D.T.D.5587

Ministry of Defence
Defence Procurement Agency, ADRP2
Abbey Wood
Bristol
BS34 8JH

OBSOLESCENCE NOTICE

All DTD specifications were declared obsolescent from 1st April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

Further Guidance

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

MINISTRY OF TECHNOLOGY

D.T.D. 5587

Amendment No. 1

February, 1970

Aerospace Material Specification

PAINT SYSTEM, LUMINOUS, TRITIUM ACTIVATED

SECTION IV - Paragraph 12. Composition

Delete "The luminous coating compound shall consist of tritiated polymer coated on to the crystalline surface of a zinc cadmium sulphide phosphor. The luminous coating compound shall have a specific activity of 250 ± 50 millicuries of tritium per gramme."

Insert "The luminous coating compound shall consist of tritiated polymer coated on to the crystalline surface of a zinc cadmium sulphide phosphor. The luminous coating compound shall have a specific activity of 350 ± 50 millicuries of tritium per gramme."

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MINISTRY OF AVIATION

D.T.D. 5587

December, 1966

Aircraft Material Specification

PAINT SYSTEM, LUMINOUS, TRITIUM ACTIVATED

1. Paint, undercoat for luminous paint: (a) air drying; (b) stoving

2. Paint medium for luminous paint: (a) air drying; (b) stoving

3. Compound, luminous, tritium activated

SECTION I - General

1. Scope and intended application

This specification relates to:

(a) a white undercoat paint;

(b) an unpigmented paint medium;

(c) a tritium-activated luminous compound.

The luminous compound is designed to be mixed with the paint medium to form a luminous paint.

The luminous paint is intended to be used in conjunction with the white undercoat to form a painting system for the preparation of markings on instrument dials and pointers which will be protected from gross contamination with water by at least a cover glass. This paint system will be applied over the normal protective paints on wood or metal by brushing, peg stick or silk screen stencilling.

Precautionary note on handling this material

(1) The manipulation of radio-active luminous compounds and paints is governed by the Factories (Luminising) Special Regulation, 1947. Attention is also drawn to the Radio-active Substances Act 1960, and to an Introductory Manual on the Control of Health Hazards from Radio-active Materials, prepared for the Medical Research Council by the Atomic Energy Research Establishment.

(2) All manipulation of luminous compounds and luminous paints shall be carried out in a cabinet, efficiently ventilated by mechanical means to the open air and maintained at a pressure slightly lower than atmospheric to prevent escapes of radio-active materials. A suitable cabinet is shown in D.C.I. Diagram No. 1147.

(3) When the luminous paint is used for luminising it is recommended that it should be applied at a dry film thickness of the order of $\frac{1}{64}$ inch which corresponds to a luminosity of 0.007 candela/ft^2. The level of radio-activity associated with a luminous paint coating of this thickness is of the order of one rad per hour per square inch of the luminised surface.

2. Related documents

(a) Reference is made in this specification to:

(i) British Standard 233 … … … ‘Glossary of terms used in illumination and photometry’

(ii) British Standard 254 … … … ‘Zinc oxide (types 1 and 2)’.

(iii) British Standard 3591 … … … ‘Industrial methylated spirit, 74 O.P.’.

(iv) Specification DEF-1053 … … … ‘Standard methods of testing paint, varnish, lacquer and related products’.

(v) Specification DEF-1059 … … … ‘paint priming and finishing for instruments’.

(vi) ‘Radioactive Substances Act, 1960’. Her Majesty’s Stationery office.

(vii) ‘The Factories (Luminising) Special Regulations, 1947’, Her Majesty’s Stationery Office.

(viii) ‘An introductory manual on the control of health hazards from radio-active material’, Medical Research Council.

(ix) ‘Journal of Scientific Instruments’, 1946, volume 23.

(b) Reference in this specification to a British Standard undated, or to a DEF specification means, in any tender or contract, the edition current at the date of such tender or contract.

