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Interim Australian Standard®

Solar heating and cooling systems—Calculation of energy consumption

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This Interim Australian Standard® was prepared by Committee CS-028, Solar Water Heaters.
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The following are represented on Committee CS-028:

- Australian Building Codes Board
- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Institute of Refrigeration, Air Conditioning and Heating
- Australian Solar Cooling Interest Group
- Australian Solar Council
- Clean Energy Council
- Consumer Electronics Suppliers Association
- CSIRO
- Department of Climate Change and Energy Efficiency
- Electrical Compliance Testing Association
- Gas Appliance Manufacturers Association of Australia
- James Cook University
- Office of the Renewable Energy Regulator
- Sustainability Victoria
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- University of South Australia

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Interim Standard through their representation on the Committee.

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PREFACE

This Interim Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CS-028, Solar Water Heaters. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Interim Standard as an Australian Interim Standard rather than an Australian/New Zealand Interim Standard.

The objective of this Interim Standard is to provide manufacturers, regulators and Conformity Assessment Bodies with a means of evaluating the annual energy performance of solar cooling and heating systems, which may or may not also deliver hot water.

The performance evaluations are based on modelling annual performance in a range of climatic conditions using the TRNSYS simulation program. TRNSYS is specified as the modelling package because of its flexibility and capacity to model renewable energy cooling and heating systems.

The performance characteristics determined by test methods specified in this Interim Standard are for the purposes of modelling annual performance using the TRNSYS simulation program.

The electronic files of weather data and typical modelling data (TRNSYS deck files) are packaged with this Interim Standard. Any updates of these files during the interim period will be provided free of charge to those who have purchased the Interim Standard.

This Interim Standard applies only to desiccant wheel-based air conditioners. It is the Committee's intention that determination of the standardized annual energy use for products such as absorption and adsorption water chillers and dry and wet cooling towers will be added in a future edition. Interim test procedures for these products may be accepted by rating authorities.

Attention is drawn to the fact that this document is an Interim Australian Standard which will have a currency of two years from its date of publication, and should be regarded as a development Standard liable to future alteration. During the life of this document, the Committee will monitor all comments as received. At the conclusion of the two year period, this Interim Standard will be revised in the light of comments received, and confirmed or withdrawn.

The terms 'normative' and 'informative' have been used in this Interim Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Interim Standard sets out a method of evaluating the annual energy performance of solar cooling and heating systems using a combination of test results for component performance and a mathematical model to determine the standardized annual purchased energy use. The procedure is applicable to desiccant-based air conditioners capable of space heating, cooling or both, with or without water heating. For solar cooling and heating systems, displaced purchased energy relative to reference cooling and heating devices is also calculated.

NOTE: For stand-alone solar water heating systems, refer to AS/NZS 4234.

This Interim Standard also specifies methods of testing and reporting the energy performance characteristics of desiccant-based air conditioners.

This Interim Standard is applicable to domestic hot water loads as defined in AS/NZS 4234 and cooling and heating capacities typical of single household loads.

At this stage, this Interim Standard does not apply to the following:

(a) Systems that do not produce a steady conditioned air stream for a given fixed set of input conditions.

(b) Refrigeration systems.

(c) Systems in which the conditioning is delivered to a fluid other than air.

There are no product design or operation requirements in this Interim Standard. System operating parameters specified in this Interim Standard are only for the purpose of performance modelling.

1.2 APPLICATION

The procedure in this Interim Standard uses a mathematical model to assess annual energy consumption; hence the application of the procedure is restricted by the availability of suitable mathematical models. The analysis required by this Interim Standard shall be based on the TRNSYS simulation model (Version 16 or later) with modifications to the TRNSYS software to suit relevant packaged solar cooling and heating systems. The TRNSYS software package is available from The University of Wisconsin (see Appendix C). Weather data and typical modelling data files (TRNSYS deck files) are supplied with this Interim Standard (AS 5389). The operating conditions and product configurations to be used for evaluating the energy performance of a cooling and heating system are also defined in this Interim Standard.

This Interim Standard is applicable to solar cooling and heating systems that—

(a) are used for the purpose of maintaining human comfort inside buildings;

(b) use heat from solar collectors, which are capable of being tested to AS/NZS 2535.1 or ISO 9806-3; and

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