IS 7164 (1973): Stopper [CHD 20: Paints, Varnishes and Related Products]

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Indian Standard

SPECIFICATION FOR STOPPER

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110001

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Indian Standard

SPECIFICATION FOR STOPPER

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Indian Standard

SPECIFICATION FOR STOPPER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 7 November 1973, after the draft finalized by the Paints and Allied Products Sectional Committee had been approved by the Chemical Division Council.

0.2 Stopper is a composition in stiff paste form used for filling, holes cracks, deep indentations, surface imperfection of castings used for fabrication of equipments, machines, etc, to obtain a smooth and even surface preparatory to finishing. It is normally applied in successive coats by means of a broad knife after priming.

0.3 The material covered in IS : 5083-1973* is used for filling up dents and uneven spots of welded integral coaches along with other materials and constitutes a part of the painting schedule for rail coaches under air-drying system. The material covered in this specification is expected to serve in general filling of dents, joints and surface imperfections in finishing of steel bodies of automobile, equipments, etc, under air-drying, stoving and nitrocellulose systems of finishing.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for stopper suitable for filling rivet recesses, butt joints, soldered areas, dents and surface imperfections in the finishing of instruments, equipments, steel bodies of automobiles, castings used for fans and sewing machines, oil engines, machine tools, etc, under nitrocellulose, air-drying and stoving synthetic systems of finishing.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS : 1303-1963‡ and **2** of IS : 101-1964§ shall apply.

*Specification for knifing stopper (*first revision*).
†Rules for rounding off numerical values (*revised*).
‡Glossary of terms relating to paints (*revised*).
§Methods of test for ready mixed paints and enamels (*second revision*).

3. REQUIREMENTS

3.1 Form and Condition — The material shall be a homogeneous soft paste and shall be free from grit and other visible impurities.

3.2 Composition — The material shall be of such a composition as to satisfy the requirements of this standard.

3.3 Lead Restriction — When tested for lead restriction as prescribed in **11** of IS : 85-1950*, the material shall not contain lead or compounds of lead or mixtures of both calculated as lead monoxide (PbO), exceeding 5 percent by mass.

3.4 The material shall also comply with the requirements prescribed in Table 1. Reference to the relevant appendices is given in col 4 of the table.

TABLE 1 REQUIREMENTS FOR STOPPER

Sl No.	Characteristic	Requirement	Method of Test, Ref to Appendix
(1)	(2)	(3)	(4)
i)	Consistency	Smooth and uniform	A
ii)	Volatile matter	Not more than 5 percent of the approved sample	B
iii)	Drying time:		
	a) For nitrocellulose system	Not more than 4 hours with no tendency to lift the primer	C
	b) For air-drying synthetic system	do	D
	c) For stoving synthetic system	30 minutes at 130°C with no tendency to lift the primer	E
iv)	Suitability for rubbing down:		
	a) For nitrocellulose system	Suitable for rubbing down and subsequent application of the appropriate primer/primer surfacer	F
	b) For air-drying synthetic system	do	G
	c) For synthetic stoving system	do	H

3.5 Durability

3.5.1 *Normal Outdoor Exposure* — When tested as prescribed in **J-1** the material shall pass the test.

*Methods of test for oil pastes for paints.

3.5.2 *Accelerated Weathering* — When tested as prescribed in **J-2** the performance of the material shall not be inferior to that of an approved sample.

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in suitable containers as agreed to between the purchaser and supplier.

4.2 Marking — Each container shall be marked with the following:

a) Name of the material;

b) Name of the manufacturer and/or his recognized trade-mark, if any;

c) Volume of the material;

d) Batch No. or lot No. in code or otherwise; and

e) Month and year of manufacture.

4.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 The representative samples shall be drawn as prescribed in **3** of IS : 85-1950*.

