

<p>NOT MEASUREMENT SENSITIVE</p>

MIL-G-3056F
14 November 1991
SUPERSEDING
MIL-G-3056E
26 January 1988

MILITARY SPECIFICATION

GASOLINE, AUTOMOTIVE, COMBAT

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

1. SCOPE

1.1 Scope. This specification covers combat-grade gasolines suitable for OCONUS use in all gasoline engines other than aircraft under all conditions of service (see 6.1). (Refer to MIL-G-46015 for combat-grade gasolines suitable for CONUS use)

1.2 Classification. The gasolines shall be of the following types as specified (see 6.1).

MILITARY SYMBOL	NATO CODE NO.	Description
MOGAS, type I	F-46	All-purpose gasoline
MOGAS, type II		Low-temperature, all-purpose gasoline

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

<p>Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATIN: STIRBE-TSE, Fort Belvoir, VA 22060-5606 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.</p>

AMSC N/A

FSC 9130

DISTRIBUTION STATEMENT A. Approved for public release, distribution is unlimited.

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SPECIFICATIONS

MILITARY

MIL-I-25017 - Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble.

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.

FED-STD-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.

QUALIFIED PRODUCTS LIST

QPL-25017 - Inhibitor, Corrosion, Fuel Soluble.

(Unless otherwise indicated, copies of federal and military specifications, standards, and QPLs are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents. The following other Government document forms a part of this document to the extent specified herein. Unless otherwise specified, the issue is that cited in the solicitation.

DEPARTMENT OF TRANSPORTATION (DOT)

CODE OF FEDERAL REGULATIONS

Title 49, Part 100-199, Department of Transportation (DOT) Rules and Regulations.

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

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 86 - Distillation of Petroleum Products.
- D 130 - Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test.
- D 323 - Vapor Pressure of Petroleum Products (Reid Method).
- D 381 - Existent Gum in Fuels by Jet Evaporation.
- D 525 - Oxidation Stability of Gasoline (Induction Period Method).
- D 1266 - Sulfur in Petroleum Products (Lamp Method).
- D 1368 - Trace Concentration of Lead in Primary Reference Fuels.
- D 2533 - Vapor-Liquid Ratio of Spark-Ignition Engine Fuels.
- D 2622 - Sulfur in Petroleum Products by X-Ray Spectrometry).
- D 2699 - Knock Characteristics of Motor Fuels by the Research Method.
- D 2700 - Knock Characteristics of Motor by the Motor Method.
- D 2885 - Research and Motor Method Octane Ratings Using On-Line Analyzers.
- D 3116 - Trace Amounts of Lead in Gasoline.
- D 3229 - Low Levels of Lead in Gas by Wavelength Dispersive X-Ray Spectrometry.
- D 4057 - Manual Sampling of Petroleum and Petroleum Products.
- D 4176 - Free Water and Particulate Contamination in Distillate Fuels (Clear and Bright Pass/Fail Procedures).
- D 4177 - Automatic Sampling of Petroleum and Petroleum Products.
- D 4814 - Automotive Spark-Ignition Engine Fuel.

(The test methods listed above are included in Volumes 05.01, 05.02, 05.03, and 05.04 of the Annual Book of ASTM Standards. The methods can also be purchased separately. Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA, 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. The gasolines supplied under this specification shall be volatile refined hydrocarbon fuels containing additives in accordance with 3.2. The feed stock from which the gasoline is refined shall be crude oils derived from petroleum, tar sands, oil shale, or mixtures thereof.

3.2 Additives. Additives and additive concentrations for both types I and II gasolines shall be as specified in 3.2.1 through 3.2.4. Application for approval of additives not listed below should be made to the US Army Belvoir Research, Development, and Engineering Center, ATTN: STRBE-VF, Fort Belvoir, VA 22060-5606. Requests for approval shall contain the chemical or trade name of the additive, material safety data sheet, concentration to be used, and laboratory test data demonstrating the effectiveness of the additive in gasoline.

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3.2.1 Oxidation inhibitors. The gasolines shall contain not less than 14 nor more than 43 grams of oxidation inhibitors (active ingredient basis) per cubic meter of gasoline. Any one or a combination of the following oxidation inhibitors may be used:

