MIL-L-19537C
15 May 1965
SUPERSEDING
MIL-L-19537B(ASG)
17 June 1963

MILITARY SPECIFICATION

LACQUER: ACRYLIC-NITROCELLULOSE GLOSS (FOR AIRCRAFT USE)

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers one grade of acrylic-nitrocellulose gloss lacquer for use as a general purpose exterior protective coating for metal surfaces, and is particularly formulated for resistance to diester lubricating oil. The lacquer is primarily intended for spray application (see 6.1).

1.2 Classification - The acrylic nitrocellulose gloss lacquer shall be furnished in the following colors, as specified (see 6.2):

Fed. Std. No. 595 Color No.	Color name
---	Clear
15102	Light blue
15044	Insignia blue
14187	Light green
X14087	Olive drab
13655	Light yellow
13538	Orange yellow
12197	International orange
11136	Insignia red
10049	Maroon
17875	Insignia white
16473	Aircraft gray
16081	Engine gray
15042	Glossy sea blue
17038	Gloss black

The list is not restrictive; the lacquer may be procured in any color desired by the activity concerned. When colors other than those listed above are required, the pigmentation and applicable qualitative and quantitative requirements shall conform to those of the nearest matching color contained herein. Where no near matching color exists, the pigments shall be in accordance with the best commercial quality (see 3.1 and 3.5.3.1).

2. APPLICABLE DOCUMENTS

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

FSC 8010

SPECIFICATIONS

Federal

QQ-A-362	Aluminum Alloy Plate and Sheet, Alclad 2024
TT-E-776	Ethylene Glycol Monobutyl Ether (for Use in Organic Coatings)
TT-M-261	Methyl-Ethyl-Ketone (for Use in Organic Coatings)
TT-M-268	Methyl Isobutyl Ketone (for Use in Organic Coatings)
TT-N-350	Nitrocellulose, Technical (for Use in Organic Coatings)
TT-P-143	Paints, Varnish, Lacquer, and Related Materials, Packaging, Packing, and Marking Of
TT-P-320	Pigment, Aluminum, Powder and Paste, for Paint
TT-P-343	Pigment, Carbon-Black, Dry
TT-P-345	Pigment, Chrome-Green, Pure, Dry
TT-P-346	Pigment, Chrome-Yellow and Chrome-Orange, Dry
TT-P-350	Pigment, Lampblack-Dry
TT-P-385	Pigment, Iron-Blue, Dry
TT-P-410	Pigment, Molybdate Orange
TT-P-442	Pigment, Titanium Dioxide, (for Protective Coatings)
TT-P-458	Pigment, Yellow-Iron-Oxide, Hydrated, Synthetic, Dry
TT-S-735	Standard Test Fluids, Hydrocarbons
TT-T-548	Toluene, Technical
TT-X-916	Xylene (for Use in Organic Coatings)

Military

MIL-P-7962	Primer Coating, Cellulose-Nitrate Modified Alkyd Type, Corrosion-Inhibiting, Fast-Drying (for Spray Application Over Pretreatment Coatings) (ASG)
MIL-C-8514	Coating Compound, Metal Pretreatment, Resin-Acid (ASG)
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-T-19544	Thinner, Acrylic-Nitrocellulose Lacquer (ASG)

STANDARDS

Federal

FED-STD-595	Colors
FED-STD-141 TEST MD	Paint, Varnish, Lacquer, and Related Materials, Methods of Inspection, Sampling, and Testing

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes

PUBLICATIONS

Air Force-Navy Aeronautical Bulletin

No. 166	Colors, List of Standard Aircraft Glossy

(Copies of specifications, standards, drawings, and publications required by suppliers 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 documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

NATIONAL BUREAU OF STANDARDS PUBLICATION

RP 1345	Multi-purpose Photoelectric Reflectometer (Nov. 1940)

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.)

CONSOLIDATED CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules

(Application for copies of the above publication should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago, Ill. 60606.)

3. REQUIREMENTS

3.1 Material - The ingredients used in the manufacture of this product shall conform to applicable Government specifications. Ingredient materials conforming to contractor's specifications may be used provided prior approval is obtained from the procuring activity. The use of contractor's specifications will not constitute waiver of Government inspection.

