BRITISH STANDARD

BS 3761:1995

Specification for

Solvent-based paint remover

Confirmed
February 2011

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee STI/3, Paints media and related products, upon which the following bodies were represented:

British Coatings Federation Ltd.
European Resin Manufacturers' Association
FOSFA International
Ministry of Defence
Oil and Colour Chemists' Association
Seed Crushers' and Oil Processors' Association

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Contents

Foreword

This British Standard has been prepared by Technical Committee STI/3. It supersedes BS 3761:1986 which is withdrawn. This British Standard was first published in 1964 as a composition specification, which was subsequently revised in 1970. The latter edition reduced the number of grades specified in the 1964 edition to a general-purpose product of medium consistency, but the specification continued to rely on a composition requirement. Nevertheless, in the 1970 edition it was recognized that, to allow for product improvement, the specification had to be based on performance criteria, although at that time it had not proved practicable to define a suitable reference paint surface on which to carry out a test for paint-removing properties. This was overcome, and the 1986 edition included a test for assessing the paint-removing property. It also covered dichloromethane1)-containing paint removers conforming to this standard. Although paint removers manufactured in accordance with this standard can be considered non-flammable in their general use, the Technical Committee responsible for this standard decided in 1986 that the term “non-flammable” should be deleted from the title of the standard. It was believed that the term could lead to laxity and abuse by users, particularly as there were no means of ensuring that containers of these paint removers were closed against loss of dichloromethane. Attention is drawn to the hazards associated with the chlorinated hydrocarbons in these paint removers, and to the precautions, including the need to avoid smoking and naked flames and the necessity for good ventilation that have to be taken during their use.

The water rinsability test was modified in 1986 and it is emphasized to users that, after application of paint removers conforming to this standard, it is essential to wash the surface thoroughly free from waxy and other residues. These residues comprise constituents of the paint remover, which will, if left on the surface, inhibit the drying of a subsequent paint coating. Solvents other than water may be used to wash the surface, but the hazards associated with these solvents have to be considered before their use in confined areas.

Paint removers conforming to this standard are not considered suitable for use on items where attack of metals, caused by reaction between the metal and the paint remover, is regarded as critical (e.g. metallic surfaces of aircraft and electronic equipment). Furthermore, a number of plastics surfaces may also be seriously affected by constituents of these paint removers.

After application to a painted surface, the paint remover is allowed to remain undisturbed until the paint film has become softened, swollen or blistered overall. It is subsequently removed, together with the affected paint film, by scraping, followed by washing with water or a suitable solvent, such as white spirit, or a solvent compatible with the coating system to be applied. More than one application of the paint remover may be necessary.

Certain types of coating, such as some stoving, cold-cured or polymeric materials, may not be readily acted upon by these paint removers. For the removal of such special coatings, or if the substrate is attacked by constituents of the paint removers, manufacturers should supply removers appropriate to the specific case, although these would not necessarily conform to this standard.

In the drafting of this British Standard it has been assumed that the tests described in this standard will be used by those who are appropriately qualified and experienced.

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1) Dichlormethane is commonly known as methylene chloride.

WARNING NOTE. Paint removers conforming to this standard contain dichloromethane. Particular attention is drawn to the hazards associated with dichloromethane, which is classified as harmful by inhalation, by contact with the skin or if swallowed; it is also classified as a class 3 carcinogen with the possible risk of irreversible effects.

It is essential that products containing this material are packaged in accordance with current national regulations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 10, an inside back cover 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.

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1 Scope

This British Standard specifies requirements for solvent-based paint removers applied by brush. The paint removers are intended for general use on surfaces of painted, varnished or lacquered wood, plaster or metal. As supplied, paint removers conforming to this standard will be non-flammable and will not be suitable for some substrates (see foreword).

2 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

3 Definitions

For the purposes of this British Standard, the definitions given in BS 2015 apply together with the following.

paint remover

at a temperature of 23 °C ± 2 °C, a homogeneous liquid based on dichloromethane, together with agents to give the required consistency, to confer miscibility with water and to limit the rate of evaporation, used to remove paint

NOTE Paint remover may also contain corrosion inhibitors.

4 Sampling

Representative samples to give a test sample of not less than 1 000 ml of the product shall be taken and stored in accordance with BS EN 21512.

5 Performance

NOTE When carrying out the tests referred to in **5.1** to **5.8**, the precautions given in the warning note in the introduction should be observed.

5.1 Rate of evaporation

When tested in accordance with Annex A, the product shall not lose more than 2 % (*m*/*m*) by evaporation.

NOTE It is advised that this test is carried out immediately after opening the container for the first time.

