Diesel and Biodiesel Fuels:

Test Packages for Diesel and Biodiesel Fuels

Diesel Fuel Oils, ASTM D 975 Specification
Qualification Test Package, Grades No. 1-D S500 and 2-D S500

Test Code	Description
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 2709	Water and Sediment in Distillate Fuels, BS&W
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 482	Ash Content of Petroleum Products
ASTM D 2622	Sulfur, X-Ray Spectrometry. LOD = 0.001 wt%
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 613	Cetane Number, Ignition Quality of Diesel Fuels
ASTM D 287.a	API Gravity, Hydrometer Method
ASTM D 976	Cetane Index, Calculated from Distillation and API Gravity
ASTM D 2500	Cloud Point of Petroleum Products
ASTM D 4539	Filterability of Diesel Fuels by Low Temperature Flow Test (LTFT) Method
ASTM D 524.b	Carbon Residue, Ramsbottom on 10% Residue
ASTM D 6079	Lubricity of Diesel Fuels by the High Frequency Reciprocating Rig (HFRR)
ASTM D 4308	Electrical Conductivity of Liquid Hydrocarbons

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	Additional Tests
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy. LOD = 0.01 wt%
ASTM D 6469	Microbial Contamination in Fuels and Fuel Systems
ASTM D 6468	Oxidation Stability, Distillate Fuels
ASTM D 2274	Oxidation Stability, Light Fuel Oils, 16 hr
ASTM D 1319	Hydrocarbon Types in Liquid Petroleum by Fluorescent Indicator Absorption (FIA)
ASTM D 2624	Electrical Conductivity, Aviation Fuels
ASTM D 6217	Particulate Contamination in Middle Distillate Fuels by Filtration
ASTM D 97	Pour Point of Petroleum Oils
ASTM D 2887.c	Simulated Distillation, SimDis, Lower Temperature Range, 55 to 538°C, C_5 to C_{44}
ASTM D 3117	Wax Appearance Point of Distillate Fuels
ASTM D 6371	Cold Filter Plugging Point of Diesel and Heating Fuels, CFPP
ASTM D 6078.a	Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE), Procedure A: Incremental Load
ASTM D 6078.b	Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE). Procedure B: Single-Load Test

Biodiesel Fuel (B 100) Blend Stock, ASTM D 6751 Specification
Grade S15 and Grade S500, Qualification Test Package

Test Code	Description
EN 14538.a	Calcium, Magnesium Content
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 2709	Water and Sediment in Distillate Fuels, BS&W
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 874	Ash, Sulfated Residue, Lube Oils and Additives
ASTM D 5453	Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by UV Fluorescence

ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 613	Cetane Number, Ignition Quality of Diesel Fuels
ASTM D 2500	Cloud Point of Petroleum Products
ASTM D 4530	Carbon Residue (Micro Method)
ASTM D 664	Acid Number of Petroleum Products, Potentiometric Titration
ASTM D 6584	Glycerin, Free and Total, in Biodiesel Fuel B 100 (Methyl Esters) by Gas Chromatography
ASTM D 4951.b	Phosphorus Content in Biodiesel Fuels by ICP-AES
ASTM D 1160	Distillation of Petroleum Products at Reduced Pressures, 5 and 10 mm
ASTM D 6469	Microbial Contamination in Fuels and Fuel Systems
EN 14538.b	Potassium and Sodium Content
EN 14112	Oxidation Stability

