MIL-G-5572F
24 January 1978
SUPERSEDING
MIL-G-5572E
24 July 1969

MILITARY SPECIFICATION

GASOLINE, AVIATION:
GRADES 80/87, 100/130, 115/145

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

1. SCOPE

1.1 Scope. This specification covers aviation gasoline for aircraft piston engines.

1.2 Classification. Aviation gasoline shall be of the following grades, as specified (see 6.2):

Grade	NATO Code Number
80/87	F-12
100/130	F-18
115/145	F-22

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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.

SPECIFICATIONS

MILITARY

MIL-I-25017 -Inhibitor, Corrosion, Fuel Soluble

QUALIFIED PRODUCTS LISTS

QPL-25017 -Products Qualified Under Military Specification MIL-I-25017, Inhibitor, Corrosion, Fuel-Soluble

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Engineering Specifications and Standards Department (Code 9321), Naval Air Engineering Center, Lakehurst, New Jersey 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 9130

STANDARDS

FEDERAL

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

MILITARY

MIL-STD-105	-Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-290	-Packaging, Packing and Marking of Petroleum and Related 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 except for the specific issue accepted by the Department of Defense as listed in the current Department of Defense Index of Specifications and Standards (DODISS). ASTM documents listed by specific date shall form a part of this specification but may not be listed in the current DODISS.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D86	Distillation of Petroleum Products, Test for
ASTM D130	Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test, Detection of
ASTM D240	Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter, Test for
ASTM D270	Petroleum and Petroleum Products, Sampling
ASTM D287	API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method) Test for

ASTM D323	Vapor Pressure of Petroleum Products (Reid Method), Test for
ASTM D381	Existent Gum in Fuels by Jet Evaporation, Test for
ASTM D526-70	Lead in Gasoline, Gravimetric Method, Test for
ASTM D611	Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents, Test for
ASTM D873	Oxidation Stability of Aviation Fuels (Potential Residue Method), Test for
ASTM D909	Knock Characteristics of Aviation Fuels by the Supercharge Method, Test for
ASTM D910	Aviation Gasolines, Specification for
ASTM D936	Aromatic Hydrocarbons in Olefin-free Gasolines by Silica Gel Adsorption, Test for
ASTM D1094	Water Reaction of Aviation Fuels, Test for.
ASTM D1266	Sulfur in Petroleum Products (Lamp Method), Test for
ASTM D1319	Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption, Test for
ASTM D2267	Aromatics in Light Naphthas and Aviation Gasolines by Gas Chromatography, Test for
ASTM D2382	Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High-Precision Method), Test for
ASTM D2386	Freezing Point of Aviation Fuels, Test for
ASTM D2392	Color of Dyed Aviation Gasolines, Test for

ASTM D2551	Vapor Pressure of Petroleum Products
ASTM D2599	Lead in Gasoline by X-ray Spectrometry, Test for
ASTM D2622	Sulfur in Petroleum Products (X-Ray spectrographic Method), Test for
ASTM D2700	Knock Characteristics of Motor and Aviation Fuels by the Motor Method, Test for

(Copies of ASTM publications may be obtained from the American Society for testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103.)

3 REQUIREMENTS

3.1 Materials. The gasoline shall consist completely of hydrocarbon compounds, except as otherwise specified herein.

3.2 Chemical and physical requirements. The chemical and physical requirements of the finished gasoline shall conform to those listed in table I. Requirements contained herein are not subject to corrections for test tolerances. If multiple determinations are made, results falling within any specified repeatability and reproductability tolerances may be averaged.

3.2.1 Water reaction. In addition to the interface rating and volume change requirements specified in Table I, the fuel shall separate sharply from the water layer and there shall be no evidence of an emulsion or precipitate within or upon either layer.

* 3.3 Additives. The additives listed herein may be used singly or in combination in amounts not to exceed those specified. The type and amount of each additive used shall be reported (see 6.3).

