

TECHNICAL REPORT

ISO
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Paints and varnishes — Determination of the ability of liquid paints to sustain combustion

*Peintures et vernis — Détermination de l'aptitude des peintures liquides
à entretenir la combustion*



Reference number
ISO/TR 9038:1991(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9038, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-Committee SC 9, *General test methods for paints and varnishes*.

The reasons which led to the decision to publish this document as a type 2 Technical Report are given in the introduction.

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Introduction

0.1 Historical context

Sub-committee ISO/TC 35/SC 9, *General test methods for paints and varnishes*, has been studying a method for the determination of combustibility since a new work item was approved in 1982 (TC 35 N 764), with Egypt, Germany, the Netherlands, Poland, Sweden and the UK agreeing to participate in the work. Progress was made, the draft proposal receiving substantial support in October 1983 and the draft International Standard being issued for ballot in August 1985.

At the meeting of ISO/TC 35/SC 9 in Hull, Canada, in May 1985, the leader of the French delegation, who had not indicated their active participation in the work, spoke on behalf of the European paint manufacturers association CEPE (liaison members of ISO/TC 35/SC 9). He referred to work carried out in 1984 by FIPEC (Fédération des Industries des Peintures, Vernis et Couleurs) and a meeting of CEPE which questioned the accuracy of the test as presented. He also pointed out that EEC regulations would need the test to be conducted at 55 °C rather than at any temperature as proposed in the ISO document.

It was agreed that, as the ISO/DIS was about to be circulated, a copy of the extensive minutes of the discussion and the FIPEC findings should be circulated and members of ISO/TC 35 asked to consider these when making their response to ISO/DIS 9038. Considerable experimental work was carried out by the members prior to registering their votes but, whilst other deficiencies were noted and alternatives proposed, no support for the changes proposed by FIPEC was put forward.

A second DIS was prepared and circulated for ballot in 1987 with a result which confirmed the decision to publish the document, with a few minor changes contained in comments accompanying approval votes, as an International Standard.

It was proposed to resolve these comments at a meeting of ISO/TC 35/SC 9 in September 1987, which was done, but at the same meeting the German delegation presented evidence which at the time, and without time to verify it, seemed credible. ISO/TC 35/SC 9 therefore resolved to propose the publication of a type 2 Technical Report whilst further work was carried out to give the method wider exposure.

0.2 Technical background

This type 2 Technical Report is related to a series of International Standards dealing with the sampling and testing of paints, varnishes and related products.

A product with a flashpoint within a given range may continue to burn after initial ignition, while a similar product, although it has a similar flashpoint, may not. This Technical Report provides a method for discriminating between those products that, after ignition under controlled

laboratory conditions and subsequent removal of the flame, sustain combustion and those which do not.

This Technical Report therefore describes a procedure by which a paint or similar product that has been classified as “flammable” as a result of the determination of its flashpoint by one of the recognized methods can be identified as being incapable of sustaining combustion because of its formulation. Products to which this applies include, for example:

- a) some paints containing chlorinated hydrocarbons;
- b) some water-dilutable paints.

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Paints and varnishes — Determination of the ability of liquid paints to sustain combustion

1 Scope

This Technical Report describes a pass/fail procedure for use with paint and related products to determine whether or not a product has the ability to sustain combustion under specified conditions. The procedure is a means of discriminating between those liquid products in the same nominal flashpoint range that do and do not sustain combustion. This method is applicable to other liquid products but is not applicable to painted surfaces in respect of their potential fire hazards.

NOTE 1 The specified conditions are contained in national and other regulations. The preferred defined temperature for the heated block is 55 °C.

IMPORTANT — This test method should be used in addition to the test method for flashpoint in assessing the fire hazard of a product. Particular care needs to be taken in translating results from small-scale tests to “real life” situations, as liquids in large quantities may not behave in the same way as small samples, especially in the case of emulsions.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report 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 1512:1974, *Paints and varnishes — Sampling*.

ISO 1513:1980, *Paints and varnishes — Examination and preparation of samples for testing*.

3 Principle

A metal block with a concave depression (test portion well) is heated to a specified temperature. A specified volume of the product under test is transferred to the well and its ability to sustain combustion is noted after application and subsequent removal of a standard flame under specified conditions.

4 Apparatus and fuel supply

4.1 Combustibility tester, consisting of a block of aluminium alloy or other corrosion-resistant metal of high thermal conductivity. The block has a concave depression (test portion well) and a pocket drilled to take a thermometer (4.3). A small gas jet assembly on a swivel is attached to the block. The handle and gas inlet for the gas jet may be fitted at any convenient angle to the gas jet.