6. TEST METHODS

6.1 Tests shall be carried out as prescribed in Appendices A to J.

6.2 Quality of Reagents — Unless specified otherwise pure chemicals and distilled water (*see* IS : 1070-1960†) shall be used.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

7. CRITERIA FOR CONFORMITY

7.1 A lot shall be declared as conforming to the requirements of this standard if the test results of the composite samples satisfy the requirements prescribed under **3**.

*Methods of test for oil pastes for paints.

†Specification for water, distilled quality (*revised*).

APPENDIX A

[*Table* 1, *Item* (i)]

DETERMINATION OF CONSISTENCY

A-1. PROCEDURE

A-1.1 A clean palette knife shall be inserted into the original container to examine the consistency. The material shall not be unduly hard. It shall be supplied in the form of a smooth homogenous paste of such a consistency that it can be readily worked with a palette knife and in this respect it shall not be inferior to the approved sample when tested in the same manner and at the same time.

APPENDIX B

[*Table* 1, *Item* (ii)]

DETERMINATION OF VOLATILE MATTER

B-0. OUTLINE OF THE METHOD

B-0.1 The volatile matter is determined by finding the loss in mass of the material after heating for 3 hours at 100 ± 2°C.

B-1. PROCEDURE

B-1.1 Weigh accurately about 2 g of the well-mixed material uniformly spread in a flat-bottomed circular metal dish of about 75 mm diameter. Heat the dish and the contents for three hours in a suitable oven maintained at 100 ± 2°C. Allow the dish and its contents to cool to room temperature and weigh again.

B-1.2 Calculate and express the result as percentage of the mass of the material taken for the test.

APPENDIX C

[*Table* 1, *Item* (iii) (*a*)]

DETERMINATION OF DRYING TIME FOR NITROCELLULOSE SYSTEM

C-0. OUTLINE OF THE METHOD

C-0.1 A mild steel panel is dented with a specified number of dents and then coated with primer and subsequently with the material. It is then suitably examined for drying time.

C-1. PROCEDURE

C-1.1 A mild steel panel, 150 × 150 × 0·8 mm, having 4 dents approximately 0·5 mm in depth and 2 mm in diameter and equally spaced, prepared as described in **F-1.1** (Stage 1), shall be used.

C-1.2 The dents on the panel prepared with appropriate primer as described in **F-1.1** (Stage 2) shall be filled with the material by applying with a palette knife.

C-1.3 The panel shall be exposed in a vertical position in a well-ventilated room in such a manner that it is illuminated by diffused daylight during the drying period. The temperature shall not be below 15°C and relative humidity 65 ± 5 percent during the drying period. The panel shall be examined for drying time after the specified period.

C-1.4 Drying time shall be such a condition of the stopper layer that it is suitable to be rubbed down wet with No. 220 emery paper without clogging the emery paper.

APPENDIX D

[*Table* 1, *Item* (iii) (*b*)]

DETERMINATION OF DRYING TIME FOR AIR-DRYING SYNTHETIC SYSTEM

D-0. OUTLINE OF THE METHOD

D-0.1 A mild steel panel is dented with a specified number of dents and then coated with primer and subsequently with the material. It is then suitably examined for drying time.

D-1. PROCEDURE

D-1.1 A mild steel panel, 150 × 150 × 0·8 mm, having 4 dents approximately 0·5 mm in depth and 2 mm in diameter and equally spaced, prepared as described in **G-1.1** (Stage 1), shall be used.

D-1.2 The dents on the panel prepared with the appropriate primer as described in **G-1.1** (Stage 2), shall be filled with the material by applying with a palette knife.

D-1.3 The panel shall be exposed in a vertical position in a well-ventilated room in such a manner that it is illuminated by diffused daylight during the drying period. The temperature shall not be below 15°C and relative humidity 65 ± 5 percent during the drying period. The panel shall be examined for drying time after the specified period.

D-1.4 Drying time shall be such a condition of the stopper layer that it is suitable to be rubbed down wet with No. 220 emery paper without clogging the emery paper.

