
INTERNATIONAL STANDARD



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Paints and varnishes — Determination of resistance to humid atmospheres containing sulphur dioxide

Peintures et vernis — Détermination de la résistance aux atmosphères humides contenant du dioxyde de soufre

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See ISO 6988

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3231 was drawn up by Technical Committee ISO/TC 35, *Paints and varnishes*, and circulated to the Member Bodies in April 1973.

It has been approved by the Member Bodies of the following countries :

Australia	India	Romania
Brazil	Iran	South Africa, Rep. of
Bulgaria	Ireland	Sweden
Czechoslovakia	Israel	Switzerland
Egypt, Arab Rep. of	Netherlands	Thailand
France	New Zealand	Turkey
Germany	Poland	United Kingdom
Greece	Portugal	

No Member Body expressed disapproval of the document.

Paints and varnishes — Determination of resistance to humid atmospheres containing sulphur dioxide

0 INTRODUCTION

This International Standard is one of a series dealing with the testing of paints, varnishes and related products. It should be read in conjunction with ISO 1512, *Paints and varnishes — Sampling*, ISO 1513, *Paints and varnishes — Examination and preparation of samples for testing*, ISO 1514, *Paints and varnishes — Standard panels for testing*, and ISO 2808, *Paints and varnishes — Determination of film thickness*.

The method of test specified requires to be completed, for any particular application, by the following supplementary information. This information shall be derived from the national standard or other document for the product under test or, where appropriate, should 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 the coating, including method of measurement and whether it is a single coating or a multicoat system;
- 4) duration and conditions of drying of the coated panel before testing (or conditions of stoving and ageing, if applicable);
- 5) conditions and duration of test, including amount of sulphur dioxide to be used (0,2 l or 1,0 l or other amounts);
- 6) how inspection of the test coating is to be made and what characteristics are to be considered in evaluating its resistance properties.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a procedure for the determination of the resistance of paints, varnishes and related products to humid atmospheres containing sulphur dioxide.

The test method allows for different amounts of sulphur dioxide; 0,2 l is generally recommended for testing coatings of thickness not exceeding about 40 μm .

2 REAGENT

Sulphur dioxide supplied from a gas cylinder or gas generating apparatus, fitted with appropriate regulating and measuring apparatus to ensure the supply of the correct volume of gas.

3 APPARATUS

3.1 Airtight cabinet of capacity 300 ± 10 l, in the base of which is a water-tight trough fitted with a means of heating the water to meet the requirements of 6.3.

The dimensions and design of the cabinet are not critical, provided the requirements of 3.2 are met. It shall be constructed of an inert material and have a roof which prevents condensed moisture dripping onto the test panels.

The cabinet shall be provided with a means of relieving excess pressure, and a gas inlet pipe which shall be situated immediately above the water trough.

The cabinet shall also be provided with a means of controlling the temperature, which shall be measured in the space above the test panels.

NOTE — Alternative designs of apparatus may be fitted with a door or a removable hood. Suitable designs of apparatus are shown in figures 1 and 2.

3.2 Stand for test panels, made of, or coated with, an inert material. The test panels shall be arranged vertically so that they are at least 100 mm from any wall or cover, at least 20 mm from each other and so that the lower edges of the panels are at least 200 mm above the water. Where possible, the test panels shall be arranged at the same level for comparative tests; if this is not possible, care shall be taken to ensure that water condensed on upper panels does not drip onto the lower panels.

The stand shall be of sufficient size to accommodate test panels with a total surface area of 0,5 m² (see 6.1.2).

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 ISO 1512. The samples shall then be examined and prepared for testing as described in ISO 1513.

5 TEST PANELS

5.1 Material and dimensions

The test panels shall be of burnished steel complying with ISO 1514 of approximate dimensions 150 mm X 100 mm X 1,2 mm, unless otherwise specified or agreed.

5.2 Preparation and coating of panels

The test panels shall be prepared in accordance with ISO 1514, unless otherwise specified, and shall then be coated by the specified method with the product or system under test.