A suitable apparatus is shown in figure 1 and the essential dimensions are given in figures 1 and 2.

4.2 Gauge, for checking that the height of the centre of the gas jet above the top of the test portion well is 2.2 mm (see figure 1).

4.3 Thermometer, mercury in glass, for horizontal operation, with a sensitivity not less than 1 mm/°C, or other measuring device of equivalent sensitivity permitting reading at 0,5 °C intervals.

When in position in the block, the thermometer bulb shall be surrounded with thermally conducting thermoplastic compound.

Dimensions in millimetres

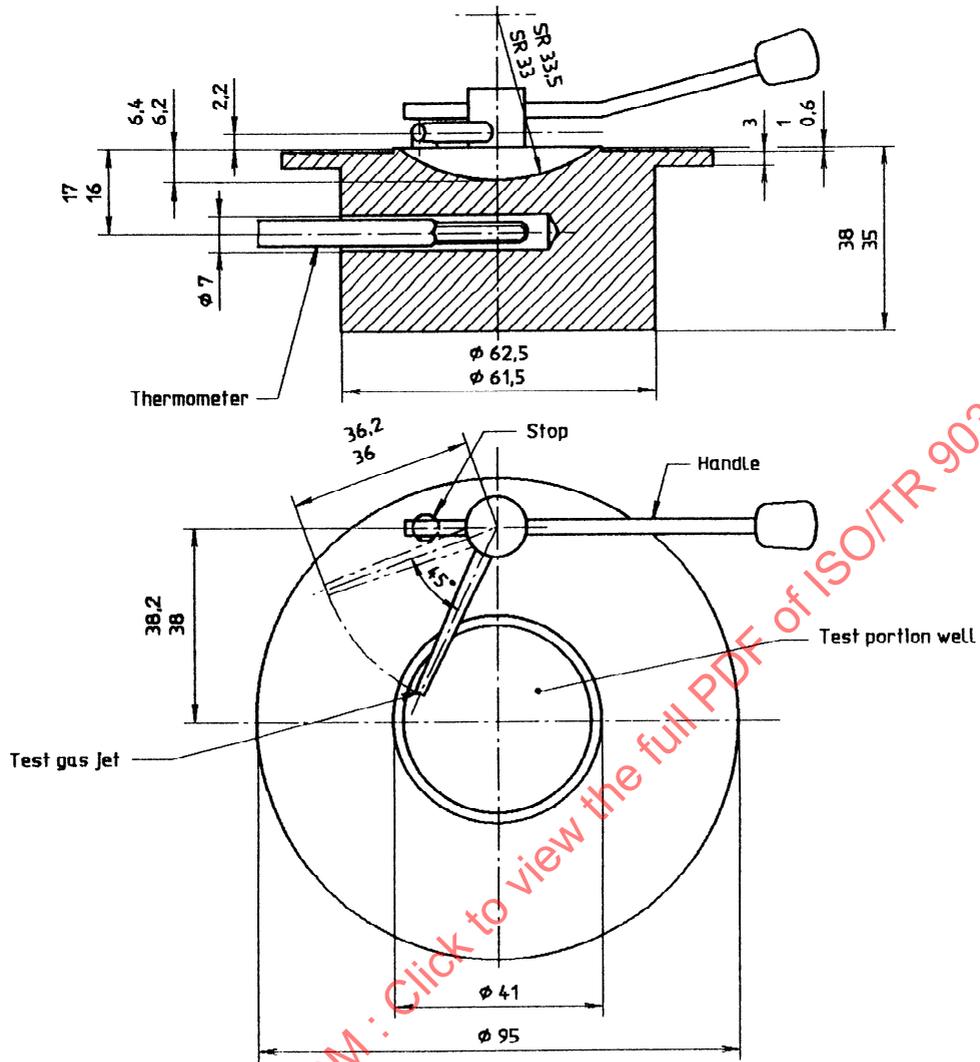


Figure 1 — Combustibility tester

Dimensions in millimetres

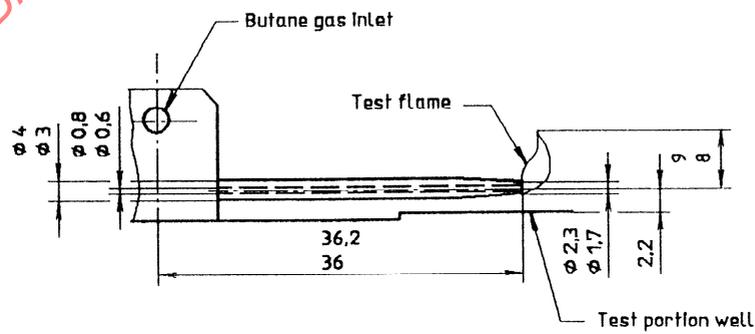


Figure 2 — Test gas jet and flame

4.4 Hotplate, fitted with a temperature-control device. (Other types of apparatus with suitable temperature-control facilities may be employed to heat the metal block.)