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	Additional Tests
ASTM D 3242	Acidity in Aviation Turbine Fuel, Acid Number
ASTM D 287.a	API Gravity, Hydrometer Method
ASTM D 189.b	Carbon Residue, Conradson on 10% Residue
ASTM D 524.b	Carbon Residue, Ramsbottom on 10% Residue
ASTM D 4737	Cetane Index, Calculated by Four Variable Equation (may be substituted for Cetane Number when ASTM D 613 is not available).
ASTM D 976	Cetane Index, Calculated from Distillation and API Gravity
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 6079	Lubricity of Diesel Fuels by the High Frequency Reciprocating Rig (HFRR)
ASTM D 6078.a	Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE), Procedure A: Incremental Load
ASTM D 6078.b	Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE). Procedure B: Single-Load Test
EN 14110	Methanol Content
ASTM D 2274	Oxidation Stability, Light Fuel Oils, 16 hr
ASTM D 6217	Particulate Contamination in Middle Distillate Fuels by Filtration
ASTM D 1266	Sulfur, Lamp Method. LOD = 0.01 wt%
ASTM D 2622	Sulfur, X-Ray Spectrometry. LOD = 0.001 wt%
ASTM D 3120	Sulfur, by Microcoulometry, Light Hydrocarbons
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy. LOD = 0.01 wt%
ASTM D 1796	Water and Sediment in Fuel Oils, BS&W
ASTM D 3117	Wax Appearance Point of Distillate Fuels

Fuel Oil, ASTM D 396 Specification
Grades No 1S 500, No 1S 5000, No 2S 5000, and No 4 (Light)

Test Code	**Description**
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 2709	Water and Sediment in Distillate Fuels, BS&W
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 524.b	Carbon Residue, Ramsbottom on 10% Residue
ASTM D 482	Ash Content of Petroleum Products
ASTM D 2622	Sulfur, X-Ray Spectrometry. LOD = 0.001 wt%
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 1298	API Gravity of Petroleum Products, Hydrometer Method (Density, Relative Density, Specific Gravity)
ASTM D 97	Pour Point of Petroleum Oils

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	Additional Tests
ASTM D 5291.a	Carbon, Hydrogen, and Nitrogen in Petroleum Products, Instrumental
ASTM D 2500	Cloud Point of Petroleum Products
ASTM D 6469	Microbial Contamination in Fuels and Fuel Systems
ASTM D 3245	Pumpability of Industrial Fuel Oils
ASTM D 95	Water by Distillation, Petroleum Products
ASTM D 5673.b	Trace Metals by ICP-MS Includes: Vanadium, Sodium, Potassium, Lithium, Lead, and Calcium. LOD = 0.05 ppm
ASTM D 473	Sediment by Extraction
ASTM D 2887.c	Simulated Distillation, SimDis, Lower Temperature Range, 55 to 538°C, C5 to C44
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy. LOD = 0.01 wt%

Kerosine, ASTM D 3699 Specification
Qualification Test Package for Grades 1K (Low Sulfur) and 2K

Test Code	Description
ASTM D 56	Flash Point, Tag Closed Tester
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 1266	Sulfur, Lamp Method LOD = 0.01 wt%, Referee Method
ASTM D 3277	Mercaptan Sulfur in Gasoline, Kerosene and Distillate Fuels
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 2386	Freezing Point of Aviation Fuels
ASTM D 187	Burning Quality of Kerosene, 16 hr and 48 hr
ASTM D 156	Color, Saybolt Chromometer Method

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Fuel Oil Quality Control, ASTM D 396 Specification
Basic 6, Basic 8, and Basic 10 Test Packages

Test Code	Description
ASTM D 287.a	API Gravity of Petroleum Products, Hydrometer Method (Density, Relative Density, Specific Gravity).
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 97	Pour Point of Petroleum Oils
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy. LOD = 0.01 wt%
ASTM D 1796	Water and Sediment in Fuel Oils, BS&W

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	Additional Tests
ASTM D 473	Sediment by Extraction
ASTM D 482	Ash Content of Petroleum Products
ASTM D 5673.b	Trace Metals by ICP-MS Includes: Vanadium, Sodium, Potassium, Lithium, Lead, and Calcium. LOD = 0.05 ppm
ASTM D 95	Water by Distillation, Petroleum Products

Aviation Fuels:

Test Packages for Aviation Fuels

Aviation Turbine Fuel, Jet B, Wide Boiling Range

ASTM D 6615 Specification, Qualification Test Package

Test Code	Description
ASTM D 1319	Hydrocarbon Types in Liquid Petroleum by Fluorescent Indicator Absorption (FIA)
ASTM D 6379	Aromatic Hydrocarbon Types in Aviation Fuels and Petroleum Distillates
ASTM D 3277	Mercaptan Sulfur in Gasoline, Kerosene and Distillate Fuels
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy LOD = 0.01 wt%
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 4052	Density and Relative Density of Liquids by Digital Density Meter
ASTM D 5191	Vapor Pressure of Petroleum Products, Automatic Method
ASTM D 2386	Freezing Point of Aviation Fuels
ASTM D 4809	Heat of Combustion of Liquid Hydrocarbon Fuel by Bomb Calorimeter
ASTM D 1322	Smoke Point of Kerosene and Aviation Turbine Fuels
ASTM D 1840	Naphthalene Content in Aviation Turbine Fuels
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 3241	Thermal Oxidation Stability of Aviation Turbine Fuels, JFTOT Procedure
ASTM D 381.b	Gum Content, Existent, in Fuels by Steam Jet Evaporation
ASTM D 2624	Electrical Conductivity, Aviation Fuels
ASTM D 3948	Separometer Index, Water Separation Characteristics, Micro (WISM or MSEA)

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	Additional Tests
ASTM D 4952	Doctor Test, Sulfur Species in Fuels and Solvents
ASTM D 5901	Freezing Point of Aviation Fuels, Automatic Optical Method
ASTM D 5972	Freezing Point of Aviation Fuels, Automatic Phase Transition Method
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 6469	Microbial Contamination in Fuels and Fuel Systems

Aviation Turbine Fuel, Grades JP-4 (NATO F-40) and JP-5 (NATO F-44) MIL-DTL-5624U Specification, Qualification Test Package

Test Code	Description
ASTM D 156	Color, Saybolt Chromometer Method
ASTM D 3242	Acidity in Aviation Turbine Fuel, Acid Number
ASTM D 1319	Hydrocarbon Types in Liquid Petroleum by Fluorescent Indicator Absorption (FIA)
ASTM D 3277	Mercaptan Sulfur in Gasoline, Kerosene and Distillate Fuels
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy LOD = 0.01 wt%
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 1298	Specific Gravity at 60°F and 100°F
ASTM D 976	Cetane Index, Calculated from API Gravity and Distillation
ASTM D 323	Vapor Pressure of Petroleum Products, Reid Method
ASTM D 2386	Freezing Point of Aviation Fuels
ASTM D 445.c	Viscosity, Kinematic, at -20°C
ASTM D 4809	Heat of Combustion of Liquid Hydrocarbon Fuel by Bomb Calorimeter
ASTM D 3701	Hydrogen Content of Aviation Turbine Fuels by NMRS
ASTM D 1322	Smoke Point of Kerosene and Aviation Turbine Fuels
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours at 100°C
ASTM D 3241	Thermal Oxidation Stability of Aviation Turbine Fuels, JFTOT Procedure
ASTM D 381.b	Gum Content, Existent, in Fuels by Steam Jet Evaporation
ASTM D 5452	Particulate Contamination in Aviation Fuels by Laboratory Filtration
ASTM D 1094	Water Reaction of Aviation Fuels
ASTM D 4948	Separometer Index, Water Separation Characteristics, Micro (WISM or MSEA)
ASTM D 5006	Anti-Icing Inhibitors (Ether) in Aviation Fuel
ASTM D 2624	Electrical Conductivity, Aviation Fuels

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	Additional Tests
ASTM D 6045	Color of Petroleum Products by Tristimulus Method
ASTM D 4952	Doctor Test, Sulfur Species in Fuels and Solvents
ASTM D 2622	Sulfur, X-Ray Spectrometry, LOD = 0.001 wt%
ASTM D 5972	Freezing Point of Aviation Fuels, Automatic Phase Transition Method