5.2 Consistency

When tested in accordance with Annex B, the product shall have a viscosity of not less than 0.3 Pa·s[2] and not more than 0.5 Pa·s. This shall be indicated by observing the rate of rise of the bubble [see **B.4** b)].

NOTE For products for special purposes, it may be necessary to specify other viscosities. These products do not conform to this standard.

5.3 Paint-removing power

When tested in accordance with Annex C, the product shall not be inferior to the reference paint remover (see **C.3.3**) using the following criteria:

a) the average time taken for the paint, applied to either of the test panels, to wrinkle or lift shall not exceed that of the reference paint remover;

b) after subjection to the washing procedure (see **C.5.5**), the squares treated with the product under test shall retain no more of the applied reference paints than the squares treated with the reference paint remover.

5.4 Water rinsability

When tested in accordance with Annex D, any residue left on the panel by the product shall be not more than 0.5 % (calculated as a percentage of the mass of paint remover applied). The residue shall be easily and completely removed by brushing under water and, after drying, the panel shall be in a suitable condition to accept a coat of the reference primer. The treatment, by comparison with the reference panel, shall impair neither the surface-dry properties of the primer when tested in accordance with the method given in BS 3900-C2, nor the appearance of the dried film.

5.5 Effect on wood

When tested in accordance with Annex E, staining of the substrate shall not exceed that shown on the reference panel. The substrate shall be in a suitable condition to accept a coat of the reference primer and the treatment shall impair neither the surface-dry properties of the primer nor the appearance of the dried film as compared with the reference panel.

5.6 Acidity or alkalinity

When tested in accordance with Annex F, the product shall not:

a) be acidic to the methyl orange indicator;

b) contain more than 0.08 % (*m*/*m*) of alkalinity, calculated as sodium hydroxide.

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[2] Pa·s = 1 N·s/m^2 = 10 P.

5.7 Corrosive effects

When tested in accordance with Annex G, the product shall not cause visible rusting or corrosion of the steel test piece and the mass of the test piece shall not be increased by more than 1 mg nor decreased by more than 5 mg.

5.8 Flammability

NOTE Attention is drawn to the Highly Flammable Liquids and Liquefied Petroleum Gas Regulations 1972 [1].

When tested in accordance with Annex H, the product shall not burn over the whole surface of any of the test panels and shall not burn for more than 2 s after removal of the flame following any of the five applications.

5.9 Storage properties

When stored at a temperature above 3 °C and not exceeding 23 °C in the sealed original containers, the product shall be in accordance with **5.1** to **5.8** for a period of not less than 24 months from the date of manufacture.

When stored at a temperature above 0 °C and not exceeding 32 °C, the product shall be in accordance with **5.1** to **5.8** for a period of not less than 12 months from the date of manufacture.

5.10 Phenol content

When tested in accordance with Annex J, the product shall not contain more than 0.2 % (*m*/*m*) of phenols expressed as C_6H_5OH.

6 Marking

Containers in which the product is packed shall be legibly and indelibly marked with the following:

a) the manufacturer's name or trade mark;

b) the number and date of this British Standard, i.e. BS 3761:1995[3];

c) general precautions, i.e. warning and first-aid advice;

d) instructions for use;

e) the batch number;

f) the date of manufacture;

g) any additional labelling required by national legislation for this type of product.

7 Packing

The product shall be packed into sound, clean and dry containers which shall be sealed with a screw cap. If glass bottles are used, these shall have a capacity not greater than 250 ml.

NOTE It is recommended that containers should be of sufficient strength to withstand any pressure likely to develop internally during storage under normal conditions. Ullage should be provided to avoid undue pressure developing inside the container when it is stored under normal conditions.

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[3] Marking BS 3761:1995 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Annex A (normative) Determination of rate of evaporation

A.1 Apparatus

A.1.1 *Ordinary laboratory apparatus*

A.1.2 *Glass dish*, of approximately 75 mm internal diameter and 10 mm wall height.

NOTE The lid of a Petri dish may be used.

A.1.3 *Hypodermic glass syringe*, of 10 ml capacity, but without a needle.

A.1.4 *Balance*, capable of weighing to an accuracy of 1 mg or less.

A.2 Procedure

A.2.1 Carry out the procedure in a room controlled at a temperature of 23 °C ± 2 °C. Place the sealed container containing the product under test in the room at least 16 h before testing.

NOTE This test should be carried out on a sample removed from a previously unopened container.

A.2.2 Weigh the glass dish (**A.1.2**) to the nearest 1 mg.