3.2 Toxicity - The material shall have no adverse effect on the health of personnel when used for its intended purpose. Evidence to this effect will be subject to review by departmental medical authority.

3.3 Composition - Lacquer shall be formulated as specified Tables I, II, III and V.

3.4 Ingredients - All ingredients used in the manufacture of lacquer shall conform to the following.

3.4.1 Resins - The resin shall be a copolymer of methyl methacrylate and other acrylic esters, with the methacrylate portion being the major part of the copolymer. The viscosity (40 percent solution in toluene) shall be 480 to 640 centipoises at 30° C (86° F).

3.4.2 Cellulose compounds - The cellulose compounds shall conform to Type II of TT-N-350.

3.4.3 Plasticizers - Chemical plasticizers shall consist of diisooctyl phthalate or dioctyl phthalate.

3.4.4 Solvents - Only those solvents, in the ratios specified, which are specified in Table I shall be used in the manufacture of the lacquer. The finished lacquer shall be capable of being thinned for use with thinner conforming to MIL-T-19544.

3.4.5 Pigments - Unless otherwise specified (see 1.2), pigments shall be as shown in Table II. When pigments covered in Table II are not covered by Government specifications listed in 2.1, they shall conform to the requirements of 3.1 and shall be of a high durability established by past usage in a comparable lacquer.

TABLE I

COMPOSITION - PERCENT BY WEIGHT

MATERIAL	MINIMUM	MAXIMUM
Pigmented colors 1/		
Nonvolatile	40	--
Pigment (percent of nonvolatile)	--	40
Volatile	--	60
Clear		
Nonvolatile	30	--
Volatile	--	70
Volatile portion 2/		
Total ketones 5/	55	--
Medium boiling 3/	27.5	--
Total alcohol	--	6
Toluene 4/	--	41
Nonvolatile vehicle solids		
RS 1/2 sec. cellulose nitrate (see 3.4.2)	23	26
Resins (see 3.4.1)	54	57
Plasticizers (see 3.4.3)	19	21

1/ For gloss black, insignia blue, insignia red, and glossy sea blue, nonvolatile shall be 32 percent minimum, volatile 68 percent maximum.

2/ The minimum boiling point of the volatile portion shall be not less than 75° C (168° F).

3/ Boiling above 114° C (237° F).

4/ Aliphatic hydrocarbons shall not be used.

5/ Slight changes in the tolerance of the solvents will be permitted, along with a substitution of small amounts of comparable boiling range solvents for the ketones to provide for the use of pigments in the form of dispersion pastes.

TABLE II

PIGMENTATION

FED-STD-595 COLOR NO.	COLOR NAME	PIGMENTATION 1/, 2/
15102	Light blue	Iron blue (TT-P-385), titanium dioxide (TT-P-442)
15044	Insignia blue	Iron blue, titanium dioxide, Carbon black 3/ (TT-P-343) (TT-P-350)
14187	Light green	Chrome green (TT-P-345), Yellow iron oxide (TT-P-458), light or medium chrome yellow 5/ (TT-P-346), Iron blue, titanium dioxide, shading yellow
14087	Olive drab	Medium Chrome-Yellow or Orange 5/, Shading yellow, Pure iron oxides (Yellow or Red), Titanium Dioxide, Carbon black 3/, Iron Blue
13655	Light yellow	Light chrome yellow 5/
13538	Orange yellow	Medium chrome yellow 5/
12197	International orange	Molybdate orange 7/ (TT-P-410)
11136	Insignia red	BON red 6/, Molybdate orange 7/
10049	Maroon	Iron oxide, titanium dioxide, carbon black 3/
17875	Insignia white	Titanium dioxide 4/
16473	Aircraft gray	Titanium dioxide, carbon black 3/
16081	Engine gray	Titanium dioxide, yellow iron oxide, carbon black 3/
15042	Glossy sea blue	Titanium dioxide, carbon black 3/ and iron blue
17038	Gloss black	Carbon black

1/ The pigments specified in Table II, or any combination thereof, shall be the principal ingredients used in the lacquer to obtain the colors specified. To exactly match the required color, other tinting pigments may be used, except for No. 17875 insignia white, in an amount which shall not exceed 2 percent of the total weight of pigment, provid such additional pigments have proven good outdoor durability.