3. Information to be applied by the purchaser

The purchaser shall state clearly in his order the conditions under which he proposes to dry the undercoat and the luminous paint film, i.e. by air drying or stoving including the time and temperature of stoving.

4. Approved samples

Before a manufacturer is accepted as an approved supplier of this type of material and before his product is accepted as complying with the requirements of this specification, he shall forward to the Approving Authority such samples of the material he proposes to supply as the Authority demands. If approved, these samples of material will constitute, for a period not exceeding twelve months from the date of approval, the standard referred to in sub-clause 13*(c)*.

The Approving Authority for this material is the Director of Chemical Inspection. Chemical Inspectorate, E. 135/17, Royal Arsenal, Woolwich, S.E.18.

5. Keeping qualities

The paint medium and the undercoat shall be such that, when stored in their original sealed containers under normal temperature conditions, they will retain the properties described in this specification for a period, from the date of despatch, of not less than twelve months in temperate and tropical climates.

6. Inspection

The material and its containers, including those for the luminous compound, shall be to the satisfaction of the Inspection Authority. Samples of the material may be taken at any stage of manufacture or from any portion of a consignment for inspection by, and the final approval of the Inspection Authority.

If the Inspection Authority has delegated inspection of this material to the manufacturer, the manufacturer shall normally test each batch to prove that it is uniform and that it complies with Clause 8, and subclauses 9 *(a)* to 9 *(g),* 11 *(a)* to *11(e)* and 13 *(a)* to 13 *(d)* and 13 *(g)* as appropriate for the material supplied. The manufacturer shall provide, in respect of each batch, a test certificate showing the results of all tests and certifying that the batch was manufactured to the same formulation as that of the approved samples (see Clause 4). The manufacturer shall also supply such samples as may be required by the Inspection Authority. The Inspection Authority may call upon any other tests for any or all of the items to ensure that the materials are compatible with other materials supplied to this specification.

The tests required by the specification will be carried out either in accordance with the appropriate methods described in specification DEF-1053. 'Standard methods of testing paint, varnish, lacquer and re lated products' or by the appropriate methods described in the appendices to this specification. Unless otherwise stated all tests will be carried out at a temperature of 15½°-21°C (60°-700°).

If any sample be found not to conform to this specification, the whole consignment may be rejected.

7. Containers and marking of containers

(a) Paint medium and undercoat paint.

The paint medium and undercoat paint shall be filled into sound, clean and dry containers which after filling shall hold an agreed quantity and shall be securely closed.

The containers shall each be legibly and durably marked with any markings called for by statutory requirements and in addition with the following details:

Description as shown in the title of this specification;

Specification number;

Contract or order number;

Distinctive lot or batch number;

Quantity of contents;

Date of supply;

Contractor's initials or recognised trade mark;

Additional markings called for in the contract or order.

(b) Luminous compound.

The luminous compound shall be supplied in glass bottles or other approved containers and each such container shall be hermatically stoppered, preferably by means of a ground glass stopper, secured with a screwed cap of moulded material and a rubber or plastic washer. Each bottle or conminer shall contain 5 grammes, or multiples of 5 grammes, of the compound (up to a maximum of 30 grammes) as stated on the contract.

The date of mixing of the activator and the phosphor shall be marked on each bottle or container together with the type of activator.

The bottles or containers comprising a consignment shall be suitably packed in approved numbers in approved boxes.

The relevant regulations of the Post Office and the Railway Clearing House shall be observed in the despatch of the compound.

SECTION II - Paint, undercoat: (a) air drying; (b) stoving

8. Composition

The colour of the undercoat shall be white. The pigment shall be zinc oxide, type I to British Standard 254, or titanium dioxide to B.S.1851 and not less than 65 per cent by weight of the paint.

