TT-P-381E
October 13, 1970
SUPERSEDING
Int. Fed. Spec. TT-P-00381d(GSA-FSS)
May 12, 1966 and
Fed. Spec. TT-P-381c
September 9, 1955

FEDERAL SPECIFICATION

PIGMENTS-IN-OIL, TINTING COLOR

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers pigments-in-oil used primarily for tinting colors.

1.2 Classification.

1.2.1 Type and colors. Pigments-in-oil, covered by this specification, shall be of one type in the following colors, as specified (see 6.2).

Blacks:

Color 1A - Bone black (drop black)
Color 1B - High color carbon black
Color 1C - Standard all purpose carbon black
Color 1D - Lampblack
Color 1E - Black iron oxide

Blues:

Color 2A - Iron blue (Prussian)
Color 2B - Ultramarine blue
Color 2C - Cobalt blue

Browns:

Color 3A - Metallic brown
Color 3B - Burnt sienna
Color 3C - Burnt umber
Color 3D - Raw umber
Color 3E - Brown iron oxide
Color 3F - Vandyke brown

Greens:

Color 4A - Light chrome green
Color 4B - Medium chrome green
Color 4C - Dark chrome green
Color 4D - Chromium oxide green

Oranges:

Color 5A - Dark chrome orange
Color 5B - Light chrome orange

Reds:

Color 6A - Bright red iron oxide
Color 6B - Indian red iron oxide
Color 6C - Mineral red iron oxide
Color 6D - Toluidine toner
Color 6E - Venetian red
Color 6F - Vermilion (American)
Color 6G - Rose lake (rose pink)

Yellows:

Color 7A - Light chrome yellow (lemon)
Color 7B - Medium chrome yellow
Color 7C - Primrose chrome yellow
Color 7D - Yellow ochre
Color 7E - Raw sienna
Color 7F - Yellow iron oxide

2. APPLICABLE DOCUMENTS

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

Federal Specifications :

RR-S-366 - Sieves; Standard for Testing Purposes
TT-D-651 - Drier, Paint, Liquid
TT-L-215 - Linseed, Oil, Raw
TT-P-143 - Paint, Varnish, Lacquer and Related Materials: General Specification for Packaging, Packing and Marking Of.
TT-P-330 - Pigment, Bone-Black, Dry
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-347 - Pigment, Chromium-Oxide-Green, Dry
TT-P-350 - Pigment, Lampblack, Dry
TT-P-375 - Pigment, Indian-Red and Bright-Red (Iron-Oxide) Dry
TT-P-385 - Pigment, Iron-Blue, Dry
TT-P-390 - Pigment, Iron Oxide, Black, Synthetic, Dry
TT-P-395 - Pigment, Iron Oxide, Brown, Synthetic, Dry
TT-P-405 - Pigment, Metallic-Brown, Dry
TT-P-408 - Pigment, Mineral-Red (Iron Oxide) Natural, Dry
TT-P-420 - Pigment, Ocher, Yellow, Dry
TT-P-435 - Pigment, Sienna, Burnt and Raw, Dry
TT-P-445 - Pigment, Toluidine-Red-Toner, Dry
TT-P-450 - Pigment, Ultramarine Blue, Dry
TT-P-455 - Pigment, Umber, Raw and Burnt, Dry
TT-P-457 - Pigment, Venetian-Red, Dry
TT-P-458 - Pigment, Yellow-Iron-Oxide, Hydrated, Synthetic, Dry
TT-T-291 - Thinner, Paint
TT-T-801 - Turpentine, Gum Spirits, Steam Distilled, Sulfate Wood and Destructivery Distilled
TT-V-109 - Varnish, Spar, Alkyd, Resin

Federal Standard:

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Washington.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

3. REQUIREMENTS

3.1 The material as received shall consist of the pigment and oil specified, so combined as to produce a tinting color meeting all the requirements of this specification.

3.2 Pigment. The pigment shall be ground in linseed oil (with a small amount of volatile thinner), together with (where necessary) small amounts of wetting and dispersing agents, to a semipaste or fluid type consistency.

3.3 Vehicle. The vehicle shall consist of linseed oil (raw) together with thinner consisting of either turpentine TT-T-801, mineral spirits TT-T-291 or a mixture thereof.

3.4 Quantitative requirements. The quantitative requirements shall be as specified in table I and the chemical analysis of the pigment shall be as specified in table II.

TABLE I.