A.2.3 With the top pointing away, carefully open the container to release any excess pressure. Immediately close the container and then gently invert it to ensure the homogeneity of the product under test. Cautiously re-open the container and quickly transfer a sample of approximately 50 ml into a 100 ml squat beaker. Fill the syringe (**A.1.3**) with more than 10 ml of the sample in the beaker at a rate of about 1 ml/s, maintaining the syringe opening approximately 5 mm below the surface of the sample. Invert the syringe and expel the excess liquid until the volume of the product in the syringe is 10 ml. Take care to expel any bubbles. Wipe off any excess of sample from the outside of the syringe and weigh the filled syringe to the nearest 1 mg.

A.2.4 Expel the contents of the syringe at a rate of about 1 ml/s into the centre of the glass dish (**A.1.2**) placed on a horizontal surface exposed to the air but protected from draughts. Reweigh the syringe. After 30 min ± 1 min, reweigh the dish and its contents to the nearest 1 mg.

A.3 Calculation

The loss in mass Δm_L (in %) is given by the equation:

$$\Delta m_L = \frac{(m_2 - m_3) - (m_4 - m_1)}{(m_2 - m_3)} \times 100$$

where

m_1 is the mass of the glass dish (in g);

m_2 is the mass of the syringe and the product under test (in g);

m_3 is the mass of the syringe after expulsion of the product under test (in g);

m_4 is the mass of the dish and the product after standing for 30 min (in g).

Annex B (normative) Assessment of consistency

B.1 Principle

The viscosity of the product under test is compared with the viscosity of two reference oils.

B.2 Apparatus and materials

B.2.1 *Test tubes*, of approximately 11 mm internal diameter.

B.2.2 *Mineral oil*[4], of viscosity 0.3 Pa·s at 25 °C ± 1 °C.

B.2.3 *Mineral oil*[4], of viscosity 0.5 Pa·s at 25 °C ± 1 °C.

B.3 Procedure

Fill two test tubes (**B.2.1**), respectively, with the mineral oils (**B.2.2** and **B.2.3**) and a third test tube with the product under test. Insert corks into each tube, checking that an air space of 13 mm ± 1 mm is present. Ensure that the temperatures of the tubes and the contents are identical at a temperature of 23 °C ± 2 °C. Mount the tubes in a suitable apparatus so that they may be inverted simultaneously. Invert the tubes four times, allowing the bubble to rise to the top of the liquid after each inversion. Compare the rates at which the bubbles rise through the liquids in the three tubes during the last inversion.

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[4] Details of the availability of calibrated oils can be obtained from the Information Centre, BSI, 389 Chiswick High Road, London W4 4AL.

B.4 Expression of results

Record the rate of rise of the bubble in the product under test as either:

a) greater than the rate of rise of the bubble in the low-viscosity oil; or

b) not greater than the rate of rise of the bubble in the low-viscosity oil but not less than the rate of rise of the bubble in the high-viscosity oil, indicating that the product has a viscosity between 0.3 Pa·s and 0.5 Pa·s; or

c) less than the rate of rise of the bubble in the high-viscosity oil.

Annex C (normative)
Assessment of relative paint removing power

C.1 Principle

The ability of the product under test to remove a reference paint system and its subsequent rinsability are compared with the same characteristics of a reference paint remover.

C.2 Apparatus

NOTE A suitable apparatus is shown in Figure C.1.

C.2.1 *Panels*, of approximately 100 mm × 150 mm × 0.71 mm, of hard aluminium, acid chromated, conforming to BS EN 605.

C.2.2 *Water spray head*, comprising a flat perforated plate, approximately 125 mm in diameter, drilled with 75 to 80 holes of 1 mm diameter, distributed uniformly. The holes should be countersunk to within 1 mm of the bottom face.

NOTE A polymethyl methacrylate sheet, approximately 4 mm thick has been found suitable.

C.2.3 *Constant head device*, to maintain a head of water of approximately 1.4 m at the spray head (**C.2.2**).

C.2.4 *Panel stand*, for supporting a panel (**C.2.1**) at 45°.

C.2.5 *Stop-clock*, accurate to 0.1 s.

C.2.6 *Glass syringe*, of 2 ml capacity, with a needle.

C.3 Materials

C.3.1 *Reference primer*[5]. A two-component, cold-curing vehicle consisting of an epoxide resin and a polyamide curing agent, either or both pigmented, suitable for direct application to the panels (**C.2.1**).

C.3.2 *Reference finishing paint*[5]. A two-component, cold-curing polyurethane finish consisting of a polyester vehicle and an aliphatic isocyanate curing agent, either or both pigmented, compatible with the reference primer (**C.3.1**).