Otherwise the choice of extenders, thinners and binder is left to the discretion of the manufacturer, but is subject to the final approval of the Approving Authority. A knowledge of the composition of the paint is essential if the performance clauses of the specification are to be interpreted soundly. The manufacturer shall therefore inform the Approving Authority, in confidence, of the composition of the material sup plied, including details of the pigment, extenders, thinners and binder employed.

9. Testing

(a) Lead content. The paint shall not contain lead or lead compounds, calculated as metallic lead, together exceeding 0.2 per cent.

(b) Flash point. When the paint is tested by DEF-1053 Method No. 5 *(a),* its flash point shall not be below 73°F.

(c) Consistency. The material shall be in such a condition that stirring easily produces a smooth uniform paint suitable for application by brush, peg stick and silk screen stencilling. When examined by DEF-1053 Method No. 1 the paint shall not show hard settling, objectionable skinning or tendency to gel, either in the original container or in the laboratory sample container.

(d) Preparation of painted test panels. For the purposes of clauses 9*(e)*, and 9*(g)* below, test panels shall be prepared in accordance with the relevant requirements of DEF-1053 Method No. 2. The weight when dry of a single coat paint film applied to test panels shall be 3.5 oz/yd^2.
When an air drying undercoat is being tested the paint shall be applied by brushing to the specified type of panel and allowed to dry in a vertical position at a temperature of 15½°-21°C (60°-70°F) and a relative humidity of 60-70 per cent.

When a stoving undercoat is being tested the paint shall be applied by brushing to the specified type of panel and shall then be allowed to stand in a vertical position at room temperature for 15 minutes. The panel shall then be stoved under the conditions and for the period agreed between the paint manufacturer and the Inspection Authority. After removal from the stoving oven, the panel shall be allowed to stand at a temperature of 15½° -21°C (60°-70°F) and a relative humidity of 60-70 per cent for not less than one hour before testing.

(e) Drying time for air drying undercoat

(i) *Surface drying time.* When the paint film prepared on a tin-plate panel is tested by DEF-1053 Method No. 7 it shall be surface dry in not more than four hours from the time of application.

(ii) *Hard drying time.* When the paint film prepared on a tin-plate panel is tested by DEF-1053 Method No. 8 it shall be hard dry in not more than eight hours from the time of application and shall then be fit to take a coat of luminous paint (see Section III).

(f) Opacity (contrast ratio) for air drying undercoat. When the paint film is prepared and tested by DEF-1053 Method No. 12 the contrast ratio shall be not less than 65 per cent.

(g) Flexibility and adhesion (*bend test*}. When the paint film is tested at room temperature, seven days after application when air dried, or one hour after stoving, by DEF-1053 Method No. 13 using a mandrel ¼ inch in diameter, it shall not show cracking or loss of adhesion.

SECTION III - Paint medium; (a) air drying; (b) stoving

10. Composition

The paint medium shall not contain heavy metal compounds liable to have an adverse effect on the radio-activation of the luminous compound. It shall be non-reactive with the luminous compounds, i.e., it shall not contain acidic or potentially acidic substances or produce such substances during drying or stoving. It shall give colourless films on drying or stoving. If thinners are required for use with the medium they shall be non-reactive.

The binder shall be based on polystyrene or polymethyl-methacrylate resins. Other types of binder may be used subject to the prior approval of the Approving Authority. Such approval will, however, be given only when acceptable evidence of performance has been produced or long-term practical trials have been carried out.

Otherwise the choice of the ingredients of the binder and thinner is left to the discretion of the manufacturer, bearing in mind the sensitivity of the phosphor in the luminous compound to the deteriorating influences of oxygen, water and acids. The formulation is subject to the final approval of the Approving Authority. A knowledge of the composition of the paint medium is essential if the performance clauses of this specification are to be interpreted soundly. The manufacturer shall therefore inform the Approving Authority, in confidence, of the composition of the material supplied, including details of the thinners and binder employed.

11. Testing

(a) Lead content. The paint medium shall not contain lead or lead compounds calculated as metallic lead, together exceeding 0.2 per cent.

