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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.

Procurement Executive
Ministry of Defence

DTD 5640
July 1990

Aerospace Material Specification

PAINT, PRIMING FOR AIRCRAFT, EPOXIDE COLD CURING, IMPROVED ADHESION, TWO PACK

Note 1. This specification is one of a series issued by the Procurement Executive, Ministry of Defence, either to meet a limited requirement not covered by an existing British Standard (Aerospace Series) or to serve as a basis for inspection of material, the properties and uses of which are not sufficiently established to warrant submission to the British Standards Institution for standardisation.

Note 2. The tests employed in this specification are chosen for their reproducibility and ability to control the properties of the material. They are not intended to be simulated service tests which, because of variability of test conditions, may be unsatisfactory for control purposes.

Note 3. This specification has been devised for the use of the Ministry of Defence and its contractors in the execution of contracts for the Ministry and, subject to the Unfair Contract Terms Act 1977, the Ministry will not be liable in any way whatever (including but without limitation negligence on the part of the Ministry, its servants or agents) where the specification is used for other purposes.

SECTION 1 - GENERAL

1. SCOPE

This specification defines the requirements for a two-pack epoxy strontium chromate primer which can be specificed for use with a number of finishing paints. It has good resistance to aerospace fluids and has better adhesion than primers qualified to DTD 5567.

2. WARNING

This specification calls for the use of substances and/or test procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and in no way absolves either the supplier or the user from statutory obligations relating to health and safety at any stage of manufacture or use.

3. RELATED DOCUMENTS

3.1 Reference is made in this Specification to:-

BS 580	Specification for Trichloroethylene
BS 3900	Methods of test for paints
BS 3978	Specification for water for Laboratory use
BS 4313	Specification for Strontium chromate pigments for paints
BS L156	Specification for sheet and strip of Aluminimum-copper-magnesium-silicon-manganese alloy (solution treated and aged at room temperature)
Def Stan 80-38	Thinners for paint epoxy two-pack cellulose nitrate paint dopes and lacquers.
DTD 5567	Interior and Exterior Protective Finishing Scheme (Cold curing Epoxide type)
DTD 5580	Exterior and Interior Finishing Schemes - Matt and Glossy (Cold Curing Polyurethane Type). Scheme I and II
TS 10281	Compound, cleaning, for aircraft surfaces

3.2 Reference in this standard to any related document means, in any tender or contract, the edition current at the date of such tender or contract unbless a specific edition is indicated.

4. DESCRIPTION

4.1. A two-pack epoxy paint prepared for use by mixing the base paint and curing agent together in a simple ratio by volume. The prepared paint after thinning with thinners complying with Def Stan 80-38 is suitable for application by spraying or rollering.

4.2 The primer is intended for use on suitably treated aluminium and aluminium alloys.

4.3 When used with the appropriate finish the system is expected to give good protection to exterior surfaces and to withstand normal service conditions for a period of not less than 2 years.

4.4 The paint in the 'prepared for use condition' has a pot life of not less than 4 hours at 23 ± 2°C after which any mixed material, not used, must be discarded.

4.5 The material is expected to be capable of being force dried at a temperature not exceeding 70°C.

5. SUPPLY

5.1. Material supplied to this Specification shall be manufactured by a supplier holding Type/Qualification for this product (see Clause 6 Section 1).

5.2 The base paint and curing agent shall be supplied in a consistency such that they will satisfy the requirements of Clause 7 Section 1. The thinners necessary to reduce the mixed components to a consistency for application by spraying or rollering shall be supplied separately (see Clause 4.1 Section 1).

5.3 All materials required to be used together as a system shall be ordered from the same manufacturer, who shall be responsible for ensuring that they are compatible one with another.

6. TYPE/QUALIFICATION APPROVAL

6.1 The Approving Authority for this paint is the Director of Quality Assurance, Technical Support, El7 Royal Arsenal East, London, SE18 6TD.

6.2 A manufacturer wishing to qualify as a supplier of paint to this Specification shall obtain Type/Qualification Approval. He shall, unless otherwise agreed with the Approving Authority, carry out all the tests described in Clause 2, Section 2 of this specification with the exception of those designated Type Tests, in a laboratory approved by the Approving Authority. Samples of paint shown to comply with the requirements of these tests together with the results thereof shall be submitted to the Approving Authority for Type/Qualification Approval.

