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Standard Guide for Selection of Test Methods for Interlayer Materials for Aerospace Transparent Enclosures[1]

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

2. Referenced Documents

2.1 *ASTM Standards:*

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus[2]

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies[3]

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension[4]

D 542 Test Methods for Index of Refraction of Transparent Organic Plastics[5]

D 570 Test Method for Water Absorption of Plastics[5]

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between −30°C and 30°C With a Vitreous Silica Dilatometer[5]

D 792 Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement[5]

D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics[5]

D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting[5]

D 1045 Methods of Sampling and Testing Plasticizers Used in Plastics[5]

D 1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature[5]

D 1824 Test Method for Apparent Viscosity of Plastisols and Organosols at Low Shear Rates by Brookfield Viscometer[5]

D 2240 Test Method for Rubber Property—Durometer Hardness[4]

D 2766 Test Method for Specific Heat of Liquids and Solids[6]

D 2857 Test Method for Dilute Solution Viscosity of Polymers[7]

D 3167 Test Method for Floating Roller Peel Resistance of Adhesives[8]

D 3465 Test Method for Purity of Monomeric Plasticizers by Gas Chromatography[7]

D 3835 Test Method for Determination of Properties of Polymeric Materials by Means of a Capillary Rheometer[7]

E 1640 Test Method for Assignment of the Glass Transition Temperature by Dynamic Mechanical Analysis[9]

[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] *Annual Book of ASTM Standards*, Vol 04.06.

[3] *Annual Book of ASTM Standards*, Vol 10.01.

[4] *Annual Book of ASTM Standards*, Vol 09.01.

[5] *Annual Book of ASTM Standards*, Vol 08.01.

[6] *Annual Book of ASTM Standards*, Vol 05.02.

[7] *Annual Book of ASTM Standards*, Vol 08.02.

[8] *Annual Book of ASTM Standards*, Vol 15.06.

[9] *Annual Book of ASTM Standards*, Vol 14.02.