



Designation: D 6823 – 02

An American National Standard

Standard Specification for Commercial Boiler Fuels With Used Lubricating Oils¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers four grades of fuel oil made of at least 25 % used lubricating oils. The four grades of fuel are intended for use in various types of fuel-oil-burning industrial equipment and commercial boilers under various climatic and operating conditions. These fuels are not intended for use in residential heaters.

1.1.1 Grades RFC4, RFC5L, RFC5H and RFC6 are used lubricating oil blends of increasing viscosity, with or without middle distillate or residual fuel oil, or both, that are intended for use in industrial burners and commercial boilers equipped to handle these types of fuels. This specification is for applications where Specification D 6448 would not meet the performance or other requirements of the burner or boiler in question.

NOTE 1—For information on the significance of the terminology and test methods used in this specification, see Appendix X1.

1.2 This specification is for use in contracts for the purchase of fuel oils derived from used lubricating oil and for the guidance of consumers of such fuels. This specification does not address the frequency with which any particular test must be run.

1.3 Nothing in this specification shall preclude observance of national or local regulations which can be more restrictive. In some jurisdictions, used oil is considered a hazardous waste and fuels derived from used oil are required to meet certain criteria before use as a fuel.

NOTE 2—For U.S. federal requirements imposed on used oil generators, transporters and transfer facilities, reprocessors, marketers, and burners, see U.S. Federal Code 40 CFR 279.

NOTE 3—The generation and dissipation of static electricity can create problems in the handling of distillate burner fuel oils. For more information on the subject, see Guide D 4865.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

¹ This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.P0 on Recycled Petroleum Products.

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2. Referenced Documents

2.1 ASTM Standards:

- D 56 Test Method for Flash Point by Tag Closed Tester²
- D 93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester²
- D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation²
- D 97 Test Method for Pour Point of Petroleum Products²
- D 129 Test Method for Sulfur in Petroleum Products (General Bomb Method)²
- D 240 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter²
- D 396 Specification for Fuel Oils²
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)²
- D 473 Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method²
- D 482 Test Method for Ash from Petroleum Products²
- D 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration²
- D 974 Test Method for Acid and Base Number by Color-Indicator Titration²
- D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)²
- D 1298 Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²
- D 1552 Test Method for Sulfur in Petroleum Products (High-Temperature Method)²
- D 1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)²
- D 2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry²
- D 2983 Test Method for Low-Temperature Viscosity of Lubricants Measured by Brookfield Viscometer²
- D 3228 Test Method for Total Nitrogen in Lubricating Oils and Fuel Oils by Modified Kjeldahl Method²

² Annual Book of ASTM Standards, Vol 05.01.

- D 3245** Test Method for Pumpability of Industrial Fuel Oils³
- D 3828** Test Methods for Flash Point by Small Scale Closed Tester³
- D 4052** Test Method for Density and Relative Density of Liquids by Digital Density Meter³
- D 4057** Practice for Manual Sampling of Petroleum and Petroleum Products³
- D 4175** Terminology Relating to Petroleum, Petroleum Products, and Lubricants³
- D 4177** Practice for Automatic Sampling of Petroleum and Petroleum Products³
- D 4294** Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-ray Fluorescence Spectrometry³
- D 4629** Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection³
- D 4865** Guide for the Generation and Dissipation of Static Electricity in Petroleum Fuel Systems³
- D 4868** Test Method for Estimation of Net and Gross Heat of Combustion of Burner and Diesel Fuels³
- D 5185** Test Method for Determination of Additive Elements, Wear Metals, and Contaminants in Used Lubricating Oils and Determination of Selected Elements in Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)³
- D 5291** Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants³
- D 5384** Test Methods for Chlorine in Used Petroleum Products (Field Test Kit Method)⁴
- D 5854** Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products⁴
- D 6160** Test Method for Determination of Polychlorinated Biphenyls (PCBs) in Waste Materials by Gas Chromatography⁴
- D 6448** Specification for Industrial Burner Fuels from Used Lubricating Oils⁵
- D 6450** Test Method for Flash Point by Continuously Closed Cup (CCCFP) Tester⁵
- 2.2 ISO Standard:**⁶
- ISO 8217** Petroleum Products—Fuel (Class F)—Specifications for Marine Fuels
- 2.3 Government Standards:**
- U.S. Federal Code CFR 761.3**⁷
- U.S. Federal Code 40 CFR 279** Standards for the Management of Used Oil⁷

USEPA SW-846⁸

3. Terminology

3.1 Definitions:

3.1.1 burner fuel oil, n—any petroleum liquid suitable for the generation of heat by combustion in a furnace or firebox as a vapor or a spray, or a combination of both.

3.1.1.1 Discussion—Different grades are characterized primarily by viscosity ranges.

3.1.2 reclaiming, n—the use of cleaning methods during recycling primarily to remove insoluble contaminants, thus making the oil suitable for further use. The methods may include settling, heating, dehydration, filtration, and centrifuging.

3.1.3 recycling, n—in petroleum technology, the acquisition of oil that has become unsuitable for its intended use, and processing it in order to regain useful materials.

3.1.4 re-refining, n—the use of refining processes during recycling to produce high quality base stocks for lubricants or other petroleum products. Re-refining may include distillation, hydrotreating, or treatments employing acid, caustic, solvent, clay, or both, or other chemicals, or a combination thereof.

3.1.5 used oil, n—in petroleum product recycling, oil whose characteristics have changed since being originally manufactured, and which is suitable for recycling.

3.1.6 waste oil, n—in petroleum technology, oil having characteristics making it unsuitable either for further use or for economic recycling.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 commercial boiler, n—indirect heating units which transfer thermal energy to water or other fluids or gases for use in heating and having a heat input between 0.3 to 10×10^6 BTU/h.

3.2.2 industrial burner, n—a device which produces heat for industrial use through the combustion of liquid hydrocarbon fuels.

3.2.2.1 Discussion—Industrial burners are typically designed for one of two applications: (1) *industrial furnaces*—integral components of manufacturing processes that provide direct heating; for example, in aggregate, cement, lime, or phosphate kilns; coke ovens; or blast, smelting, melting, refining, or drying ovens and (2) *industrial boilers*—large indirect heating units which transfer thermal energy to water or other fluids or gases for use in heating in industrial settings and in manufacturing processes. These boilers can be classified as utility/large industrial boilers with a heat input greater than 100×10^6 BTU/h or small industrial boilers with a heat input of between 10 to 100×10^6 BTU/h.

3.2.3 reprocessing, n—in petroleum product recycling, the preparation of used oil to be suitable as a fuel.

3.2.3.1 Discussion—Reprocessing includes procedures such as settling, filtration, blending, distillation, or chemical treatment.

3.3 For definitions of other terms used in this specification, refer to Terminology **D 4175**.

³ Annual Book of ASTM Standards, Vol 05.02.

⁴ Annual Book of ASTM Standards, Vol 05.03.

⁵ Annual Book of ASTM Standards, Vol 05.04.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁷ National Archives and Records Administration, Code of Federal Regulations. Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401 (www.access.gpo.gov).

⁸ Available from United States Environmental Protection Agency (EPA), Ariel Rios Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460 (www.epa.gov).