4.5 Stopwatch, or other suitable timing device.

4.6 Syringe, capable of delivering 2 ml to an accuracy of $\pm 0,1$ ml.

4.7 Fuel source, butane test fuel.

5 Sampling

5.1 Take a representative sample of the product to be tested, as described in ISO 1512.

Examine and prepare each sample for testing, as described in ISO 1513. The sample shall be supplied in a tightly closed container.

5.2 Because of the possibility of loss of volatile constituents, the sample shall receive only the minimum treatment to ensure its homogeneity. After removing each test portion, the sample container shall be immediately closed tightly to ensure that no volatile components escape from the container; if this closure is incomplete, an entirely new sample shall be taken.

6 Procedure

6.1 Carry out the determination in duplicate.

WARNING — Do not carry out the test in a small confined area (for example a glove box), because of the hazard of explosions.

6.2 It is essential that the apparatus is set up in a completely draught-free area (see warning) and in the absence of strong light (to facilitate observation of a flash, flame, etc.)

6.3 Place the metal block (4.1) on the hotplate (4.4) or heat the metal block by other suitable means so that its temperature, as indicated by the thermometer (4.3) placed in the metal block, is maintained at the specified temperature within a tolerance of ± 1 °C. The preferred temperature is 55 °C. Correct this temperature for the difference in barometric pressure from the standard atmospheric pressure (101,3 kPa¹⁾ by raising the test temperature for a higher pressure or lowering the test temperature for a lower pressure by 1,0 °C for each 4 kPa difference. Ensure that the top of the metal block is exactly horizontal. Use the gauge (4.2) to check that the jet is 2,2 mm above the top of the well (see figure 1) when in the test position.

1) 1 kPa = 10 mbar

6.4 Light the butane test fuel with the jet away from the test position (i.e. in the "off" position, away from the well). Adjust the size of the flame so that it is 8 mm to 9 mm high and approximately 5 mm wide.

6.5 Using the syringe (4.6), take from the sample container at least 2 ml of the sample and rapidly transfer a test portion of 2 ml $\pm 0,1$ ml to the well of the combustibility tester and immediately start the timing device (4.5).

6.6 After a heating time of 60 s, by which time the test portion is deemed to have reached its equilibrium temperature, and if the test fluid has not ignited, swing the test flame into the test position over the edge of the pool of liquid. Maintain it in this position for 15 s and then return it to the "off" position while observing the behaviour of the test portion. The test flame shall remain alight throughout the test.

6.7 For each test observe and record:

- whether there is ignition and sustained combustion or flashing, or neither, of the test portion before the test flame is moved into the test position;
- whether the test portion ignites while the test flame is in the test position, and, if so, how long combustion is sustained after the test flame is returned to the "off" position.

6.8 If sustained combustion interpreted in accordance with clause 7 is not found, repeat the procedure described in 6.1 to 6.7 with new test portions but with a heating time of 30 s.

7 Interpretation of observations

The product shall be assessed either as not sustaining combustion (pass) or as sustaining combustion (fail). Sustained combustion shall be reported at either of the heating times if one of the following occurs with either of the test portions:

- when the test flame is in the "off" position, the test portion ignites and sustains combustion;
- the test portion ignites while the test flame is in the test position, maintained for 15 s, and sustains combustion for more than 15 s after the test flame has been returned to the "off" position.

Intermittent flashing shall not be interpreted as sustained combustion. Normally, at the end of 15 s, the combustion has either clearly ceased or continues;

in cases of doubt, the product shall be deemed to sustain combustion and hence to fail.

8 Test report

The test report shall include at least the following information:

- a) all details necessary for the complete identification of the product tested;
- b) a reference to this Technical Report (ISO/TR 9038);
- c) the corrected test temperature, in degrees Celsius, and the barometric pressure, in kilopascals;
- d) a statement that the product does or does not sustain combustion according to the interpretation given in clause 7, including particular observations, e.g. "intermittent flashing";
- e) any deviation from the test procedure described;
- f) the date(s) of the test.

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