(b) Flash point. When the paint medium is tested by DEF-1053 Method No. 5(a), its flash point shall not be below 73°F.

(c) Consistency.

(i) When examined by DEF-1053 Method No. 1 the paint medium shall not show objectionable skinning or tendency to gel, either in the original container or in the laboratory sample container.

(ii) The viscosity of the paint medium shall be such that when mixed by gentle stirring with the luminous compound in the ratio of:

luminous compound.....10 parts by weight

paint medium..... 4 parts by weight

a smooth uniform paint shall be obtained suitable for application by brush, peg stick and silk screen stencilling.

(d)Hard drying time for air drying medium. When a film of the paint medium applied to a tin-plate panel prepared in accordance with the relevant requirements of DEF-1053 Method No. 2 is tested by DEF-1053 Method No. 8 is shall be hard dry in not more than 8 hours from the time of application.

(e) Colour. A film of the paint medium prepared on a glass plate shall be colourless and transparent.

SECTION IV - Compound, luminous

12 Composition

The luminous coating compound shall consist of tritiated polymer coated on to the crystalline surface of a zinc cadmium sulphide phosphor. The luminous coating compound shall have a specific activity of 250 ± 50 millicuries of tritium per gramme.

A knowledge of the composition and age of the luminous compound is essential if the performance clauses of this specification are to be interpreted soundly. The manufacturer shall therefore inform the Approving Authority of the type and composition of the compound supplied and the date of mixing of the activator with the phosphor.

13. Testing

Attention is drawn to the precautionary note in clause 1 on the handling of this material.

(a) Preparation of specimens for test.

(i) *Specimen of the luminous compound in powder form.* The sample holder is illustrated in D.C.I. Diagram No. 148. Transfer 3 ± 0.1 g of luminous compound to the glass inner receptacle, the bottom of which is a plate of borosilicate crown glass 2.5 mm thick, place the polythene film over the top of the receptacle and gently push the rubber stopper down the tube until the powder is held firmly against the glass plate at the bottom. The inner receptacle is now placed in the outer metal case, which provides extra safety in handling. The sample holder may now be removed from the handling cabinet.

(ii) *Painted specimen with luminous paint only.* Use a lantern slide cover glass 2 inches square, to which is attached by means of hot pressing, a piece of photographic paper also 2 inches square with a 0.5 inch diameter hole cut out of the centre by means of a wad punch or similar tool. Care must be taken that the centre hole remains clean. Weigh out 0.2 ± 0.002 g of luminous compound on to the centre of the glass and add 0.08 ml of medium (about 3 drops). Mix the two components by stirring gently with a 22 S.W.G. wire bent into a U at one end, and spread as evenly as possible over the space provided. Care should be taken to keep the mixture within the ½ inch diameter and prevent any spreading on to the paper. Allow the painted panel to dry in the handling cabinet overnight in a horizontal position and then remove the panel from the cabinet. Mount a piece of opal glass in contact with the back of the specimen before making luminance measurements.

(iii) *Painted specimen, full paint system.* Use a piece of burnished hard aluminium 2 inches square with a recess of 0.5 inch diameter and 0.020 inch depth as shown in D.C.I. Diagram No. 149. Prepare in accordance with DEF-1053 Method No. 2 and paint with one coat of priming paint and one coat of black semi-gloss finishing paint complying with specification DEF-1059, and stove each coat in accordance with the manufacturers instructions. Then paint the panels with one coat of either air drying or stoving (as required) undercoat to Section II of this specification. Allow these panels to stand for 24 hours at a temperature of 15½°-21°C (60°-70°F) and a relative humidity of 60-70 per cent.

