



Designation: D5900 – 20

Standard Specification for Physical and Chemical Properties of Industry Reference Materials (IRM)¹

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1. Scope

1.1 This specification covers the chemical and physical quality specifications or requirements, or both, for Industry Reference Materials (IRMs) as cited in Practice D4678 and other standards.

1.2 IRMs, as evaluated and referenced in Practice D4678, are vitally important to conduct product, specification, and development testing in the rubber and carbon black industries.

1.3 Before a new lot of material can be accepted as an IRM, it must comply with the specifications prescribed in this specification. However, these specifications are only part of the requirements. Other requirements as given in Practice D4678 shall be met before a candidate material can be formally accepted as an IRM.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D88 Test Method for Saybolt Viscosity

¹ This specification is under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.20 on Compounding Materials and Procedures.

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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.

- D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D97 Test Method for Pour Point of Petroleum Products
- D280 Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments
- D287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)
- D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents
- D1278 Test Methods for Rubber from Natural Sources—Chemical Analysis
- D1416 Test Methods for Rubber from Synthetic Sources—Chemical Analysis (Withdrawn 1996)³
- D1500 Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)
- D1519 Test Methods for Rubber Chemicals—Determination of Melting Range
- D1646 Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)
- D1747 Test Method for Refractive Index of Viscous Materials
- D1951 Test Method for Ash in Drying Oils and Fatty Acids (Withdrawn 2003)³
- D1959 Test Method for Iodine Value of Drying Oils and Fatty Acids (Withdrawn 2006)³
- D1960 Test Method for Loss on Heating of Drying Oils (Withdrawn 2003)³
- D1965 Test Method for Unsaponifiable Matter in Drying Oils, Fatty Acids, and Polymerized Fatty Acids (Withdrawn 2007)³
- D1980 Test Method for Acid Value of Fatty Acids and Polymerized Fatty Acids (Withdrawn 2007)³
- D1982 Test Method for Titer of Fatty Acids
- D1993 Test Method for Precipitated Silica-Surface Area by Multipoint BET Nitrogen Adsorption

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

- D2007 Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method
- D2140 Practice for Calculating Carbon-Type Composition of Insulating Oils of Petroleum Origin
- D2161 Practice for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity
- D2501 Test Method for Calculation of Viscosity-Gravity Constant (VGC) of Petroleum Oils
- D3037 Test Method for Carbon Black—Surface Area by Nitrogen Adsorption (Withdrawn 1999)³
- D3157 Test Method for Rubber from Natural Sources—Color
- D3194 Test Method for Rubber From Natural Sources—Plasticity Retention Index (PRI)
- D3280 Test Methods for Analysis of White Zinc Pigments
- D4004 Test Methods for Rubber—Determination of Metal Content by Flame Atomic Absorption (AAS) Analysis
- D4075 Test Methods for Rubber Compounding Materials—Flame Atomic Absorption Analysis—Determination of Metals
- D4315 Test Methods for Rubber Compounding Material—Zinc Oxide
- D4569 Test Method for Rubber Compounding Materials—Determination of Acidity in Sulfur
- D4570 Test Method for Rubber Chemicals—Determination of Particle Size of Sulfur by Sieving (Dry)
- D4571 Test Methods for Rubber Compounding Materials—Determination of Volatile Material
- D4572 Test Method for Rubber Chemicals—Wet Sieve Analysis of Sulfur
- D4574 Test Methods for Rubber Compounding Materials—Determination of Ash Content
- D4578 Test Methods for Rubber Chemicals—Determination of Percent Sulfur by Extraction
- D4678 Practice for Rubber—Preparation, Testing, Acceptance, Documentation, and Use of Reference Materials
- D4934 Test Method for Rubber Compounding Materials: 2-Benzothiazyl Sulfenamide Accelerators—Insolubles
- D4936 Test Method for Mercaptobenzothiazole Sulfenamide Assay by Reduction/Titration
- D5289 Test Method for Rubber Property—Vulcanization Using Rotorless Cure Meters
- D5668 Test Methods for Rubber From Synthetic Sources—Volatile Matter
- D6738 Test Method for Precipitated Silica—Volatile Content
- D6739 Test Method for Silica—pH Value
- D6845 Test Method for Silica, Precipitated, Hydrated—CTAB (Cetyltrimethylammonium Bromide) Surface Area
- 2.2 ISO Standards:⁴
- ISO 787 General methods of test for pigments and extenders
- ISO 3262 Extenders for paints -- Specifications and methods of test

TABLE 1 Reference Material Number Assignment by Material Classification^A

Material Classification	RM Number
Accelerators	1–10
Antioxidants	11–20
Fatty or stearic acids	21–30
Sulfur	31–40
Process oils	41–50
Plasticizers, physical	51–60
Waxes	61–70
Processing aids	71–80
ASTM and other reference liquids	81–90
Zinc-oxides	91–99
Silicas	100–110
Unassigned	111–120
Non-black fillers	121–140
NR	201–210
SBR	211–220
NBR	221–230
CR	231–240
IIR	241–250
BR	251–260
Other rubbers	261–300
Tackifying resins	301–320
Non-sulfur crosslinking agents	321–340
Inhibitors/retarders	341–360
Plasticizers, chemical (peptizers)	361–380
Reference liquids	901–930
Miscellaneous materials	931–999

^A The assigned numbers apply to both IRM and CRM.

3. Significance and Use

3.1 IRMs are vitally important in product and specification testing, in research and development work, in technical service work, and in quality control operations in the rubber and carbon black industries. They are especially valuable for referee purposes. Many ASTM rubber standards for the evaluation of natural or synthetic rubber require the use of specific IRMs in their test recipes for better laboratory repeatability and reproducibility.

3.2 New material lots that have been selected as candidates for IRM approval shall conform to the appropriate specifications given in this standard and meet requirements given in Practice D4678 before the lots may be accepted as IRMs.

3.3 The chemical and physical IRM specifications shown will ensure some consistency in IRM properties from one lot to the next. However, the specifications cannot ensure exact inter-lot consistency.

4. Assignment and Tabulation of Reference Material (RM) Numbers

4.1 *Assigning RM Numbers*—Table 1 lists the numbering system that shall be used for assigning numbers for reference materials. These numbers shall be assigned to either IRM or CRM candidate materials, with the acronym preceding the number when referring to the reference material.

5. Specifications

5.1 The following are specifications for Industry Reference Materials (IRMs).

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>.