The pigments shall be sufficiently insoluble to prevent leaching during immersion (see 3.5.14).

2/ Where titanium dioxide is specified, the chalk-resisting type conforming to Type III of TT-P-442, shall be used.

3/ Lampblack may be used if desired in these colors.

4/ This color shall contain no tinting pigment whatsoever.

5/ Pigments conforming to TT-P-346 may be unsatisfactory. The proprietary lightfast chrome yellows and oranges are satisfactory.

6/ Manganese precipitate of Color Index No. 48 permanent red; otherwise known as Permanent Red-2B Manganese.

7/ Red shade may not be used.

3.5 Qualitative requirements -

3.5.1 Condition in container - The lacquer, in a freshly opened full container, shall show no grit, skinning, curdling, livering or excessive pigment flotation, shall show no more settling or caking than may be redispersed with a paddle to a uniform homogeneous condition (see 4.6.1).

3.5.2 Storage stability - The lacquer, stored in a full, closed container for 1 year at 21° to 32° C (70° to 90° F) shall pass all tests specified in this specification except weathering (see 4.6.2).

3.5.3 Odor - The odor of the lacquer, wet or dry, shall not be obnoxious. An air-dried film shall retain no residual odor 48 hours after application (see 4.6.1).

3.5.4 Color - The color of the lacquer film after drying 24 hours shall match the applicable color specified in Table II. A slight variation in color for insignia red will be permitted (see 4.6.1).

For insignia white only: Color No. 17875 shall be considered as defining the minimum brightness for insignia white; brighter or whiter shades shall be considered acceptable.

3.5.4.1 When colors other than those in Table II are specified, they shall conform to the color(s) shown in FED-STD-595, ANA Bulletin No. 166 or as specified by the procuring activity.

3.5.5 Working properties - Two coats of the lacquer reduced to spray consistency and applied to a smooth, vertical metal surface, shall show good working properties, and shall dry to a uniform, smooth surface free of runs, sags, bubbling, wrinkling, streaking, or other defects (see 4.6.3).

3.5.6 Self-lifting properties - After application of the second coat of the lacquer, there shall be no evidence of lifting in the system when tested as specified in 4.6.16.

3.5.7 Drying time - The lacquer, applied to a total film thickness of 1.0 ±0.2 mil, shall dry hard in not more than 40 minutes under laboratory conditions of temperature and relative humidity specified herein.

3.5.8 Surface appearance - The lacquer film, after drying, shall be free from blushing, streaks, blisters, coarse particles, silking or other irregularities of surface (see 4.6.4).

3.5.9 Print resistance - The lacquer shall show no permanent print from cheesecloth (see 4.6.5).

3.5.10 Primer absorption - The lacquer film applied over primer shall not show a loss in gloss of more than 5 units when compared with the same lacquer film applied over bare metal (see 4.6.6).

3.5.11 Coating anchorage - The lacquer film shall cut loose in the form of a ribbon without flaking or separation from the primer. The coating anchorage of the lacquer under test shall be equal to or better than that exhibited by a simultaneously tested control lacquer of the corresponding color (see 4.6.7).

3.5.12 Baking properties - Lacquer films, baked as specified in 4.6.8, shall show no pronounced color change as compared with the unbaked film.

3.5.13 Flexibility (cold cracking) - The lacquer film shall exhibit no flaking at the bend when subjected to the cold cracking test. Fine cracks shall not be cause for rejection (see 4.6.9).

3.5.14 Resistance properties -

3.5.14.1 Water resistance - The lacquer film shall withstand immersion in water at room temperature for 24 hours without showing any cracking, blistering, or whitening. A slight whitening or dulling which may be removed by light wiping with a soft cloth shall not be cause for rejection. The immersed film shall, in all respects, be equal to or better than the control lacquer of the corresponding color after immersion under the same conditions. The water shall not be discolored by extraction of leachable matter from the paint film (see 4.6.10).

