

MIL-P-8793A(ASG)

21 JUNE 1961

Superseding
MIL-F-8799(ASG)
8 January 1957

MILITARY SPECIFICATION

PAINT, (GLOSS AND NONSPECULAR),
FOR USE ON ELASTOMERIC PIGMENTED FILM

This specification has been approved by the Department
of the Air Force and by the Bureau of Naval Weapons.

1. SCOPE

1.1 Scope.- This specification covers paint for use in the manufacture of decalcomanias intended for application on the exterior and interior surfaces of aircraft and aeronautical equipment.

1.2 Classification.- The paint shall be furnished in various colors, as specified, each of which shall be made glossy or nonspecular by overlaying with either a clear glossy or clear flat finishing coat, respectively (see 3.4.2 and 6.2)

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

SPECIFICATIONSFederal

QQ-A-362	Aluminum Alloy Plate and Sheet, Alclad 2024
TT-P-143	Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of
TT-T-291	Thinner; Paint, Volatile Mineral Spirits (Petroleum Spirits)
TT-X-916	Xylene (for Use in Organic Coatings)

Military

MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-F-8799	Film, Elastomeric, Pigmented, for Use in the Manufacture of Aircraft Decalcomanias

STANDARDSFederal

FED. TEST METHOD STD. NO. 141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling, and Testing
FED. STD. NO. 595	Colors

Military

MIL-STD-129	Marking for Shipment and Storage
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FSC 8010

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PUBLICATIONSAir Force-Navy Aeronautical Bulletin

No. 157	Colors; List of Standard Aircraft Camouflage
No. 166	Colors; List of Standard Aircraft Glossy

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications.- The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

National Bureau of Standards

RP 1345	Multipurpose Photoelectric Reflectometer Journal of Research, Volume 25, No. 5, Nov. 1940
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(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

3. REQUIREMENTS

3.1 Qualification.- The paint furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable Qualified Products List.

3.2 Materials.- The ingredient materials used in the manufacture of the paints shall be of high quality and entirely suitable for the purpose intended.

3.2.1 Toxicity.- The manufacturer shall certify that the paint contains no substance of known toxicity under normal conditions of usage.

3.3 Composition.- The composition shall conform to the percent by weight as specified in table I (see 4.6.1).

TABLE I

Volatile and Nonvolatile Content

Content	Clear	Colors
Nonvolatile (percent) (min)	20	55
Volatile (percent) (max)	80	45

3.3.1 Vehicle solids.- The vehicle solids shall consist of a film forming resin. Compatible resins and plasticizers may be added if found advantageous.

3.4 Physical properties.-

3.4.1 Appearance.- The appearance of the packaged paint shall be uniform and homogeneous, showing no traces of grit, coarse particles, or skins. In addition, there shall be no pigment separation in the pigmented paints. Settling, if present, shall be of the soft type only, and shall be capable of being readily redispersed with a paddle to a homogeneous mass (see 4.6.1).

3.4.2 Colors.- The glossy color(s) of the paint shall conform to the color(s) shown in Federal Standard No. 595 or ANA Bulletin No. 166, as specified (see 6.2), when overlaid with a clear, glossy finishing coat. The camouflage colors shall conform to the color(s) shown in Federal Standard No. 595 or ANA Bulletin No. 157, as specified (see 6.2), when overlaid with a clear, nonspecular finishing coat.

3.4.3 Storage stability.- A full, closed container of paint shall be capable of passing all the tests of this specification, except weather resistance (4.6.8), after storage for a period of 6 months. The paint shall show no livering, gelling, or any other indications which would render the paint unfit for its intended use (see 4.6.9).

3.4.4 Fineness of grind.- The fineness of grind for pigmented paint shall be not less than 6 (see 4.6.1).

3.4.5 Weight per gallon.- The weight per gallon of package paint shall be a minimum of 7.5 pounds for all colors and 6.75 pounds for the clear coat (see 4.6.1).

3.5 Performance properties.-

3.5.1 Working properties.- The paint, applied by silk screening, shall work freely without sags, bubbling, wrinkling, streaking, or any other defects; it shall print sharp lines and, with the exception of the clear coat, shall give complete hiding.

3.5.2 Lifting properties.- The paint shall show no evidence of lifting when tested as specified in 4.6.2.

3.6 Film properties.-

3.6.1 Flexibility.- The paint panels shall show no break or crack in the film when bent 180 degrees around a 1/4-inch mandrel, and tested as specified in 4.6.4.

