

ASTM Volume 09.01, July 2017

Rubber, Natural and Synthetic -- General Test Methods; Carbon Black

Table of Contents

D297-15 Standard Test Methods for Rubber Products—Chemical Analysis

D395-16e1 Standard Test Methods for Rubber Property—Compression Set

D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D413-98(2013) Standard Test Methods for Rubber Property—Adhesion to Flexible Substrate

D429-14 Standard Test Methods for Rubber Property—Adhesion to Rigid Substrates

D430-06(2012) Standard Test Methods for Rubber Deterioration—Dynamic Fatigue

D454-04(2015) Standard Test Method for Rubber Deterioration by Heat and Air Pressure

D471-16a Standard Test Method for Rubber Property—Effect of Liquids

D531-15 Standard Test Method for Rubber Property—Pusey and Jones Indentation

D572-04(2015) Standard Test Method for Rubber—Deterioration by Heat and Oxygen

D573-04(2015) Standard Test Method for Rubber—Deterioration in an Air Oven

D575-91(2012) Standard Test Methods for Rubber Properties in Compression

D623-07(2014) Standard Test Methods for Rubber Property—Heat Generation and Flexing Fatigue In Compression

D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D750-12 Standard Practice for Rubber Deterioration Using Artificial Weathering Apparatus

D813-07(2014) Standard Test Method for Rubber Deterioration—Crack Growth

D814-95(2014) Standard Test Method for Rubber Property—Vapor Transmission of Volatile Liquids

D816-06(2016) Standard Test Methods for Rubber Cements

D832-07(2012) Standard Practice for Rubber Conditioning For Low Temperature Testing

D865-11 Standard Test Method for Rubber - Deterioration by Heating in Air (Test Tube Enclosure)

D925-14 Standard Test Methods for Rubber Property—Staining of Surfaces (Contact, Migration, and Diffusion)

D926-08(2013) Standard Test Method for Rubber Property—Plasticity and Recovery (Parallel Plate Method)

D945-16 Standard Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)

D991-89(2014) Standard Test Method for Rubber Property—Volume Resistivity Of Electrically Conductive and Antistatic Products

D1052-09(2014) Standard Test Method for Measuring Rubber Deterioration—Cut Growth Using Ross Flexing Apparatus

D1053-92a(2012) Standard Test Methods for Rubber Property—Stiffening at Low Temperatures: Flexible Polymers and Coated Fabrics

D1076-15 Standard Specification for Rubber—Concentrated, Ammonia Preserved, Creamed, and Centrifuged Natural Latex

D1148-13 Standard Test Method for Rubber Deterioration—Discoloration from Ultraviolet (UV) or UV/Visible Radiation and Heat Exposure of Light-Colored Surfaces

D1149-16 Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment

D1171-16e1 Standard Test Method for Rubber Deterioration—Surface Ozone Cracking Outdoors (Triangular Specimens)

D1229-03(2015) Standard Test Method for Rubber Property—Compression Set at Low Temperatures

D1278-91a(2015) Standard Test Methods for Rubber from Natural Sources—Chemical Analysis

D1329-16 Standard Test Method for Evaluating Rubber Property—Retraction at Lower Temperatures (TR Test)

D1349-14 Standard Practice for Rubber—Standard Conditions for Testing

D1415-06(2012) Standard Test Method for Rubber Property—International Hardness

D1417-16 Standard Test Methods for Rubber Latices—Synthetic

D1418-17 Standard Practice for Rubber and Rubber Latices—Nomenclature

D1456-86(2014) Standard Test Method for Rubber Property—Elongation at Specific Stress

D1460-86(2014) Standard Test Method for Rubber Property—Change in Length During Liquid Immersion

D1485-07(2015) Standard Practice for Rubber from Natural Sources—Sampling and Sample Preparation