3.5.14.2 Hydrocarbon resistance - The lacquer film shall withstand immersion in Type III hydrocarbon test fluid conforming to TT-S-735 at room temperature for 4 hours. Immediately after removal, the film shall show no blistering or film failure, except that slight gumming above the liquid level shall not be cause for rejection. Twenty-four hours after removal, the film shall, in all respects, be equal to or better than the film of the control lacquer of corresponding color immersed under the same conditions except that a slight discoloration or dulling shall not be cause for rejection. The test fluid shall not be discolored by extractions of leachable matter from the paint film (see 4.6.11).

3.5.14.3 Lubricating oil resistance - The lacquer film shall withstand immersion in oil for a period of 2 hours at a temperature of 121° ±2° C (250° ±4° F) without showing any blistering, film softening or other film failure, except that slight gumming above the liquid level shall not be cause for rejection. Slight discoloration will be permitted. Twenty-four hours after removal, the film shall, in all respects, be equal to or better than the film of a similarly prepared control formula lacquer of corresponding color which has been similarly immersed in the lubricating oil. The oil shall not be discolored by extraction of leachable matter from the paint film (see 4.6.12).

3.5.14.4 Weather resistance - Panels which have been weather-exposed for 1 year in Florida shall show no greater film deterioration, loss of gloss or color change at any time during the exposure period than that exhibited by a simultaneously exposed panel of the control lacquer of the corresponding color. The panels shall be examined after washing with detergent and water. At the end of 3 months, and at any time thereafter, the test shall be terminated upon evidence of failure of the lacquer under test to conform to this specification (see 4.6.15).

3.5.14.5 Anchorage (tape test) - The lacquer film under test shall show no more removal from the primer, nor the entire system from the panel, than that exhibited by a simultaneously tested sample of the control lacquer of the corresponding color (see 4.6.13).

3.6 Quantitative requirements - The lacquer shall conform to the quantitative requirements specified herein and in Table III.

TABLE III

QUANTITATIVE REQUIREMENTS

REQUIREMENT	MINIMUM	MAXIMUM
Coarse particles (retained on a No. 325 sieve) percent by weight of total lacquer (see 4.6.1)	---	0.1
Fineness of grind (see 4.6.1)	7.5	---
Viscosity (reduced as specified in 4.3.2) (determined with a No. 4 Ford cup see 4.6.1)		
All colors except engine gray	---	20
Engine gray	---	25
Weight per gallon (pounds) (see 4.6.1)		
Clear lacquer	7.6	---
Insignia red	7.8	---
Gloss black	7.7	---
Glossy sea blue	7.7	---
Insignia blue	7.7	---
All other colors	8.4	---
Specular gloss (60 degrees geometry) (see 4.6.1)		
All colors (except the following)	75	---
Insignia white	67	---
Glossy sea blue and gloss black	80	---
Color (by photoelectric tristimulus) (see 4.6.1) 1/		
Insignia white only		
A value	85.0	---
B value	85.0	---
C value	85.0	---

1/ Tristimulus values may be obtained using Hunter reflectometer with three filters, in the same manner described in the National Bureau of Standards Research Paper RP1345 (November 1940) or using the Photovolt Lumetron reflectometer.

3.6.1 Hiding power - The minimum contrast ratio of the lacquer coating, cast on a black and white Carrara glass at the specified dry film thickness shall conform to Table IV (see 4.6.14).

TABLE IV

CONTRAST RATIO

COLOR	DRY FILM THICKNESS (MAXIMUM) (INCHES)	CONTRAST RATIO (MINIMUM) (PERCENT)
Light blue	0.001	0.98
Insignia blue	.001	.98
Light green	.001	.98
Olive drab	.001	.98
Light yellow	.001	.86
Orange yellow	.001	.88
International orange	.001	.96
Insignia red	.001	.88
Maroon	.001	.98
Insignia white	.001	.90
Aircraft gray	.001	.98
Engine gray	.001	.98
Gloss black	.001	.98
Glossy sea blue	.001	.98

3.7 Workmanship - The component ingredients shall be ultimately assembled and processed as required in accordance with the best practice for the manufacture of high quality lacquer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. 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 - All the tests required for t testing of lacquer are classified as quality conformance tests.