* 3.3.1 Antioxidants. The following inhibitors may be blended separately or in combination into the gasoline in total concentration not in excess of 8.4 pounds of inhibitor (active ingredient) per 1,000 barrels (42 gal.) of fuel (91 mg./gal.) (U.S.), 24 mg./liter, or 8.4 lb./35,000 gal. (U.K.) in order to prevent the formation of gum:

a. N,N'-diisopropyl-para-phenylenediamine
b. N,N'-disecondary butyl-para-phenylenediamine
c. N, secondary butyl,N'-phenyl ortho-phenylenediamine
d. 2,6-ditertiary butyl-4-methylphenol
e. 2,4-dimethyl-6-tertiary butylphenol
f. 72 percent min. 2,4-dimethyl-6-tertiary butylphenol
28 percent max, monomethyl and dimethyl tertiary butylphenols
g. 55 percent min. 2,4-dimethyl-6-tertiary butylphenol
15 percent min. 2,6-ditertiary butyl-4-methylphenol
30 percent max. mixed monomethyl and dimethyl tertiary butylphenols
h. 2,6-ditertiary butylphenol
i. 75 percent min. 2,6-ditertiary butylphenol
25 percent max. mixed tertiary and ditertiary butylphenols
j. 60 percent min. 2,4-ditertiary butylphenol
40 percent max. mixed tertiary butylphenols
k. 35 percent min. 2,6-ditertiary butyl-4-methylphenol
65 percent max. mixed methyl, ethyl, and dimethyl tertiary butylphenols
l. 55 percent min. butylated ethyl phenols
45 percent max. butylated methyl and dimethyl phenols.

3.3.2 Corrosion inhibitor. A corrosion inhibitor shall not be added to aviation gasoline by the supplier or the transporting agency unless prior approval is obtained from the procuring agency. When used, the corrosion inhibitor shall conform to MIL-I-25017 and the finished fuel shall meet all the requirements specified in section 3. No limit is placed on the minimum amount which may be added. The maximum allowable concentration shall not exceed that listed in the latest revision of QPL-25017. If a corrosion inhibitor is used, the contractor or transporting activity, or both, shall maintain and upon request, make available to the Government, evidence that the corrosion inhibitors used are equal in every respect to the product specified in MIL-I-25017.

* 3.3.3 Color. Color for each grade shall be within the minimum and maximum color standards for the applicable color when determined by the test method indicated in Table I. The colors indicated for each grade of gasoline in Table I shall be obtained by the addition of dyes in amounts listed in Table II. Dyes may be dissolved in xylene for ease of mixing. When a xylene solution is used, the maximum dye limits in Table II are to be based on the nonvolatile portion of the dye solution. The quantities of dyes indicated are the total dye content, including that normally in the TEL mix. No dyes other than the following shall be present in the finished fuel:

a. Blue - Essentially 1, 4-dialkylaminoanthraquinone.

b. Red - Essentially alkyl derivative of azobenzene-4-azo-2-naphthol

3.3.4 Tetraethyllead content. The tetraethyllead (TEL) shall be added in the form of an antiknock mixture containing not less than 61 percent by weight of tetraethyllead and sufficient ethylene dibromide to provide two bromine atoms per atom of lead. The balance shall contain no added ingredients other than a hydrocarbon solvent, an approved oxidation inhibitor, and dyes as specified herein.

3.4 Workmanship. The gasoline shall be visually free from undissolved water, sediment, and suspended matter.

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 in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, 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 supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection and testing of the aviation gasoline shall be classified as quality conformance inspection.

* 4.3 Quality conformance inspection sample. The quality conformance inspection sample shall consist of samples for tests (4.3.2) and sample for examination of filled containers (4.3.3). Samples shall be labeled completely with information identifying the purpose of the sample, name of product, specification number, lot number, date of sampling and contract number.

* 4.3.1 Lot. A lot shall consist of the following:

4.3.1.1 Bulk lot. An indefinite quantity of a homogeneous mixture of one type of gasoline contained in one isolated container; or manufactured in a single plant run (not more than 24 hours), through the same processing equipment with no change in the ingredient materials.

* 4.3.1.2 Packaged lot. An indefinite number of 55-gallon drums or smaller unit containers of identical size and type offered for acceptance and filled from one isolated tank containing a homogeneous mixture of material.

* 4.3.2 Sample for test. Each bulk lot of materials shall be sampled for verification of product quality in accordance with ASTM Method D270 and tested as specified in 4.5.

* 4.3.3 Sample for inspection of filled containers. Each lot of filled containers shall be sampled in accordance with MIL-STD-105, Inspection Level I, Acceptable Quality Level (AQL) 2.5 percent defective, and inspected as specified in 4.5.2.2.