APPENDIX E

[*Table* 1, *Item* (iii) (*c*)]

DETERMINATION OF DRYING TIME FOR STOVING SYNTHETIC SYSTEM

E-0. OUTLINE OF THE METHOD

E-0.1 A mild steel panel is dented with a specified number of dents and then coated with primer and subsequently with the material. It is then suitably examined for drying time.

E-1. PROCEDURE

E-1.1 A mild steel panel, 150×150×0·8 mm, having 4 dents, approximately 0·5 mm in depth and 3 mm in diameter and equally spaced, prepared as described in **H-1.1** (Stage 1), shall be used.

E-1.2 The appropriate primer shall be sprayed on the panel, prepared as in **H-1.1** (Stage 2), in a single coat to give a dry film thickness of 20 to 25 μm. A flash-off time of 15 minutes shall be given and the panel shall be stoved at 130°C for 30 minutes.

E-1.3 The stopper shall be applied with a palette knife to fill the dents on the panel in not less than 2 applications avoiding application in thick layers. After 15 minutes flash-off time after the first application the panel shall be stoved at 130°C for 30 minutes. After cooling to room temperature the second application shall be given and stoved as in the first application.

E-1.4 Drying time shall be such a condition of the stopper layer that it is suitable to be rubbed down wet with No. 220 emery paper without clogging the emery paper.

APPENDIX F

[*Table* 1, *Item* (iv) (*a*)]

DETERMINATION OF SUITABILITY FOR RUBBING DOWN FOR NITROCELLULOSE SYSTEM

F-0. OUTLINE OF THE METHOD

F-0.1 A mild steel panel is prepared with the material and dried, rubbed, washed and again dried. Then a single coat of suitable primer or primer surfacer is applied and film is allowed to dry and examined for its suitability for rubbing down and tendency to lift the primer or primer surfacer.

F-1. PREPARATION OF PANEL

F-1.1 The complete painting system in conjunction with the stopper shall

consist of:

a) two coats of paint, priming, red oxide-zinc chrome, conforming to IS : 2074-1962*;

b) two coats of paint, surfacer, nitrocellulose, grey, light, conforming to IS : 6126-1971†; and

c) three coats of paint, finishing, nitrocellulose, high gloss, conforming to IS : 5691-1970‡.

The primer and stopper shall be thinned as required with thinner for synthetic paints (*see* IS : 1872-1961§) and the surfacer and finishing paints shall be thinned with thinner conforming to IS : 5667-1970‖ (1 :1·5 by volume), and the painting system prepared as follows:

Stage 1 — A mild steel panel, 150 × 150 × 1·25 mm, having 4 dents as described in Appendix C shall be degreased with a suitable solvent and then dipped for 5 minutes in a bath containing solution of the composition stated below, kept at 60°C:

Orthophosphoric acid (relative density 1·7)	54 parts by mass
n-Butyl alcohol (conforming to IS : 361-1962¶)	10 parts by mass
Methylated spirit (conforming to IS : 324-1959**)	10 parts by mass
Water	26 parts by mass

The panel shall be withdrawn and washed thoroughly in boiling water to remove all traces of the solution and dried for 15 minutes in an oven at 60°C. The panel shall then be kept at room temperature (21 to 38°C) for 1 hour.

Stage 2 — The primer conforming to IS : 2074-1962* shall be applied on to the panel prepared as above in a single coat by spraying to give a dry film thickness of 20 to 25 μm and allowed to dry for 4 hours.

Stage 3 — The stopper shall be applied with a palette knife to fill the dents on the panel in not less than two applications at an interval of 4 hours avoiding application in thick layers to give a total dry film thickness of 100 to 125 μm in two coats and then allowed to dry for 16 hours after the final application under the conditions described in Appendix C. The material shall then be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a further coat of the primer. The surface shall then be washed down with water to remove loosely adherent dirt and allowed to dry for 30 minutes. A further coat of the primer shall be applied and allowed to dry for 4 hours.