4.3 Test conditions - The laboratory testing conditions shall be in accordance with FED-STD-141 TEST MD and as specified herein.

4.3.1 Test panels - Except as otherwise specified herein, all panels used for test purposes shall be aluminum-clad aluminum alloy conforming to QQ-A-362, anodized in accordance with Type I of MIL-A-8625. The panels shall be 0.020 by 3 by 6 inches in size, and shall be finished as follows: Spray one coat of wash primer conforming to MIL-C-8514, to a dry film thickness of 0.0002 to 0.0003 inch and air dried for 30 minutes. The test panels with the wash primer applied shall then be sprayed to a dry film thickness of 0.0003 to 0.0004 inch of control formula primer conforming to MIL-P-7962, and air dried for 30 minutes. Unless otherwise specified, two spray coats of lacquer under test shall then be applied over the primer with a 45-minute drying interval between coats. Lacquer under test shall be prepared as specified in 4.3.2. The total dry film thickness of the two coats of lacquer shall be 0.001 ±0.0002 inch. Unless otherwise specified after application of the lacquer, the panels shall be air dried for 24 hours. For the following tests, the panels shall be air dried for 2 hours and force-dried for 1 hour at a temperature of 82° C (180° F):

(a)	Flexibility (cold cracking)	(4.6.9)
(b)	Water resistance	(4.6.10)
(c)	Hydrocarbon resistance	(4.6.11)
(d)	Lubricating oil resistance	(4.6.12)

4.3.2 Methods for preparing lacquer samples - Samples shall be prepared for testing in accordance with FED-STD-141 TEST MD and as specified herein. All tests shall be conducted with the package lacquer, unless spray application is required. In such cases, thinning for spray application shall be accomplished by reducing the lacquer with an equal volume of thinner conforming to the following composition:

Ingredients	Percent by weight
Methyl isobutyl ketone (TT-M-268)	45
Toluene (TT-T-548)	45
Ethylene glycol monobutyl ether (TT-E-776)	5
Xylene (TT-X-916)	5

4.3.3 Control formula lacquer - The control formula lacquer of Table V is for the insignia white color. When testing for outdoor weathering, the control formula must be the same color approximately as the color of the material under test. Lacquers made in other colors shall be formulated from the raw materials specified in Table V, except for the pigments which shall be in accordance with Table II. Control lacquers shall conform to this specification.

TABLE V

INSIGNIA WHITE CONTROL FORMULA 3/

INGREDIENT	PERCENT BY WEIGHT
White dispersion 1/	23.8
Dioctyl phthalate	5.4
Cellulose nitrate RS 1/2 second (70% in ethanol)	5.9
Acrylic resin solution (40% in toluene) 2/	35.8
Methyl ethyl ketone (TT-M-261)	13.1
Methyl isobutyl ketone	16.0
	100.0

1/ R.B.H. No. 6610 (TiO_2 - 60 percent, RS 1/2 second NC-8 percent, ethyl alcohol 3.5 percent, ethyl acetate 16 percent, toluene 12.5 percent).

2/ Rohm and Haas Acryloid B-82 (40 percent in toluene).

3/ NOTE: The Table V formulation with the specified proprietary raw materials represents a product of established outdoor weathering durability. The listing of these proprietary materials is not to be construed as an endorsement thereof or as precluding qualification of lacquers formulated with raw materials from other proprietary sources or other formulations within the compositional framework of Tables I and II. Such products may prove equivalent or even superior in performance to the test lacquer. However, the Table V formulation should be employed as the comparison standard, for control purposes. Control lacquers in colors other than gloss white shall be prepared in accordance with 4.3.3.

4.4 Batch data - Batch production data shall be furnished in accordance with Method 1031 of FED-STD-141 TEST MD.

4.4.1 Report of tests - The manufacturer shall submit test reports to the Government representative, in accordance with Method 1031 of FED-STD-141 TEST MD, for each batch showing the results of all tests specified herein except weather resistance (4.6.15) and storage stability (4.6.2). Each ingredient material shall be identified with the name of its manufacturer and that manufacturer's trade name and formula number.