D1506-15 Standard Test Methods for Carbon Black—Ash Content

D1508-12 Standard Test Method for Carbon Black, Pelleted Fines and Attrition

D1509-15 Standard Test Methods for Carbon Black—Heating Loss

D1510-16a Standard Test Method for Carbon Black—Iodine Adsorption Number

D1511-12 Standard Test Method for Carbon Black—Pellet Size Distribution

D1512-15b Standard Test Methods for Carbon Black—pH Value

D1513-05(2012) Standard Test Method for Carbon Black, Pelleted—Pour Density

D1514-15 Standard Test Method for Carbon Black—Sieve Residue

D1519-95(2014) Standard Test Methods for Rubber Chemicals—Determination of Melting Range

D1566-15 Standard Terminology Relating to Rubber

D1618-99(2011) Standard Test Method for Carbon Black Extractables - Transmittance of Toluene Extract

D1619-16a Standard Test Methods for Carbon Black—Sulfur Content

D1630-16 Standard Test Method for Rubber Property—Abrasion Resistance (Footwear Abrader)

D1646-15 Standard Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)

D1765-17 Standard Classification System for Carbon Blacks Used in Rubber Products

D1766-05(2016) Standard Test Method for Rubber Chemicals—Solubility

D1799-03a(2014) Standard Practice for Carbon Black—Sampling Packaged Shipments

D1817-05(2016) Standard Test Method for Rubber Chemicals—Density

D1900-06(2015) Standard Practice for Carbon Black—Sampling Bulk Shipments

D1917-03(2012) Standard Test Methods for Rubber Property—Shrinkage of Raw and Compounded Hot-Polymerized Styrene-Butadiene Rubber (SBR)

D1937-13 Standard Test Method for Carbon Black, Pelleted—Mass Strength

D1991-15 Standard Test Method for Rubber Chemicals—2-Mercaptobenzothiazole (MBT)—Assay

D1992-91(2013) Standard Guide for Testing Synthetic Plasticizers Used in Rubber

D1993-03(2013)e1 Standard Test Method for Precipitated Silica-Surface Area by Multipoint BET Nitrogen Adsorption

D2084-11(2016) Standard Test Method for Rubber Property—Vulcanization Using Oscillating Disk Cure Meter

D2136-02(2012) Standard Test Method for Coated Fabrics—Low-Temperature Bend Test

D2137-11 Standard Test Methods for Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics

D2226-93(2012) Standard Classification for Various Types of Petroleum Oils for Rubber Compounding Use

D2227-96(2015) Standard Specification for Natural Rubber (NR) Technical Grades

D2228-04(2015) Standard Test Method for Rubber Property—Relative Abrasion Resistance by Pico Abrader Method

D2230-96(2012) Standard Test Method for Rubber Property—Extrudability of Unvulcanized Compounds

D2240-15 Standard Test Method for Rubber Property—Durometer Hardness

D2414-16e1 Standard Test Method for Carbon Black—Oil Absorption Number (OAN)

D2449-88(2015) Standard Specification for Rubber Bales From Natural Sources—Limit on Coating

D2632-15 Standard Test Method for Rubber Property—Resilience by Vertical Rebound

D2663-14 Standard Test Methods for Carbon Black—Dispersion in Rubber

D2702-05(2016) Standard Practice for Rubber Chemicals—Determination of Infrared Absorption Characteristics

D3053-15 Standard Terminology Relating to Carbon Black

D3137-81(2013) Standard Test Method for Rubber Property—Hydrolytic Stability

D3156-96(2016) Standard Practice for Rubber—Chromatographic Analysis of Antidegradants (Antioxidants, Antiozonants and Stabilizers)

D3157-05(2015) Standard Test Method for Rubber from Natural Sources—Color

D3182-16 Standard Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

D3183-10(2015) Standard Practice for Rubber—Preparation of Pieces for Test Purposes from Products

D3184-11 Standard Practice for Rubber - Evaluation of NR (Natural Rubber)

D3185-06(2016) Standard Test Methods for Rubber—Evaluation of SBR (Styrene-Butadiene Rubber) Including Mixtures With Oil