*Specification for ready mixed paint, red oxide-zinc chrome, priming.
†Specification for nitrocellulose surfacer.
‡Specification for lacquer, cellulose, pigmented, finishing, glossy.
§Specification for thinners for synthetic paints and varnishes for aircrafts.
‖Specification for thinner for cellulose nitrate based paints and lacquers.
¶Specification for normal butyl alcohol, technical (*revised*).
**Specification for ordinary denatured spirit (*revised*).

Stage 4 — One coat of the surfacer conforming to IS : 6126-1971* shall be applied by spraying on to the panel to give a dry film thickness of 20 to 25 μm and allowed to dry for 30 minutes under the conditions described in Appendix C. One further coat shall be applied similarly with a 30 minutes interval between coats and the panel allowed to dry for 4 hours.

The film prepared in the above manner shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a coat of the finishing paint. The surface shall then be washed down with water to remove all loosely adherent dust and allowed to dry for 30 minutes.

Stage 5 — One coat of the finishing paint conforming to IS : 5691-1970† shall be applied by spraying to give a dry film thickness of 15 to 20 μm and allowed to dry for one hour under the conditions described in Appendix C. Two further coats of the finishing paint shall be applied in a similar manner with an interval for one hour between coats and the panel allowed to dry for 72 hours.

Stage 6 — The panel thus prepared shall be rubbed down wet with No. 400 emery paper to give a smooth and even surface and then thoroughly washed down with water to remove loose dust and allowed to dry for 30 minutes.

The film shall then be rubbed down vigorously with a suitable cutting paste, washed with white spirit to remove adherent dust and abrasive and finally given a thorough polishing with a soft cloth using a suitable wax polish.

F-2. PROCEDURE

F-2.1 A mild steel panel, 150 × 150 × 1·25 mm, shall be used. The panel, prepared as described in **F-1.1** (Stages 1 to 3), shall be allowed to dry for 16 hours. The panel thus prepared shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper to give a smooth and even surface and then thoroughly washed down with water to remove loose dust and allowed to dry for 30 minutes. The appropriate primer or primer surfacer shall then be applied in a single coat and allowed to dry for 16 hours as described in Appendix **F-1.1** (Stage 3), and the film examined.

F-2.2 The requirements shall be taken as having been satisfied if the material dried to a hard firmly adherent layer suitable for rubbing down as described in Appendix **F-1.1** (Stage 3) and shows no tendency to lift the primer or primer surfacer.

*Specification for nitrocellulose surfacer.
†Specification for lacquer, cellulose, pigmented, finishing glossy.

APPENDIX G

[*Table* 1, *Item* (iv) (*b*)]

DETERMINATION OF SUITABILITY FOR RUBBING DOWN FOR AIR-DRYING SYNTHETIC SYSTEM

G-0. OUTLINE OF THE METHOD

G-0.1 A mild steel panel is prepared with the material and dried, rubbed, washed and again dried. Then a single coat of suitable primer or primer surfacer is applied and film is allowed to dry and examined for its suitability for rubbing down and tendency to lift the primer or primer surfacer.

G-1. PREPARATION OF PANEL

G-1.1 The complete painting system in conjunction with the stopper under the air-drying system shall consist of:

a) two coats of paint, priming, red oxide-zinc chrome, conforming to IS : 2074-1962*;

b) two coats of synthetic primer surfacer, air-drying, conforming to Indian Standard specification for primer surfacer, air-drying, for automobiles (*under preparation*).

NOTE — Until the standard under preparation is published, the matter shall be subject to agreement between the concerned parties.

c) two coats of synthetic enamel, air-drying, conforming to IS : 2932-1964†; and

d) one glaze coat consisting of 50 percent of the above synthetic enamel and 50 percent of synthetic clear conforming to IS : 524-1968‡. The primer, stopper surfacer, finishing enamel and glaze coat shall be thinned as required with thinner for synthetic paint (*see* IS : 1872-1961§).

