

MIL-P-25576C
10 February 1967
Superseding
MIL-R-25576B
23 January 1959

MILITARY SPECIFICATION
PROPELLANT, KEROSENE

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

1. SCOPE

1.1 This specification covers kerosene propellant for rocket engines.

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.

STANDARDS

Federal

Fed. Test Method Std. No. 791 - Lubricants, Liquid Fuels, and
Related Products; Methods of Testing

Military

MIL-STD-290 - Packaging, Packing and Marking of Petroleum
Products

(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.

American Society for Testing and Materials Publications

ASTM Standards, Parts 17 and 18

(Copies of ASTM publications may be obtained upon application to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

[FSC 9130]

3. REQUIREMENTS

3.1 Material. The propellant shall consist completely of hydrocarbon compounds except as otherwise specified herein.

3.2 Chemical and physical requirements. The chemical and physical requirements of the propellant shall conform to those listed in table I when tested in accordance with applicable tests.

3.2.1 Water reaction. When tested as specified in table I and 4.5.2.1, the propellant shall have separated sharply from the water layer. The interface shall be equal to or better than rating 1b described in Fed. Test Method Std. No. 791, Method 3251, table I. In addition, neither layer shall have changed in volume by more than 1 milliliter.

3.3 Additives. The additives listed herein may be used singly or in combination, in amounts not to exceed those specified. No substance of known dangerous toxicity under usual conditions of handling and use shall be added except as specified herein. The type and amount of each additive used shall be reported.

3.3.1 Antioxidants. The following active inhibitors may be added separately or in combination to the propellant in total concentration not in excess of 8.4 pounds of inhibitor (not including weight of solvent) per 1,000 barrels (6.3.1) of fuel (9.1 gm/100 U.S. gal) in order to prevent the formation of gum.

- (a) 2, 6-ditertiary butyl 4-methyl phenol.
- (b) N, N' disecundary butyl paraphenylenediamine.
- (c) 2, 4-dimethyl-6 tertiary-butyl phenol.
- (d) 2, 6-ditertiary butyl phenol.

3.3.2 Metal deactivator. A metal deactivator, N, N'-disalicylidene-1, 2-propanediamine, may be added in an amount not to exceed 2 pounds of active ingredient per 1,000 barrels of fuel (2.2 gm/100 U.S. gal).

3.3.3 Dye. A dye, methyl derivative of azobenzene-4-azo-2-naphthol, may be added in an amount not to exceed 1/2 ounce (wt) per 100 U.S. gallons of fuel.

3.4 Limiting values. For purposes of determining conformance with these requirements, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limitation value, in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E29).

TABLE I. - Chemical and Physical Requirements and Test Methods

| Requirements | Kerosene | Test Method Fed. Std. No. 791 | Test Method ASTM No. |
|--|-----------------------------|-------------------------------------|-------------------------|
| Distillation | | 1001 | D86. |
| Initial boiling point | $\frac{1}{1}$ 365° to 410°F | | |
| Fuel evaporated, 10% | $\frac{1}{1}$ | | |
| Fuel evaporated, 50% at (°F) | $\frac{1}{1}$ | | |
| Fuel evaporated, 90% at (°F) | 525°F | | |
| End point, max | 1.5 | | |
| Residue, vol percent, max | 1.5 | | |
| Distillation loss, vol percent, max | 42.0 (0.815) | 401 | D287. |
| Gravity° API--min (sp gravity, max) | 45.0 (0.801) | 401 | D287. |
| Gravity° API--max (sp gravity, min) | 7 | 3302 | D381 |
| Existent gum, mg/100 ml, max | 14 | 2/ 3354 | D873 |
| Potential gum, 16 hr aging mg/100 ml, max | 0.05 | 3/ 5201 | D1266. |
| Sulfur, total percent wt, max | 0.005 $\frac{4}{1}$ | 5204 | D1219 or D1323. |
| Mercaptan-sulfur, percent wt, max | -36 | 1411 | D2386. |
| Freezing point, °F, max | | | |
| Thermal value: | | | |
| Net heat of combustion BTU/lb, min | 18,500 | 2502 | D240 |
| or aniline-gravity product, min $\frac{7}{1}$ | 7,200 | 3601 & 401 | D611 & D287 |
| Viscosity, centistokes at -30°F, max | 16.5 | 305 | D445. |
| Aromatics, vol percent, max | 5.0 | 3703 | D1319. |
| Olefins, vol percent, max | 1.0 | 3701 | D875. |
| Smoke point, mm, min | 25.0 | 2107 | D1322. |
| Copper strip corrosion, ASTM classification, max | 1 | 5/ 5325 | D130. |
| Water reaction | $\frac{6}{1}$ | 3251 | D93. |
| Flash point, min | 110°F | 1102 | D611. |
| Aniline point, °F | $\frac{1}{1}$ | 3601 | D2276-64T, Method A |
| Particulate, max | 5.7 mg/gal (U.S.) | | |

