Designation: E905 – 87 (Reapproved 2013)

Standard Test Method for Determining Thermal Performance of Tracking Concentrating Solar Collectors[1]

This standard is issued under the fixed designation E905; 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 test method covers the determination of thermal performance of tracking concentrating solar collectors that heat fluids for use in thermal systems.

1.2 This test method applies to one- or two-axis tracking reflecting concentrating collectors in which the fluid enters the collector through a single inlet and leaves the collector through a single outlet, and to those collectors where a single inlet and outlet can be effectively provided, such as into parallel inlets and outlets of multiple collector modules.

1.3 This test method is intended for those collectors whose design is such that the effects of diffuse irradiance on performance is negligible and whose performance can be characterized in terms of direct irradiance.

NOTE 1—For purposes of clarification, this method shall apply to collectors with a geometric concentration ratio of seven or greater.

1.4 The collector may be tested either as a thermal collection subsystem where the effects of tracking errors have been essentially removed from the thermal performance, or as a system with the manufacturer-supplied tracking mechanism.

1.4.1 The tests appear as follows:

	Section
Linear Single-Axis Tracking Collectors Tested as Thermal Collection Subsystems	11–13
System Testing of Linear Single-Axis Tracking Collectors	14–16
Linear Two-Axis Tracking and Point Focus Collectors Tested as Thermal Collection Subsystems	17–19
System Testing of Point Focus and Linear Two-Axis Tracking Collectors	20–22

1.5 This test method is not intended for and may not be applicable to phase-change or thermosyphon collectors, to any collector under operating conditions where phase-change occurs, to fixed mirror-tracking receiver collectors, or to central receivers.

1.6 This test method is for outdoor testing only, under clear sky, quasi-steady state conditions.

1.7 Selection and preparation of the collector (sampling method, preconditioning, mounting, alignment, etc.), calculation of efficiency, and manipulation of the data generated through use of this standard for rating purposes are beyond the scope of this test method, and are expected to be covered elsewhere.

1.8 This test method does not provide a means of determining the durability or the reliability of any collector or component.

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

1.10 *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]

E772 Terminology of Solar Energy Conversion

2.2 *Other Standard:*

ASHRAE 93-86, Methods of Testing to Determine the Thermal Performance of Solar Collectors[3]

NOTE 2—Where conflicts exist between the content of these references and this test method, this test method takes precedence.

NOTE 3—The definitions and descriptions of terms below supersede any conflicting definitions included in Terminology E772.

3. Terminology

3.1 *Definitions:*

3.1.1 *area, absorber, n*—total uninsulated heat transfer surface area of the absorber, including unilluminated as well as illuminated portions. **(E772)**

[1] This test method is under the jurisdiction of ASTM Committee E44 on Solar, Geothermal and Other Alternative Energy Sourcesand is the direct responsibility of Subcommittee E44.05 on Solar Heating and Cooling Systems and Materials.

Current edition approved Nov. 1, 2013. Published December 2013. Originally approved in 1982. Last previous edition approved in 2007 as E905 – 87(2007). DOI: 10.1520/E0905-87R13.

[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] Available from the American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., 1791 Tullie Circle, N.E. Atlanta, GA 30329.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States