NOTE Panels suitably coated with a reference paint system (see **C.3.1** and **C.3.2**) may be purchased from certain paint manufacturers.

C.3.3 ***Reference paint remover***

NOTE This is a reference material for use only in the test for assessment of relative paint-removing power.

The reference paint remover shall consist of the following:

a) 1.0 g of paraffin wax with a softening point of 50 °C to 55 °C;

b) 3.0 g of trichloroethylene;

c) 78.5 g of dichloromethane, conforming to BS 1994;

d) 1.5 g of high-substitution methyl cellulose solid[6], having a viscosity of 0.1 Pa·s ± 0.015 Pa·s when in a 2 % (*m*/*m*) aqueous solution;

e) 4.0 g of sodium dodecyl benzene sulfonate (85 % active), added as a 30 % (*m*/*m*) aqueous solution;

f) 12.0 g of industrial methylated spirits, conforming to BS 3591.

Prepare the reference paint remover by melting the paraffin wax and adding it to the trichloroethylene. Stir until mixed and then add the mixture to the dichloromethane. Whilst stirring, add the remaining constituents in the order d), e), f) and store the final product in a suitable sealed container (see clause **6**).

Discard the reference paint remover 1 month after its preparation.

C.4 Preparation of test surface

Prepare two test panels (**C.2.1**) for each product under test by applying uniformly, preferably by spray, a coating of the reference primer (**C.3.1**) to give a dry-film thickness of 15 µm ± 3 µm. Allow the primer to dry at a temperature of 23 °C ± 2 °C and relative humidity of (50 ± 5) % for 24 h.

Apply the reference finishing paint (**C.3.2**) to both test panels using a brush or spray, to give a uniform dry-film thickness of 30 µm ± 2.5 µm. Allow the test panels to condition at a temperature of 23 °C ± 2 °C and a relative humidity of (50 ± 5) % with free access of air, for at least 14 days.

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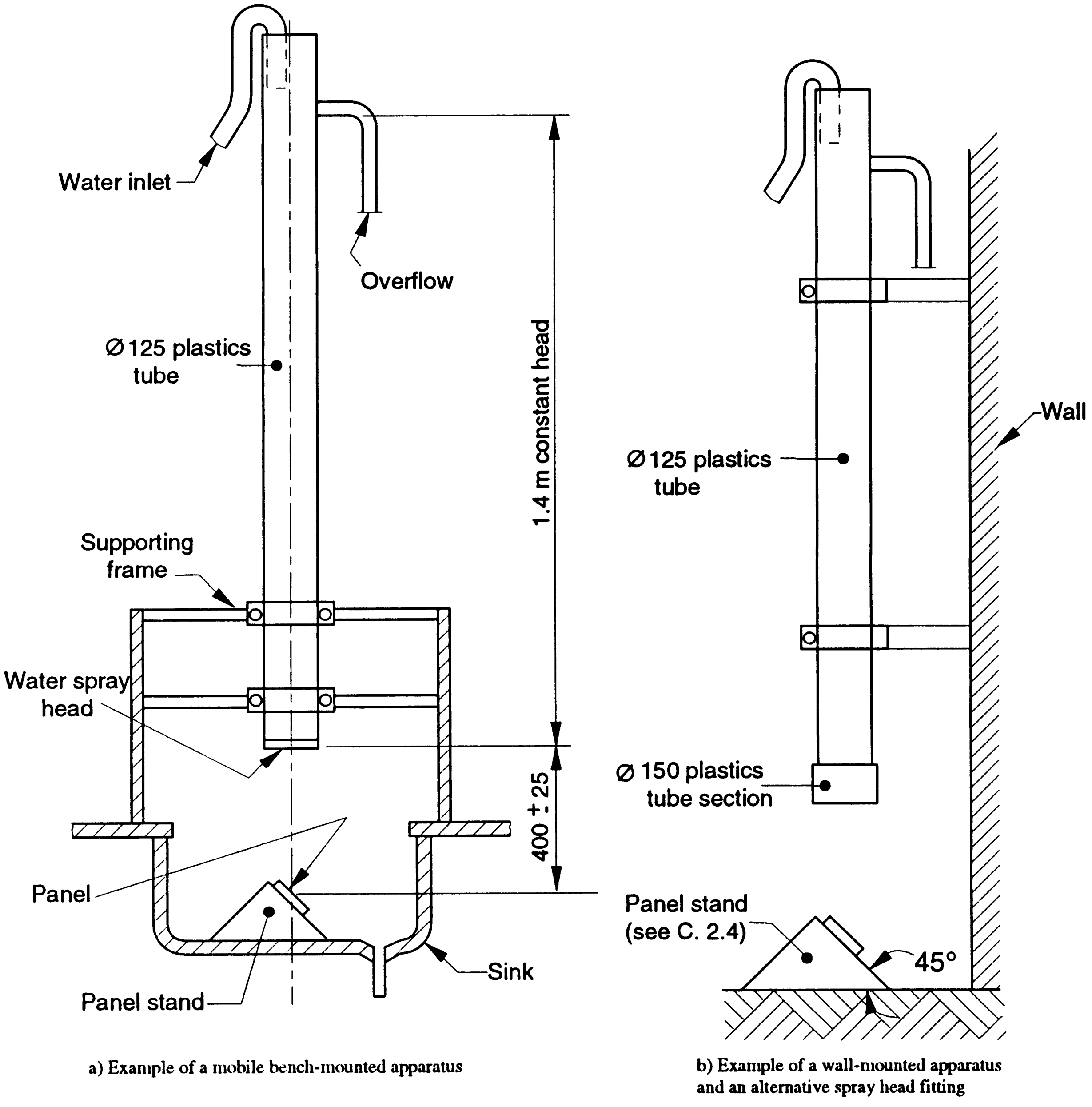
[5] The reference primer is equivalent to BS X 33 Type A and the reference finishing paint is equivalent to BS X 34 Type A.