4.4.1.1 In lieu of reporting analytical results on the breakdown of the nonvolatile and volatile composition of the lacquer, 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 details of his production methods which in his opinion, guarantee that any suitable analysis made by the Government will yield acceptable results.

4.4.2 Examination of product - The lacquer shall be examined for conformance with the requirements of this specification with respect to material and workmanship.

4.4.3 Sampling -

4.4.3.1 Sampling for tests - Samples shall be selected as required by Method 1021 of FED-STD-141 TEST MD.

4.4.3.2 Sampling for visual inspection of filled containers - A random sample of filled containers shall be selected in accordance with MIL-STD-105 at Inspection Level I, Acceptable Quality Level of 2.5 percent defective to verify all requirements of this specification in regard to fill, closure, packaging, packing, marking, workmanship, and other requirements not involving tests.

4.4.3.3 Resubmitted inspection lots - Paragraph titled "Resubmitted lots" of MIL-STD-105 shall apply, except that a resubmitted inspection lot shall be inspected using tightened inspection. For visual examination, where the original acceptance number was zero, a sample size represented by the next higher sample size code letter shall be chosen.

4.5 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 lacquer as attested by the date appearing on the container's label. Samples for retest shall be taken from previously unopened containers. Should the results of retest be unsatisfactory, the contracting officer will be so informed, and may require the contractor to remove the entire batch and supply conforming material to replace it.

4.6 Test methods - The tests of this specification shall be conducted in accordance with the specified methods of FED-STD-141 TEST MD and as specified herein.

4.6.1 The following tests shall be conducted in accordance with the specified methods of FED-STD-141 TEST MD; panels shall be prepared as specified in 4.3.1.

Test	Method No. of FED-STD-141 TEST MD
Pigment content (supercentrifuge)	4022
Volatile and nonvolatile content	4041
Vehicle solids	4052

Test	Method No. of FED-STD-141 TEST MD
Condition in container	3011
Coarse particles	4092
Viscosity (No. 4 Ford cup)	4282
Weight per gallon	4184
Drying time	4061
Specular gloss	6101
Color	4250
Color (photoelectric tristimulus) (white only)	4252
Fineness of grind (determined with use of gage having minimum path length of 4 inches)	4411
Odor	4401

4.6.2 Storage stability - A full, closed container of lacquer shall be stored under warehouse conditions at a temperature of 21° to 32° C (70° to 90° F) for 1 year, at the end of which time it shall be opened and inspected and tested for conformance to this specification, except for weather resistance (see 3.5.2).

4.6.3 Working properties - A panel prepared in accordance with 4.3.1 shall be placed in a nearly vertical position and allowed to air-dry for 24 hours prior to examination. After air-drying for the specified time, the panel shall be examined for defects.

4.6.4 Surface appearance - The film on a panel prepared as specified in 4.3.1 shall be examined under a magnification of 10 to 15 diameters (see 3.5.8).

4.6.5 Print resistance - A panel prepared as specified in 4.3.1 shall be air dried for 5 hours, and tested in accordance with Method 6211 of FED-STD-141 TEST MD. A 1-psi pressure shall be applied for 1 hour. The panel shall be examined 4 hours after removal of pressure (see 3.5.9).

4.6.6 Primer absorption - Panels shall be prepared as specified in 4.3.1 along with panels prepared without the undercoat. The gloss of the primed and unprimed panels shall be tested as specified in 4.6.1 for specular gloss (see 3.5.10).

4.6.7 Coating anchorage - Panels prepared as specified in 4.3.1, shall be air dried for 48 hours and then tested in accordance with Method 6304 of FED-STD-141 TEST MD and examined (see 3.5.11).

4.6.8 Baking properties - Panels shall be prepared as specified in 4.3.1 except that the panels shall be baked for 48 hours at a temperature of 63° to 68° C (145° to 154° F). The panels shall then be examined for color change (see 3.5.12).