Fuel System Icing Inhibitors Type III - DiEGME
Diethylene Glycol Monomethyl Ether - ASTM D 4171.b

Test Code	Description
ASTM D 1613	Acidity in Volatile Solvents and Chemical Inhibitors
ASTM D1209	Color, APHA, Platinum Cobalt Scale
ASTM E 70	pH of Aqueous Solutions, with Glass Electrode
ASTM D 4052	Density and Relative Density of Liquids by Digital Density Meter
ASTM D 1364	Water Content by Karl Fischer Method, Volatile Solvents
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 6810	Antioxidant Concentration in HL Turbine Oils

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	Additional Tests
ASTM D 5006	Anti-Icing Inhibitors (Ether) in Aviation Fuels
ASTM E 1064	Water Content by Karl Fischer Method, Organic Liquids
ASTM E 203	Water Content by Volumetric Karl Fischer Method

Marine Fuels:

Test Packages for Marine Fuels

Marine Distillate Fuels, Class F, ISO 8217 Specification
Qualification Test Package for Grades DMX and DMA

Test Code	Description
ASTM D 4176.b	Visual Inspection, Procedure B
ASTM D 1298	API Gravity of Petroleum Products, Hydrometer Method (Density, Relative Density, Specific Gravity)
ASTM D 445.a	Viscosity, Kinematic, at 40°C, cSt
ASTM D 93	Flash Point, Pensky-Martens Closed Cup
ASTM D 97	Pour Point of Petroleum Oils
ASTM D 2500	Cloud Point of Petroleum Products
ASTM D 524.b	Carbon Residue, Ramsbottom on 10% Residue
ASTM D 482	Ash Content of Petroleum Products
ASTM D 95	Water by Distillation, Petroleum Products
ASTM D 473	Sediment by Extraction
ASTM D 613	Cetane Number, Ignition Quality of Diesel Fuels
ASTM D 4294	Sulfur by X-Ray Fluorescence Spectroscopy. LOD = 0.01 wt%

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	Additional Tests
ASTM D 976	Cetane Index, Calculated from Distillation and API Gravity
ASTM D 130	Corrosion from Petroleum Products, Copper Strip Tarnish Test, 2 hours @ 100°C
ASTM D 4052	Density and Relative Density of Liquids by Digital Density Meter
ASTM D 86.b	Distillation of Petroleum Products at Atmospheric Pressure
ASTM D 6079	Lubricity of Diesel Fuels by the High Frequency Reciprocating Rig (HFRR)
ASTM D 6078.b	Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE). Procedure B: Single-Load Test
ASTM D 2709	Water and Sediment in Distillate Fuels, BS&W

ASTM D 381.b	Gum Content, Existent, in Fuels by Steam Jet Evaporation
ASTM D 3605.g	Trace Metals by Flame Atomic Absorption Spectroscopy. Includes: Sodium, Potassium, Vanadium, Lead, Calcium, Barium, Magnesium, and Phosphorous, LOD = 0.05 ppm

Alternative Fuels, Biofuels, Tire Chips:

Test Packages for Alternative Fuels

Scrap Tire-Derived Fuel (TDF), ASTM D 6270

Test Code	Description
ASTM D 2361	Chloride
ASTM D 3172.a	Proximate Analysis - Referee Method
ASTM D 3176	Ultimate Analysis (C, H, N, S, O)
ASTM D 3173	Moisture in the Analysis Sample
ASTM D 3174.a	Ash in the Analysis Sample, wt%
ASTM D 3175	Volatile Matter
ASTM D 3177	Sulfur, Total, in the Analysis Sample
ASTM D 3178	Carbon and Hydrogen in the Analysis Sample
ASTM D 3179	Nitrogen in the Analysis Sample
ASTM D 3682	Elemental Analysis in Ash by AA
ASTM D 4239	Sulfur Analysis Using High Temp Tube Furnace Combustion
ASTM D 5865	Calorific Value, Gross
ASTM D 4749	Sieve Analysis, per Sieve