



Standard Guide for Self-Assessment of Quality System Practices in Petroleum Products and Lubricant Testing Laboratories¹

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1. Scope

1.1 This guide covers and provides direction for the self-assessment of the quality system practices in a laboratory testing petroleum products and lubricants in the oil industry. This guide is intended to satisfy requirements of international laboratory quality standards to conduct periodic self-assessments. It is not intended for comparing laboratory performance among a laboratory group or for use in external certification programs.

1.2 Other forms of assessment formats may also be acceptable as long as they cover the essential elements of this guide regarding laboratory capability.

1.3 *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 limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D94 Test Methods for Saponification Number of Petroleum Products
- D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D892 Test Method for Foaming Characteristics of Lubricating Oils
- D1265 Practice for Sampling Liquefied Petroleum (LP) Gases, Manual Method
- D3244 Practice for Utilization of Test Data to Determine Conformance with Specifications
- D3700 Practice for Obtaining LPG Samples Using a Floating Piston Cylinder

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- D3764 Practice for Validation of the Performance of Process Stream Analyzer Systems
- D4051 Practice for Preparation of Low-Pressure Gas Blends
- D4057 Practice for Manual Sampling of Petroleum and Petroleum Products
- D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products
- D4178 Practice for Calibrating Moisture Analyzers
- D4296 Practice for Sampling Pitch
- D4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination
- D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards
- D4378 Practice for In-Service Monitoring of Mineral Turbine Oils for Steam, Gas, and Combined Cycle Turbines
- D4418 Practice for Receipt, Storage, and Handling of Fuels for Gas Turbines
- D5185 Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)
- D5842 Practice for Sampling and Handling of Fuels for Volatility Measurement
- D5854 Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products
- D6046 Classification of Hydraulic Fluids for Environmental Impact
- D6122 Practice for Validation of the Performance of Multi-variate Online, At-Line, and Laboratory Infrared Spectrophotometer Based Analyzer Systems
- D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance
- D6304 Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration
- D6595 Test Method for Determination of Wear Metals and Contaminants in Used Lubricating Oils or Used Hydraulic Fluids by Rotating Disc Electrode Atomic Emission Spectrometry
- D6596 Practice for Ampulization and Storage of Gasoline and Related Hydrocarbon Materials

- D6792** Practice for Quality System in Petroleum Products and Lubricants Testing Laboratories
- D6849** Practice for Storage and Use of Liquefied Petroleum Gases (LPG) in Sample Cylinders for LPG Test Methods
- D6969** Practice for Preparation of Calcined Petroleum Coke Samples for Analysis
- D6970** Practice for Collection of Calcined Petroleum Coke Samples for Analysis
- D7235** Guide for Establishing a Linear Correlation Relationship Between Analyzer and Primary Test Method Results Using Relevant ASTM Standard Practices
- D7260** Practice for Optimization, Calibration, and Validation of Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) for Elemental Analysis of Petroleum Products and Lubricants
- D7343** Practice for Optimization, Sample Handling, Calibration, and Validation of X-ray Fluorescence Spectrometry Methods for Elemental Analysis of Petroleum Products and Lubricants
- D7372** Guide for Analysis and Interpretation of Proficiency Test Program Results
- D7482** Practice for Sampling, Storage, and Handling of Hydrocarbons for Mercury Analysis
- E29** Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E77** Test Method for Inspection and Verification of Thermometers
- E548** Guide for General Criteria Used for Evaluating Laboratory Competence (Withdrawn 2002)³
- E882** Guide for Accountability and Quality Control in the Chemical Analysis Laboratory
- E898** Test Method of Testing Top-Loading, Direct-Reading Laboratory Scales and Balances
- E994** Guide for Calibration and Testing Laboratory Accreditation Systems General Requirements for Operation and Recognition (Withdrawn 2003)³
- E1323** Guide for Evaluating Laboratory Measurement Practices and the Statistical Analysis of the Resulting Data
- IEEE/ASTM SI 10** American National Standard for Metric Practice

2.2 ISO Standards:⁴

- ISO 4259** Petroleum Products – Determination and Application of Precision Data in Relation to Methods of Test
- ISO 9000** Quality Management Standards
- ISO 17025** General Requirements for the Competence of Testing and Calibration Laboratories

3. Terminology

3.1 Definitions:

3.1.1 *bias*, *n*—a systematic error that contributes to the difference between a population mean of the measurements or test results and an accepted reference or true value. **D6299**

3.1.2 *calibration*, *n*—the determination of the values of the significant parameters by comparison with values indicated by a set of reference standards. **D6595**

3.1.3 *calibration standard*, *n*—a material with a certified value for a relevant property, issued by or traceable to a national organization such as NIST, and whose properties are known with sufficient accuracy to permit its use to evaluate the same property of another sample. **D6792**

3.1.4 *certificate of analysis (COA)*, *n*—a document provided by a supplier to a customer giving results from analyses of required parameters to show how the material is in conformance with the product specifications or not.

3.1.5 *certified reference material*, *n*—a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by a traceable certificate or other documentation which is issued by a certifying body. **D6792**

3.1.6 *control limits*, *n*—limits on a control chart that are used as criteria for signaling the need for action or for judging whether a set of data does or does not indicate a state of statistical control. **D6299**

3.1.7 *good laboratory practices*, *n*—guidelines for the management of laboratory experiments which are published by regulatory agencies or other recognized groups and are concerned with the organizational process and the conditions under which laboratory studies are planned, performed, monitored, recorded, and reported. **D6046**

3.1.8 *ICP-AES*, *n*—a high temperature discharge generated by passing an ionizable gas through a magnetic field induced by a radio frequency coil surrounding the tubes that carry gas. The light emitted by this process is measured at fixed wavelengths specific to elements of interest and converted to their concentrations in a sample.

3.1.9 *proficiency testing*, *n*—determination of a laboratory's testing capability by evaluating its test results in interlaboratory exchange testing or crosscheck programs. One example is the ASTM D02 Committee's proficiency testing programs in a wide variety of petroleum products and lubricants, many of which may involve more than a 100 laboratories. **D6792**

3.1.10 *quality control*, *n*—a planned system of activities whose purpose is to provide a level of quality that meets the needs of users; also the uses of such a system. **D6792**

3.1.11 *reference material*, *n*—a material with accepted reference value(s), accompanied by an uncertainty at a stated level of confidence for desired properties, which may be used for calibration or quality control purposes in the laboratory. Sometimes these may be prepared “in-house” provided the reference values are established using accepted standard procedures. **D6792**

3.1.12 *sigma*, *n*—a measure of variance; also called standard deviation.

3.1.13 *test performance index (TPI)*, *n*—an approximate measure of a laboratory's testing capability, defined as the ratio of test method reproducibility to site precision. **D6792**

3.1.14 *traceable*, *n*—property of the result of a measurement or the value of a standard whereby it can be related to stated

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.