

## **ASTM Volume 10.04, April 2018**

### **Electronics; Declarable Substances in Materials; 3D Imaging Systems; Additive Manufacturing Technologies**

E2544-11a Standard Terminology for Three-Dimensional (3D) Imaging Systems

E2641-09(2017) Standard Practice for Best Practices for Safe Application of 3D Imaging Technology

E2807-11 Standard Specification for 3D Imaging Data Exchange, Version 1.0

E2919-14 Standard Test Method for Evaluating the Performance of Systems that Measure Static, Six Degrees of Freedom (6DOF), Pose

E2938-15 Standard Test Method for Evaluating the Relative-Range Measurement Performance of 3D Imaging Systems in the Medium Range

E3064-16 Standard Test Method for Evaluating the Performance of Optical Tracking Systems that Measure Six Degrees of Freedom (6DOF) Pose

E3124-17 Standard Test Method for Measuring System Latency Performance of Optical Tracking Systems that Measure Six Degrees of Freedom (6DOF) Pose

E3125-17 Standard Test Method for Evaluating the Point-to-Point Distance Measurement Performance of Spherical Coordinate 3D Imaging Systems in the Medium Range

F7-95(2016) Standard Specification for Aluminum Oxide Powder

F15-04(2017) Standard Specification for Iron-Nickel-Cobalt Sealing Alloy

F16-12(2017) Standard Test Methods for Measuring Diameter or Thickness of Wire and Ribbon for Electronic Devices and Lamps

F18-12(2017) Standard Specification and Test Method for Evaluation of Glass-to-Metal Headers Used in Electron Devices

F19-11(2016) Standard Test Method for Tension and Vacuum Testing Metallized Ceramic Seals

F29-97(2017) Standard Specification for Dumet Wire for Glass-to-Metal Seal Applications

F30-96(2017) Standard Specification for Iron-Nickel Sealing Alloys

F31-16 Standard Specification for Nickel-Chromium-Iron Sealing Alloys

F44-16 Standard Specification for Metallized Surfaces on Ceramic

F72-17 Standard Specification for Gold Wire for Semiconductor Lead Bonding

F73-96(2017) Standard Specification for Tungsten-Rhenium Alloy Wire for Electron Devices and Lamps

F76-08(2016)e1 Standard Test Methods for Measuring Resistivity and Hall Coefficient and Determining Hall Mobility in Single-Crystal Semiconductors

F83-71(2013) Standard Practice for Definition and Determination of Thermionic Constants of Electron Emitters

F85-76(2013) Standard Practice for Nomenclature for Wire Leads Used as Conductors in Electron Tubes

F96-77(2015) Standard Specification for Electronic Grade Alloys of Copper and Nickel in Wrought Forms

F106-12(2017) Standard Specification for Brazing Filler Metals for Electron Devices

F180-94(2015) Standard Test Method for Density of Fine Wire and Ribbon Wire for Electronic Devices

F204-76(2013) Standard Test Method for Surface Flaws in Tungsten Seal Rod and Wire

F205-94(2015) Standard Test Method for Measuring Diameter of Fine Wire by Weighing

F219-96(2013) Standard Test Methods of Testing Fine Round and Flat Wire for Electron Devices and Lamps

F256-05(2015) Standard Specification for Chromium-Iron Sealing Alloys with 18 or 28 Percent Chromium

F269-60(2014) Standard Test Method for Sag of Tungsten Wire

F288-96(2014) Standard Specification for Tungsten Wire for Electron Devices and Lamps

F289-96(2014) Standard Specification for Molybdenum Wire and Rod for Electronic Applications

F290-94(2015) Standard Specification for Round Wire for Winding Electron Tube Grid Laterals

F364-96(2014) Standard Specification for Molybdenum Flattened Wire for Electron Tubes

F375-89(2015) Standard Specification for Integrated Circuit Lead Frame Material

F390-11 Standard Test Method for Sheet Resistance of Thin Metallic Films With a Collinear Four-Probe Array

F448-11 Test Method for Measuring Steady-State Primary Photocurrent

F458-13 Standard Practice for Nondestructive Pull Testing of Wire Bonds<sup>1,2</sup>

F459-13 Standard Test Methods for Measuring Pull Strength of Microelectronic Wire Bonds

F487-13 Standard Specification for Fine Aluminum–1 % Silicon Wire for Semiconductor Lead-Bonding

F615M-95(2013) Standard Practice for Determining Safe Current Pulse-Operating Regions for Metallization on Semiconductor Components (Metric)