Characteristics	Requirement Minimum	Requirement Maximum
Nonvolatile matter in vehicle, percent by weight of vehicle	80(1)	---
Consistency, Krebs-Stormer, Shearing rate 200 rpm:		
Grams	350	(2)
K. U. equivalent	100	--
Coarse particles, percent by weight of pigment	---	2
Fineness of grind	6	---
Fish oil	Negative	---
Iodine number	170	---
Unsaponifialable	Negative	---
Water, percent by weight of paste	---	1(3)

(1) The following exceptions are:

Colors	Nonvolatile matter percent by weight
2A Iron blue	60
2B Ultramarine blue	70
2C Cobalt blue	70
3F Vandyke brown	55
4C Dark chrome green	60
7A Light chrome yellow	60
7C Primerose chrome yellow	70

(2) For maximum consistency see 4.4.6

(3) The following exceptions are:

Colors	Percent, maximum allowable
Colors 1A and 1B	2
Color 2A	4
Color 2B	3
Colors 3A, 3B, 3C and 3D	3
Color 7E	3
Color 3F	No requirement

TABLE II. Pigment Analysis

Colors	Dry pigment (percent by weight) minimum	Specification for Pigment content(1)
Blacks:		
Color 1A - Bone black (drop black)	45	TT-P-330
Color 1B - High color carbon black	5	(class A)TT-P-343
Color 1C - Standard all purpose carbon black . . .	10	(class B)TT-P-343
Color 1D - Lampblack	25	TT-P-350
Color 1E - Black iron oxide	70	TT-P-390
Blues:		
Color 2A - Iron blue (Prussian)	32	TT-P-385
Color 2B - Ultramarine blue	66	TT-P-450
Color 2C - Cobalt blue	55	. . . . .

TABLE II. Pigment Analysis (cont.)

Colors	Dry pigment (percent by weight) minimum	Specification for Pigment content(1)
Browns:		
Color 3A - Metallic brown	68	TT-P-405
Color 3B - Burnt sienna	55	TT-P-435
Color 3C - Burnt umber	55	TT-P-455
Color 3D - Raw umber	55	TT-P-455
Color 3E - Brown iron oxide	70	TT-P-395
Color 3F - Vandyke brown	45	. . . . .
Greens:		
Color 4A - Light chrome green	65	(type I) TT-P-345
Color 4B - Medium chrome green	60	(type II) TT-P-345
Color 4C - Dark chrome green	45	(type III)TT-P-345
Color 4D - Chromium oxide green	75	TT-P-347
Oranges:		
Color 5A - Dark chrome orange	82	(type V) TT-P-346
Color 5B - Light chrome orange	79	(type IV)TT-P-346
Reds:		
Color 6A - Bright red iron oxide	69	(type II)TT-P-375
Color 6B - Indian red iron oxide	68	(type I) TT-P-375
Color 6C - Mineral red iron oxide	75	TT-P-408
Color 6D - Toluidine toner	34	TT-P-445
Color 6E - Venetian red	76	TT-P-457
Color 6F - Vermilion (American)	72	. . . . .
Color 6G - Rose lake (rose pink)	65	. . . . .
Yellows:		
Color 7A - Light chrome yellow	65	(type II)TT-P-346
Color 7B - Medium chrome yellow	60	(type III)TT-P-346
Color 7C - Primrose chrome yellow	70	(type I) TT-P-346
Color 7D - Yellow ochre	70	TT-P-420
Color 7E - Raw sienna	55	TT-P-435
Color 7F - Yellow iron oxide	60	TT-P-458

(1) The extracted pigment shall conform to the dry pigment requirements of the indicated specification except for such properties as are covered by this specification or which may not properly be determined on an extracted pigment.

3.5 Qualitative requirements.

3.5.1 Condition in container. The pigments-in-oil, tested as in 4.4.1 shall not settled or caked badly that it cannot be reincorporated with the liquid to form a smooth semipaste.

3.5.2 Miscibility. The pigments-in-oil, tested as in 4.4.2 shall be miscible or break up readily with "thinning liquid," to form a uniform, smooth paint to a brushing consistency. The brushed film shall be uniform and smooth.

3.5.3 Skinning (partially filled container). The pigments-in-oil tested as in 4.4.3 shall not skin within 48 hours.

3.5.4 Storage stability (full container). The pigments-in-oil, tested as in 4.4.4 and stored 24 months shall not caked and settled badly and shall not show evidence of putrefaction.