D3186-07(2016) Standard Test Methods for Rubber—Evaluation of SBR (Styrene-Butadiene Rubber) Mixed With Carbon Black or Carbon Black and Oil

D3187-06(2016) Standard Test Methods for Rubber—Evaluation of NBR (Acrylonitrile-Butadiene Rubber)

D3188-06(2010) Standard Test Methods for Rubber-Evaluation of IIR (Isobutene-Isoprene Rubber)

D3189-06(2016) Standard Test Methods for Rubber—Evaluation of

Solution BR (Polybutadiene Rubber)

D3190-06(2016) Standard Test Method for Rubber—Evaluation of Chloroprene Rubber (CR)

D3191-10(2014) Standard Test Methods for Carbon Black in SBR (Styrene-Butadiene Rubber)—Recipe and Evaluation Procedures

D3192-09(2014) Standard Test Methods for Carbon Black Evaluation in NR (Natural Rubber)

D3194-17 Standard Test Method for Rubber From Natural Sources—Plasticity Retention Index (PRI)

D3265-15a Standard Test Method for Carbon Black—Tint Strength

D3314-02(2017) Standard Test Method for Rubber—Chemical Analysis for Polystyrene Blocks In SBR (Styrene-Butadiene Rubber) and Styrene-Reinforced Latices

D3346-12 Standard Test Methods for Rubber Property—Processability of Emulsion SBR (Styrene-Butadiene Rubber) With the Mooney Viscometer (Delta Mooney)

D3389-16 Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)

D3403-07(2016) Standard Test Methods for Rubber—Evaluation of IR (Isoprene Rubber)

D3452-06(2017) Standard Practice for Rubber—Identification by Pyrolysis-Gas Chromatography

D3484-06(2016) Standard Test Methods for Rubber—Evaluation of Oil-Extended Solution BR (Polybutadiene Rubber)

D3493-16 Standard Test Method for Carbon Black—Oil Absorption Number of Compressed Sample (COAN)

D3566-03(2014) Standard Practice for Rubber—Determination of Bromine in the Presence of Chlorine by Oxygen Combustion

D3568-03(2013) Standard Test Methods for Rubber—Evaluation of EPDM (Ethylene Propylene Diene Terpolymers) Including Mixtures With Oil

D3616-95(2014) Standard Test Method for Rubber—Determination of Gel, Swelling Index, and Dilute Solution Viscosity

D3677-10(2015) Standard Test Methods for Rubber—Identification by Infrared Spectrophotometry

D3767-03(2014) Standard Practice for Rubber—Measurement of Dimensions

D3847-01(2012) Standard Practice for Rubber—Directions for Achieving Subnormal Test Temperatures

D3848-03(2013) Standard Test Methods for Rubber—Evaluation of NBR (Acrylonitrile-Butadiene Copolymers) Mixed With Carbon Black

D3849-14a Standard Test Method for Carbon Black—Morphological Characterization of Carbon Black Using Electron Microscopy

D3853-12(2017) Standard Terminology Relating to Rubber and Rubber

Latices—Abbreviations for Chemicals Used in Compounding

D3896-07(2016) Standard Practice for Rubber From Synthetic Sources—Sampling

D3900-15 Standard Test Methods for Rubber—Determination of Ethylene Units in Ethylene-Propylene Copolymers (EPM) and in Ethylene-Propylene-Diene Terpolymers (EPDM) by Infrared Spectrometry

D3958-06(2016) Standard Test Methods for Rubber—Evaluation of BIIR and CIIR (Halogenated Isobutene—Isoprene Rubber)

D4004-06(2017) Standard Test Methods for Rubber—Determination of Metal Content by Flame Atomic Absorption (AAS) Analysis

D4026-06(2017) Standard Test Method for Rubber Latex—Styrene-Butadiene Copolymer—Determination of Residual Styrene

D4075-06(2017) Standard Test Methods for Rubber Compounding Materials—Flame Atomic Absorption Analysis—Determination of Metals