F744M-16 Standard Test Method for Measuring Dose Rate Threshold for Upset of Digital Integrated Circuits (Metric)

F773M-16 Standard Practice for Measuring Dose Rate Response of Linear Integrated Circuits (Metric)

F980-16 Standard Guide for Measurement of Rapid Annealing of Neutron-Induced Displacement Damage in Silicon Semiconductor Devices

F996-11 Standard Test Method for Separating an Ionizing Radiation-Induced MOSFET Threshold Voltage Shift Into Components Due to Oxide Trapped Holes and Interface States Using the Subthreshold Current-Voltage Characteristics

F1094-87(2012) Standard Test Methods for Microbiological Monitoring of Water Used for Processing Electron and Microelectronic Devices by Direct Pressure Tap Sampling Valve and by the Presterilized Plastic Bag Method

F1190-11 Standard Guide for Neutron Irradiation of Unbiased Electronic Components

F1192-11 Standard Guide for the Measurement of Single Event Phenomena (SEP) Induced by Heavy Ion Irradiation of Semiconductor Devices

F1238-95(2011) Standard Specification for Refractory Silicide Sputtering Targets for Microelectronic Applications

F1262M-14 Standard Guide for Transient Radiation Upset Threshold Testing of Digital Integrated Circuits (Metric)

F1263-11 Standard Guide for Analysis of Overtest Data in Radiation Testing of Electronic Parts

F1269-13 Standard Test Methods for Destructive Shear Testing of Ball Bonds

F1367-98(2011) Standard Specification for Chromium Sputtering Targets for Thin Film Applications

F1372-93(2012) Standard Test Method for Scanning Electron Microscope (SEM) Analysis of Metallic Surface Condition for Gas Distribution System Components

F1373-93(2012) Standard Test Method for Determination of Cycle Life of Automatic Valves for Gas Distribution System Components

F1374-92(2012) Standard Test Method for Ionic/Organic Extractables of Internal Surfaces-IC/GC/FTIR for Gas Distribution System Components

F1375-92(2012) Standard Test Method for Energy Dispersive X-Ray Spectrometer (EDX) Analysis of Metallic Surface Condition for Gas Distribution System Components

F1376-92(2012) Standard Guide for Metallurgical Analysis for Gas Distribution System Components

F1394-92(2012) Standard Test Method for Determination of Particle Contribution from Gas Distribution System Valves

F1396-93(2012) Standard Test Method for Determination of Oxygen Contribution by Gas Distribution System Components

F1397-93(2012) Standard Test Method for Determination of Moisture Contribution by Gas Distribution System Components

F1398-93(2012) Standard Test Method for Determination of Total Hydrocarbon Contribution by Gas Distribution System Components

F1438-93(2012) Standard Test Method for Determination of Surface Roughness by Scanning Tunneling Microscopy for Gas Distribution System Components

F1466-99(2015) Standard Specification for Iron-Nickel-Cobalt Alloys for Metal-to-Ceramic Sealing Applications

F1467-11 Standard Guide for Use of an X-Ray Tester ( $\approx 10$  keV Photons) in Ionizing Radiation Effects Testing of Semiconductor Devices and Microcircuits

F1512-94(2011) Standard Practice for Ultrasonic C-Scan Bond Evaluation of Sputtering Target-Backing Plate Assemblies

F1513-99(2011) Standard Specification for Pure Aluminum (Unalloyed) Source Material for Electronic Thin Film Applications

F1578-07(2014) Standard Test Method for Contact Closure Cycling of a Membrane Switch

F1593-08(2016) Standard Test Method for Trace Metallic Impurities in Electronic Grade Aluminum by High Mass-Resolution Glow-Discharge Mass Spectrometer

F1594-95(2011) Standard Specification for Pure Aluminum (Unalloyed) Source Material for Vacuum Coating Applications

F1595-00(2012) Standard Practice for Viewing Conditions for Visual Inspection of Membrane Switches

F1596-15 Standard Test Method for Exposure of a Membrane Switch or Printed Electronic Device to Temperature and Relative Humidity

F1598-95(2014) Standard Test Method for Determining the Effects of Chemical/Solvent Exposure to a Membrane Switch/Graphic Overlay (Spot Test Method)

F1661-09(2015) Standard Test Method for Determining the Contact Bounce Time of a Membrane Switch

F1662-16 Standard Test Method for Verifying the Specified Dielectric Withstand Voltage and Determining the Dielectric Breakdown Voltage of a Membrane Switch or Printed Electronic Device

