Designation: F790 – 23

Standard Guide for Testing Materials for Aerospace Plastic Transparent Enclosures[1]

This standard is issued under the fixed designation F790; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide is intended to summarize the standard test methods available on individual and composite materials utilized in fabrication of aerospace plastic transparent enclosures. As such, it is intended to specifically include transparent thermoplastics, transparent elastomers, and reinforced plastics, whether thermoplastic or thermosetting.

1.2 This guide is intended as an aid in the search for test methods pertinent to Aerospace Plastic Transparent Enclosures. It should be understood that all methods listed may not apply to all enclosures.

1.3 The standards included refer to the properties or aspects listed in Table 1. The properties or aspects are listed in alphabetical order and the descriptions used are intended to facilitate the search.

1.4 *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.*

1.5 *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]

C117 Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

D257 Test Methods for DC Resistance or Conductance of Insulating Materials

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D542 Test Method for Index of Refraction of Transparent Organic Plastics

D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents

D570 Test Method for Water Absorption of Plastics

D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D638 Test Method for Tensile Properties of Plastics

D695 Test Method for Compressive Properties of Rigid Plastics

D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between −30°C and 30°C with a Vitreous Silica Dilatometer

D746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

D785 Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

D953 Test Method for Pin-Bearing Strength of Plastics

D1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics

D1004 Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting

D1044 Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser

D1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

[1] This guide is under the jurisdiction of ASTM Committee F07 on Aerospace and Aircraft and is the direct responsibility of F07.08 on Transparent Enclosures and Materials.

Current edition approved Jan. 1, 2023. Published February 2023. Originally approved in 1988. Last previous edition approved in 2018 as F790 – 18. DOI: 10.1520/F0790-23.

[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.

D1499 Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics
D1525 Test Method for Vicat Softening Temperature of Plastics
D2240 Test Method for Rubber Property—Durometer Hardness
D2565 Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
D2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor (Withdrawn 2022)[3]
D2584 Test Method for Ignition Loss of Cured Reinforced Resins
D2766 Test Method for Specific Heat of Liquids and Solids (Withdrawn 2018)[3]
D3167 Test Method for Floating Roller Peel Resistance of Adhesives
D5420 Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
E1269 Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry
E2716 Test Method for Determining Specific Heat Capacity by Modulated Temperature Differential Scanning Calorimetry
E1640 Test Method for Assignment of the Glass Transition Temperature By Dynamic Mechanical Analysis
F319 Practice for Polarized Light Detection of Flaws in Aerospace Transparency Heating Elements
F320 Test Method for Hail Impact Resistance of Aerospace Transparent Enclosures
F330 Test Method for Bird Impact Testing of Aerospace Transparent Enclosures
F428 Test Method for Intensity of Scratches on Aerospace Glass Enclosures
F484 Test Method for Stress Crazing of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds
F520 Test Method for Environmental Resistance of Aerospace Transparencies to Artificially Induced Exposures
F521 Test Methods for Bond Integrity of Transparent Laminates
F548 Test Method for Intensity of Scratches on Aerospace Transparent Plastics
F733 Practice for Optical Distortion and Deviation of Transparent Parts Using the Double-Exposure Method
F734 Test Method for Shear Strength of Fusion Bonded Polycarbonate Aerospace Glazing Material
F735 Test Method for Abrasion Resistance of Transparent Plastics and Coatings Using the Oscillating Sand Method
F736 Test Method for Impact Resistance of Monolithic Polycarbonate Sheet by Means of a Falling Weight
F791 Test Method for Stress Crazing of Transparent Plastics
F801 Test Method for Measuring Optical Angular Deviation of Transparent Parts
F942 Guide for Selection of Test Methods for Interlayer Materials for Aerospace Transparent Enclosures
F1164 Test Method for Evaluation of Transparent Plastics Exposed to Accelerated Weathering Combined with Biaxial Stress
F1165 Test Method for Measuring Angular Displacement of Multiple Images in Transparent Parts
F1181 Test Method for Measuring Binocular Disparity in Transparent Parts
F1252 Test Method for Measuring Optical Reflectivity of Transparent Materials
F1316 Test Method for Measuring the Transmissivity of Transparent Parts
F1362 Test Method for Shear Strength and Shear Modulus of Aerospace Glazing Interlayer Materials
F1864 Test Method for Dust Erosion Resistance of Optical and Infrared Transparent Materials and Coatings
F2108 Practice for Inspection of Transparent Parts by Prism
F2156 Test Method for Measuring Optical Distortion in Transparent Parts Using Grid Line Slope
F2469 Test Method for Measuring Optical Angular Deviation of Transparent Parts Using the Double-Exposure Method
G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials

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