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TT-T-291F
May 8, 1978
SUPERSEDING
Fed. Spec. TT-T-291E
October 12, 1970 and
Fed. Spec. TT-T-295A
May 16, 1960
(See 6.3)

FEDERAL SPECIFICATION

THINNER, PAINT, MINERAL SPIRITS, REGULAR AND ODORLESS

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 three types of mineral spirits (volatile petroleum spirits) for thinning paints, enamels, varnishes, and related materials.

1.2 Classification. The thinners shall be of the following types as specified (see 6.2), all of which meet established pollution control standards for the emission of solvents into the atmosphere (see 3.1 and 6.1):

Type I - Regular mineral spirits.
Type II - High-flash (or 60 deg. C) mineral spirits.
Type III - Odorless mineral spirits.

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 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, DC 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, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, Denver, San Francisco, Los Angeles, and Seattle, WA.

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

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Military Standard:

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

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Code of Federal Regulations:

49 CFR 171-178 - Department of Transportation Regulations for the Transportation of Explosives and Other Dangerous Articles by Land and Water.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 2<UT>02. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

American Society for Testing and Materials (ASTM) Standards:

D 86 - Distillation of Petroleum Products.
D 156 - Saybolt Color of Petroleum Products (Saybolt Chromometer Method).
D 611 - Aniline Point of Petroleum Products and Hydrocarbon Solvents.
D 847 - Acidity of Industrial Aromatic Hydrocarbons.
D 1296 - Odor of Volatile Solvents and Diluents.
D 1476 - Heptane Miscibility of Lacquer Solvents.
D 1616 - Copper Corrosion by Mineral Spirits.
D 3278 - Flash Point of Liquids by Setaflash Closed Tester.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

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3.1 Quantitative and qualitative requirements. The thinners shall conform to the quantitative and qualitative requirements in table I and as hereinafter specified, when tested as specified in 4.4.

3.2 Appearance. The thinners shall be clear, and shall be free from sediment or suspended globules or solid particles, when examined as specified in table II.

3.3 Odor (type III only). When tested as specified in table II, the odor shall be characteristic of that found in commercially acceptable odorless thinners.

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3.4 Container types (see section 5). Unit containers of 1-gallon or less shall be rectilinear in shape. Five-gallon containers shall be rectilinear or round but, if they are round, they shall be equipped with a pouring device. Drums shall be of the closed head type.

TABLE I. Quantitative and Qualitative Requirements

	Type I		Type II		Type III	
Characteristic	Min.	Max.	Min.	Max.	Min.	Max.
Aniline point, deg. C	59	65	59	65	83	87
Distillation range:						
Initial boiling point, deg. C	150	------	171	------	168	------
90 percent by volume, deg. C	-----	200	-----	------	-----	------
95 percent by volume, deg. C	-----	------	-----	238	-----	------
End point, deg. C	-----	210	-----	252	-----	210
Flash point, deg. C	38.0	------	52.0	------	57.0	------
Allowable constituents:						
(a) Total of aldehydes and branched chain ketones, percent	-----	none	-----	none	-----	none
(b) Total of aromatic compounds, with 8 or more carbon atoms to the molecule except ethylbenzene, percent	-----	8	-----	8	-----	8
(c) Ethylbenzene and toluene, percent	-----	20	-----	20	-----	20
(d) Total of solvents with olefinic or cyclo-olefinic unsaturation, percent	-----	none	-----	none	-----	none
(e) Total of (a) + (b) + (c) + (d), percent	-----	20	-----	20	-----	20
(f) Benzene, percent	-----	0.50	-----	0.50	-----	0.50
Acidity	-----	none	-----	none	-----	none
Color	-----	25	-----	25	-----	25
Copper corrosion	-----	none	-----	none	-----	none
Doctor test precipitate	-----	none	-----	none	-----	none
Water	-----	none	-----	none	-----	none
Non-volatile residue, mg per 100 ml	-----	10	-----	10	-----	10
Spot test impurities	-----	none	-----	none	-----	none

4. QUALITY ASSURANCE PROVISIONS

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4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government.

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4.2 Inspection.

4.2.1 Inspection of preparation for delivery. An examination shall be made to determine compliance with section 5. The sample unit shall be one container fully prepared for delivery. Sampling shall be in accordance with MIL-STD-105. The inspection level shall be S-2 with an acceptable quality level (AQL) of 4.0 percent defective.