F1663-15 Standard Test Method for Determining the Capacitance of a Membrane Switch or Printed Electronic Device

F1680-07a(2014) Standard Test Method for Determining Circuit Resistance of a Membrane Switch

F1681-14 Standard Test Method for Determining Current Carrying Capacity of a Membrane Switch Circuit

F1683-09 Standard Practice for Creasing or Bending a Membrane Switch, Membrane Switch Flex Tail Assembly or Membrane Switch Component

F1684-06(2016) Standard Specification for Iron-Nickel and Iron-Nickel-Cobalt Alloys for Low Thermal Expansion Applications

F1689-05(2012) Standard Test Method for Determining the Insulation Resistance of a Membrane Switch

F1709-97(2016) Standard Specification for High Purity Titanium Sputtering Targets for Electronic Thin Film Applications

F1710-08(2016) Standard Test Method for Trace Metallic Impurities in Electronic Grade Titanium by High Mass-Resolution Glow Discharge Mass Spectrometer

F1711-96(2016) Standard Practice for Measuring Sheet Resistance of Thin Film Conductors for Flat Panel Display Manufacturing Using a Four-Point Probe Method

F1761-00(2011) Standard Test Method for Pass Through Flux of Circular Magnetic Sputtering Targets

F1762-14 Standard Test Method for Determining the Effects of Atmospheric Pressure Variation on a Membrane Switch

F1812-15 Standard Test Method for Determining the Effect of an ESD Discharge on a Membrane Switch or Printed Electronic Device

F1842-15 Standard Test Method for Determining Ink or Coating Adhesion on Flexible Substrates for a Membrane Switch or Printed Electronic Device

F1843-15 Standard Practice for Sample Preparation of Plastic Films used on Membrane Switch Overlays for Specular Gloss Measurements

F1844-97(2016) Standard Practice for Measuring Sheet Resistance of Thin Film Conductors For Flat Panel Display Manufacturing Using a Noncontact Eddy Current Gage

F1845-08(2016) Standard Test Method for Trace Metallic Impurities in Electronic Grade Aluminum-Copper, Aluminum-Silicon, and Aluminum-Copper-Silicon Alloys by High-Mass-Resolution Glow Discharge Mass Spectrometer

F1892-12 Standard Guide for Ionizing Radiation (Total Dose) Effects Testing of Semiconductor Devices

F1893-11 Guide for Measurement of Ionizing Dose-Rate Survivability and Burnout of Semiconductor Devices

F1894-98(2011) Test Method for Quantifying Tungsten Silicide Semiconductor Process Films for Composition and Thickness

F1895-14 Standard Test Method for Submersion of a Membrane Switch

F1896-16 Test Method for Determining the Electrical Resistivity of a Printed Conductive Material

F1995-13 Standard Test Method for Determining the Shear Strength of the Bond between a Surface Mount Device (SMD) and Substrate in a Membrane Switch

F1996-14 Standard Test Method for Silver Migration for Membrane Switch Circuitry

F2072-14 Standard Test Method for Hosedown of a Membrane Switch

F2073-14 Standard Test Method for Non-Destructive Short Circuit Testing of a Membrane Switch

F2112-02(2011) Standard Terminology for Membrane Switches

F2113-01(2011) Standard Guide for Analysis and Reporting the Impurity Content and Grade of High Purity Metallic Sputtering Targets for Electronic Thin Film Applications

F2187-02(2011) Standard Test Method for Determining the Effect of Random Frequency Vibration on a Membrane Switch or Membrane Switch Assembly

F2188-02(2011) Standard Test Method for Determining the Effect of Variable Frequency Vibration on a Membrane Switch or Membrane Switch Assembly

F2359-04(2011) Standard Test Method for Determining Color of a Membrane Switch Backlit with Diffuse Light Source

F2360-08(2015)e1 Standard Test Method for Determining Luminance of a Membrane Switch Backlit with Diffuse Light Source

F2405-04(2011) Standard Test Method for Trace Metallic Impurities in High Purity Copper by High-Mass-Resolution Glow Discharge Mass Spectrometer

F2576-15a Standard Terminology Relating to Declarable Substances in Materials

F2577-14 Standard Guide for Assessment of Materials and Products for Declarable Substances

F2592-16 Standard Test Method for Measuring the Force-Displacement of a Membrane Switch

