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10 FEBRUARY 1995
SUPERSEDING
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MILITARY SPECIFICATION

FUEL OIL RECLAIMED

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

1. SCOPE

1.1 Scope. This specification covers Fuel Oil, Reclaimed (Stock Number NSN 9140-01-068-6903) which is produced as a product of Navy reclamation operations (product use is described in 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Standards. The following standards 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.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commanding Officer, Navy Petroleum Office, 8725 John J. Kingman Road, Suite 3719, Fort Belvoir, VA 22060-6222, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 9140

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

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets

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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 of Petroleum and Related Products

Unless otherwise indicated, copies of Federal and Military specifications, standards and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094.

2.2 Non-Government Publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DOD adopted shall be the issue listed in the current DODISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 88 - Saybolt Viscosity
D 93 - Flash Point by Pensky-Martens Closed Tester, Test Method For (DOD adopted)
D 97 - Pour Point of Petroleum Oils, Test Method For (DOD adopted)
D 129 - Sulfur in Petroleum Products (General Bomb Method), Test Method For (DOD adopted)
D 287 - API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method), Test Method For (DOD adopted)
D 396 - Standard Specification for Fuel Oils
D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity), Test Method For (DOD adopted)
D 473 - Sediment in Crude and Fuel Oils by Extraction
D 482 - Ash from Petroleum Products, Test Method For (DOD adopted)

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D 808 - Standard Test Method for Chlorine in New and Used Petroleum Products (Bomb Method)
D 1796 - Water and Sediment in Fuel Oils by Centrifuge Method (Laboratory Procedure)
D 4057 - Standard Method of Sampling Petroleum and Petroleum Products (manual) (DOD adopted)
D 4177 - Standard Method of Sampling Petroleum and Petroleum Products (automatic) (DOD adopted)
E 29 - Recommended Practice for Indicating Which Places of Figures Are to Be Considered Significant in Specified Limiting Values (DOD adopted)

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

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Title 40 Code of Federal Regulations (CFR) part 266 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities

Title 40 Code of Federal Regulations (CFR) part 761 - Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

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

(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 information services.)

2.3 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS

3.1 General. Requirements contained herein are not subject to corrections for tolerance of test methods. If multiple determinations are made by the inspecting laboratory, average results will be used except for those test methods where repeatability data are given. In those cases, the average value derived from the individual results that agree within the repeatability limits given may be used at the discretion of the inspection authority, provided an indication is given of the total number of results obtained and the number falling outside the repeatability limits. For purposes of determining conformance with each requirement, an observed value or calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off procedures given in ASTM E 29.

3.2 Material. Fuel Oil, Reclaimed shall consist of a mixture of distillates and residual fuel and may contain used lubricants or other used oil products. The product must be in conformance with 40 CFR 266 for On-Specification Used Oil Fuel to meet the requirements of Fuel Oil, Reclaimed. A product that is subject to regulation as a hazardous waste or that is mixed with a hazardous waste does not meet the requirements of this specification.

3.2.1 Additives. The additives listed herein may be present singularly or in combination as a result of different fuel sources.

3.2.1.1 Stabilizer Additives. Fuel Oil Stabilizer Additive, conforming to DOD-A-24682 (and listed in the current QPL-24682, may have been blended into the original distillate fuel for additional protection against deterioration at a dosage up to 100 milligrams per liter (37.9 grams/100 gallons (U.S.) or 35 pounds/ 1,000 barrels).

3.2.1.2 Antioxidants. An approved antioxidant may have been nlended into the original jet fuel to prevent the formation of gums and peroxides after manufacture. The concentration of the antioxidant may range from 17.2 mg to 24 mg of active ingredient per liter of fuel (6.0 to 8.4 lb/1000 barrels). The following antioxidant formulations are approved:

a. 2,6-di-tert-butyl-4-methylphenol
b. 6-tert-butyl-2,4-dimethylphenol
c. 2,6-di-tert-butylphenol
d. 75 percent minimum-2,6-di-tert-butylphenol 25 percent maximum tert-butylphenols and tri-tert-butylphenols
e. 72 percent minimum 6-tert-butyl-2,4-dimethyphenol 28

percent maximum tert-butyl-methylphenols and tert-butyl-dimethylphenols

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3.2.1.3 Metal Deactivator. A metal deactivator, N,N-disalicyclidene-1, 2 propanediamine may have been blended into the original fuel in an amount not to exceed 5.8 milligrams of active ingredient per liter of fuel (2.2 grams/100 gallons (U.S.) or 2 lb/1,000 barrels).

3.2.1.4 Ignition Improver. Ignition Improver additives may have been added to the original fuel to raise the ignition quality of the fuel. The following additives are approved:

Amyl Nitrate (mixed primary nitrates)
Hexyl Nitrate (N-Hexyl Nitrate)
Cyclohexyl Nitrate
N-Octyl Nitrate

3.3 Chemical and Physical Requirements. The fuel shall conform to the physical and chemical requirements specified in Table I. The values provided for variability unless otherwise stated.