Weigh 0.2 ± 0.002 g of luminous compound on the centre of the prepared recess and add 0.08 ml of medium (about 3 drops). Mix the two components by stirring gently with a 22 S.W.G. wire bent into a U at one end, avoiding scratching of the undercoat, and spread as evenly as possible over the recess. Care should be taken to keep the mixture within the recess. Allow the panel to dry in the handling cabinet overnight in a horizontal position and then remove it from the cabinet. Allow to stand at a temperature of 15½°-21°C (60°-7O°F) and a relative humidity of 60-70 per cent before testing.

If a stoving medium is used, the panel, after removal from the cabinet, shall be stoved under the conditions and for the period agreed between the Approving Authority and paint manufacturer. After removal from the stoving oven the panel shall be allowed to stand at a temperature of 15½°-21°C and a relative humidity of 60-70 per cent for not less than one hour before testing.

(iv) *Soak test specimen.*

Weigh out 0.10 g of the luminous compound and mix it with 0.04 ml of medium and spread over a disc of aluminium sheet 1 inch diameter. Allow to dry for 24 hours at a temperature of 15½°-21°C and a relative humidity of 60-70 per cent.

(b) Luminance. When specimens, prepared as in sub-clause 13*(a)*(i), 13*(a)*(ii) and 13*(a)*(iii) as appropriate are tested by the method, described in Appendix A, the luminance shall be not less than the appropriate value in the table below:

Type of specimen	Luminance candela/ft.²	Luminance after 120 days ageing candela/ft.²
In powder form Sub-clause 13(*a*)(i)	0·018	0·009
Luminous paint only Sub-clause 13(*a*)(ii)	0·007	0·003
Complete paint system Sub-clause 13(*a*)(iii)	0·007	0·003

(c) Colour. The colour, when viewed in daylight, of the luminous paint system prepared as in sub-clause 13*(a)*(iii) shall be 'off-white' or 'broken-white', and shall match the colour of the luminous paint system prepared from the approved samples.

(d) Resistance to methylated spirit 74 0.P. (Type test). When the luminous paint, prepared by the method described in sub-clause 13 *(a)* (iii) or subclause 13 *(a)* (iii) as required, is tested for 7 days by the method described in Appendix C it shall show no signs of loss of adhesion and shall retain its original colour and luminance, and the test fluid shall not be coloured. The test shall commence 7 days after removal from the handling cabinet.

(e) Resistance to light. (Type test). Films of the luminous paint prepared by the method described in sub-clause 13 *(a)* (ii) or 13 *(a)* (iii) as required and exposed for 500 hours to the arc as described in DEF-1053 Method No. 33 shall retain a luminance of not less than 85 per cent of that of similar fi1ms prepared at the same time but stored in the dark. Exposure to the arc shall commence 7 days after removal from the handling cabinet.

(f) Resistance to heat. (Type test). Films of the luminous paint prepared by the method described in sub-clause 13 *(a)* (ii) or 13 *(a)* (iii) as required and exposed for 500 hours to dry heat at 70°C shall retain a luminance of not less than 90 per cent of that of similar films prepared at the same time but stored at room temperature in the dark. Heating shall commence 7 days after removal from the handling cabinet.

(g) Soak test value.
The specimen prepared as in paragraph 13 *(a)* (iv) and tested as described in Appendix B shall have as oak test value of less than 5 percent.

APPENDIX A

Method for determination of luminance

1. Test specimens

The specimens which are required for the determination of luminance fall into three distinct categories as follows:

(a) A specimen of the luminous compound in powder form;

(b) A painted specimen for measuring the luminance of the compound admixed with medium;

(c) A painted specimen for measuring the luminance of the complete paint system.

Prepare the appropriate specimens in accordance with sub-clause 13*(a).* Dry in the specified manner and for the specified period.

2. Apparatus

The apparatus required for measuring low luminance consists of three main items, a dark room, a photo-electric photometer and a calibrated standard.

(a) The photo-electric photometer. The photo-electric photometer as shown in D.C.I. Diagram No. 150 consists of the following components:

(i) A photomultiplier cell complete with filter and shutter;

(ii) A stabilised power supply;

(iii) A bridge amplifier, as shown in D.C.I. Diagram No. 165.