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 specified herein. Except as otherwise specified in the contract or order the supplier may use his own or any other facilities unless disapproved by 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 that supplies and services conform to the prescribed requirements.

4.2 Classification of inspection. Inspection shall be classified as follows:

(a) Production inspection of the pigments-in-oil.

(b) Inspection of preparation for delivery.

4.3 Production inspection.

4.3.1 Sampling and inspection. Sampling and inspection shall be in accordance with Fed. Test Method Std. No. 141, section 1000.

4.4 Test procedures. The pigments-in-oil shall be tested in accordance with the following applicable methods of Fed. Test Method Std. No. 141 as indicated in table III and as hereinafter specified.

TABLE III.

Characteristics	Requirement Reference	Test Method	
		Fed. Test Method Std. No. 141	Paragraph Reference
Condition in container	3.5.1	3011	4.4.1
Miscibility	3.5.2	. . .	4.4.2
Skinning	3.5.3	3021	4.4.3
Storage stability	3.5.4	3022	4.4.4(1)
Nonvolatile matter in vehicle	Table I	4053	4.4.5
Consistency	Table I	4281	4.4.6
Coarse particle	Table I	4091	. . .
Fineness of grind	Table I	4411	. . .
Fish oil	Table I	. . .	4.4.7
Iodine number	Table I	5061	. . .
Unsaponifialable	Table I	7011	. . .
Water content	Table I	4081	. . .

(1) The inspector may accept a certified manufacturer's report stating that the material offered for delivery has been tested and found to meet the storage requirement.

4.4.1 Condition in container. Determine the package condition in accordance with method 3011 of Fed. Test Method No. 141 and observe for compliance with 3.5.1.

4.4.2 Miscibility test. Thin two volumes of paste with one volume of "thinning liquid" (composed of 70 parts by volume of raw linseed oil TT-L-215, 20 parts of spar varnish TT-V-109, and 10 parts of liquid paint drier TT-D-651). A convenient amount is 60 milliliters of paste and 30 ml. of thinning liquid. The paste may be measured or weighed (The latter requires the weight per gallon of paste). To the paste, add the thinning liquid in increments of about 10 ml., stirring the mixture thoroughly after each addition. Brush the material on a tin, steel, or sealed cardboard and observe for compliance with 3.5.2.

4.4.3 Skinning (partially filled container). Determine the skinning in accordance with method 3021 of Fed. Test Method Std. No. 141 for compliance with 3.5.3.

4.4.4 Storage stability (full container). Storage stability shall be tested in accordance with method 3022 of Fed. Test Method Std. No. 141 except that the storage period shall be 24 months and determine for compliance with 3.5.4.

4.4.5 Nonvolatile in vehicle. Determine the nonvolatile matter in vehicle in accordance with method 4053 of Fed. Test Method Std. No. 141 for compliance with table I.

4.4.6 Maximum Consistency. Transfer a thoroughly mixed portion of the paste to a half-pint, round paint can, (2 3/4 inches diameter), filling the paste to within one-quarter inch from the top. Cover, and allow to come to a temperature of 77°F (25°C), then thoroughly stir the sample, and immediately pour (at the maximum pouring rate) the contents of the container into a weight per gallon cup (metal cup described in method 4184 of Fed. Test Method Std. No. 141). Sufficient paste shall pour out of the container to fill the cup within 20 seconds.

4.4.7 Fish oil (qualitative test).

4.4.7.1 Reagents:

(a) Special chloroform. -- Shake U.S.P. chloroform with several portions of water to wash out all the alcohol. Dry the product over granulated anhydrous calcium chloride overnight in order to remove all traces of water. Decant from the calcium chloride and distil. Add to the distillate 3 ml. of absolute alcohol for every 100 ml. of chloroform. Keep in a stoppered brown bottle.
(b) Special bromine solution. -- Mix one part by volume of bromine conforming to A.C.S. specifications with two parts by volume of chloroform prepared as above. This solution must be made up fresh each day because it deteriorates upon standing.
(c) Amylene. -- Technical grade (boiling point 32° to 37°C) has been found to be satisfactory.