The back and edges of the panel shall be coated with the product or system under test, unless otherwise specified.

5.3 Drying and conditioning of the test panels

The coated test panels shall be dried (or stoved and aged) for the specified time and under the specified conditions and, unless otherwise specified, shall be conditioned at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$ for a minimum of 16 h, with free circulation of air and not exposed to direct sunlight. The test procedure shall then be carried out as soon as possible.

5.4 Thickness of coating

The thickness, in micrometres, of the dry coating shall be determined by the method specified, using one of the procedures described in ISO 2808.

6 PROCEDURE

6.1 Ambient conditions

Set up the apparatus in a room with a clean atmosphere and a temperature of $23 \pm 2^\circ\text{C}$ and relative humidity of $50 \pm 5\%$. The apparatus shall be protected from draughts and direct sunlight.

6.1.1 Filling the trough

Fill the trough with $2 \pm 0,2$ l of distilled water.

NOTE — The water shall be drained and renewed prior to each heating operation.

6.1.2 Arrangement of the test panels

Arrange the test panels in the cabinet in accordance with 3.2.

NOTE — As the same volume of SO_2 is introduced at each test cycle, the total surface area of the test panels in the cabinet is important and for comparative tests the total test panel area in the cabinet should be the same. In cases of dispute or for critical tests the total surface area of the test panels should be $0,5 \pm 0,1$ m².

Different types of film absorb SO_2 at different rates and to different extents, so that the operation of the test may be affected by the types of test panels included in the cabinet. For example, the inclusion of oil paints and matt paints containing reactive basic pigments will reduce the severity of the test for other panels. For critical applications, the test panels in the cabinet shall be restricted to the type undergoing evaluation for a particular purpose.

6.2 Introduction of SO_2

After closing the apparatus, introduce 0,2 l or 1,0 l of SO_2 as specified. By agreement other amounts of SO_2 may be used.

6.3 Test cycle

After the introduction of the SO_2 , switch on the heating appliance and raise the air temperature to $40 \pm 3^\circ\text{C}$ in about 1,5 h and maintain this temperature until a total period of 8 h from the commencement of the test cycle has elapsed.

At the end of this period, switch off the heating appliance and open the door completely or raise the hood of the apparatus to at least the upper edge of the test panels.

After a further 16 h, remove the test panels from the cabinet and carry out an interim examination.

Replace the panels in the cabinet, change the water and repeat for the specified number of cycles.

Normally cycles should follow without interruption, but if breaks occur, for example the advent of the weekend, this fact shall be reported.

6.4 Final inspection

At the end of the specified number of test cycles, remove the panels from the cabinet, blot them with absorbent paper and immediately examine the whole test surface of each panel for blistering or other signs of deterioration.

Allow the panels to stand in the open at room temperature for 24 h and examine the test surface again for loss of adhesion, rust staining, change of colour, embrittlement or other characteristics which may be specified.

If it is required to examine the substrate for signs of attack, remove the coating by the specified method.

7 TEST REPORT

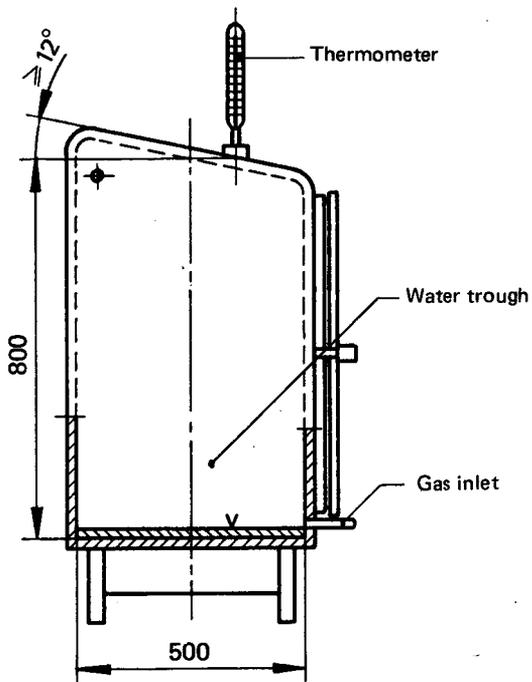
The test report shall include the following particulars :