D4122-17 Standard Practice for Carbon Black—Evaluation of an Industry Reference Black

D4295-89(2017) Standard Classification for Rubber Compounding Materials—Zinc Oxide

D4315-94(2017) Standard Test Methods for Rubber Compounding Material—Zinc Oxide

D4482-11 Test Method for Rubber Property - Extension Cycling Fatigue

D4483-14a Standard Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

D4527-99(2016) Standard Test Method for Carbon Black—Solvent Extractables

D4528-88(2017) Standard Classification for Rubber Compounding Materials—Sulfur

D4569-06(2012) Standard Test Method for Rubber Compounding Materials—Determination of Acidity in Sulfur

D4570-02(2017) Standard Test Method for Rubber Chemicals—Determination of Particle Size of Sulfur by Sieving (Dry)

D4571-06(2012) Standard Test Methods for Rubber Compounding Materials—Determination of Volatile Material

D4572-89(2017) Standard Test Method for Rubber Chemicals—Wet Sieve Analysis of Sulfur

D4573-03(2014) Standard Test Method for Rubber Chemicals—Determination of Oil Content in Oil-Treated Sulfur

D4574-06(2012) Standard Test Methods for Rubber Compounding Materials—Determination of Ash Content

D4575-09(2015) Standard Test Methods for Rubber Deterioration—Reference and Alternative Method(s) for Determining Ozone Level in Laboratory Test Chambers

D4578-06(2012) Standard Test Methods for Rubber Chemicals—Determination of Percent Sulfur by Extraction

D4583-95(2015) Standard Practice for Carbon Black—Calculation of Process Indexes From an Analysis of Process Control Data

D4620-02(2017) Standard Test Method for Evaluating the Effective Surface Area of Zinc Oxide in Rubber

D4676-94(2017) Standard Classification for Rubber Compounding Materials—Antidegradants

D4677-87(2013) Standard Classification for Rubber Compounding Materials—Titanium Dioxide

D4678-15a Standard Practice for Rubber—Preparation, Testing, Acceptance, Documentation, and Use of Reference Materials

D4817-88(2017) Standard Classification for Rubber Compounding Materials—Stearic Acid

D4818-89(2017) Standard Classification for Rubber Compounding Materials—Vulcanization Accelerators

D4821-16 Standard Guide for Carbon Black—Validation of Test Method Precision and Bias

D4924-89(2017) Standard Classification for Petroleum Waxes for Use in Rubber Compounding

D4934-02(2012) Standard Test Method for Rubber Compounding Materials: 2-Benzothiazyl Sulfenamide Accelerators—Insolubles

D4936-10(2015) Standard Test Method for Mercaptobenzothiazole Sulfenamide Assay by Reduction/Titration

D4937-96(2012) Standard Test Method for p-Phenylenediamine Antidegradants Purity by Gas Chromatography

D5044-06(2012) Standard Test Method for Rubber Compounding Materials—Free 2-Mercaptobenzothiazole (MBT) in Benzothiazyl Disulfide (MBTS)

D5051-06(2012) Standard Test Method for Rubber Compounding Materials—Benzothiazyl Disulfide (MBTS)—Assay

D5054-90(2014) Standard Test Method for Rubber Chemicals—Diphenyl Guanidine (DPG) and Di-o-tolyl-guanidine (DOTG) Assay

D5099-08(2013) Standard Test Methods for Rubber—Measurement of Processing Properties Using Capillary Rheometry

D5230-14e1 Standard Test Method for Carbon Black—Automated Individual Pellet Hardness

D5289-12 Standard Test Method for Rubber Property—Vulcanization Using Rotorless Cure Meters

D5297-95(2014) Standard Test Methods for Rubber Chemical Accelerator—Purity by High Performance Liquid Chromatography

D5376-06(2012) Standard Test Method for Rubber Compounding Materials—Determination of the Basic Nitrogen Content in Rubber Antioxidant: Polymerized TMQ