TABLE I. CHEMICAL AND PHYSICAL REQUIREMENTS.1/2/

Characteristics	Requirements	FED-STD-791 Test Method	ASTM Test Method
Flashpoint, °C (min.)	38		D 93
Explosiveness, % (max.)	50	1151.1	
Water & Sediment, % (max.)	2.0		D 1796
Sediment, % (max.)	0.5		D 473
Density (API Gravity @ 60°C)	(25-40)		D 287
Viscosity at 40°C, Cst	2.0 - 15.0		D 445
Viscosity at 50°C, SU	30 - 90		D 88
Pour Point, °C (max.)	-6.7		D 97
Neutrality	Neutral	5101	----
Sulfur content, % (max.)	2.0		D 129
Sulfated Ash, % (max.)	0.15		D 482
Trace metals, ppm (max.)			
Arsenic	5		3040*/3050 EPA SW-846 and proposed method for evaluating solid waste
Cadmium	2		
Chromium	10		
Lead	100		
Total Halogen3/	1000 ppm		ASTM D 808-87

* Recommended only for non-sedimentaceous oils.

1/ In the U.S., limits for sulfur, metals, halogens, PCBs or other constituents shall be as specified or as regulated by EPA, State or local regulations where the fuel is to be burned,

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whichever is more restrictive. In foreign countries the sulfur limit shall conform to the limit established in the Status of Forces Agreement.

2/ Requirements may vary in accordance with changes in Federal, State and local environmental regulations and with specific user equipment requirements.

3/ Fuel Oil, Reclaimed is intended to be managed as an On-Specification Used Oil Fuel under this specification in accordance with regulations for Used Oils provided by 40 CFR 266. Fuel Oil, Reclaimed containing more than 1,000 ppm total halogens is presumed to be a hazardous waste and is not acceptable for use under this specification. This presumption can be rebutted by demonstrating that the oil does not contain significant concentrations of hazardous waste, in which case the oil is acceptable for use under this specification and can be managed as a Used Oil Fuel under 40 CFR 266. Fuel Oil, Reclaimed containing more than 4,000 ppm total halogens that is not a hazardous waste is regulated as an Off-Specification Used Oil Fuel under 40 CFR 266.

3.4 Regulatory Requirements. Because Fuel Oil, Reclaimed is a product of a mixture of a variety of oils, the product is subject to regulation by 40 CFR 266, Subpart E. Generators, suppliers and users of Fuel Oil, Reclaimed are also subject to applicable environmental regulations in 40 CFR 266.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility. Unless otherwise specified in the contract or purchase order, the Navy is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the Navy may use its own or any other facilities suitable for the performance of the inspection requirements specified herein.

4.2 Bulk Lot. Bulk lot shall be considered an indefinite quantity of a homogeneous mixture of material offered for acceptance in a single isolated container.

4.3 Homogeneity. The homogeneity of the product will be determined by measuring density (API Gravity) using ASTM Test

4.4

4.5 Method D 287. Lots will be considered homogeneous if the determinations for the upper, middle and lower samples do not vary from the average by more than 0.5 for API Gravity.

4.4 Sampling.

4.4.1 Sampling for Tests. Samples for tests shall be taken in accordance with ASTM D 4057 or 4177. Samples shall be tested in accordance with Table I and 4.5. Upper, middle and lower samples will be taken as described in ASTM D 4057 or 4177. Samples may

be composited to a single sample if the lot is homogeneous. If the lot is not homogeneous, specification tests will be performed separately on the upper, middle and lower samples.

4.5 Inspection. Inspection shall be performed in accordance with method 9601 of FED-STD-791.

4.6 Test Reports. Test data shall be reported in the same order as listed in Table I.

5. PREPARATION FOR DELIVERY

5.1 Packaging, Packing and Marking. Packaging, packing and marking shall be in accordance with MIL-STD-290. The level of packaging, level of packing, type, and size shall be as specified (see 6.2.1).

6. NOTES

6.1 Intended Use. Fuel Oil, Reclaimed can be used as a substitute for ASTM D 396 either directly or as a blend in stationary fuel-burning furnaces for heating buildings, for the generation of steam or other purposes.

6.2 Navy Responsibilities. The Navy is responsible for assuring that the Fuel Oil, Reclaimed meets all the requirements listed in Table I.

6.3 User Responsibilities. The user is responsible for any on-site blending and all operational or equipment modifications necessary to assure that the Fuel Oil, Reclaimed is burned in a safe, efficient and environmentally sound manner as specified in MO-911, "Utilization of Navy Generated Waste Oils as Burner Fuel."

6.4 Subject Term (Keyword) Listing.

Shore Boiler Fuel
F.O.R.
Fuel
Recycle Fuel
Reclaimed Oil

6.5 Changes from Previous Issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.6 National Stock Number. The following National Stock Number has been assigned to the fuel covered by this specification:

Gallon (COG 1B Item) 9140-01-068-6903

Custodians:
Navy - SA

Preparing Activity:
Navy - SA
(Project 9140-N107)

Review Activities:
Navy - YD, MC, CG
DLA - PS

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