4.3 Sampling and testing.

4.3.1 Sampling of the end item for tests. For end item testing, the thinners shall be assembled into lots expressed in units of gallons. Samples shall be taken from filled containers ready for delivery. Sampling shall be in accordance with MIL-STD-105, using inspection level S-2 and an AQL of 2.5 percent defective.

4.4 Test procedures. The thinners shall be tested in accordance with the methods specified in table II, and <UT> hereinafter specified. Unless otherwise specified, all tests shall be conducted at standard conditions which are 23 deg. C +/- 1 deg. C and 50 +/- 5 percent relative humidity. All test reports shall contain the individual values used in expressing the final result. All tests shall be evaluated for conformance with requirements in section 3. Failure to pass any test, or noncompliance with any requirement, shall be cause for rejection of the sample.

TABLE II. Index of tests

	Applicable tests	
Characteristics	Fed. Test Method Std. No. 141	ASTM
Appearance	4261	------
Aniline point	--------	D 611
Distillation range	--------	D 86
Flash point	--------	D 3278
Allowable constituents	7356	------
Acidity	--------	D 847
Color	--------	D 156
Copper corrosion (see 4.4.1)	--------	D 1616
Doctor test (see 4.4.2)	--------	------
Water (see 4.4.3)	--------	D 1476
Nonvolatile residue (see 4.4.4)	--------	------
Spot test	4491 [1]	------
Odor	--------	D 1296

[1] For types II and III allow 2-1/2 hours evaporation instead of the 30 minutes specified in method 4491.

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4.4.1 Copper corrosion. Conduct the copper corrosion test in accordance with ASTM method D 1616 except that, in lieu of the specified copper strip corrosion standards, corrosion shall be determined by direct comparison of the copper strips immersed in the test sample with copper strips immersed in the noncorrosive mineral spirits. Any evidence of corrosion caused by the test sample when so compared shall be cause for rejection of the sample.

4.4.2 Doctor test.

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4.4.2.1 Preparation of doctor (sodium plumbite) solution. Dissolve approximately 125g of sodium hydroxide (NaOH) in 1 liter of distilled water. Add 60g lead oxide (PbO) and shake vigorously for 15 minutes, or let stand with occasional shaking for at least 24 hours. Allow undissolved material to settle, and decant or siphon off the clear liquid. Filtration through a mat of asbestos should be employed if settling does not produce a clear liquid. Keep the solution in a tightly stoppered bottle and refilter before using if it is not clear.

4.4.2.2 Procedure. To 10 ml of the thinner in a test tube, add 5 ml of the doctor solution (4.4.2.1), and shake vigorously for 15 seconds. Add a small pinch of pure, dry flowers of sulfur, again shake for 15 seconds, and allow to settle. Observe after 2 minutes. (The quantity of sulfur used should be such that practically all of it floats on the interface between the test sample of thinner and the doctor solution.)

4.4.2.3 Interpretation of results. If the sample of thinner is discolored, or if the yellow color of the sulfur film is noticeably masked, the test sample shall be reported as positive, and the sample rejected. If the test sample remains unchanged in color, and if the sulfur film is bright yellow or only slightly discolored with gray or flecked with black, the sample shall be reported as negative and shall be considered acceptable.

4.4.3 Water. Test for water in accordance with ASTM D 1476. The thinner shall be considered free from moisture when there is no turbidity in a solution containing, by volume, 19 parts of heptane and one part of the thinner.

4.4.4 Nonvolatile residue. Place 100 ml of thinner in a tared porcelain dish. Evaporate the contents over a steam bath until there is no further evaporation. Then heat the dish and residue to constant weight in an oven at 105 deg. C +/- 2 deg. C. Determine the weight of the nonvolatile residue in the dish. Conduct the test in duplicate and report the average and individual results in g/100 ml for conformance with table I.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or commercial, as specified (see 6.2).

5.1.1 Level A. The thinner shall be furnished in 1 quart metal cans, 1 gallon metal cans, 5 gallon metal pails, or 55 gallon steel drums, as specified (see 6.2). The metal cans, pails, and drums shall meet the requirements of DOT Specifications under 49 CFR 178.