- a. N,N'-di-sec-butyl-p-phenylenediamine.
- b. N,N'-diisopropyl-p-phenylenediamine.
- c. N,N'-dioctyl-p-phenylenediamine.
- d. N,N'-bis-(1,4-dimethylpentyl)-p-phenylenediamine.
- e. N,N'-di-sec-butyl-o-phenylenediamine.
- f. 2,6-Di-tert-butylphenol.
- g. 2,6-Di-tert-butyl-4-methylphenol.
- h. 2,4-Dimethyl-6-tert-butylphenol.
- i. Triethylenetetramine di (monononylphenolate).
- j. N-sec-butyl,N'-phenyl-o-phenylenediamine.
- k. Mixed 2,6-dialkyl- and 2,4,6-trialkylphenols containing mixed hexyl and heptyl groups.
- l. 2,4-Di-tert-butylphenol (60 weight percent minimum) and mixed tert-butylphenols (40 weight percent maximum).
- m. Butylated ethylphenols (55 weight percent minimum) and butylated ethyl- and dimethylphenols (45 weight percent maximum).
- n. 4,6-Di-tert-butyl-2-methylphenol (45 weight percent minimum), mixture of 6-tert-butyl-2-methylphenol and 2,4,6,-tri-tert-butylphenol (40 weight percent minimum), and other butylated phenols (15 weight percent maximum).
- o. 2,4-Dimethyl-6-tert-butylphenol (72 weight percent) and a mixture of methyl- and dimethyl-tert-butylphenols (28 weight percent).
- p. Di- and tri-isopropylphenols (75 weight percent minimum) and di- and tri-tert-butylphenols (25 weight percent maximum).

3.2.2 Metal deactivators. The gasolines shall contain not less than 2.8 grams nor more than 8.6 grams of an approved metal deactivator (active ingredient basis) per cubic meter of gasoline. Any one of the following metal deactivators may be added separately or in combination with an approved oxidation inhibitor:

- a. N,N'-disalicylidene-1,2-ethanediamine.
- b. N,N'-disalicylidene-1,2-propanediamine.
- c. N,N'-disalicylidene-1,2-cyclohexanediamine.
- d. Disalicylidene-N-methyl-dipropylenetriamine.

3.2.3 Corrosion inhibitors. An approved corrosion inhibitor may be added at the option of the refiner, or if required by the procuring activity. Any corrosion inhibitor used shall be a product which conforms to MIL-I-25017. The addition of a corrosion inhibitor shall not permit waiving any of the requirements of MIL-G-3056. The quantity added shall not exceed the maximum approved in QPL-25017 for the specific corrosion inhibitor used.

3.2.4 Other additives. The gasolines shall not contain other additives such as detergents, solvent oils, dispersants, etc., except dyes which are required to meet the color requirement.

3.3 Physical and chemical requirements. The finished gasolines shall be as specified in table I.

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TABLE I. Physical and chemical requirements.

Property	Type I	Type II
Distillation:		
10% recovered, °C	50 to 70	50 max
50% recovered, °C	88 to 115	71 to 95
90% recovered, °C	132 to 180	150 max
Residue, % vol, max.	2.0	2.0
Temperature, °C, min. at V/L ratio = 20 <u>1</u> / ₁	60	41
Reid vapor pressure, kPa	61.5 max	84 to 93
Unwashed gum, mg/100 mL, max.	4	4
Lead, g/L, max.	0.013	0.013
Sulfur, % wt, max.	0.10	0.10
Corrosiveness, 3 hr at 50 °C, max.	1	1
Oxidation stability, minutes, min.	480	480
Free water and sediment	Free from water and sediment	Free from water and sediment
Color	Red, equal to standard	Red, equal to standard
Octane number		
Motor method, min.	83.0	83.0
Research method, min.	91.0	91.0

1/ At 101.3 kPa pressure.

2/ Some countries may require lead limits below 0.013 g/L. If a local law is more restrictive, then the local law shall govern the maximum lead content.

3.4 Material Safety Data Sheets. Material Safety Data Sheets (MSDS) shall be prepared in accordance with FED-STD-313 (see 6.3). Material Safety Data Sheets are required when gasoline is packaged in cans or drums, but not for bulk deliveries.

3.5 Workmanship. The finished fuel shall be visually free of undissolved water, sediment, and suspended matter; it shall be clear and bright at the ambient temperature or 21 °C, whichever is higher.

4. QUALITY ASSURANCE PROVISIONS

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 purchase 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. 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.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a

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part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Lot.

4.2.1 Bulk lot. An indefinite quantity of a homogeneous blend of one type of gasoline offered for acceptance in a single, isolated container; or manufactured in a single plant run (not exceeding 24 hours), through the same processing equipment, with no change in the ingredient materials.

4.2.2 Packaged lot. An indefinite number of 55-gallon drums or smaller unit containers of identical size and type, offered for acceptance, and filled with a homogeneous blend of one type of gasoline from a single, isolated container; or filled with a homogeneous blend of one type of gasoline manufactured in a single plant run (not exceeding 24 hours), through the same processing equipment, with no change in the ingredient materials.

4.3 Sampling.

4.3.1 Sampling for inspection of filled containers. Take a random sample of filled containers from each lot in accordance with MIL-STD-105, at inspection level II. Presence of one or more defects shall be cause for rejection.