6.2 Approval sample

6.2.1 A 1 litre sample of the base paint together with an appropriate quantity of curing agent the manufacturer proposes to supply shall be forwarded to the Approving Authority together with declarations of composition as required by Clause 1 Section 2. One litre of the appropriate thinners (see clause 4.1, Section 1) together with the recommended thinning ratio, shall also be supplied. These samples, if approved, will qualify the manufacturer for Type/Qualification Approval for paint to this specification and shall constitute the Approved sample referred to in Clause 9, Section 1 for a period not exceeding 12 months from the date of approval.

6.2.2 No charge shall be made for any samples required in connection with the Approval.

6.2.4 If, after Type/Qualification Approval has been granted, it is desired to change the formulation of the paint, the new paint shall be subjected to the batch and qualification tests and submitted for Type/Qualification Approval.

7. KEEPING QUALITIES

The base paint and curing agent, when stored in the original sealed containers at a temperature of 5-35°C. shall retain the properties described in this specification for a period, from the date of despatch by the manufacturer to the customer, of not less than 12 months.

8. QUALITY ASSURANCE

8.1 Material supplied to the requirements of this specification shall be of the same formulation as that of the Approval Sample (see Clause 6 Section 1).

8.2 Samples of the base paint, curing agent, and their ingredients may be taken at any stage of manufacture or from any portion of a consignment for inspection by the Quality Assurance Authority named in the contract. The manufacturer shall also supply any further evidence of performance and such samples as may be required by the Quality Assurance Authority.

8.3 The manufacturer shall test each batch to prove that it complies with the requirements of tests 1 to 8 in Table 1 of Clause 2.6 Section 2.

8.4 The tests in Table 2 of Clause 2.6 Section 2 are normally required for qualification only, but the Quality Assurance Authority may require the manufacturer to carry out these tests at any time.

8.5 When carried out for other than Qualification Approval purposes the results of test 11 shall not be inferior to those of a system prepared from the Approved Sample and tested in the same manner.

8.6 The tests in Table 3 of Clause 2.6 Section 2 are Type Tests and will be carried out by the Quality Assurance Authority at its discretion.

8.7 If any sample be found not to conform to this specification the whole batch may be rejected.

9. CONTAINERS AND MARKING OF CONTAINERS

9.1. The base paint and curing agent shall be filled into sound, clean and dry containers suitable for the product. Trade pattern containers will be accepted unless otherwise specified in the contract.

9.2 It is the manufacturer's responsibility to mark containers in accordance with any legal requirements, in addition, the containers constituting a consignment shall each be legibly and durably marked with the following details:-

Designation of the material
Specification number
Distinctive batch number
Date of despatch by the manufacturer to the customer
Manufacturer's initials or recognised trade mark
Component name (eg base paint)
Mixing and thinning instructions -
(See manufacturers data sheet)

and such other markings as may be prescribed in the terms of the contract.

SECTION 2 - MATERIAL

1. COMPOSITION

1.1 The paint shall consist of a pigmented two component cold curing epoxide resin vehicle.

1.2 The pigment content of the paint shall consist essentially of strontium chromate opacifying pigments and extenders.

1.3 The strontium chromate shall comply with BS 4313 and shall comprise not less than 15% of the dried film.

1.4 The paint shall not contain lead or lead compounds calculated as metallic lead in excess of 0.25% m/m.

1.5 The choice of the remaining ingredients is left to the discretion of the manufacturer but is subject to registration by the Approving Authority.

1.6 A knowledge of the composition of the paint is essential if the performance clauses of this specification are to be interpreted soundly and for the proper conduct of Quality Assurance; the manufacturer shall therefore inform the Approving Authority, in confidence, of the composition of the material supplied including details of all ingredients employed.

2. TEST REQUIREMENTS

2.1 Test methods

Any enquiries concerning methods of test shall be referred to the Approving Authority.

2.2 Test conditions

Unless otherwise specified all tests shall be carried out at a temperature of 23 ± 2°C.

2.3 Composition

Samples taken from any portion of the supply shall be of the same formulation as that of the Approved sample.

2.4 Condition

2.4.1 When the base paint or the curing agent in the original containers or in the laboratory sample container are examined in accordance with Part A2, they shall be free from extraneous matter and shall not show hard settling, objectionable skinning, tendency to gel or other defect.