D5377-93(2017) Standard Classification for Rubber Compounding Materials—Ground Coal

D5406-93(2016) Standard Practice for Rubber—Calculation of Producer's Process Performance Indexes

D5460-02(2012) Standard Test Method for Rubber Compounding Materials—Water in Rubber Additives

D5461-06(2012) Standard Test Method for Rubber Compounding Materials—Wet Sieve Analysis of Powdered Rubber Compounding Materials

D5538-13 Standard Practice for Thermoplastic Elastomers—Terminology and Abbreviations

D5603-01(2015) Standard Classification for Rubber Compounding Materials—Recycled Vulcanizate Particulate Rubber

D5604-96(2017) Standard Test Methods for Precipitated Silica—Surface Area by Single Point B.E.T. Nitrogen Adsorption

D5605-94(2016) Standard Practice for Styrene-Butadiene Rubber (SBR)—Establishing Raw Mooney Viscosity Target Values

D5644-01(2013) Standard Test Methods for Rubber Compounding Materials—Determination of Particle Size Distribution of Recycled Vulcanizate Particulate Rubber

D5666-95(2014) Standard Test Method for Rubber Chemical Antidegradants—Purity of *p*-Phenylenediamine (PPD) Antidegradants by High Performance Liquid Chromatography

D5667-95(2015) Standard Test Method for Rubber From Synthetic Sources—Total and Water Soluble Ash

D5668-09(2014) Standard Test Methods for Rubber From Synthetic Sources—Volatile Matter

D5670-95(2014) Standard Test Method for Rubber—Determination of Residual Unsaturation in Hydrogenated Nitrile Rubber (HNBR) by Infrared Spectrophotometry

D5774-95(2014) Standard Test Methods for Rubber—Chemical Analysis of Extractables

D5775-95(2014) Standard Test Method for Rubber—Determination of Bound Styrene in Styrene Butadiene Rubber by Refractive Index

D5805-00(2014) Standard Test Methods for Rubber—Determination of Carbon Black in Masterbatches

D5817-03a(2014) Standard Practice for Carbon Black, Pelleted—Reduction, Blending, and Drying of Gross Samples for Testing

D5899-98(2013) Standard Classification System for Rubber Compounding Materials for Use in Computer Material Management Systems

D5900-16 Standard Specification for Physical and Chemical Properties of Industry Reference Materials (IRM)

D5902-05(2015) Standard Test Method for Rubber—Determination of Residual Unsaturation in Hydrogenated Nitrile Rubber (HNBR) by Iodine Value

D5963-04(2015) Standard Test Method for Rubber Property—Abrasion Resistance (Rotary Drum Abrader)

D5964-16 Standard Practice for Rubber IRM 901, IRM 902, and IRM 903 Replacement Oils for ASTM No. 1, ASTM No. 2, ASTM No. 3 Oils, and IRM 905 formerly ASTM No. 5 Oil

D5992-96(2011) Standard Guide for Dynamic Testing of Vulcanized Rubber and Rubber-Like Materials Using Vibratory Methods

D6047-15 Standard Test Methods for Rubber, Raw—Determination of 5-Ethylidenenorbornene (ENB) or Dicyclopentadiene (DCPD) in Ethylene-Propylene-Diene (EPDM) Terpolymers

D6048-07(2012) Standard Practice for Stress Relaxation Testing of Raw Rubber, Unvulcanized Rubber Compounds, and Thermoplastic Elastomers

D6049-03(2013) Standard Test Method for Rubber Property—Measurement of the Viscous and Elastic Behavior of Unvulcanized Raw Rubbers and Rubber Compounds by Compression Between Parallel Plates

D6085-97(2016) Standard Practice for Sampling in Rubber Testing—Terminology and Basic Concepts

D6147-97(2014) Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomer—Determination of Force Decay (Stress Relaxation) in Compression

D6204-15 Standard Test Method for Rubber—Measurement of Unvulcanized Rheological Properties Using Rotorless Shear Rheometers