4.3.2 Sampling for tests. Take samples for tests in accordance with ASTM D 4057 or ASTM D 4177.

4.4 Inspection. Perform inspection in accordance with FED-STD-791, method 9601.

4.4.1 Examination of filled containers. Examine samples selected in accordance with 4.3.1 for compliance with MIL-STD-290 with regard to fill, closure, sealing, leakage, packaging, packing, and marking requirements. Reject any container having one or more defects or under the required fill. If the number of defective or unfilled containers exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, reject the lot represented by the sample. Reject packaged lot if Material Safety Data Sheet is not prepared in accordance with FED-STD-313.

4.5 Classification of tests. All tests are quality conformance tests.

4.6 Test procedures. Perform tests in accordance with table II.

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TABLE II. Test methods.

Test	ASTM Method
Distillation	D 86
Temperature at V/L ratio 20 <u>1/</u>	D 2533
Reid vapor pressure	D 323
Unwashed gum <u>2/</u>	D 381
Lead	D 1368, D 3116, or D 3229
Sulfur	D 1266 or D 2622
Corrosiveness	D 130
Oxidation stability	D 525
Free water and sediment	Visual
Color	<u>3/</u>
Octane number	
Motor method	D 2700 or D 2885
Research method	D 2699 or D 2885
Workmanship	D 4176, method A or B <u>4/</u>

- 1/ As an alternative, the temperature at V/L = 20 may be calculated in accordance with any of the three techniques presented in ASTM D 4814, appendix X2. However, ASTM D 2533 shall be the referee method when calculated values are questionable.
- 2/ Unwashed gum is defined in ASTM D 381, 3.2. Follow the procedure for unwashed gum in ASTM D 381.
- 3/ Use FED-STD-791, method 103 for determination of color.
- 4/ Fuel to be used in this test shall not be cooled below about 15 °C or its temperature at the time the sample was taken, whichever is lower, as cooling of gasoline-oxygenate blends may produce changes in appearance that are not reversed on rewarming.

4.7 Statement of analysis. The contractor shall provide copies of analyses giving the results of these tests along with a statement of the type and concentration of the additives used in the gasoline.

4.8 Inspection of packaging. The packing and marking shall be examined and tested in accordance with the quality assurance provisions of MIL-STD-290.

5. PACKAGING

5.1 Packing and marking. Packing and marking shall be in accordance with MIL-STD-290. The containers used to package the gasoline shall meet the requirements of Performance Oriented Packaging (POP) as indicated in CFR 49.

5.1.1 Special marking for packaged lots. Each container shall be labeled in accordance with CFR title 49, Part 172. Each container in a packaged lot shall bear the following cautionary label:

WARNING: CONTAINS UNLEADED GASOLINE
Do not swallow
Avoid breathing vapor
Avoid contact with skin

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6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Gasolines covered by this specification are intended for OCONUS use in automotive, stationary, and marine gasoline engines; vehicle and personnel heaters; and cooking units. Gasolines are supplied in two types; the application of these is based on ambient temperature as follows:

- Type I - Type I gasoline is intended for general use at all temperatures above -18 °C.
- Type II - Type II gasoline is intended for use in areas where the mean temperature is consistently below 0 °C.

These gasolines are acceptable for both immediate use or long-term storage.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. Type of gasoline required (see 1.2 and 6.1).
- d. Whether a corrosion inhibitor is required (see 3.2.3).
- e. Quantity of gasoline required. The unit of purchase is one US gallon (3.79 liters) at 60 °F (15.6 °C).
- f. Type and size of containers required (see 4.2).

6.3 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313, appendix B.

6.4 Standardization agreements. Certain provisions of this specification are the subject of international standardization agreements (NATO STANAGS 1135, 2754, and 2845). When amendment, revision, or cancellation of this specification is proposed which would affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.

6.5 Subject term (key word) listing.

Fuel
Gasoline, all-purpose
Gasoline, automotive
Gasoline, combat
Gasoline, low-temperature
Gasoline, unleaded
MOGAS

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6.6 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - ME
Navy - SH
Air Force - 68

Preparing activity:

Army - ME

Project 9130-0149

Review activities:

Army - AT, EA
Navy - SA
Air Force - 11
DLA - PS

User activities:

Navy - MC, YD

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-G-3056F

2. DOCUMENT DATE (YYMMDD)
911114

3. DOCUMENT TITLE

Gasoline, Automotive, Combat

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed)

5. REASON FOR RECOMMENDATION

6 SUBMITTER

a. NAME (Last, First, Middle Initial)

c. ADDRESS (Include Zip Code)

b. ORGANIZATION

d. TELEPHONE (Include Area Code)
(1) Commercial
(if applicable)
(2) AUTOVON

7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. NAME

Betty Taylor

c. ADDRESS (Include Zip Code)

US Army Belvoir RDE Center
ATTN STRBE-TSE
Fort Belvoir, VA 22060-5606

b. TELEPHONE (Include Area Code)
(1) Commercial
(703) 664-1866

(2) AUTOVON
354-1866

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT

Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340