Standards
Association of
Australia

Australian Standard®
2002—1987

SOLAR WATER HEATERS—INSTALLATION

For referenced documents see Annex p. 62

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 17 August 1987 and published on 9 November 1987.

The following interests are represented on Committee CS/28:

Australian Gas Association

CSIRO, Division of Energy Technology

Department of Consumer Affairs, N.S.W.

Department of Housing and Construction

Department of Industrial Relations and Employment, 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.

Gas and Fuel Corporation of Victoria

International Solar Energy Society

Master Plumbers and Mechanical Services Association of Victoria

Melbourne and Metropolitan Board of Works

Metal Trades Industry Association of Australia

Solar Energy Industries Association of Australia

University of New South Wales

Victorian Solar Energy Council

This Standard was issued in draft form for comment as DR 86020.

AUSTRALIAN STANDARD

SOLAR WATER HEATERS—INSTALLATION

AS 2002—1987

First published 1979
Second edition 1981
Third edition 1987

PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.

ISBN 0 7262 4731 6

PREFACE

This Standard was prepared by the Association's Committee on Solar Water Heaters, to supersede AS 2002—1981, the Installation of Household Type Solar Hot Water Supply Systems. It is one of a series of Standards relating to solar hot water systems prepared in response to a request from the Australian and New Zealand section of the International Solar Energy Society. This request received active support from Australian manufacturers of solar hot water systems, energy supply authorities and the Commonwealth Scientific and Industrial Research Organization (CSIRO).

The manufacture and use of solar hot water systems has been established in Australia for many years, but prior to 1979 there were no Australian Standards relating to the design, construction, installation and performance of these items. With increasing awareness of the need to make greater use of available solar energy and the increasing costs of using non-renewable energy supplies, it was felt that the establishment of Standards and codes of practice in this field was necessary both from the point of view of providing a measure of consumer protection, and to facilitate efficient use of resources.

This Standard covers some subjects in common with AS 1529—1974, Code of Practice for Installation of Household Type Hot Water Supply Systems, and the requirements of the two Standards are compatible. Upon completion of the revision of AS 1529 it is proposed that much of the material in AS 2002 will be replaced with a cross reference to AS 1529.

This edition includes additional material dealing with the installation of solar water heaters incorporating heat exchange units, and also with the installation of larger systems comprising a number of household type units in multiple-unit arrangement. Requirements for expansion control valves have also been revised.

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FOREWORD

The primary aim of an installation using solar energy for water heating is to optimize the solar contribution (thereby reducing the consumption of other forms of energy) in the provision of hot water on demand and in sufficient quantity in all weathers, always at or above the required minimum temperature and at an acceptable overall cost.

Commercially available household type solar hot water units in Australia are designed to operate up to about 60 °C with an acceptable solar contribution. Operation of these units at higher temperatures will result in reduced solar contribution.

Environmental factors of solar radiation for the area, local considerations of dust, hail, frost, shade, and wind, and the aspects of both the quality of water used and the consumer hot water usage habits will affect both the performance and the service life of the unit. Other considerations must be applied to the aesthetics of any installation both to the occupier of the dwelling where a solar hot water unit is installed and to the possible effect upon occupants of neighbouring premises.

Systems rated in accordance with AS 2813 or AS 2984 must be installed strictly in accordance with the manufacturer's instructions and with the relevant sections of this Standard in order to ensure that the rated performance is achieved. The performance of unrated systems (typically those assembled from components of different manufacture) and of forced circulation systems (where the water is circulated through the solar collector by means other than thermosiphon action) will be particularly dependent upon compliance with this Standard.

Basic reference data are included in this Standard and appendices provide information to assist in the choice of a suitable system.

Full collaboration at the planning stage between the architect, owner, builder, fuel suppliers, manufacturers, contractors, and authorities is essential.

To achieve optimum system performance, it is recommended that wherever possible one contractor be responsible for the complete solar hot water installation and for coordinating all trades on-site, positioning the collectors for acceptable solar contribution, locating the container nearest the most used draw-off point, keeping all pipe runs to a minimum, and the final testing and handover of the system to the owner or occupier.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
SOLAR WATER HEATERS—INSTALLATION

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out requirements for the installation of solar hot water supply systems in household premises and in commercial and industrial installations comparable with household installations, intended to deliver potable water of acceptable quality.

