable solvent-based paint remover".

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