Stage 1 — A mild steel panel, 150 × 150 × 1·25 mm, having 4 dents as described in Appendix C shall be degreased with a suitable solvent and then dipped for 5 minutes in a bath containing solution of the composition stated below, kept at 60°C:

Orthophosphoric acid (relative density 1·7)	54 parts by mass
n-Butyl alcohol (conforming to IS : 361-1962‖)	10 parts by mass
Methylated spirit (conforming to IS : 324-1959¶)	10 parts by mass
Water	26 parts by mass

The panel shall be withdrawn and washed thoroughly in boiling water

*Specification for ready mixed paint, red oxide-zinc chrome, priming.

†Specification for enamel, synthetic, exterior, Type 1, (a) undercoating, (b) finishing, colour as required.

‡Specification for varnish, finishing, exterior, synthetic (*first revision*).

§Specification for thinners for synthetic paints and varnishes for aircrafts.

‖Specification for normal butyl alcohol, technical (*revised*).

¶Specification for ordinary denatured spirit (*revised*).

to remove all traces of the solution and dried for 15 minutes in an oven at 60°C. The panel shall then be kept at room temperature (21 to 38°C) for 1 hour.

Stage 2 — The primer conforming to IS : 2074-1962* shall be applied on to the panel prepared as above in a single coat by spraying to give a dry film thickness of 20 to 25 μm and allowed to dry for 4 hours.

Stage 3 — The stopper shall be applied with a palette knife to fill the dents on the panel in not less than two applications at an interval of 4 hours to avoid application in thick layers to give a total dry film thickness of 100 to 125 μm in two coats and then allowed to dry for 16 hours under the conditions described in Appendix C. The material shall then be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a further coat of the primer. The surface shall then be washed down with water to remove loosely adherent dirt and allowed to dry for 30 minutes. A further coat of the primer shall then be applied and allowed to dry for 4 hours.

Stage 4 — One coat of the appropriate surfacer shall be applied by spraying on to the panel to give a dry film thickness of 20 to 25 μm and allowed to dry for 6 hours under the conditions described in Appendix C. One further coat of the surfacer shall be applied similarly with 6 hours interval between coats and the panel shall be allowed to dry for 16 hours.

The film prepared in the above manner shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a coat of the finishing paint. The surface shall then be washed down with water to remove all loosely adherent dust and allowed to dry for 30 minutes.

Stage 5 — One coat of the finishing enamel conforming to IS : 2932-1964† shall be applied by spraying to give dry film thickness of 20 to 25 μm and allowed to dry for 8 hours under the conditions described in Appendix C. One further coat of the finishing paint shall be applied in similar manner with an interval of 8 hours in between coats and the finish allowed to dry for 72 hours.

Stage 6 — The panel thus prepared shall be rubbed down wet with No. 400 emery paper to give a smooth and even surface and then thoroughly washed down with water to remove loose dust and allowed to dry for 30 minutes.

Stage 7 — One glaze coat consisting of 50 percent of finishing enamel conforming to IS : 2932-1964† and 50 percent of the synthetic varnish conforming to IS : 524-1968‡ shall be mixed and sprayed to give a dry film thickness of 15 to 20 μm and allowed to dry for 72 hours.

*Specification for ready mixed paint, red oxide-zinc chrome, priming.

†Specification for enamel, synthetic, exterior, Type 1, (a) undercoating, (b) finishing, colour as required.

‡Specification for varnish, finishing, exterior, synthetic (*first revision*).

G-2. PROCEDURE

G-2.1 A mild steel panel, 150 × 150 × 1·25 mm, shall be used. The panel, prepared with the material as described in **G-1.1** (Stages 1 to 3), shall be allowed to dry for 16 hours. The panel thus prepared shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper to give a smooth and even surface and then thoroughly washed down with water to remove loose dust and allowed to dry for 30 minutes at room temperature. The appropriate primer or primer surfacer shall then be applied in a single coat and allowed to dry for 16 hours as described in **G-1.1** (Stage 3), and the film examined.

G-2.2 The requirements shall be taken as having been satisfied if the material dries to a hard firmly adherent layer suitable for rubbing down as described in **G-1.1** (Stage 3) and shows no tendency to lift the primer or primer surfacer.