3.6.2 Adhesion (tape test).- The paint shall exhibit satisfactory adhesion when tested as specified in 4.6.5.

3.6.3 Gloss.- The specular gloss of panels shall be a minimum of 40 for gloss colors and a maximum of 5 for camouflage colors when tested as specified in 4.6.1.

3.6.4 Drying properties.- The paint film shall set to touch within 1 hour and shall dry hard within 4 hours for all colors and within 2 hours for the clear coat when tested as specified in 4.6.1.

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3.6.5 Hiding power.- The minimum contrast ratio of the paint, cast on black and white Carrara glass at the specified dry film thickness shall conform to the requirements specified in table II:

TABLE II

Hiding power

Color	Dry film thickness (maximum inch)	Contrast ratio (minimum)
Light blue	0.001	0.98
Insignia blue	0.001	0.98
Light green	0.001	0.98
Olive drab	0.001	0.98
Light yellow	0.001	0.86
Orange yellow	0.001	0.88
Aircraft cream	0.001	0.96
International orange	0.001	0.96
Insignia red	0.001	0.88
Maroon	0.001	0.98
Insignia white	0.001	0.90
Aircraft gray	0.001	0.98
Engine gray	0.001	0.98
Gloss black	0.001	0.98
Glossy sea blue	0.001	0.98

3.7 Thinning.- The paint shall be capable of being thinned, using thinners conforming to Government specifications.

3.8 Resistance properties.-

3.8.1 Water resistance.- Paint films shall exhibit no film defects, such as blistering, peeling, or whitening, 5 minutes after removal from water, when tested as specified in 4.6.6. Three hours after removal from water, the film of the immersed portion shall be equal in hardness, toughness, gloss retention, and adhesion to the emerged portion.

3.8.2 Hydrocarbon resistance.- Paint films shall withstand immersion in hydrocarbon fluid when tested as specified in 4.6.7. Twenty-four hours after removal from the fluid, the immersed portion shall be equal in all respects to the emerged portion. The immersed film on removal from the fluid, shall show no blistering or film failure.

3.8.3 Weather resistance.- Paint films shall exhibit no checking, cracking, blistering, fading, or other forms of deterioration when exposed as specified in 4.6.8.

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3.9 Use of AN, MS, or MIL designations.- AN, MS, or MIL designations shall not be applied to a product, except for qualification test samples, now referred to in correspondence, until notice of approval has been received from the activity responsible for qualification.

3.10 Workmanship.- The component ingredients shall be intimately assembled and processed in accordance with the best practice for high-quality paint.

4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection responsibility.- The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of tests.- The inspection and testing of the paint shall be classified as follows:

- (a) Qualification tests (4.4)
- (b) Acceptance tests (4.5)

4.3 Test conditions.- The laboratory testing conditions shall be in accordance with Federal Test Method Standard No. 141 and as specified herein.

4.3.1 Test panels.- Except as otherwise specified, the paint shall be silk screened in parallel stripes on an elastomeric film 12 by 12 inches in size conforming to Specification MIL-F-8799. If it is found that the paint requires thinning, the manufacturer's instructions should be followed. The stripes shall be 1/4 inch apart. After the paint has air dried, it shall be coated with either clear gloss or clear camouflage, as applicable, and air dried. The elastomeric film shall then be cut across the stripes into strips about 2-1/2 inches to insure that each strip includes a portion of each color. For the gloss determination, the strip shall be at least 3 by 6 inches. The film shall then be applied to 0.020 by 3 by 6-inch aluminum-alloy panels (Specification QQ-A-362) that have been anodized in accordance with type II of Specification MIL-A-8625. Unless otherwise specified, panels shall air dry for 68 hours prior to tests.

4.4 Qualification tests.-

4.4.1 Sampling instructions.- Although qualification shall be for the full range of colors, samples shall consist only of insignia red, insignia blue, insignia white, black, and clear. Qualification test samples shall consist of three 1-quart samples of paint in these colors, together with three 1-quart samples of the glossy and nonspecular clear finishing coats. In addition, six 12- by 12-inch sample decals shall be submitted by the manufacturer for all of the above listed colors prepared as specified in 4.3.1, overcoat with glossy clear on white stock conforming to Specification MIL-F-8799. The sample paints shall be selected in accordance with Method 1631 of Federal Test Method Standard No. 141. Samples shall be identified with the manufacturer's identifying nomenclature and code number and any additional identification

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required by the letter of authorization (see 6.3). Sufficient thinner shall be furnished with samples. Samples shall be accompanied by a complete set of instructions for the application of the material, for approval.