* 4.4 Quality conformance inspection tests. The quality conformance inspection tests shall include testing of the sample (4.3.2) for conformance to the requirements of this specification, and an inspection of samples of containers (4.3.3) for conformance to the packaging, packing, and marking requirements.

* 4.5 Methods of inspection and test.

* 4.5.1 Samples for test (4.3.2) shall be tested in accordance with Table I to determine conformance with 3.2 and samples for inspection of filled containers (4.3.3) shall be examined in accordance with 4.5.2 to determine conformance with 5.1.

* 4.5.2 Inspection. Inspection shall be in accordance with Method 9601 of Federal Test Method Standard No. 791.

* 4.5.2.1 Prior to filling, each empty unit container shall be visually inspected for cleanliness and suitability.

* 4.5.2.2 After filling, each unit container shall be visually inspected for marking, fill, closure, sealing, leakage, and conformance to MIL-STD-290.

5. PACKAGING

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

6. NOTES

6.1 Intended use. The gasoline covered by this specification is intended for use in aircraft piston engines.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification
(b) Grade and NATO Code Number of gasoline required (see 1.2).
(c) Quantity required and size containers desired.
(d) Levels of packaging and packing required (see 5.1).

6.3 Precautions for mixing inhibitors. To prevent any possible reaction between the concentrated forms of different inhibitors, the fuel supplier is cautioned not to mix inhibitors prior to addition to the gasoline.

6.4 International standardization agreement. Certain provisions of this specification are the subject of international standardization agreement NATO STANAG No. 1135 and ASCC AIR STD 15/1. When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreements concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

6.5 Marginal indicia. The margins of this specification are marked to indicate where changes, deletions, or additions to the previous issue have been made. This is done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Figures are not so marked. 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 - MR
Navy - AS
Air Force 11

Preparing activity:
Navy - AS

(Project No. 9130-0088)

Reviewer activities:
Army - AV, ME, MI
Air Force - 68
DLA - PS

International interest (see 6.4)

*TABLE I. Chemical and physical requirements and test methods.

Requirements	Grade			ASTM test Methods
	80/87	100/130	115/145	
Distillation:				
Fuel evaporated, 10 percent min. at	75°C (167°F)	75°C (167°F)	75°C(167F°)	D86
Fuel evaporated, 40 percent max. at	75°C (167°F)	75°C (167°F)	75°C(167°F)	---
Fuel evaporated, 50 percent min. at	105°C (221°F)	105°C (221°F)	105°C(221°F)	---
Fuel evaporated, 90 percent min. at	135°C (275°F)	135°C (275°F)	135°C(275°F)	---
End point, max.	170°C (338°F)	170°C (338°F)	170°C(338°F)	---
Sum of 10 percent and 50 percent evaporated temperature, min. 1/	135°C (307°F)	135°C (307°F)	135°C(307°F)	---
Residue, vol., max. percent	1-1/2	1-1/2	1-1/2	---
Distillation loss, vol, max. percent	1-1/2	1-1/2	1-1/2	---
Gravity, API degrees	2/	2/	2/	D287
Existent gum, max., mg/100 ml.	3.0	3.0	3.0	D381
Oxidation stability				
Potential gum, 16 hr. aging, max., mg/100 ml.	6.0	6.0	6.0	D873
Precipitate, max., mg/100 ml.	2.0	2.0	2.0	D873
Sulfur, max., percent by wt.	0.05	0.05	0.05	D1266 or D2622
Aromatics, vol., min. percent	---	5.0	5.0	3/ D936, D1319 or D2267
Reid vapor pressure at 37.8°C (100°F) (min.-max.), psi (kPa)	5.5-7.0 (38.5-49.0)	5.5-7.0 (38.5-49.0)	5.5-7.0 (38.5-49.0)	D323 or D2551
Freezing point, max.	-60°C(-76°F)	-60°C(-76°F)	-60°C(-76°F)	D2386
Copper corrosion, max. (2 Hrs. at 100°C(212°F)	1	1	1	D130
Water reaction (see 3.2.1)				
Interface rating, max.	2	2	2	D1094
Vol. change, max., ml.	2	2	2	D1094
Heating value:				
Net heat of combustion, min., MJ/kg(Btu/lb.), or aniline-gravity product, min. 4/	43.5 (18,700) 7,500	43.5 (18,700) 7,500	44.0 (18,900) 9,800	D240 or D2382 D611 and D287

