



Designation: F 520 – 97

## Standard Test Method for Environmental Resistance of Aerospace Transparencies<sup>1</sup>

This standard is issued under the fixed designation F 520; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers determination of the effects of exposure to thermal shock, condensing humidity, and simulated weather on aerospace transparent enclosures.

1.2 This test method is not recommended for quality control nor is it intended to provide a correlation to actual service life.

1.3 *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:

D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics<sup>2</sup>

F 521 Test Methods for Bond Integrity of Transparent Laminates<sup>3</sup>

G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials<sup>4</sup>

G 26 Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials<sup>4</sup>

G 53 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type for Exposure of Nonmetallic Materials<sup>4</sup>

### 3. Summary of Test Method

3.1 Two types of test specimens, duplicating the aerospace transparent enclosure design, are subjected to thermal shock, condensing humidity, and artificial weathering. Edge sealing may be used if representative of the design.

3.1.1 Type A specimens are used to determine the effect of environmental exposure on electrical and optical properties.

3.1.2 Type B specimens are used to determine the effect of environmental exposure on bond integrity.

### 4. Significance and Use

4.1 This test, when applied to aerospace transparencies of either monolithic glass/plastic or laminated combinations, is a measure of the ability of the transparency to withstand the effects of artificially induced environments. The test may be used on configurations employing electrically conductive coatings, and also to evaluate the integrity of noncoated materials.

4.2 The resistance of the transparent enclosure to environmental effects may vary appreciably depending on the size, geometry, material of construction, coating integrity, coating density, and other factors.

### 5. Test Specimens

5.1 Each Type A specimen shall be a 250 by 250-mm (9.8 by 9.8-in.) cross section of the design and shall contain, as applicable, surface coatings of operational, electrically conducting coating systems complete with bus bars, braids, and temperature sensors.

5.1.1 Type A test specimens shall have a fully operational coating system, when applicable, with an average resistivity consistent with the average resistivity of the representative design. Reproduction of multiphase electrical circuits is not required for these test specimens since this type of circuitry is only a design technique used to accommodate limited voltage resources at installation.

5.2 Each Type B test specimen shall be 50 by 50 mm (2 by 2 in.) and shall be of a cross section consistent with the edge configuration of the representative design. Type B test specimens are not intended to be operational electrically, but they shall be representative of the average resistivity of the design.

### 6. Preparation of Test Specimens

6.1 Prepare a minimum of three Type A specimens for each design configuration. If the design contains an electrically activated coating, only one temperature sensor per specimen is required.

6.2 Prepare a minimum of five Type B specimens for each design configuration. Prepare the specimen in such a manner as to produce smooth edges and corners to prevent chipping during testing. Polish at least one edge of each specimen to

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.03.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 14.02.