4.4.2 Report of tests.- The manufacturer shall submit reports of his qualification product in accordance with Federal Test Method Standard No. 141, showing results of all the tests specified herein, except weather resistance (4.6.8) and storage stability (4.6.9). Regarding the composition of the paint, the manufacturer may report such results as "calculated" provided in his opinion analysis made by the Government will yield the same results.

4.4.3 Tests.- The qualification tests of the paint shall consist of all the tests of this specification.

4.5 Acceptance tests.- Acceptance tests shall consist of the following tests: volatile and nonvolatile content, appearance, weight per gallon, fineness of grind (4.6.1); and color (4.6.3).

4.5.1 The Government reserves the right to rerun any or all tests of this specification at any time within 1 year from the date of manufacture of the paint, as attested by the date appearing on the container label. Samples for retests shall be taken from previously unopened containers. Should the results of the retest be unsatisfactory, the contracting officer shall be so informed and may require the contractor to remove the entire batch and supply conforming material to replace it.

4.5.2 Batch data.- Batch production data shall be furnished in accordance with Federal Test Method Standard No. 141.

4.5.3 Report of tests.- The manufacturer shall submit test reports to the Government inspector in accordance with the requirements of Federal Test Method Standard No. 141 for each batch, showing the results for all the acceptance tests.

4.5.3.1 In lieu of reporting analytical results on the breakdown of the non-volatile and volatile composition of the paint, the manufacturer may report such results as "calculated" under the condition that he has carefully described by separate report, attached to manufacturer's test reports, the character and detail of his production methods which in his opinion guarantee that any suitable analysis made by the Government will yield acceptable results.

4.5.4 Examination of product.- Paint shall be examined to determine conformance with this specification with respect to material and workmanship.

4.5.5 Sampling.-

4.5.5.1 Sampling for tests.- Acceptance test samples consisting of two 1-quart containers shall be selected in accordance with Federal Test Method Standard No. 141.

4.5.5.2 Sampling and visual inspection of filled containers.- Sampling and visual inspection of filled containers shall be conducted in accordance with Method 1031 of Federal Test Method Standard No. 141.

4.5.6 Rejection and retest.- Rejection and retest provisions shall be as specified in Method 1031 of Federal Test Method Standard No. 141.

4.6 Test methods.- The tests of this specification shall be conducted in accordance with the specified methods of Federal Test Method Standard No. 141, and as specified herein.

4.6.1 The tests listed below shall be conducted on panels in accordance with the specified methods of Federal Test Method Standard No. 141, and the panels shall be prepared as specified in 4.3.1, unless otherwise specified.

<u>Test</u>	Fed. Test Method Standard No. 141 <u>Method No.</u>
Volatile and nonvolatile content	4041
Appearance of pigmented materials	4262
Working properties of coating materials	4541
Drying time	4061
Weight per gallon	4184
Specular gloss	6101
Fineness of grind	4411

4.6.2 Lifting properties.- Paint for each color submitted shall be silk screened on elastomeric pigmented film in such a manner that a parallel strip for each color is represented on the film. The first coat of paint shall be air dried for 2 hours, and each color, respectively, shall be overcoated with the paint of any color. The second coat shall be air dried for 5 hours. After the 5-hour air dry, a glossy clear coat and a nonspecular clear coat in separate areas shall be silk screened across the painted surface. The system shall be examined for any evidence of film irregularity (see 3.5.2).

4.6.3 Color.- Steel panels, prepared as specified in Method 2011 of Federal Test Method Standard No. 141, shall be covered with a 1-mil drawdown coat of paint under test, allowed to dry, and overcoated with 0.5 mil of the glossy clear finishing coat or nonspecular clear finishing coat, as applicable. After drying, the color shall be determined in accordance with Method 4250 of the above-mentioned standard (see 3.4.2).

4.6.4 Flexibility.- Test panels shall be prepared as specified in 4.3.1. The flexibility shall be determined in accordance with Method 6221 of Federal Test Method Standard No. 141, except that the panels, after air drying, shall be baked for 92 hours at 200° ±10° F (see 3.6.1).

4.6.5 Adhesion.- Panels prepared as specified in 4.3.1 shall be immersed in distilled water for a period of 24 hours at room temperature. After 24 hours' immersion, each panel shall be removed from the water and soon thereafter wiped dry with a soft cloth. Two hours thereafter a 1-inch-wide strip of masking tape, taken from a fresh sample of Minnesota Mining and Manufacturing Company Code No. 250 masking tape, or equal, shall be applied, adhesive side down, on the paint. The tape shall be pressed down with two passes of a 4-1/2 pound rubber-covered roller approximately 3-1/2 inches in diameter by 1-3/4 inches in width. The surface of the roller shall have a durometer hardness value within the range of 70 to 80. The tape shall be removed with one abrupt motion and the panel examined for damage, such as the removal of the paint from the elastomeric pigmented film. Stripping of tape from the panel shall be done immediately after application thereof (see 3.6.2).