(i) The photomultiplier. From the photometric point of view, a photomultiplier is equivalent to an emission type photocell except for its sensitivity, which is much higher, and its range of linear response, which is smaller. Owing to the high sensitivity and the high potential between the photocathode and the adjoining electrode, care must be taken not to expose the photocathode to any but the weakest illuminations especially with voltages applied. The range of output over which the response is linear is usually specified by the makers, but in the absence of such specification the maximum permissible output may be taken as 100 microamperes. The basic require ments of the photomultiplier are high cathode sensitivity, low dark current and a Bi-Ag-Cs cathode (See note below).

The spectral sensitivity of the photomultiplier can be measured at the National Physical Laboratory, and shall be corrected to approximate to that of the human eye in the photopic state. This can be done by means of a filter designed as described in the Journal of Scientific Instruments, 1946, 23, 211. The photomultiplier and correction filter must be mounted in a light-tight box fitted with a protective shutter in front of the photo-sensitive surface.

NOTE. Suitable types of photomultiplier are: E.M.I. type No. 6095.A and 6095.B.

(ii) The stabilised power supply. The maximum over-all voltage across the photomultiplier is 180 x (n + 1) volts, where n is the number of dynodes. Since the gain varies as a high power of the over-all voltage (roughly the eighth power for an eleven-stage tube), a highly stabilised supply is necessary for consistent results. Suitable voltage stabilisers can be obtained commercially, but alternatively the circuit shown in D.C.I. Diagram No. 151 has been used and found satisfactory. It consists of an ordinary condenser input bi-phase rectifier circuit with a chain of high quality neon stabiliser tubes across the output. The neon tube rating is chosen so that its running voltage matches the inter-stage voltage of the particular type of photomultiplier being used in preference to valve types, since they take less space and need no highly insulated heater windings. The choke L and resistances Rl and R2 are at a high potential and should be well insulated from the chassis. A high resistance connected across each neon facilitates the striking of the tube. A condenser C4 may be connected across the last stage to provide additional smoothing. A milliammeter is connected in series with the neon chain, in order that the running current of

the neons may be checked from time to time. The photomultiplier cell and voltage supply may be used together in one box, but care must be taken to ensure that the photomultiplier is kept light-tight and cool. Alternatively, the two items may be separated after resistance R2 or after the neon tubes (see circuit D.C.I. Diagram No. 151). Due care must be taken, however, in feeding the high potential from the power supply to the photomultiplier.

(iii) The bridge amplifier. For precise measurements it is convenient to feed the output from the photomultiplier into a d.c. bridge amplifier as shown in D.C.I. Diagram No. 165. The most convenient valves are sub-miniature types with battery-fed directly heated cathodes. e.g. Service code ref. C.V.2371.

The galvanometer is used only as an indicator of out-of-balance of the valve bridge. With the photo-multiplier in the dark, the bridge is balanced by the grid bias controls R_4, and R_5 and the anode variable resistor R_3. When the photomultiplier is exposed, balance is restored by applying a reverse potential to the grid of the measuring valve from a potentiometer of 0.1 per cent accuracy. The grid resistor forms a very convenient adjustment for sensitivity, but it will be found in general that it cannot be usefully increased beyond about 10^7 ohms without introducing excessive instability of the whole circuit. In some cases it has been found advantageous to reduce the total voltage applied to the photomultiplier, thus losing amplifications in the dynode stages, and make up for the loss by using a high value of grid resistor and a more sensitive galvanometer. This expedient is especially applicable when the photomultiplier has a rather high dark current.