- 1/ To be reported - not limited.
- 2/ When conducting referee test, Method 3354 shall be used. In either test, the aging period shall be 16 hours.
- 3/ Either volumetric or gravimetric method may be used, except that the gravimetric method shall be used for referee test.
- 4/ The mercaptan-sulfur determination may be waived at the option of the Inspector if the fuel is considered "sweet" when tested in accordance with Method 5203.
- 5/ To be performed in accordance with paragraph titled "Tests at 212°F (100°C) for Volatile Materials" of ASTM D130-65.
- 6/ See 3.2.1 for requirements and 4.5.2.1 for exception to Method 3251.
- 7/ Aniline-gravity product is defined as the product of the gravity in °API and the aniline point in °F.

3.5 Filter. A filter with a 10 micron nominal and 40 absolute rating shall be installed between the manufacturer's plant system and the container to be filled for delivery.

3.6 Qualitative. The propellant shall be a single phase liquid when examined visually by transmitted light.

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. The inspection and testing of the propellant shall be classified as quality conformance tests.

4.3 Test conditions. The test conditions are described under the individual tests to which they apply.

4.4 Quality conformance tests. Quality conformance tests shall consist of:

- (a) Individual test 4.4.1
- (b) Sampling test 4.4.2

4.4.1 Individual test. The propellant shall be subjected to the following test as described under 4.5.

Examination of product 4.5.1

4.4.2 Sampling tests. The propellant shall be selected in accordance with 4.4.2.1 and subjected to the tests specified in table I.

4.4.2.1 Sampling plan.

4.4.2.1.1 Lot. A lot shall consist of propellant produced by one manufacturer and contained in one storage tank, provided the operation is continuous. In the event the process is a batch process, each batch shall constitute a lot.

4.4.2.1.2 Sampling. A sample shall consist of no less than two U.S. gallons. Sampling shall be in accordance with ASTM Method D270 titled, "Sampling Petroleum and Petroleum Products".

4.5 Test methods.

4.5.1 Examination of product. The propellant sample shall be visually examined while performing tests specified in table I to determine compliance with the requirement specified herein. Examination shall be conducted after the sample has been transferred to the test apparatus.

4.5.2 Testing. Unless otherwise specified by the procuring activity, inspection shall be in accordance with Method 9601 of Federal Test Method Standard No. 791. Tests as specified in 3.2 shall be conducted in accordance with Federal Test Method Standard No. 791 or ASTM standards, using applicable methods as listed in table I, except for the water reaction test (4.5.2.1).

4.5.2.1 Water reaction. The water reaction test shall be conducted in accordance with Method 3251 of Federal Test Method Standard No. 791, except that a 2-hour rather than a 5-minute standing period shall be used before evaluating the propellant-water interface.

4.6 Rejection and retest. Material not conforming to the requirements of this specification shall be rejected. Rejected material shall not be re-submitted without furnishing full particulars concerning previous rejection and measures taken to overcome defects.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. Packaging, packing, and marking shall be in accordance with MIL-STD-290.

5.2 Shipment. Shipments shall be made in conformance with applicable Interstate Commerce Commission Regulations referenced in MIL-STD-290.

6. NOTES

6.1 Intended use. The kerosene covered by this specification is intended for use as a fuel in rocket engines and as a hydraulic fluid medium in rocket engine gimbal systems.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Quantity required and size containers desired.
- (c) Levels of packaging and marking required (5.1).

(d) That two copies of certificate of analysis, signed by the contractor's representative, listing values obtained on all tests (quantitative values where method provides) should accompany each shipment delivered to the consignee. In addition, one copy should also be furnished to the AFRPL/RPPS, Edwards, California 93523.

6.2.1 The material will be purchased by volume, the unit being a U.S. gallon at 60°F (15.5°C).

6.3 Definitions.

6.3.1 Barrel. A barrel as specified herein will contain 42 U.S. gallons.

Custodians:

Air Force 12
Army MR
Navy AS

Preparing activity:

Air Force 12
Project No. 9130-0022

Reviewer activities:

Air Force 14, 19, 67
Army MI, MU
DSA

Civilian Agency interest:

NAS

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-P-25576C Propellant, Kerosene
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 BY (Printed or typed name and activity)

DATE

FOLD

AFRPL (RPPS)
EDWARDS, CALIFORNIA 93523

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Director
Air Force Rocket Propulsion Laboratory (RPPS)
Edwards, California 93523

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