It covers systems with fixed orientation and inclination with volumetric storage capacity up to and including 700 L, used either singly or in multiple-unit installations.

The Standard is applicable to both thermosiphon and pumped systems, to both close-coupled (or integral) systems and systems with the container remote from the collectors, and to both rated and unrated systems. Requirements relating to the installation of supplementary heating (electricity, gas, liquid or solid fuel) are also specified.

The Standard does not apply to space heating or swimming pool heating installations.

1.2 REFERENCED DOCUMENTS. A list of the Standards referred to in this Standard is given in the Annex.

1.3 DEFINITIONS. For the purpose of this Standard, the following definitions apply.

NOTES:

1. Figures 1.1 to 1.4 are intended to provide visual clarification of some of the definitions. In these figures, individual points of the several system installations are identified both by name and by the clause number associated with them. In some cases, the clause number is that of the definition and in others that of a particular requirement.
2. Some definitions and requirements are also illustrated in Figures 3.1 and 3.3, and in Figures J1, J2, J3, and K1.
3. A comprehensive glossary of plumbing terms is given in AS 1355.

1.3.1 Absorber—a device within a collector for absorbing radiant energy and transferring this energy as heat into a fluid.

1.3.2 Air eliminator—a device which opens to release accumulated air from the system and which automatically closes in the presence of a liquid.

1.3.3 Angle of inclination—angle between the absorbing surface of the collector and the horizontal.

1.3.4 Capacity.

1.3.4.1 *Capacity of a solar water heater*—the usable hot water delivered by the system when tested in accordance with AS 2813 or AS 2984.

1.3.4.2 *Volumetric storage capacity of container*—the total volume of water which may be held in the container.

NOTE: Storage capacity is expressed in litres.

1.3.5 Cistern-fed water heater—a water heater which is supplied with cold water from a feed tank in which the level of the water is automatically maintained. The cold water feed tank may form an integral part of the water heater or it may be detached and mounted separately so that the maximum working head is not exceeded.

NOTE: Water heaters in which the level of water is automatically maintained by means of a float or similar valve located inside the container are regarded as cistern-fed water heaters for the purpose of this Standard.

1.3.6 Close-coupled solar water heater—a solar water heater in which the collector abuts the container on a common chassis or cradle. (See Figure 1.1.)

1.3.7 Collector—a device containing an absorber. Collectors may be installed either as single or multiple units supplying to a common container.

1.3.8 Collector aperture—the net area available for transmission of solar radiation through the outer air/cover interface.

1.3.9 Combination relief valve—a valve which combines the features of temperature and pressure relief valves.

1.3.10 Container—the vessel, including fittings, in which the heated water is stored.

NOTE: The container is sometimes referred to as the 'storage container', 'cylinder', or 'tank'.

1.3.11 Contractor—the person or firm responsible to the customer for the installation of the solar hot water system and/or supplementary heating system where required.

NOTE: The contractor is sometimes referred to as 'the installer'.

1.3.12 Dead water—uncirculated water drawn from a hot water outlet prior to the establishment of hot water at an acceptable temperature.

1.3.13 Displacement water heater—a water heater in which cold water is fed into the container at or near the bottom, displacing but not mixing with the hot water as it is drawn off at or near the top.

1.3.14 Expansion control valve—a pressure-activated valve which opens in response to an increase in pressure caused by the expansion of water during the normal heating cycle of the water heater, and which is designed for installation on the cold water supply to the water heater.

1.3.15 Falling level water heater—a water heater with a free water surface in which hot water is drawn off at or near the bottom, the level of the water falling as the hot water is drawn off.

1.3.16 Float valve—a valve for controlling the flow into a cistern or other vessel, which is operated by the movement of a float.

NOTE: The float valve is sometimes called a 'ball valve' or 'ball cock'.

1.3.17 Forced circulation—a circulated flow in any primary, secondary, or supplementary circuit occasioned by the use of pumps or other mechanical means. (See Figure 1.4).