APPENDIX H

[*Table* 1, *Item* (iv) (*c*)]

DETERMINATION OF SUITABILITY FOR RUBBING DOWN UNDER STOVING SYSTEM

H-0. OUTLINE OF THE METHOD

H-0.1 A mild steel panel is prepared with the material and dried, rubbed, washed and again dried. Then a single coat of suitable primer or primer surfacer is applied and film is allowed to dry and examined for its suitability for rubbing down and tendency to lift the primer or primer surfacer.

H-1. PREPARATION OF PANEL

H-1.1 The complete painting system in conjunction with the stopper shall consist of:

a) one coat of paint, priming, red oxide-zinc chrome, conforming to IS : 2075-1962*;

b) two coats of synthetic primer surfacer, stoving, conforming to IS : 6161-1971†; and

c) two coats of synthetic stoving enamel, finishing, conforming to IS : 6125-1971‡.

The primer, stopper, surfacer and finishing enamel shall be thinned as required with thinner for synthetic paint, conforming to IS : 1872-1961§.

*Specification for ready mixed paint, stoving, red oxide-zinc chrome, priming.
†Specification for primer-surfacer, stoving, exterior, red and grey, for automobiles.
‡Specification for enamel, synthetic, stoving, for automobiles.
§Specification for thinners for synthetic paints and varnishes for aircrafts.

Stage 1 — A mild steel panel, 150×150×1·25 mm, having 4 dents as described in Appendix C shall be degreased with a suitable solvent and then dipped for 5 minutes in a bath containing solution of the composition stated below, kept at 60°C:

Orthophosphoric acid (relative density 1·7)	54 parts by mass
n-Butyl alcohol (conforming to IS : 361-1962*)	10 parts by mass
Methylated spirit (conforming to IS : 324-1959†)	10 parts by mass
Water	26 parts by mass

The panel shall be withdrawn and washed thoroughly in boiling water to remove all traces of the solution and dried for 15 minutes in an oven at 60°C. The panel shall then be kept at room temperature (21 to 38°C) for 1 hour.

Stage 2 — The primer conforming to IS : 2075-1962‡ shall be applied on to the panel prepared as above in a single coat by spraying to give a dry film thickness of 30 to 37 μm and after 15 minutes of flash-off time shall be stoved at 130°C for 30 minutes.

Stage 3 — The stopper shall be applied with a palette knife to fill the dents on the panel in not less than two applications avoiding application in thick layers to give a total dry film thickness of 100 to 125 μm in two coats. After 15 minutes flash-off time after the first application the panel shall be stoved at 130°C for 30 minutes. After cooling to room temperature the second application shall be given and stoved as in the first application and allowed to cool to room temperature. The material shall then be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a further coat of the primer. The surface shall then be washed down with water to remove loosely adherent dirt and allowed to dry for 30 minutes.

Stage 4 — One coat of primer surfacer conforming to IS : 6161-1971§ shall be applied by spraying on to the panel to give a dry film thickness of 30 to 37 μm and allowed a flash-off time of 15 minutes and then one further coat of the primer surfacer shall be similarly applied and finally stoved at 130°C for 30 minutes.

The film prepared in the above manner shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper until the surface is sufficiently smooth and even to take a coat of the finishing paint. The surface shall then be washed down with water to remove all loosely adherent dust and allowed to dry for 30 minutes.

Stage 5 — One coat of the finishing enamel conforming to IS : 6125-1971‖ shall be applied by spraying to give a dry film thickness of 25 to

*Specification for normal butyl alcohol, technical (*revised*).
†Specification for ordinary denatured spirit (*revised*).
‡Specification for ready mixed paint, stoving, red oxide-zinc chrome, priming.
§Specification for primer-surfacer, stoving, exterior, red and grey, for automobiles.
‖Specification for enamel, synthetic, stoving, for automobiles.