[6] Details of suitable materials can be obtained from the Information Centre, BSI, 389 Chiswick High Road, London W4 4AL.



a) Example of a mobile bench-mounted apparatus

b) Example of a wall-mounted apparatus and an alternative spray head fitting

Dimensions in millimetres unless otherwise indicated.

Figure C.1 — Apparatus for water rinsability test

C.5 Procedure

C.5.1 For each product under test, mark out and identify 30 squares, approximately 25 mm × 20 mm, on each of the duplicate test panels prepared as described in **C.4**. Place the test panels horizontally.

C.5.2 Apply to one of the test panels, by means of the glass syringe (**C.2.6**), 0.1 ml of the material under test to the centre of each of 15 alternate squares at 10 intervals to form a diagonal lattice pattern. Immediately apply in the same manner 0.1 ml of the reference paint remover (**C.3.3**) to the centre of each of the remaining (vacant) squares. Start the stop-clock (**C.2.5**).

C.5.3 After completing the application, continue to examine the panel, and record the time for the paint to wrinkle or lift in each square. Calculate for each square the period to wrinkle or lift and then calculate the average periods both for the product under test and for the reference paint remover.

If for either the product or the reference paint remover, the time for the paint film to lift or wrinkle in more than two squares exceeds twice the average of the time taken by the remaining areas, repeat the test. If one or two test squares take an excessive time to wrinkle or lift, then calculate an average from the time taken by the remaining squares.

C.5.4 Repeat the procedure described in **C.5.2** and **C.5.3** on a duplicate test panel.

C.5.5 After the last test square of paint on a panel has wrinkled or lifted or 1 h after application of the last drop, whichever is the less, fix the panel in the stand (**C.2.4**) ensuring that the lower edge of the panel is above the level reached by the drainage water (see Figure C.1). Place the water spray head (**C.2.2**) such that its centre is 400 mm ± 25 mm above the centre of the panel, and connect the constant head device (**C.2.3**) to the spray head.

Allow the flow of water from the spray head to flush the test panel for 120 s ± 10 s. At the end of this period, remove the panel and shake it to remove any remaining water. Visually examine the surface of the panel at the centre of each test square for residues of the reference paint system.

C.6 Expression of results

Report the following:

a) whether the average time taken for the paint to be wrinkled or lifted by the product under test was longer or shorter than that taken by the reference paint remover;

b) whether, after washing, the amount of paint retained on the squares treated by the product under test is greater or less than that on the square treated by the reference paint remover.

Annex D (normative) Determination of water rinsability

D.1 Principle

An aluminium test panel, treated with the paint remover, is rinsed with water and any gain in mass is recorded. The panel, after being gently brushed in water and allowed to dry, is coated with a priming paint and the properties of this coating are compared with a coating applied to a reference test panel.

D.2 Apparatus and material

D.2.1 *Panels*, of approximately 100 mm × 150 mm × 0.71 mm, of hard aluminium, acid chromated, conforming to BS EN 605.

D.2.2 *Water spray head* (**C.2.2**)

D.2.3 *Constant head device* (**C.2.3**)

D.2.4 *Panel stand* (**C.2.4**)

D.2.5 *Paint brush*, flat, 25 mm.

D.2.6 *Balance* (**A.1.4**)

D.2.7 *White solvent-thinned priming paint*, conforming to BS 5358.

