



Standard Guide for Performance Evaluation of Hydraulic Fluids for Piston Pumps¹

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1. Scope

1.1 This guide establishes test protocols and methodologies for determining the suitability of fluids for use in fluid power systems that incorporate axial or radial piston pumps. The suitability of all fluid types to meet specific levels of performance in piston pumps is addressed. These fluids include, but are not limited to formulations based on mineral, synthetic or vegetable oil base stocks. The finished fluids may be in the form of straight oils, soluble oils or invert emulsions.

1.2 The test protocols and methodologies described in this guide have been selected for their ability to distinguish between highly acceptable, acceptable and unacceptable fluid performance in piston pumps. They take into account the broad range of operating conditions piston pumps are subjected to, as well as the common variations in design and materials of construction among pump manufacturers.

1.3 This guide is intended to complement proprietary test protocols and methodologies employed by some piston pump manufacturers. The test protocols and methodologies within this guide may help pump manufacturers, fluid formulators and end users accurately screen potential fluids for specific performance characteristics. The results of this screening may be sufficient in certain instances for pump manufacturers to forego requirements for additional fluid performance tests.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup²
- D 93 Test Methods for Flash-Point by Pensky-Martens Closed Cup Tester²

¹ This guide is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.N0.07 on Lubricating Properties.

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² Annual Book of ASTM Standards, Vol 05.01.

- 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 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test²
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids²
- D 482 Test Method for Ash from Petroleum Products²
- D 611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents²
- D 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration²
- D 665 Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water²
- D 874 Test Method for Sulfated Ash from Lubricating Oils and Additives²
- D 877 Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes³
- D 892 Test Method for Foaming Characteristics of Lubricating Oils²
- D 943 Test Method for Oxidation Characteristics of Inhibited Mineral Oils²
- D 974 Test Method for Acid and Base Number by Color-Indicator Titration²
- D 1121 Test Method for Reserve Alkalinity of Engine Coolants and Antirusts⁴
- D 1123 Test Methods for Water in Engine Coolant Concentrate by the Karl Fischer Reagent Method⁴
- D 1169 Test Method for Specific Resistance (Resistivity) of Electrical Insulating Liquids³
- D 1298 Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²
- D 1401 Test Method for Water Separability of Petroleum Oils and Synthetic Fluids²
- D 1500 Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)²
- D 1533 Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration³

³ Annual Book of ASTM Standards, Vol 10.03.

⁴ Annual Book of ASTM Standards, Vol 15.05.