30 μm and allowed a flash-off time of 15 minutes and then one further coat of the finishing enamel shall be similarly applied and finally stoved at 130°C for 30 minutes.

H-2. PROCEDURE

H-2.1 A mild steel panel, 150 × 150 × 1·25 mm, shall be used. The panel prepared with the material as described in **H-1.1** (Stages 1 to 2) shall be stoved at 130°C for 30 minutes and cooled to room temperature. The panel thus prepared shall be rubbed down wet with No. 280 emery paper followed by No. 400 emery paper to give a smooth even surface and then thoroughly washed down with water to remove loose dust and allowed to dry for 30 minutes. The appropriate primer or primer surfacer shall then be applied to a single coat and after a flash-off time of 15 minutes shall be stoved at 130°C for 30 minutes as described in **H-1.1** (Stage 3), and the film examined.

H-2.2 The requirements shall be taken as having been satisfied if the material dries to a hard firmly adherent layer suitable for rubbing down as described in **H-1.1** (Stage 3) and shows no tendency to lift the primer or primer surfacer.

APPENDIX J

(*Clause* 3.5)

DURABILITY

J-0. OUTLINE OF THE METHOD

J-0.1 The durability of the material is determined by ascertaining actual behaviour of suitably prepared test panels in normal outdoor exposure test for a specified period and evaluating the results of this exposure by a suitable method of rating for various characteristics of the film. The material is also evaluated by an accelerated weathering test wherein a prepared panel is subjected to controlled exposure of heat, light and water in an artificial weathering apparatus.

J-1. NORMAL OUTSIDE EXPOSURE

J-1.1 A mild steel panel, 300 × 300 × 1·25 mm, shall be used. The panel prepared as described in **F-1.1** (Stages 1 to 6) shall be allowed to dry in a vertical position at room temperature (21 to 38°C) for 7 days.

J-1.2 The panel prepared as described in **G-1.1** (Stages 1 to 7) shall be allowed to dry in a vertical position at room temperature (21 to 38°C) for 7 days.

J-1.3 The panel prepared as described in **H-1.1** (Stages 1 to 5) shall be allowed to dry in a vertical position at room temperature (21 to 38°C) for 7 days.

J-1.4 The reverse side of the panel shall be protected by painting with a suitable paint.

J-1.5 The panel, as the case may be, shall be exposed for one year in the open facing south at an angle of 45° to the horizontal. At the end of this period, the panel shall be removed, washed with water, dried, one-half of the panel repolished with a suitable wax polish and the freshly polished and the unpolished surfaces examined for loss of gloss, checking, chalking, blistering, spotting, change of colour or any other evidence of breakdown with the aid of a magnifying glass or microscope at 10× magnification using a freshly prepared panel of the composite film as the standard.

J-1.5.1 The samples shall be considered to have passed the requirement of this test if the condition of film of the panel exposed is well comparable with that of the freshly prepared panel.

J-1.5.2 The other portion of the film shall be completely removed with a suitable paint remover and the exposed metal examined for corrosion. Corrosion within 6 mm of the edges of the panel shall be ignored in assessing the results. Localized corrosion and/or rust spots shall not constitute a cause of failure. To satisfy the requirements of this standard, the metal surface shall be otherwise free from corrosion.

J-2. ACCELERATED WEATHERING

J-2.1 Accelerated Weathering Apparatus — An artificial weathering apparatus of the carbon arc type for uniform and controlled exposure to the effects of heat, light and water.

J-2.2 Procedure

J-2.2.1 Panels prepared as described in **F-1.1** (Stages 1 to 6), **G-1.1** (Stages 1-7), **H-1.1** (Stages 1 to 5), as the case may be, from samples drawn from the supplies shall be tested with the approved sample in the same manner and at the same time in the accelerated weathering apparatus for 100 hours not exceeding 7 hours a day.

J-2.2.2 The composite film shall not be inferior to the composite film prepared from the approved sample at any stage as regards loss of gloss, checking, chalking, blistering, spotting, change of colour or any other signs of breakdown.