2.4.2 The base paint and curing agent shall each be in a condition such that stirring easily produces smooth uniform material which, after mixing in the proportions specified and thinning with thinners complying with Def Stan 80-38 to the viscosity recommended by the manufacturer, shall be suitable for application by spraying.

2.5 The paint thus prepared shall be used for the preparation of test panels (Appendix A).

2.6 Test requirements

A sample taken from any portion of the supply shall comply with the requirements of the following Tables.

TABLE 1

BATCH TESTS (See Clause 8.3 Section 1)

No	Test	System/Substrate	Limit	Method
1	Pot Life	—	After 4 hours the viscosity shall not increase by more than a factor of 2	Appendix B
2	Density (of each component)	—	Shall be within 2% of the Approved sample	Part A12

No	Test	System/Substrate	Limit	Method
3	Application Properties and Finish	Single coat detergent degreased hard aluminium	Smooth, opaque even finish free from runs, sags or other defects	Visual, 24 hours after application
4	Specular gloss	Single coat detergent degreased hard aluminium	20 units max	Part D5 using a 60° geometry gloss meter, 24 hours after application
5	Surface-dry	Single coat detergent degreased hard aluminium	30 minutes max	Part C2
6	Hard-dry time	Single coat detergent degreased hard aluminium	4 hours max	Part C3
7	Recoating time	Single coat detergent degreased hard aluminium	Within 5 units of the control panel	Appendix C
8	Resistance to water (force dried)	Single coat detergent degreased hard aluminium	a. No penetration to the substrate, no blistering or other film defects	Appendix D

TABLE 2

QUALIFICATION TESTS (see Clause 8.4 Section 1)

No	Test	System/Substrate	Limit	Method
9	Capping Test (force dried)	Single coat acid chromate pickled hard aluminium	No cracking	Part E4, 4 mm indentation
10	Cross-cut test (force dried)	Single coat detergent degreased hard aluminium	Classification O	Appendix E
11	Resistance to Phosphate ester based hydraulic fluid (force dried)	Single coat acid chromate pickled hard aluminium	No blistering or other film defect, no penetration to the substrate	Appendix F

TABLE 3

TYPE TESTS (see Clause 8.6 Section 1)

No	Test	Systems/Substrate	Limit	Method
12	Resistance to corrosion	System, detergent degreased aluminium alloy 1.2 mm thick	No blistering or other film defect little or no sign of corrosion spread from the cut	Appendix G

APPENDIX A

Preparation of Painted Test Panels

A1 For the purpose of tests number 3 to 11 use test panel complying with Part A3.

A2 For the purposes of test number 12 use a panel complying with BS L156. Before use heat the panel to 495 ± 5°C and then quench in water complying with BS 3978, Grade 3 at 100°C for 15 minutes; remove, allow to cool and dry.

A3 Immerse the panels in trichloroethylene vapour complying with BS 580 for 5 minutes, remove, allow to cool and dry and then immerse in a 9:1 v/v solution of TS 10281 and tap water for 15 minutes. Remove, wash with running tap water for 1 minute and check that a water break free surface is obtained and then follow with a final rinse using water complying with BS 3978, Grade 3 and allow to dry.

A4 Mix and thin the paint in accordance with the manufacturers instructions and allow to condition at 23 ± 2°C for at least 30 minutes. Apply the paint by spraying to the specified type of panel and allow to dry in a vertical attitude with free access of air for the specified time at 23 ± 2°C and 50 ± 5% relative humidity. Complete the application of the test panels within 60 minutes of mixing and thinning the paint.

A5 For the purposes of tests numbered 8 to 11 inclusive, allow the panels to dry in a vertical attitude with free access of air for 15 minutes at a temperature of 23 ± 2°C and relative humidity of 50 ± 5% and then force dry at a temperature of 70 ± 5°C for 3 hours. Remove the panels from the oven and allow to stand in a vertical attitude with free access of air at a temperature of 23 ± 2°C and relative humidity 50 ± 5% for at least 1 hour before testing.

A6 For the purposes of test number 12 allow the primer to dry for 16 hours at a temperature of 23 ± 2°C and relative humidity 50 ± 5% and then apply 1 coat of gloss finish complying with and applied in accordance with DTD 5580.