F2617-15 Standard Test Method for Identification and Quantification of Chromium, Bromine, Cadmium, Mercury, and Lead in Polymeric Material Using Energy Dispersive X-ray Spectrometry

F2725-11 Standard Guide for European Union's Registration, Evaluation, and Authorization of Chemicals (REACH) Supply Chain Information Exchange

F2749-15 Standard Test Method for Determining the Effects of Creasing a Membrane Switch or Printed Electronic Device

F2750-16 Standard Test Method for Determining the Effects of Bending a Membrane Switch or Printed Electronic Device

F2771-10(2016) Standard Test Method for Determining the Luminance Curve of an Electroluminescent Lamp at Ambient Conditions

F2853-10(2015) Standard Test Method for Determination of Lead in Paint Layers and Similar Coatings or in Substrates and Homogenous Materials by Energy Dispersive X-Ray Fluorescence Spectrometry Using Multiple Monochromatic Excitation Beams

F2865-13 Standard Guide for Classifying the Degrees of Ingress of Dust and Water into a Membrane Switch

F2866-11 Standard Test Method for Flammability of a Membrane Switch in Defined Assembly

F2924-14 Standard Specification for Additive Manufacturing Titanium-6 Aluminum-4 Vanadium with Powder Bed Fusion

F2931-17 Standard Guide for Analytical Testing of Substances of Very High Concern in Materials and Products

F2964-12 Standard Test Method for Determining the Uniformity of the Luminance of an Electroluminescent Lamp or Other Diffuse Lighting Device

F2971-13 Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing

F2980-13(2017) Standard Test Method for Analysis of Heavy Metals in Glass by Field Portable X-Ray Fluorescence (XRF)

F3001-14 Standard Specification for Additive Manufacturing Titanium-6 Aluminum-4 Vanadium ELI (Extra Low Interstitial) with Powder Bed Fusion

F3049-14 Standard Guide for Characterizing Properties of Metal Powders Used for Additive Manufacturing Processes

F3055-14a Standard Specification for Additive Manufacturing Nickel Alloy (UNS N07718) with Powder Bed Fusion

F3056-14e1 Standard Specification for Additive Manufacturing Nickel Alloy (UNS N06625) with Powder Bed Fusion

F3078-15 Standard Test Method for Identification and Quantification of Lead in Paint and Similar Coating Materials using Energy Dispersive X-ray Fluorescence Spectrometry (EDXRF)

F3091/F3091M-14 Standard Specification for Powder Bed Fusion of Plastic Materials

F3122-14 Standard Guide for Evaluating Mechanical Properties of Metal Materials Made via Additive Manufacturing Processes

F3139-15 Standard Test Method for Analysis of Tin-Based Solder Alloys for Minor and Trace Elements Using Inductively Coupled Plasma Atomic Emission Spectrometry

F3147-15 Standard Test Method for Evaluating the Reliability of Surface Mounted Device (SMD) Joints on a Flexible Circuit by a Rolling Mandrel Bend

F3152-16 Standard Test Method for Determining Abrasion Resistance of Inks and Coatings on Substrates Using Dry or Wet Abrasive Medium

F3166-16 Standard Specification for High-Purity Titanium Sputtering Target Used for Through-Silicon Vias (TSV) Metallization

F3184-16 Standard Specification for Additive Manufacturing Stainless Steel Alloy (UNS S31603) with Powder Bed Fusion

F3187-16 Standard Guide for Directed Energy Deposition of Metals

F3192-16 Standard Specification for High-Purity Copper Sputtering Target Used for Through-Silicon Vias (TSV) Metallization

F3213-17 Standard for Additive Manufacturing – Finished Part Properties – Standard Specification for Cobalt-28 Chromium-6 Molybdenum via Powder Bed Fusion

F3290-17 Standard Guide for Handling and Application of a Membrane Switch or Printed Electronic Device to its Final Support Structure

F3291-17 Standard Test Method for Measuring the Force-Resistance of a Membrane Force Sensor

ISO/ASTM52900-15 Standard Terminology for Additive Manufacturing – General Principles – Terminology

ISO/ASTM52901-16 Standard Guide for Additive Manufacturing – General Principles – Requirements for Purchased AM Parts

ISO/ASTM52910-17 Standard Guidelines for Design for Additive Manufacturing

ISO/ASTM52915-16 Standard Specification for Additive Manufacturing File Format (AMF) Version 1.2

ISO/ASTM52921-13 Standard Terminology for Additive Manufacturing-Coordinate Systems and Test Methodologies