5.1.2 Commercial. The thinner shall be preserved and packaged in accordance with normal commercial practice. The complete package shall be designed to protect the item against damage during shipment, handling, and storage.

5.3 Unitization. When shipments to Government depots are full car or truckload, the shipping containers shall be unitized for shipment and handling in accordance with normal commercial practice. The unitized load shall not exceed 2,500 pounds in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

5.4 Marking. Marking shall be as specified in the contract or order (see 6.2).

5.5 DOT regulations. The packaging, packing, marking, and labeling

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shall comply with 49 CFR 171-178.

5.6 Special markings. Special markings on all unit containers shall be as follows:

(a) "Warning! Flammable. Keep away from sparks and open flames."
(b) "Use with adequate ventilation."
(c) "Avoid prolonged breathing of vapors."

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6. NOTES

6.1 Intended use. The materials covered by this specification are intended for use as solvents or thinners for such coatings as paints, primers, and natural or synthetic enamels, or their vehicle components. They are for use generally where thinners of relatively high solvency power are not required. All three types meet established regulations for control of solvent emissions into the atmosphere. Types I and II are conventional mineral spirits. The type II is used where thinner of higher flash point and slower evaporation is required. Type III is for use where a thinner of relatively low odor is required.

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

(a) Title, number, and date of this specification.
(b) Type of thinner required (see 1.2).
(c) Size and type of container required (see 3.4 and 5.1.1).
(d) Level of packaging and packing required (see 5.1 and 5.2).
(e) Special markings required (see 5.4, 5.5, and 5.6).

6.3 Supersession data. The following supersession data are applicable:

TT-E-291E	TT-E-291F
Type I	
Grade A	Deleted
Grade B	Deleted
Type II	
Grade A	Type I
Grade B	Type II
TT-T-295A	Type III

MILITARY INTEREST

Custodians
- Army - ME
- Navy - SH
- Air Force - 99

Review Activities
- Army - MR, MU
- Navy - YD, OS

User Activities
- Navy - MC, OS

Military Coordinating Activity
- Army - ME

CIVIL AGENCIES COORDINATING ACTIVITIES

COM-NBS
GSA-PCD
INT-BPA
NASA-JFK
SBA

PREPARING ACTIVITY

GSA-FSS

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INTERIM AMENDMENT

TO

FEDERAL SPECIFICATION

THINNER, PAINT, MINERAL SPIRITS,
REGULAR AND ODORLESS

This interim amendment was developed by the Federal Supply Service, General Services Administration, Washington, DC 20406, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

The General Services Administration has authorized the use of this interim amendment as a valid exception to Federal Specification TT-T-291F, dated May 8, 1978.

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TABLE I. Delete in its entirety and substitute the following:

TABLE I. Quantitative and Qualitative Requirements

	Type I		Type II		Type III	
Characteristic	Min.	Max.	Min.	Max.	Min.	Max.
Aniline point, deg. C	59	65	59	65	83	87
Distillation range:						
Initial boiling point, deg. C	150	-----	171	-----	168	-----
90 percent by volume, deg. C	-----	200	-----	-----	-----	-----
95 percent by volume, deg. C	-----	-----	-----	238	-----	-----
End point, deg. C	-----	210	-----	252	-----	210
Flash point, deg. C	38.0	-----	60.0	-----	38.0	-----
Allowable constituents:						
(a) Solvent with olefinic or cycloolefinic unsaturation, percent	-----	5	-----	5	-----	5
(b) Aromatic compounds with eight or more carbon atoms in the molecule, except ethylbenzene, methyl benszate, and phenyl acetate, percent	-----	8	-----	8	-----	8
(c) Total or ethylbenzene, toluene, and branched chain ketones, percent	-----	20	-----	20	-----	20
(d) Total of (a) + (b) + (c)	-----	20	-----	20	-----	20

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Acidity		none	-----	none	-----	none
Color	-----	25	-----	25	-----	25
Copper corrosion	-----	none	-----	none	-----	none
Doctor test precipitate	-----	none	-----	none	-----	none
Water	-----	none	-----	none	-----	none
Non-volatile residue, mg per 100 ml	-----	10	-----	10	-----	10
Spot test impurities	-----	none	-----	none	-----	none

FSC 8010