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Standard Guide for Selection of Test Methods for Interlayer Materials for Aerospace Transparent Enclosures¹

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1. Scope

1.1 This guide summarizes the standard test methods available for determining physical and mechanical characteristics of interlayer materials used in multi-ply aerospace transparent enclosures.

1.2 Interlayer materials are used to laminate glass-to-glass, glass-to-plastic, and plastic-to-plastic. Interlayer materials are basically transparent adhesives with high-quality optical properties. They can also serve as an energy absorbing medium, a fail-safe membrane to contain cockpit pressure and to prevent entry of impact debris; a strain insulator to accommodate different thermal expansion rates of members being laminated and as an adherent to prevent spalling of inner surface ply material fragments. The relative importance of an interlayer characteristic will be a function of the prime use it serves in its particular application.

1.3 This guide, as a summary of various methods in Section 2, is intended to facilitate the selection of tests that can be applied to interlayer materials.

1.4 The test methods listed are for use in determining basic design characteristics and in assuring lot-to-lot uniformity of the materials being tested except as noted in 3.3.

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

2. Referenced Documents

2.1 ASTM Standards:²

C177 Test Method for Steady-State Heat Flux Measure-

ments and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
D542 Test Method for Index of Refraction of Transparent Organic Plastics
D570 Test Method for Water Absorption of Plastics
D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics
D1004 Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheet
D1045 Test Methods for Sampling and Testing Plasticizers Used in Plastics
D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheet or Film at Elevated Temperature
D1824 Test Method for Apparent Viscosity of Plastics and Organosols at Low Shear Rates
D2240 Test Method for Rubber Property—Durometer Hardness
D2766 Test Method for Specific Heat of Liquids and Solids
D2857 Practice for Dilute Solution Viscosity of Polymers
D3167 Test Method for Floating Roller Peel Resistance of Adhesives
D3465 Test Method for Purity of Monomeric Plasticizers by Gas Chromatography
D3835 Test Method for Determination of Properties of Polymeric Materials by Means of a Capillary Rheometer
E1640 Test Method for Assignment of the Glass Transition Temperature By Dynamic Mechanical Analysis
F520 Test Method for Environmental Resistance of Aerospace Transparencies to Artificially Induced Exposures
F521 Test Methods for Bond Integrity of Transparent Laminates

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

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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.