D.3 Procedure

D.3.1 Weigh a panel (**D.2.1**) to the nearest 1 mg. Apply 5 g ± 0.5 g of the product under test evenly to one face and immediately reweigh the panel. Allow the panel to stand in a horizontal draught-free position at a temperature of 23 °C ± 2 °C for 30 min.

D.3.2 At the end of the 30 min period, place the panel centrally under the water spray head (**D.2.2**) and rinse as described in **C.5.5**. After 120 s ± 10 s, remove the panel and allow it to dry at a temperature of 23 °C ± 2 °C with free access to air for 24 h.

D.3.3 Weigh the panel to the nearest 1 mg.

D.3.4 Place the panel in a bath of water and gently brush away any residues for 120 s ± 10 s. Take the panel from the bath, shake the panel to remove surplus water and allow to dry at a temperature of 23 °C ± 2 °C for 24 h. Weigh the panel to the nearest 1 mg. If the mass of the panel has increased by 25 mg or more discard the test.

D.3.5 Apply a coat of the white solvent-thinned priming paint (**D.2.7**) to the panel. Similarly apply the paint to a second panel to which has been carried out only the procedure described in **D.3.2**. Apply the paint at a similar mass to both panels.

By comparison of the two panels, record whether the surface-dry properties of the priming paint when tested in accordance with the method described in BS 3900-C2, or the appearance of the dry film after 16 h have been impaired by use of the paint remover.

D.4 Calculation

The increase in mass Δm_i (in %) is given by the equation:

$$\Delta m_\mathrm{i} = \frac{(m_7 - m_5)}{(m_6 - m_5)} \times 100$$

where

m_5 is the mass of the panel (see **D.3.1**) (in g);

m_6 is the mass of the panel after application of the paint remover (see **D.3.1**) (in g);

m_7 is the mass of the panel after rinsing and drying (see **D.3.3**) (in g).

D.5 Expression of results

The report shall include a statement on the percentage increase in mass, the surface-dry properties of the treated and untreated panels and an assessment of the appearance of the treated panel compared with the untreated panel.

Annex E (normative) Determination of the effect on wood

E.1 Principle

A wooden test panel that has been treated with the paint remover and rinsed with water is compared with a similar panel that has only been rinsed. After allowing the panels to dry, the appearance of each is examined. A priming paint is then applied to each panel and its adhesion and drying properties are compared.

E.2 Apparatus and materials

E.2.1 *Two panels*, of approximately 150 mm × 100 mm, of European redwood (common pine), planed and smooth.

E.2.2 *Water spray head* (**C.2.2**)

E.2.3 *Constant head device* (**C.2.3**)

E.2.4 *Panel stand* (**C.2.4**)

E.2.5 *White solvent-thinned priming paint*, conforming to BS 5358.

E.3 Procedure

E.3.1 Take a panel (**E.2.1**) and apply 5 g ± 0.5 g of the product under test evenly to one face. Allow the panel to stand in a horizontal draught-free position at a temperature of 23 °C ± 2 °C for 15 min.

E.3.2 At the end of the 15 min period, place the panel centrally under the water spray head (**E.2.2**) and rinse as described in **C.5.5**. After 120 s ± 10 s, remove the panel and allow it to dry at a temperature of 23 °C ± 2 °C with free access to air for 24 h.

E.3.3 Prepare a reference panel by taking a second panel (**E.2.1**) and carrying out the procedure described in **E.3.2**.

E.3.4 After the 24 h drying period, compare the test panel with the reference panel for any signs of staining.

E.3.5 Apply a coat of the white solvent-thinned priming paint (**E.2.5**) at a similar film mass to each of the panels.

E.4 Expression of results and report

Compare the two panels and record whether the surface-dry properties of the paint, when tested in accordance with the method described in BS 3900-C2, or the appearance in terms of staining of the dry film after 16 h, have been impaired by use of the paint remover and whether staining of the substrate by the product is worse compared with the untreated panel.

Annex F (normative) Determination of acidity or alkalinity

F.1 Reagents

NOTE The reagents used should be of recognized analytical reagent quality. Water conforming to Grade 3 of BS 3978:1987 or water of at least equal purity should be used.

F.1.1 *Methyl orange indicator solution*, 0.4 g/l.

F.1.2 *Phenolphthalein indicator solution*, 10 g/l.

F.1.3 *Hydrochloric acid, standard volumetric solution*, $c(\mathrm{HCl}) = 0.1$ mol/l.

F.2 Procedure

F.2.1 Vigorously shake 10 g ± 0.1 g of the product under test with 30 ml of water for 5 min.

