



Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode¹

This standard is issued under the fixed designation E881; 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 practice covers a procedure for the exposure of solar collector cover materials to the natural weather environment at elevated temperatures that approximate stagnation conditions in solar collectors having a combined back and edge loss coefficient of less than $1.5 \text{ W}/(\text{m}^2 \cdot ^\circ\text{C})$.

1.2 This practice is suitable for exposure of both glass and plastic solar collector cover materials. Provisions are made for exposure of single and double cover assemblies to accommodate the need for exposure of both inner and outer solar collector cover materials.

1.3 This practice does not apply to cover materials for evacuated collectors, photovoltaic cells, flat-plate collectors having a combined back and edge loss coefficient greater than $1.5 \text{ W}/(\text{m}^2 \cdot ^\circ\text{C})$, or flat-plate collectors whose design incorporates means for limiting temperatures during stagnation.

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.*

2. Referenced Documents

2.1 ASTM Standards:²

D1435 Practice for Outdoor Weathering of Plastics

E765 Practice for Evaluation of Cover Materials for Flat Plate Solar Collectors (Withdrawn 1991)³

E772 Terminology of Solar Energy Conversion

E782 Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simu-

lating Operational Mode

G7 Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials

2.2 Other Documents:⁴

Federal Specification HH-I-558B, Amendment 3, Insulation Blocks, Boards, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering Thermal (Mineral Fiber, Industrial Type) August 1976

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this practice, refer to Terminology **E772**.

4. Significance and Use

4.1 This practice describes a weathering box test fixture and establishes limits for the heat loss coefficients. Uniform exposure guidelines are provided to minimize the variables encountered during outdoor exposure testing.

4.2 Since the combination of elevated temperature and solar radiation may cause some solar collector cover materials to degrade more rapidly than either exposure alone, a weathering box that elevates the temperature of the cover materials is used.

4.3 This practice may be used to assist in the evaluation of solar collector cover materials in the stagnation mode. No single temperature or procedure can duplicate the range of temperatures and environmental conditions to which cover materials may be exposed during stagnation conditions. To assist in evaluation of solar collector cover materials in the operational mode, Practice **E782** should be used. Insufficient data exist to obtain exact correlation between the behavior of materials exposed in accordance with this practice and actual in-service performance.

4.4 This practice may also be useful in comparing the performance of different materials at one site or the performance of the same material at different sites, or both.

4.5 Means of evaluating the effects of weathering are provided in Practice **E765**, and in other ASTM test methods that evaluate material properties.

¹ This practice is under the jurisdiction of ASTM Committee **E44** on Solar, Geothermal and Other Alternative Energy Sources and is the direct responsibility of Subcommittee **E44.05** on Solar Heating and Cooling Systems 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.

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

⁴ Federal Specification HH-I-558B has several classes of insulation material intended for high-temperature use.