4.6.9 Flexibility (cold cracking) - Panels shall be prepared as specified in 4.3.1, and shall be tested for cold cracking, using a 1/4-inch diameter mandrel, in accordance with Method 6223 of FED-STD-141 TEST MD. The time of bend shall be 2 seconds (see 3.5.13).

4.6.10 Water resistance - Panels, prepared as specified in 4.3.1, shall be immersed in distilled water in accordance with Method 6011 of FED-STD-141 TEST MD for 24 hours at room temperature. Five minutes after removal from the water, the lacquer shall be examined (see 3.5.14.1).

4.6.11 Hydrocarbon resistance - Panels shall be prepared as specified in 4.3.1. The panels shall then be immersed in test fluid conforming to Type III of TT-S-735, at room temperature, for 4 hours, in accordance with Method 6011 of FED-STD-141 TEST MD. The film shall be examined immediately after removal and 24 hours after removal from the fluid (see 3.5.14.2).

4.6.12 Lubricating oil resistance - Panels shall be prepared as specified in 4.3.1. The panels shall then be immersed in diester lubricating oil composed of 95 percent di-2 ethyl-hexyl sebacate, and 5 percent tricresyl phosphate, by weight, at a temperature of 121° ±2° C (250° ±4° F) for a period of 2 hours. The film shall be cleaned immediately after removal with detergent and water, mineral spirits, or aliphatic naphtha. Twenty-four hours after removal, the panels shall be compared (see 3.5.14.3).

4.6.13 Anchorage (tape test) - Four 3- by 6-inch anodized aluminum-clad aluminum-alloy panels conforming to QQ-A-362 shall be cleaned carefully with solvent. Panels shall be prepared as specified in 4.3.1. Two of the panels shall be coated with two coats of the lacquer under test, and the remaining two panels with two coats of the control lacquer of corresponding color. After application of the second coat of lacquer, the panels shall be air dried for 72 hours. All four panels shall then be partially immersed in distilled water, at a temperature of 23° ±1.1° C (73.5° ±2° F), for 24 hours. The panels shall then be removed from the water and wiped dry with a soft cloth. Immediately thereafter two parallel scratches, 1 inch apart, and penetrating to the metal, shall be made with a stylus upon a previously immersed part of each panel. A 1-inch wide strip of masking tape, taken from a fresh sample of Minnesota Mining and Manufacturing Co. Code No. 250 masking tape or equal, shall be applied across each set of scratches, adhesive side down. 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 in one abrupt motion and each panel examined for conformance to this specification. The interval from the time of removal of the panels from the water to the time of application of the tape shall be 60 ±5 seconds. Stripping of the tape from the panel shall be done immediately after application thereof (see 3.5.14.5).

4.6.14 Hiding -

4.6.14.1 Panel preparation - A representative portion of the lacquer under test shall be cast on a smooth flat metal surface utilizing a suitable doctor blade so that a dry film thickness of 1 mil is obtained. The metal plate 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 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 lacquer 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 application technique and dry 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).

4.6.14.2 Reflectance determination - The reflectance of the coated black and white Carrara glass shall be determined in accordance with Method 6121 of FED-STD-141 TEST MD. The Hunter reflectometer used with the green filter in the manner described in the National Bureau of Standards Research Paper (RP1345, November 1940), meets these requirements as does the Photovolt Lumetrom reflectometer. The reflectance of the film over the black is divided by the reflectance of the film over the white to obtain the contrast ratio (see 3.6.1).

4.6.15 Weather resistance - Panels, 5 by 16 inches, shall be prepared as specified in 4.3.1. Panels shall be prepared for exposure with the lacquer under test and separate panels shall be prepared with the control lacquer of the corresponding color. The panels shall be exposed in accordance with Method 6161 of FED-STD-141 TEST MD for 1 year in the vicinity of Miami, Florida (see 3.5.14.4).

4.6.16 Self-lifting properties - Three panels shall be prepared in accordance with 4.3.1. The first coat of the lacquer under test applied to the three panels shall be allowed to dry for 1/2, 1, and 2 hours, respectively. After application of the second coat there shall be no evidence of lifting in the system (see 3.5.6).