- a) a reference to this International Standard or to a corresponding national standard;
- b) type and identification of the coating under test;
- c) the items of supplementary information referred to in the introduction to this International Standard;
- d) the national standard or other document supplying the information referred to in c) above;
- e) the test cycle used (i.e. the amount of SO_2) and the number of cycles, and any interruptions;
- f) any deviation, by agreement or otherwise, from the test procedure described;
- g) the results of the test, in terms of the stated requirements;
- h) date of test.

Dimensions in millimetres

Capacity 300 ± 10 l

Capacity 300 ± 10 l



Top view

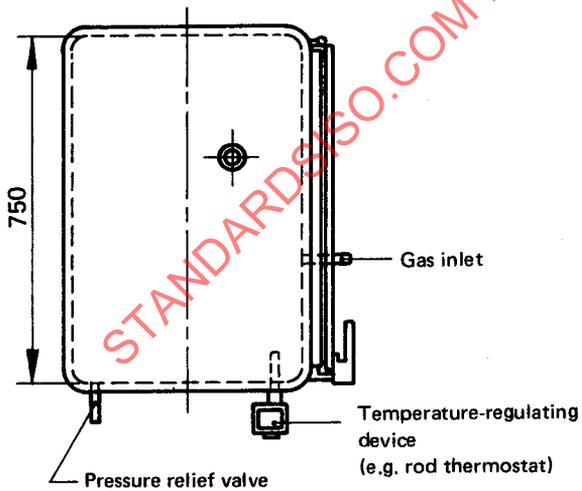
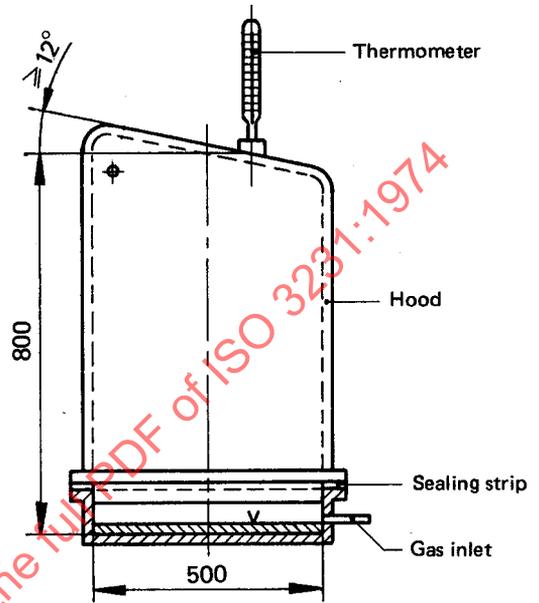


FIGURE 1 – Cabinet with door



Top view

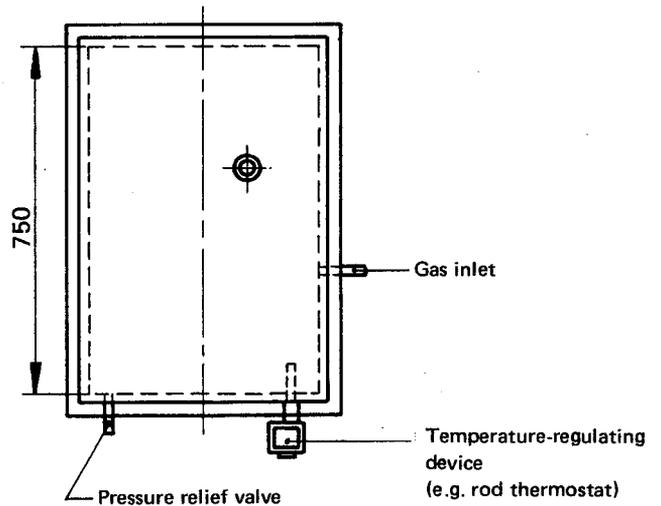


FIGURE 2 – Hooded apparatus

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