

Australian/New Zealand Standard™

**Heated water systems—Calculation of  
energy consumption**



## **AS/NZS 4234:2008**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee CS-028, Solar Water Heaters. It was approved on behalf of the Council of Standards Australia on 25 July 2008 and on behalf of the Council of Standards New Zealand on 28 July 2008.

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The following are represented on Committee CS-028:

Australian Chamber of Commerce and Industry  
Australian Electrical and Electronic Manufacturers Association  
Australian Industry Group  
Australian and New Zealand Solar Energy Society  
Chartered Institution of Building Services Engineers  
Department of Energy, Utilities and Sustainability (NSW)  
Energy Efficiency and Conservation Authority of New Zealand  
Gas Appliance Manufacturers Association of Australia  
Institution of Professional Engineers New Zealand  
James Cook University  
Massey University  
Master Plumbers, Gasfitters and Drainlayers New Zealand  
New Zealand Solar Industries Association  
Office of the Renewable Energy Regulator  
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## PREFACE

A3 | This Standard was prepared by the Joint Standards Australia/New Zealand Committee CS-028, Solar Water Heaters to supersede AS 4234—1994. The performance evaluation procedure defined in this Standard has been designed to provide a means of evaluating the annual task performance of heated water systems.

*This Standard incorporates Amendment No. 1 (March 2011), Amendment No. 2 (November 2011) and Amendment No. 3 (November 2014). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

Testing of solar and heat pump water heating systems under outdoor conditions has been defined in AS 2984, *Solar water heaters—Methods of test for thermal performance—Outdoor test method*. Outdoor testing requires a long test period (8–10 weeks) due to the need to obtain stable inputs for a range of operating conditions. The major drawback of outdoor testing is that the tests must be repeated for every variation of system configuration offered by the supplier. The procedure defined in this Standard overcomes the time and cost limitations of using the outdoor test standard AS 2984.

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 the wide range of renewable energy water heaters used in Australia and New Zealand.

A3 | It is the committee's intention that determination of the standardized annual energy use for other products, such as integral solar water heaters (combined solar collector and storage tank), will be added to this Standard by amendment. Interim test procedures for these products may be accepted by rating authorities.

The terms 'normative' and 'informative' have been used in this 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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## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

**Australian/New Zealand Standard****Heated water systems—Calculation of energy consumption**

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE**

This Standard sets out a method of evaluating the annual energy performance of water heaters 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 electric, gas and solar water heaters with integral boosting or preheating into a conventional storage or instantaneous water heater and to heat pump water heaters. For solar and heat pump water heaters, displaced purchased energy relative to reference water heaters is also calculated. Solar and solar boosted heat pump water heater types not covered in the application of this Standard can be tested under AS 2984 to obtain an annual performance assessment.

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

**1.2 APPLICATION**

The procedure in this Standard uses a mathematical model to assess annual energy, hence the application of the procedure is restricted by the availability of suitable mathematical models. The analysis required by this Standard shall be based on the TRNSYS simulation model (version 15 or later) with modifications to suit typical packaged solar and heat pump water heaters. The TRNSYS software package is available from The University of Wisconsin (see Appendix E). Weather data and typical modelling data files (TRNSYS deck files) are supplied with this Standard. The operating conditions and product configurations to be used for evaluating the energy performance of a water heater are also defined in this Standard.

This Standard may be applied to the following water heaters:

- (a) Electric and gas storage water heaters.
- (b) Electric and gas instantaneous heaters.
- (c) Solar water heaters with—
  - (i) flat plate, concentrating or evacuated tubular solar collectors;
  - (ii) thermosiphon or pumped fluid circulation through the solar collectors;
  - (iii) collector loop heat exchangers in a thermosiphon loop;
  - (iv) horizontal or vertical water storage tanks;
  - (v) storage tanks with single or dual electric element(s);
  - (vi) storage tanks with internal gas boosting; and
  - (vii) storage tanks with delivery side heat exchangers.
- (d) Solar preheaters in series with electric or gas storage or instantaneous boosters.