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4.6.6 Water resistance.- Test panels prepared as specified in 4.3.1 shall be immersed in distilled water at a temperature of $73.5^{\circ} \pm 2^{\circ}$ F for 8 hours. Five minutes after removal from the water, the film shall be examined. The film shall also be examined 3 hours after removal from the water (see 3.8.1).

4.6.7 Hydrocarbon resistance.- Test panels prepared as specified in 4.3.1 shall be immersed in hydrocarbon test fluid composed of 15 parts by weight of xylene conforming to Specification TT-X-916 and 85 parts by weight of mineral spirits, conforming to Specification TT-T-291, for 1 hour at a temperature of $73.5^{\circ} \pm 2^{\circ}$ F. Immediately after removal from the test fluid the panels shall be examined. This examination shall be repeated 24 hours after removal from the fluid (see 3.8.2).

4.6.8 Weather resistance.- Weather resistance panels prepared as specified in 4.3.1 shall be exposed in accordance with Method 6161 of Federal Test Method Standard No. 141 for 1 year in Florida (see 3.8.3).

4.6.9 Storage stability.- A full, closed container of paint shall be stored under warehouse conditions at a temperature of 70° to 90° F for 6 months, at the end of which time it shall be opened and inspected for conformance to the requirements of this specification, except weather resistance (see 3.4.3).

4.6.10 Hiding power.-

4.6.10.1 Panel preparation.- A representative portion of the paint under test shall be cast on a smooth, flat metal surface, utilizing an 0.008-inch (approximate clearance) doctor blade, in order that a dry film thickness of 1 mil is obtained. The metal panel shall be held firm when the film is cast with the doctor blade. An excess of the coating being tested shall be poured on the metal plate just in front of the film applicator. The plate shall be lowered and the drawdown made immediately, continuing the motion down the plate until the lower end is reached. The film should be homogeneous and free of film irregularities which would affect the overall accuracy of the determination. The paint coating shall be dried in a horizontal position for at least 24 hours in a dust-free cabinet. An average of five film-thickness readings shall be taken in the central portion of the coated panel with a suitable film meter. The doctor blade clearance which gave the desired film thickness shall be utilized in casting the coating on the black and white Carrara glass. The drying procedure is similar to the one utilized in the preparation of the metal panels. The black Carrara glass shall have a daylight 45-degree, 0-degree apparent reflectance of less than 1 percent; the white Carrara glass shall have a daylight 45-degree, 0-degree apparent reflectance of 86 ± 2 percent (relative to MgO).

4.6.10.2 Reflectance determination.- The reflectance of the coated black and white Carrara glass shall be determined by the Hunter reflectometer used with the green filter in the manner described in the National Bureau of Standards Research Paper RPL345 (November 1940). The reflectance of the film over the black is divided by the reflectance of the film over the white to obtain the contrast ratio.

4.7 Packaging, packing, and marking.- Preparation for delivery shall be examined for conformance with section 5.

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5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking.-

5.1.1 Packaging and packing.- The paint, in quantities specified (see 6.2), shall be packaged level A or C and packed level A, B, or C in accordance with Specification TT-P-143.

5.1.2 Marking.- Marking shall be in accordance with Standard MIL-STD-129. Individual cans shall bear a printed label showing the following information:

Color (glossy clear for overlay) (nonspecular clear for overlay)
as applicable.
Thinning directions (including reference to Government specification
for thinner).
Instructions for use.

6. NOTES

6.1 Intended use.- The paint covered by this specification is intended for use in the manufacture of decalcomanias conforming to Specification MIL-F-8799 decal stock.

6.2 Ordering data.- Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Color number, name, and either the clear gloss or clear flat finishing coat (see 1.2 and 3.4.2).
- (c) Size of the containers in which the paint and overlay is to be furnished (see 5.1.1).
- (d) Level of packaging and packing (see section 5).

The material will be purchased by volume, the unit being U. S. Gallon (231 cubic inches at 60° F).

6.3 Provisions for qualification.- With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Bureau of Naval Weapons, Washington 25, D. C.; however, information pertaining to qualification of products may be obtained from the Director, Aeronautical Materials Laboratory, Naval Air Material Center, Philadelphia 12, Pa.

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