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Australian Standard[®]

**Solar collectors with liquid as
the heat-transfer fluid - Method
of testing thermal performance**

This Australian standard was prepared by Committee CS/28, Solar Water Heaters. It was approved on behalf of the Council of the Standards Association of Australia on 3 November 1986 and published on 5 December 1986.

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Australian Gas Association
CSIRO, Division of Energy Technology
Department of Consumer Affairs, N.S.W.
Department of Housing and Construction
Department of Industrial Relations, N.S.W.
Department of Mines and Energy, N.T.
Department of Resources and Energy
Electricity Supply Association of Australia
Energy Authority of New South Wales
Engineering and Water Supply Department, S.A.
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International Solar Energy Society
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PREFACE

This standard was prepared by the Association's Committee on Solar Water Heaters, as one of a series of standards relating to solar hot water systems, in response to a request from the Australian and New Zealand section of the International Solar Energy Society.

The committee is preparing methods of test for complete solar hot water systems (incorporating collector, container and controls), but it has also recognized the need for a test to measure the thermal characteristic of the collectors commonly used in these systems.

In view of the extensive work done by the CSIRO, Division of Mechanical Engineering, and latterly by the Division of Energy Technology in developing such collector test methods, it was agreed that the CSIRO tests should form the basis of this standard, and the assistance received therefrom is gratefully acknowledged.

In this edition of the standard the scope has been extended to include all types of collector which utilize a liquid as the heat-transfer fluid, and provision has been made for testing either outdoors under natural sunlight or indoors under a solar simulator.

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FOREWORD

The test described in this standard is conducted outdoors using naturally occurring climatic conditions or indoors using a solar simulator. The test has been arranged to minimize the effects of uncontrolled variables.

The test method is based on that described in 'A Generalized Method for Testing All Classes of Solar Collector—Parts I, II and III' by D. Proctor, Solar Energy Vol. 32, No 3—1984, pages 377 to 399. Software for the calculations contained in this standard is available from the author of that paper.

One of the options in this test method will produce results which are similar to those arrived at using the appropriate sections of ASHRAE 93-77 (ANSI B198.1-1977), Methods of Testing to Determine the Thermal Performance of Solar Collectors. The thermal time-constant of a solar collector is not required to be measured since in system design it makes very little difference (less than 1 percent) whether it is taken into account or neglected.* The measurements required in this test method are substantially the same as those of ASHRAE 93-77, but the data reduction is more rigorous as are the requirements for the conditions during a test point period.

* See Klein, Duffie & Beckman, Journal of Engineering for Power, TRANS ASME, p.109 April 1974, 'Transient Consideration of Flat Plate Solar Collectors'.

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