4.7 Inspection for packaging, packing and marking - The lacquer material shall be inspected for all the requirements of Section 5.

4.8 Rejection and retest - Rejection and retest provisions shall be in accordance with Section 1000 of FED-STD-141 TEST MD.

5. PREPARATION FOR DELIVERY

5.1 Levels of packaging - The level of packaging shall be Level A or C, as specified (see 6.2).

5.1.1 Level A - The lacquer shall be packaged in accordance with TT-P-143, in the manner specified for "Unit Packaging for Domestic and Overseas Shipment".

5.1.2 Level C - When Level C is required, packaging shall conform to the manufacturer's commercial practice, unless the procuring activity determines that modification to the manufacturer's commercial practice is required to meet the requirements of this level.

5.2 Levels of packing - Packing shall be Level A, B or C, as specified (see 6.2).

5.2.1 Level A - Lacquer packaged as specified in 5.1.1 shall be packed in accordance with TT-P-143 in the manner specified for "Overseas Shipment".

5.2.2 Level B - Lacquer packaged as specified shall be packed in accordance with TT-P-143 in the manner specified for "Domestic Shipment".

5.2.3 Level C - Lacquer shall be packed so as to insure safe transportation at the lowest rate to the point of delivery. Shipping containers shall conform to the Uniform Freight Classification Rules in effect at time of shipment.

5.3 Marking and labeling - In addition to the marking required by TT-P-143, individual cans or containers shall bear a label showing the following information:

"PRIMING COATS: Use only over a system consisting of MIL-C-8514 wash primer and MIL-P-7962 lacquer primer."

"THINNING DIRECTIONS: For spraying or brushing, reduce as required with thinner conforming to MIL-T-19544. Thinning with an approximately equal quantity of thinner will generally be satisfactory."

The information below is intended for the label for clear lacquer packages only.

"ALUMINUM LACQUER: Prepare by incorporating 12 ounces of aluminum paste conforming to Type II, Class A of TT-P-320 in 1 gallon of clear lacquer, with the aid of thinner as required. Aluminum powder of comparable fineness, purity, and physical properties may be employed in the production of aluminized finishes. In such instances where powder is used, the amount shall be equal to that contained in the amount of aluminum content of the aluminum paste specified."

6. NOTES

6.1 Intended use - The lacquer conforming to this specification is intended for use as a general purpose exterior protective coating for metal surfaces, and is particularly formulated for resistance to diester lubricating oil. The lacquer is intended to be used only over a system consisting of wash primer (pretreatment coating), MIL-C-8514, and lacquer type primer, MIL-P-7962. MIL-F-18264 covers the application and control of this finish on aircraft.

6.2 Ordering data - Procurement documents should specify:

(a) Title, number, and date of this specification.
(b) Color number and name (see 1.2).
(c) Size of container for lacquer. The lacquer should be purchased by volume, the unit being a US gallon, (231 cubic inches) at 15.5° C (60° F).
(d) Levels of packaging and packing required (see section 5).

6.3 Changes from previous issue - The outside margins of this document have been marked "#" to indicate where changes (deletions, additions, etc.) from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Army - MO
Navy - WP
Air Force - MOAMA (Code 69)

Preparing activity:
Navy - WP

Project No. 8010-0291

Review activity:
Army - MO
Navy - WP
Air Force - MOAMA

Review/user information is current as of date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current DODISS.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof).*

SPECIFICATION
MIL-L-19537C LACQUER: ACRYLIC-NITROCELLULOSE GLOSS (FOR AIRCRAFT USE)

ORGANIZATION *(Of submitter)*	CITY AND STATE

CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

   ☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED *(Printed or typed name and activity)*	DATE

DD FORM 1 NOV 64 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-82279

FOLD

DEPARTMENT OF THE NAVY
Naval Air Engineering Center
Philadelphia, Pennsylvania 19112

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
NAVY DEPARTMENT

BuWeps Engineering Standardization Office
Naval Air Engineering Center
Philadelphia, Pennsylvania 19112

FOLD