



Standard Guide for Evaluation of Hydrocarbon-Based Quench Oil¹

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1. Scope

1.1 This guide covers information without specific limits, for selecting standard test methods for testing hydrocarbon-based quench oils for quality and aging.

1.2 *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 its use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 91 Test Method for Precipitation Number of Lubricating Oils²
- D 92 Test Method for Flash Point and Fire Points by Cleveland Open Cup²
- D 94 Test Methods for Saponification Number of Petroleum Products²
- D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation²
- D 189 Test Method for Conradson Carbon Residue of Petroleum Products²
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)²
- D 482 Test Method for Ash from Petroleum Products²
- D 524 Test Method for Ramsbottom Carbon Residue of 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 1298 Practice for Density, Relative Density (Specific Gravity) or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²
- D 4052 Test Method for Density and Relative Density of

Liquids by Digital Density Meter³

D 4530 Test Method for Determination of Carbon Residue (Micro Method)³

D 6200 Test Method for Determination of Cooling Characteristics of Quench Oils by Cooling Curve Analysis⁴

D 6304 Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fisher Titration⁴

2.2 ISO Standards:⁵

ISO 9950 Industrial Quenching Oils—Determination of Cooling Characteristics—Nickel-Alloy Probe Test Method, 1995-95-01

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 Quench Processing:

3.1.1.1 *austenitization, n*—heating a steel containing less than the eutectoid concentration of carbon (about 0.8 mass %) to a temperature just above the eutectoid temperature to decompose the pearlite microstructure to produce a face-centered cubic (fcc) austenite-ferrite mixture.

3.1.1.2 *dragout*—solution carried out of a bath on the metal being quenched and associated handling equipment.

3.1.1.3 *martempering, n*—cooling steel from the austenitization temperature to a temperature just above the start of martenite transformation (M_s) for a time sufficient for the temperature to equalize between the surface and the center of the steel, at which point the steel is removed from the quench bath and air cooled as shown in Fig. 1. **(1)**⁶

3.1.1.4 *protective atmosphere, n*—any atmosphere that will inhibit oxidation of the metal surface during austenitization, or it may be used to protect the quenching oil, which may be an inert gas such as nitrogen or argon or a gas used for a heat treating furnace.

3.1.1.5 *quench media, n*—any medium, either liquid (water, oil, molten salt, or lead, aqueous solutions of water-soluble polymers or salt-brines) or gas or combinations of liquid and

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.

⁴ *Annual Book of ASTM Standards*, Vol 05.03.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁶ The boldface numbers in parentheses refer to the list of references at the end of this standard.