4.4.7.2 Procedure. Place approximately 1.0 gram of fatty acids prepared according to method 5051 of Fed. Test Method Std. No. 141 and 10 ml of special chloroform (see above) in an extraction tube. Place in an ice bath to which a small amount of concentrated hydrochloric acid has been added. The temperature of the bath should be between -5 and -10°C. After cooling in the bath for at least 15 minutes, add bromine solution (see above) dropwise at the rate of not more than 2 drops a second from a 10-ml. burette, shaking the tube continously. Add the bromine solution until a permanent orange color prevails (usually 1 ml. of the bromine solution will be required for 1 gram of fatty acids). Now run in rapidly 0.5 ml. of the bromine solution to insure an excess of bromine, close the tube with rubber stopper, and allow to stand for at least 1 hour at -5 to -10°C. Now add amylene (see above) to the cold solution dropwise until all the bromine is expelled as evidenced by change in color. Usually 5 or 6 drops of amylene will be sufficient to remove all the free bromine. A few drops of amylene in excess does no harm. Place the tube and contents in a water bath heated to near its boiling point. After the solution has boiled slowly for about a minute, examine the solution. If all the bromides are soluble becomes perfectly clear, fish oil may be considered absent. Should the solution remain cloudy even to the point of merely obscuring regular point, the presence of fish oil is apparent, since the octobromides obtained from the bromonation of fish-oil fatty acids are insoluble under the condition of the test.

4.4.8 Packaging, packing, and marking. The pigments-in-oil shall be inspected for compliance with the packaging, packing, and marking requirements of section 5.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The pigments-in-oil shall be packaged, packed, and marked in accordance with TT-P-143. The level of packaging shall be A, B, or C, and the level of packing shall be A, B, or C, as specified (see 6.2). The pigments-in-oil shall be furnished in 1-ounce tubes, half-pint, 1 quart or 1 gallon multiple friction top containers, as specified (see 6.2).

6. NOTES

6.1 Intended use. The pigments-in-oil covered by this specification is intended for use as a tinting color. It is suitable for use synthetic enamel, lacquer enamel, oil paints, and new synthetics. It is not intended for water-thinned paints.

6.2 Ordering data. Purchasers should select the preferred options offered herein and include the following information in procurement documents:

(a) Title, number and date of this specification.
(b) Size of container required (see section 5).
(c) Levels of packaging and packing required (see section 5).
(d) Color and designation required (see 1.2.1).

6.3 The pigments-in-oil covered by this specification should be purchased by volume, the unit being one U.S. liquid gallon of 231 cubic inches at 20°C. (68°F.).

6.4 The approximate weights per gallon as shown in table IV, of the various paste colors, may be helpful to the user. This is based on the minimum percentage of pigment required in this specification, and a vehicle composed of the percentage of linseed oil specified in 3.3, with the remainder mineral spirits, turpentine, or a mixture thereof.

CIVIL AGENCY INTEREST:

GSA
PO
VA
COM

Preparing activity:

GSA-FSS

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain copies and other documents referenced herein. Price 10 cents each.

GENERAL SERVICES ADMINISTRATION - FEDERAL SUPPLY SERVICE

SPECIFICATION COMMENT SHEET

BUDGET BUREAU NO. 29-R0175

INSTRUCTIONS

This form provides a way for users of this specification to inform the originator of problems encountered in its use. It is not to be used to request changes to accommodate proprietary features. All comments will be considered and appreciated, but please do not expect a reply. To comment: detach, complete, and mail to General Services Administration, FSS (FMSB), Wash., D. C. 20406.

NOTE: Comments on this form do not constitute or imply authorization to waive any part of the document or serve to amend contractual requirements.

1. SPECIFICATION

TT-P-381E Pigments-In-Oil, Tinting Color

2. CONTRACT NO. *(If any)*	3. QUANTITY ON CONTRACT *(Optional)*	4. DOLLAR VALUE *(Optional)*

5. GENERAL NATURE OF PROBLEM *(e.g., inspection difficulties, manufacturers unable to meet tolerances, containers collapse under normal warehousing conditions, etc.)*

6. SPECIFIC REQUIREMENTS AFFECTED *(Include paragraph number and lines of wording)*

7. SPECIFIC PROBLEMS *(e.g. tests in 4.2.2 will not assure that the battery will last required time; temperature ranges in table 2 do not conform to commercially available items.)*

8. RECOMMENDATIONS

9. NAME OF MANUFACTURER, ASSOCIATION, GOVT., AGENCY, ETC.	10. ADDRESS *(Number, Street, City, State and Zip Code)*

11. NAME AND TITLE OF SUBMITTER	12. DATE

GSA DC 69-9761

FORM GSA FEB 69 2200