A7 Apply the paint to the test panels at a spreading rate sufficient to produce a single dry coat with a mass of 30 ±5 g/m^2. (15 ± 2.5µm)

APPENDIX B

Pot Life

Store a 250 ml sample of the ready to use paint for the specified period in an open container so that the depth of the material is approximately equivalent to the diameter of the container. At the end of the period determine the viscosity.

APPENDIX C

Recoating

C1 Four hours after application of the paint, apply to the test panel and to a degreased glass control panel, one coat of glossy finish complying with and applied in accordance with DTD 5580.

C2 Allow the panels to dry for 24 hours at a temperature of 23 ± 2°C and relative humidity 50 ± 5%, and determine the specular gloss in accordance with Part D5 using a 60°C geometry gloss meter.

APPENDIX D

Resistance to Water

D1 Immerse the panel in water complying with BS 3978, Grade 3 for a period of 24 hours. Remove the panels and dry by dabbing with absorbent paper or cloth.

D2 Immediately test the panel in accordance with Part El using a load of 1200 g.

APPENDIX E

Cross-cut test

E1 Test the paint film in accordance with Part E6 using a manually applied multiple cutting tool with six 30° cutting edges to make 6 cuts 1 mm apart.

E2 Examine for loss of adhesion.

E3 Apply one end of a piece of 25 mm wide, clear adhesive tape firmly across the cuts. Allow the tape to remain in position for one minute and then remove it with a snatching motion at approximately 90° to the panel surface.

E4 Examine the panel and tape for further signs of loss of adhesion.

APPENDIX F

Resistance to tr-n-butyl phosphate

F1 Immediately before testing, damage the panel by making a straight line cut through the paint film using a sharp bladed knife. Make the cut down the middle of the panel parallel to the long edge and use only sufficient pressure on the blade to ensure that the paint film is cut through to the metal surface.

F2 Test the panels in accordance with Part G5, Method 1, Procedure A, using tri-n-butyl phosphate.

F3 Immerse the whole panel for a period of 7 days, remove and clean the film with a pad of cotton wool soaked in a 30/70 v/v mixture of toluene/trimethyl pentane to remove excess fluid, and examine.

F4 Test the panel in accordance with Part E2 using a load of 200 g, make the scratch parallel to and approximately 1 cm from the cut.

APPENDIX G

Test for resistance to alternate immersion/emersion in salt solution/humid air

GI Apparatus

G 1.1 The apparatus consists of a series of arms mounted along the length of a central horizontal spindle such that panels suspended from them may be alternately immersed in the specified salt solution and withdrawn into the air space above. A separate glass or plastic container of salt solution is provided for each panel. The whole is enclosed in a chamber which can be adequately sealed and heated internally so that a temperature of 35 ± 2°C and relative humidity of 87.5 ± 7.5% can be maintained uniformly throughout; to ensure this an open reservoir of distilled water is required in the bottom of the chamber.

G1.2 By the means of a suitable drive and timing device the panels are immersed in the salt solution and lifted into the air space above at intervals of 2 hours in each position. It is advantageous if the chamber is transparent since this enables the operation of the apparatus to be verified from time to time.

G2 Test solution

G2.1 Use reagents of a recognised analytical quality and water complying with BS 3978, Grade 3.

Composition of test solution:-

Sodium chloride as NaCl	30 g
Water	1000ml
Disodium hydrogen phosphate as $Na_2 HPO_3$	0.19 g
Boric acid as $H_3 BO_3$	1.25 g

Adjust to pH8 with a saturated solution of sodium carbonate in water complying with BS 3978, Grade 3.

G3 Procedure

G3.1 Immediately before testing make a straight line cut through the paint film using a chisel tool to produce a cut 0.6 mm wide. Make the cut down the middle of the panel parallel to the long side and use only sufficient pressure on the blade to ensure that the paint film is cut through to the metal surface.

G3.2 Suspend the panels from the arms of the apparatus by means of glass or plastic hooks so that the upper edge of each panel, when immersed is at least 10 mm below the surface. Adjust the volume of salt solution in each container to be at least 4 ml/cm2 of exposed panel.

G3.3 Close the chamber and commence the test period. A complete cycle takes 4 hours, 2 hours immersed and 2 hours above the test solution.

G3.4 Maintain the level in each container by the addition of water.

G3.5 Renew the solution in the containers every 2 days for the first 6 days and then every 10 days for the remainder of the test period.

G3.6 After 1500 hrs exposure remove and examine the panels.

Approved for issue,

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