Add three drops of the methyl orange indicator solution (**F.1.1**) and, if a red colour is observed, report the sample as acidic to methyl orange.

F.2.2 Vigorously shake 10 g ± 0.1 g of the product under test with 30 ml of water for 5 min and add three drops of the phenolphthalein indicator solution (**F.1.2**).

If no pink colour is produced, report the sample as having an alkalinity less than 0.08 % (*m*/*m*) calculated as sodium hydroxide.

If a pink colour is produced when the phenolphthalein solution is added, titrate with the hydrochloric acid solution (**F.1.3**) until the coloration has been permanently discharged.

F.3 Calculation

Calculate the alkalinity A [in % (m/m)] of sodium hydroxide in the sample from the following equation:

$$A = \frac{V(40 \times 0.1 \times 100)}{m \times 1000}$$

$$= \frac{0.4V}{m}$$

where

A is the alkalinity of sodium hydroxide [in % (m/m)];

V is the volume of hydrochloric acid used to discharge the pink colour of phenolphthalein (in ml);

m is the mass of paint remover (in g).

F.4 Expression of results

The report shall state one of the following:

a) the product is acidic to methyl orange;

b) the product has an alkalinity less than 0.08 % (m/m) calculated as sodium hydroxide;

c) the alkalinity of the product, expressed as a percentage by mass of sodium hydroxide.

Annex G (normative)
Determination for corrosive effects

G.1 Principle

The mass loss of a steel strip immersed in the product for a specified time is determined.

G.2 Test piece

The test piece shall be 20 mm × 125 mm × 1.25 mm, of steel strip conforming to grade CR1 FF of BS 1449-1.1:1991 and BS 1449-1.3:1991 and burnished in accordance with **3.4** of BS EN 605:1992.

G.3 Procedure

G.3.1 Weigh the test piece (see **G.2**) to the nearest 1 mg.

G.3.2 Completely immerse the steel test piece in the product under test contained in a test tube, stopper the tube and maintain it at a temperature of 23 °C ± 2 °C for 7 days.

G.3.3 At the end of the exposure period, remove the adhering material from the test piece using a suitable solvent, and visually inspect the test piece for rusting or corrosion.

G.3.4 After drying the test piece, weigh it to the nearest 1 mg.

G.4 Expression of results

Record the difference between the mass of the test piece, before and after the test. Record any corrosion of the test piece.

Annex H (normative)
Test for flammability

H.1 Principle

A quantity of the product under test is applied to degreased test panels and the product is ignited with a specified flame. The flame is applied for a specified time at five time intervals allowing for varying evaporation rates of constituent materials to be evaluated. The burning of the product after removal of the flame is noted.

H.2 Apparatus and materials

H.2.1 *Five panels*, each measuring 200 mm × 250 mm × 0.71 mm, of hard aluminium.

H.2.2 *Glass beaker*, of nominal capacity 150 ml.

H.2.3 *Stop-watch*

H.2.4 *Flat brush*, 25 mm.

H.3 Procedure

H.3.1 Degrease five test panels of hard aluminium (**H.2.1**) in accordance with **5.2** of BS EN 605:1992.

H.3.2 Pour a quantity of the product to be tested into the beaker (**H.2.2**). Using a flat brush (**H.2.4**), apply 10 g ± 5 g of the paint remover evenly to each panel. Determine the mass applied by weighing the beaker, its contents and the brush immediately before and after the application.

H.3.3 Place the coated panels horizontally and maintain at a temperature of 23 °C ± 2 °C and a relative humidity of (50 ± 5) %. In a draught-free environment, carry out the procedure given in **H.3.4** on successive test panels at the following intervals after application:

a) immediately;

b) 15 min;

c) 30 min;

d) 60 min;

e) 120 min.

H.3.4 Support the panel horizontally with the paint-remover coating uppermost. Using a Bunsen burner adjusted to give a 25 mm blue flame, direct the flame (at an angle of 45°) at the centre of the panel for 5 s. Remove the flame and observe the effect on the product.

H.4 Expression of results

Record, for each time interval, whether, after removal of the flame, there is any local burning and whether the burning ceases within 2 s.

Annex J (normative) Determination of phenols in paint and varnish remover

J.1 Scope

This method may be used to determine phenols and cresols in water-rinsable dichloromethane-based paint and varnish removers. Some substituted phenols such as trichlorophenol cannot be detected using this method.

J.2 Principle

Phenols are recovered from the paint and varnish remover by steam distillation under acid conditions. After removing the dichloromethane from the distillate, an excess of iodine solution is added. After the reaction is completed in the presence of sodium hydrogen carbonate, the mixture is acidified and the excess iodine is determined by titration with sodium thiosulfate.