D6370-99(2014) Standard Test Method for Rubber—Compositional Analysis by Thermogravimetry (TGA)

D6556-16 Standard Test Method for Carbon Black—Total and External Surface Area by Nitrogen Adsorption

D6600-00(2013) Standard Practice for Evaluating Test Sensitivity for Rubber Test Methods

D6601-15 Standard Test Method for Rubber Properties—Measurement of Cure and After-Cure Dynamic Properties Using a Rotorless Shear Rheometer

D6602-13 Standard Practice for Sampling and Testing of Possible Carbon Black Fugitive Emissions or Other Environmental Particulate, or Both

D6738-15 Standard Test Method for Precipitated Silica—Volatile Content

D6739-11(2015) Standard Test Method for Silica—pH Value

D6740-15 Standard Test Method for Silanes Used in Rubber Formulations (bis-(triethoxysilylpropyl)sulfanes): Residue on Ignition

D6741-10(2015) Standard Test Methods for Silanes Used in Rubber Formulations (bis-(triethoxysilylpropyl)sulfanes): Sulfur Content

D6746-15 Standard Test Method for Determination of Green Strength and Stress Relaxation of Raw Rubber or Unvulcanized Compounds

D6814-02(2013) Standard Test Method for Determination of Percent Devulcanization of Crumb Rubber Based on Crosslink Density

D6843-10(2015) Standard Test Method for Silanes Used in Rubber Formulations (bis-(triethoxysilylpropyl)sulfanes): Characterization by Gas

Chromatography (GC)

D6844-10(2015) Standard Test Method for Silanes Used in Rubber Formulations (bis-(triethoxysilylpropyl)sulfanes): Characterization by High Performance Liquid Chromatography (HPLC)

D6845-12 Standard Test Method for Silica, Precipitated, Hydrated—CTAB (Cetyltrimethylammonium Bromide) Surface Area

D6854-15a Standard Test Method for Silica—Oil Absorption Number (OAN)

D6915-17 Standard Practice for Carbon Black—Evaluation of Standard Reference Blacks

D7050-04(2014) Standard Practice for Rubber from Natural Sources—Sampling and Sorting Bales Based on Predicted Processing Properties

D7121-05(2012) Standard Test Method for Rubber Property—Resilience Using Schob Type Rebound Pendulum

D7426-08(2013) Standard Test Method for Assignment of the DSC Procedure for Determining T_g of a Polymer or an Elastomeric Compound

D7605-11(2016) Standard Test Method for Thermoplastic Elastomers—Measurement of Polymer Melt Rheological Properties and Congealed Dynamic Properties Using Rotorless Shear Rheometers

D7633-13 Standard Test Method for Carbon Black—Carbon Content

D7662-15 Standard Test Method for Carbon Content in Carbon Black Feedstock Oils

D7679-16 Standard Test Method for Sulfur Content in Carbon Black Feedstock Oils

D7723-11 Standard Test Method for Rubber Property - Macro-Dispersion of Fillers in Compounds

D7724-11(2016) Standard Test Method for Carbon Black—Non-Dispersible Matter by Mechanical Flushing (NDM)

D7771-17 Standard Test Method for Determination of Benzo- α -Pyrene (BaP) Content in Carbon Black

D7772-15 Standard Test Method for Carbon Black Extractables – Absorbance of Cyclohexane Extract

D7849-14 Standard Classification for Nomenclature of Reference Materials of Committee D24

D7854-16 Standard Test Method for Carbon Black-Void Volume at Mean Pressure

D7969-16 Standard Specification for Gravity Convection and Forced Ventilation Ovens

D8016-15 Standard Test Method for Silica, Precipitated, Hydrated—Sears Number

D8043-16 Standard Guide for Carbon Black—Shelf Life

D8059-16 Standard Test Method for Rubber Compounds—Measurement of Unvulcanized Dynamic Strain Softening (Payne Effect) Using Sealed Cavity Rotorless Shear Rheometers