(b) A calibrated standard. A calibrated standard may be either of the following forms:

(i) A combination of a standardized lamp and a known diffuse reflecting surface.
The combination of a lamp and a diffuse reflecting surface makes a reliable and long-lasting standard. The luminous intensity of the lamp in the direction to be used and the reflection factor of the diffuse reflecting surface must be determined, the former by ultimate reference to a National Physical Laboratory standard lamp, the latter by comparison with a standard surface such as smoked magnesium oxide. The magnesium oxide surface shall be freshly prepared by depositing a layer at least 1 mm thick on aluminium.

(ii) A self luminous standard. A self luminous standard shall be of the same physical dimensions as the test area of the painted specimen. The luminance of this standard must be determined in candela per square foot by a standards laboratory. As this type of standard deteriorates is must be recalibrated at least once every six months.

3. Procedure

The equipment is fitted up as shown in D.C.I. Diagram Nos. 150 and 153. The specimen to be measured at aperture B (D.C.I. Diagram No. 153) is compared with a known luminescence value at aperture A by means of the photometer. The apertures A and B are identical in size and at the same distance from the photometer. In front of A and B are the measuring shutters These should be covered in black velvet and should be no larger than is necessary to obscure the apertures The principle of their action is that they only obscure the light to be measured. Any stray light will be unaffected by their action and will be automatically allowed for in the zero balancing of the photometer. Precautions should, of course, be taken that the stray light is not excessive, otherwise trouble may be experienced through difficulty or unsteadiness in zero balancing, or through overloading of the photomultiplier.

First switch on the photometer and allow it to settle for about fifteen minutes; at the same time connect the supplies to the photomultiplier, taking care to see that the protective shutter is closed. When all supplies are connected, balance the amplifier bridge by adjusting one of the grid bias resistors and the fine adjustment resistor R_3. This will bring the galvanometer to zero. First direct the photometer towards aperture A, which discloses the calibrated standard, and record the photometer reading. Close shutter A and direct the photometer towards aperture B. Again adjust the zero, open shutter B and record the photometer reading for the specimen under test.

Carry out the measurements three times and take the mean of the results.

4. Calculation

If the luminance of the specimen under test is I. then

$$\mathbf{I} = \frac{\mathbf{C}}{\mathbf{C_s}} .I_s \text{ candela per square foot.}$$

where C = photometer reading of the test specimen;
C = photometer reading of the standard;
I_s = luminance of the standard in candela per square foot.

If a self-luminous standard is used the luminance of this will have been provided by the standard laboratory. If the combination of lamp and reflecting surface is used then

$$C_s = \frac{pI_e}{\pi d^2}$$

where p = reflection factor of the diffuse reflecting surface;
I_e = luminous intensity of the lamp in candela;
d = distance in feet between the Iamp and the reflecting surface.

APPENDIX B

Method of determining the Soak Test Value

The specimen prepared as described in paragraph 13 *(a)* (iv) is placed in a beaker containing 100 ml of distilled water for a period of 24 hours at a temperature of 15½°-21°C (60°-70°F). It is then removed and the tritium content of the water measured.

The Soak Test Value shall be calculated as follows:

$$\text{Soak Test Value} = \frac{t \times 100}{W \times T}\%$$

Where t = Tritium released into the water;
W = Weight of luminous compound applied on the disc;
T = Specific activity of the tritium luminous compound.

APPENDIX C

Method for detemination of resistance to industrial methylated spirit

1. Preparation of panel

Use a panel of aluminium prepared and painted as described in subclause 13*(a)*(iii).

Dry in the specified manner and for the specified period.

2. Reagent

Industrial methylated spirit 74 O.P. to specification B.S.3591.

3. Apparatus

A small beaker capable of holding sufficient reagent for the complete immersion of the panel.

4. Procedure

Place sufficient of the reagent in the beaker. Immerse the panel in a vertical position in the reagent. Cover the beaker to prevent loss of reagent by evaporation.

After the specified period of time, remove the panel from the reagent. Immediately examine the film for the specified signs of deterioration.

Approved for issue,

E. W. RUSSELL,

Director of Materials Research and Development.

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