J.3 Reagents

NOTE The reagents used should be of recognized analytical reagent quality. Water conforming to Grade 3 of BS 3978:1987 or water of at least equal purity should be used.

J.3.1 *Hydrochloric acid*, $c(\mathrm{HCl}) \approx 5$ mol/l. Add cautiously, with stirring, 50 ml of concentrated hydrochloric acid to 50 ml of water.

J.3.2 *Sulfuric acid*, $c(\mathrm{H_2SO_4}) = 0.5$ mol/l. Continuously add, with stirring and cooling, 14 ml of concentrated sulfuric acid [ρ(20 °C) = 1.84 g/cm^3] to 400 ml of water. Cool and dilute to 500 ml with water.

J.3.3 *Sodium hydrogen carbonate solution*, 10 g/l. Dissolve 1 g of sodium hydrogen carbonate in 100 ml of water.

J.3.4 *Iodine solution*, $c(\mathrm{I_2}) = 0.05$ mol/l. Dissolve 20 g of potassium iodide in 30 ml to 40 ml of water contained in a one mark 1l graduated flask and add 12.7 g of iodine. Shake the flask until all the iodine has dissolved, dilute to the mark with water and mix thoroughly.

Commercially prepared iodine solutions, $c(\mathrm{I_2}) = 0.05$ mol/l, are available and may be used for this determination.

J.3.5 *Sodium thiosulfate standard solution*, $c(\mathrm{Na_2S_2O_3}) = 0.1$ mol/l.

J.3.6 *Starch indicator*, 5 g/l. Suspend 0.5 g of soluble starch in 100 ml of water and heat to boiling with constant stirring. Allow the solution to cool.

J.4 Apparatus

J.4.1 *Ordinary laboratory apparatus*

J.4.2 *Steam generator*

J.4.3 *Splash head and steam delivery tube*

J.4.4 *Round-bottomed flask*, of 500 ml capacity.

J.4.5 *Water-cooled condenser*, of 400 mm effective length.

J.4.6 *Iodine flasks*, of 500 ml capacity.

J.4.7 *Pipette*, one mark, of 25 ml capacity, conforming to Class B of BS 1583:1986.

J.4.8 *Burette*, of 50 ml capacity, conforming to Class B of BS 846:1985.

J.5 Procedure

Weigh 10 g ± 0.01 g of the paint remover (W) into the 500 ml round-bottomed flask (**J.4.4**).

Add 100 ml of water, 5 ml of hydrochloric acid, $c(\mathrm{HCl}) = 5$ mol/l, and a few antibumping granules. Assemble the steam distillation apparatus and, using the 500 ml iodine flask as a receiver, collect not less than 100 cm^3 of steam distillate. Rinse the condenser and distillate delivery tube with water combining the rinsings in the iodine flask. Add a few antibumping granules to the iodine flask and warm it on a steam bath until all the globules of dichloromethane have boiled away. Cool the contents of the flask to 22 °C to 25 °C and, by means of pipette, add 25.00 ml of the iodine solution, $c(\mathrm{I_2}) = 0.05$ mol/l. Add immediately, 25 ml of sodium hydrogen carbonate solution, insert the stopper and mix the flask contents thoroughly. After 20 min, add 5 ml of sulfuric acid, $c(\mathrm{H_2SO_4}) = 0.05$ mol/l, and titrate the contents of the flask with sodium thiosulfate solution (T_1), $c(\mathrm{Na_2S_2O_3}) = 0.01$ mol/l, adding the starch indicator as the end-point is approached.

NOTE When *ortho*-cresol is present in the distillate, the iodide formed is pale orange. Thus for *ortho*-cresol the colour change at the end-point may be from brownish green to orange, whereas, for all other phenols, the colour change is from green through blue to white.

Carry out a blank titration (T_2) substituting 100 ml of water for the distillate. There is no need to allow 20 min to elapse between adding the sodium hydrogen carbonate solution and adding the sulfuric acid.

J.6 Calculating and reporting

Calculate the phenols content and report to the nearest 0.01 % (m/m) as phenol using the formula:

$$\frac{(T_2 - T_1) \times 0.157 \times F}{W}$$

where

T_1 is the titration for the sample (in ml);

T_2 is the titration for the blank (in ml);

W is the mass to the nearest 0.01 g of the sample (in g);

F is the correction factor for the sodium thiosulfate, $c(\mathrm{Na_2S_2O_3}) = 0.1$ mol/l.

blank

List of references

Normative references

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BS EN 605:1992, *Paints and varnishes. Standard panels for testing.*
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