



Designation: E546 – 08

Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units¹

This standard is issued under the fixed designation E546; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method describes a laboratory procedure for determining the frost/dew point within the air space(s) of sealed insulating glass units, and establishes the criteria for determining whether that point is below or above a given or specified temperature.

1.2 This test method also describes the apparatus to be used for these determinations.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see 9.1.3.

2. Referenced Documents

2.1 *ASTM Standards:*²

[C1036 Specification for Flat Glass](#)

[E77 Test Method for Inspection and Verification of Thermometers](#)

[E576 Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position](#)

[E631 Terminology of Building Constructions](#)

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.22 on Durability Performance of Building Constructions.

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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.

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this test method, refer to Terminology E631.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *frost state*—the case where the frost/dew point of a sealed insulating glass unit is above the test temperature specified by the purchaser or user.

3.2.2 *frost/dew point, n*—the temperature at which water, organic vapor, or other chemicals begin to appear on the interior glass surface of a sealed insulating glass unit in contact with the measuring surface of the frost/dew-point apparatus.

3.2.3 *no-frost state*—the case where the frost/dew point of a sealed insulating glass unit is below the temperature specified by the purchaser or user.

4. Summary of Test Method

4.1 This test method is conducted by the use of a special apparatus, consisting basically of two chilled cylindrical metal blocks positioned one over the other and separated by a gap of controllable distance. The upper block has an exposed flat circular surface, 25 mm (1 in.) in diameter, and can be chilled to far below the ice point by regulating the air-gap distance between it and the lower metal block which is maintained at approximately -78°C (-109°F) by dry ice. The test specimen is placed in contact with this chilled flat circular surface of the upper block for specified short periods of time, with the metal surface at successively lower temperatures, to determine at what temperature frost appears on the corresponding lower air space glass surface.

5. Significance and Use

5.1 This test method and the apparatus described are intended primarily for sealed insulating glass units positioned horizontally. If the procedure is applied to such units in other than a horizontal position, the results may not be comparable to those obtained by this procedure.

NOTE 1—A similar method is Test Method **E576**.

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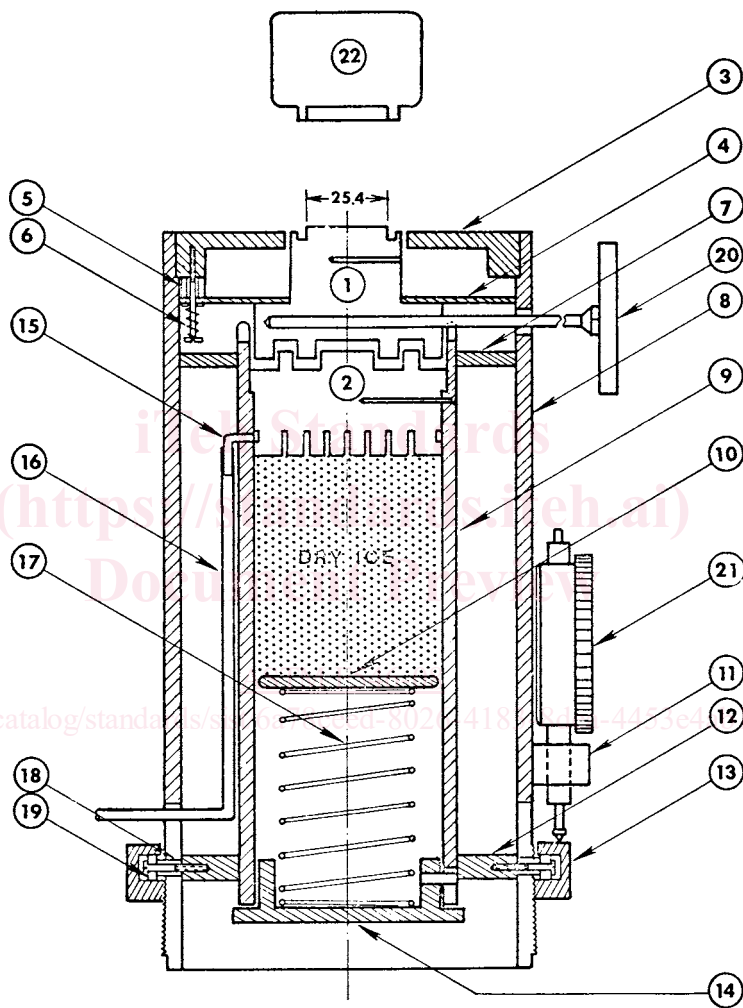
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6. Apparatus

6.1 Test Apparatus³(see Fig. 1), consisting of upper and lower cylindrical metal blocks with a thermocouple, bimetallic thermometer, or other suitable temperature sensors being

³ The sole source of supply of the apparatus known to the committee at this time is Dennis Industries, 20032 Waynegarden Court, Germantown, MD 20874, <http://www.dennisind.com>. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

inserted in the upper block; a control ring; and an insulated containment cylinder fitted with a retainer spring assembly. The two metal blocks are separated by a small air gap, the distance of which can be regulated by the control ring. The exposed flat circular surface of the upper block is 25 mm (1 in.) in diameter; has a ground or lapped finish; and, when placed in contact with the glass test specimen, forms the frost/dew point measuring surface. The lower block is chilled by a dry ice pack kept in contact with it by the retainer spring assembly, maintaining it at a temperature near to that of sublimating dry



Parts List

Part No.	Nomenclature	Part No.	Nomenclature
1	upper metal block	12	supporting ring, bottom of inner tube
2	lower metal block	13	control ring
3	top cover	14	cover lid, inner tube
4	supporting plate, upper metal block	15	elbow
5	spacer	16	tube, nylon
6	spring, upper metal block	17	main spring
7	supporting plate, top of inner tube	18	spacer
8	outer tube	19	bearing
9	inner tube	20	bimetallic dial thermometer
10	disk, dry ice pushing	21	dial indicator
11	clamp, dial gage	22	heat source block

FIG. 1 Schematic Diagram of Frost/Dew-Point Apparatus