TABLE I. (Continued)

Requirements	Grade 80/87	Grade 100/130	Grade 115/145	ASTM test Methods
Color, see 3.3.3	red	blue	purple	D2392
Dye content, see table II				
Tetraethyllead content, max. (see 3.3.4)				
ml/gal. (U.S.)	0.50	2.00	4.60	5/D526-70
lead. gm/gal. (U.S.)	0.53	2.12	4.86	---
ml/gal. (U.K.)	0.60	2.40	5.52	---
lead, gm/gal. (U.K.)	0.64	2.54	5.83	---
ml/liter	0.13	0.53	1.22	---
lead, gm/liter	0.14	0.56	1.28	---
Knock value, lean mixture Aviation rating, min.	7/ 80	7/ 100	8/ 115	6/ D2700
Knock value, rich mixture Supercharge rating, min.	7/ 87	8/ 130	8/ 145	D909

* NOTES:

1/ Note that the temperature conversion for the sum is $C_1 + C_2 = 5/9\ (F_1 - 32 + F_2 - 32)$
2/ To be reported not limited.
3/ ASTM Method D936 shall be used for referee tests.
4/ Aniline-gravity product is defined as the product of the gravity in °API and aniline point in °F.
5/ The tetraethyl lead content may also be determined by ASTM Method D2599. ASTM Method D526-70 shall be used for referee tests. Test results obtained in grams of lead per U.S. gal. at 15.6°C (60°F), grams of lead, per Imperial gal. at 15.6°C (60°F) or grams of lead per liter at 15°C(59°F) may be converted to the equivalent values in milliliters by multiplying by 0.946.
6/ Knock Values obtained by ASTM Method D2700 are Motor Octane Numbers. To convert Motor Octane Numbers to Aviation Ratings use Table 2 of ASTM D910.
7/ Octane number: To be reported to the nearest 0.1 octane number.
8/ Performance number: To be reported to the nearest 0.1 performance number.

*TABLE II. Dye concentrations.

REQUIREMENT	GRADE					
	80/87		100/130		115/145	
	Min	Max	Min	Max	Min	Max
BLUE DYE						
mg/liter	---	0.131	0.80	1.51	0.713	1.24
mg/gal. (U.S.)	---	0.500	3.03	5.70	2.70	4.70
mg/gal. (U.K.)	---	0.596	3.64	6.85	3.24	5.64
lb/1000 barrels	---	0.046	0.28	0.528	0.250	0.435
RED DYE						
mg/liter	1.83	2.29	---	---	0.502	0.864
mg/gal. (U.S.)	6.93	8.66	---	---	1.90	3.27
mg/gal. (U.K.)	8.24	10.40	---	---	2.28	3.93
lb/1000 barrels	0.642	0.802	---	---	0.176	0.303

FOLD

DEPARTMENT OF THE NAVY
Naval Air Engineering Center
Lakehurst, NJ 08733

POSTAGE AND FEES PAID
Navy Department
DOD-316

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

Engineering Specifications and Standards Department (Code 93)
Naval Air Engineering Center
Lakehurst, NJ 08733

FOLD

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS: This form is provided to solicit beneficial comments which may improve this document and enhance its use. DoD contractors, government activities, manufacturers, vendors, or other prospective users of the document are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity. A response will be provided to the submitter, when name and address is provided, within 30 days indicating that the 1426 was received and when any appropriate action on it will be completed.

NOTE: This form shall not be used to submit requests for waivers, deviations or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

DOCUMENT IDENTIFIER *(Number)* AND TITLE

MIL-G-5572F GASOLINE, AVIATION: GRADES 80/87, 100/130, 115/145

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

1. ☐ HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? ☐ IS ANY PART OF IT TOO RIGID, RESTRICTIVE, LOOSE OR AMBIGUOUS? PLEASE EXPLAIN BELOW.

A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDED WORDING CHANGE

C. REASON FOR RECOMMENDED CHANGE(S)

2. REMARKS

SUBMITTED BY *(Printed or typed name and address — Optional)*	TELEPHONE NO.
	DATE

DD FORM 1426 1 OCT 76

EDITION OF 1 JAN 72 WILL BE USED UNTIL EXHAUSTED.