Designation: E 745 – 80 (Reapproved 2003)

Standard Practices for Simulated Service Testing for Corrosion of Metallic Containment Materials for Use With Heat-Transfer Fluids in Solar Heating and Cooling Systems[1]

This standard is issued under the fixed designation E 745; 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 These practices cover test procedures simulating field service for evaluating the performance under corrosive conditions of metallic containment materials in solar heating and cooling systems. All test results relate to the performance of the metallic containment material only as a part of a metal/fluid pair. Performance in these test procedures, taken by itself, does not necessarily constitute an adequate basis for acceptance or rejection of a particular metal/fluid pair in solar heating and cooling systems, either in general or in a particular design.

1.2 These practices describe test procedures used to evaluate the resistance to deterioration of metallic containment materials in the several conditions that may occur in operation of solar heating and cooling systems. These conditions include: (*1*) operating full flow; (*2*) stagnant empty vented; (*3*) stagnant, closed to atmosphere, non-draindown; and (*4*) stagnant, closed to atmosphere, draindown.

1.3 The recommended practices cover the following three tests:

1.3.1 *Practice A*—Laboratory Exposure Test for Coupon Specimens.

1.3.2 *Practice B*—Laboratory Exposure Test of Components or Subcomponents.

1.3.3 *Practice C*—Field Exposure Test of Components or Subcomponents.

1.4 Practice A provides a laboratory simulation of various operating conditions of solar heating and cooling systems. It utilizes coupon test specimens and does not provide for heating of the fluid by the containment material. Practice B provides a laboratory simulation of various operating conditions of a solar heating and cooling system utilizing a component or a simulated subcomponent construction, and does provide for heating of the fluid by the containment material. Practice C provides a field simulation of various operating conditions of solar heating and cooling systems utilizing a component or a simulated subcomponent construction. It utilizes controlled schedules of operation in a field test.

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.* For a specific safety precaution statement see Section 6.

2. Referenced Documents

2.1 *ASTM Standards:*

E 712 Practice for Laboratory Screening of Metallic Containment Materials for Use With Liquids in Solar Heating and Cooling Systems[2]

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *collector*, *n*—a device designed to absorb incident solar radiation and transfer the energy to a heat-transfer fluid. A collector has an absorber surface, a containment membrane, and may or may not have insulation and glazing.

3.1.2 *panel*, *n*—the absorber surface and containment membrane within the collector.

3.1.3 *component*, *n*—an individually distinguishable product that forms part of a more complex product, that is, a subsystem or system. The panel and collector are each components.

3.1.4 *simulated subcomponent*, *n*—a specimen fabricated in such a manner as to embody the major characteristics of a component with regard to material selection, design, forming, joining, and surface condition.

4. Significance and Use

4.1 At this time none of these practices have been demonstrated to correlate with field service.

4.2 Because these procedures do not restrict the selection of either the containment material or the fluid for testing, it is

[1] These test methods are 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 Subsystems and Systems.

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[2] *Annual Book of ASTM Standards*, Vol 12.02.

[3] *Annual Book of ASTM Standards*, Vol 03.02.

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