

Dup

**LOAN COPY**  
INFORMATION CENTRE  
STANDARDS AUSTRALIA

AS 2040—1990

ds Revision (in Part) see DR 97559  
see DR 97560

**WITHDRAWN:**  
19980705  
**SUPERSEDED BY:**  
AS/NZS 2040.1:1998

Australian Standard®

---

**Performance of household electrical  
appliances—Clothes washing  
machines**

---

H



**STANDARDS AUSTRALIA**



This Australian Standard was prepared by Committee EL/15, Quality and Performance of Household Electrical Appliances. It was approved on behalf of the Council of Standards Australia on 23 July 1990 and published on 15 October 1990.

---

The following interests are represented on Committee EL/15:

Australian Consumers Association  
Australian Electrical and Electronics Manufacturers Association  
Australian Federation of Consumer Organizations  
Consumer Electronics Suppliers Association  
Department of Business and Consumer Affairs, N.S.W.  
Electricity Supply Association of Australia  
Metal Trades Industry Association of Australia

---

**Review of Australian Standards.** To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up-to-date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

---

This Standard was issued in draft form for comment as DR 89220.

AS 2040—1990

**Australian Standard®**

---

**Performance of household electrical  
appliances—Clothes washing  
machines**

---

First published as AS 2040—1977.  
Second edition 1990.

PUBLISHED BY STANDARDS AUSTRALIA  
(STANDARDS ASSOCIATION OF AUSTRALIA)  
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW  
ISBN 0 7262 6467 9

## PREFACE

This Standard was prepared by the Standards Australia Committee on Quality and Performance of Household Electrical Appliances to supersede AS 2040—1977, *Household electric clothes washing machines*.

It differs from AS 2040—1977 in a number of ways including the following:

- (a) The inclusion of point-of-sale information requirements.
- (b) The recommendation that purchasers be advised concerning the most economical use of the machine.
- (c) The inclusion of requirements regarding water hammer effect.
- (d) The insertion of performance requirements, for reference machines, and clothes washing machines.
- (e) The wash temperature in the test for determination of percentage soil removal has been reduced, reflecting current practice and the need to reduce energy usage.
- (f) The standard detergents have been changed.
- (g) The insertion of requirements and tests for severity of washing action.
- (h) The insertion of requirements and tests for energy and water consumption.
- (i) The insertion of requirements for clothes washing machines that include a wool wash program.

The role of the laboratory reference machine in this Standard is different from that of the reference machine in IEC 456, *Methods for measuring the performance of electric clothes washing machines for household use*, in which the reference machine sets the performance standards in tests to which the performance of other machines are referred.

The laboratory reference machine is used in this Standard to determine if the test materials, test equipment, and methods used by testing personnel in a series of tests will produce valid results.

The inclusion of a Clause covering minimum service life is under consideration for a future edition of this Standard.

The requirements for rinse effectiveness index are under consideration pending the results of further testing.

### © Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the Head Office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

## CONTENTS

	<i>Page</i>
<b>SECTION 1 SCOPE AND GENERAL</b>	
1.1 SCOPE .....	5
1.2 REFERENCED DOCUMENTS .....	5
1.3 SAFETY REQUIREMENTS .....	5
1.4 DEFINITIONS .....	5
<b>SECTION 2 DESIGN AND CONSTRUCTION</b>	
2.1 GENERAL .....	7
2.2 SWITCHES AND CONTROLS .....	7
2.3 OPERATIONAL LIMITS .....	7
2.4 HOSES AND FITTINGS .....	7
2.5 PREVENTION OF BACKFLOW .....	7
2.6 WATER HAMMER .....	7
2.7 CALCULATED AND RATED LOAD CAPACITIES .....	7
<b>SECTION 3 PERFORMANCE AND GENERAL REQUIREMENTS FOR LABORATORY REFERENCE MACHINES</b>	
3.1 GENERAL .....	9
3.2 PURPOSE .....	9
3.3 WATER HEATING CAPABILITY .....	9
3.4 WASH PROGRAM .....	9
3.5 REPEATABILITY OF TEST RUNS .....	9
3.6 PERCENTAGE SOIL REMOVAL .....	9
3.7 PERCENTAGE WHITENESS RETENTION .....	9
3.8 RINSE EFFECTIVENESS INDEX .....	9
3.9 WATER EXTRACTION INDEX .....	9
3.10 SEVERITY OF WASHING ACTION INDEX .....	9
3.11 GENERAL REQUIREMENTS .....	9
<b>SECTION 4 PERFORMANCE REQUIREMENTS FOR CLOTHES WASHING MACHINES</b>	
4.1 GENERAL .....	10
4.2 PERCENTAGE SOIL REMOVAL .....	10
4.3 PERCENTAGE WHITENESS RETENTION .....	10
4.4 RINSE EFFECTIVENESS INDEX .....	10
4.5 WATER EXTRACTION INDEX .....	10
4.6 SEVERITY OF WASHING ACTION INDEX .....	10
4.7 WOOL WASH PROGRAM .....	10
4.8 ENERGY AND WATER CONSUMPTION .....	10
4.9 VIBRATION DURING WATER EXTRACTION (SPIN DRYING) (AGITATOR-TYPE AND IMPELLER-TYPE WASHING MACHINES ONLY) .....	10
4.10 OPERATION AT MAXIMUM AND MINIMUM WATER PRESSURES .....	10
<b>SECTION 5 MARKINGS, INSTRUCTIONS AND OTHER INFORMATION</b>	
5.1 MARKINGS .....	11
5.2 POINT-OF-SALE INFORMATION .....	11
5.3 GUARANTEE .....	11
5.4 INSTALLATION INSTRUCTIONS .....	11
5.5 INSTRUCTIONS FOR OPERATION AND CARE .....	12
5.6 SOURCE FOR REPLACEMENT PARTS .....	12

APPENDICES

A	GENERAL TEST CONDITIONS AND PROCEDURES	13
B	DETERMINATION OF PERCENTAGE SOIL REMOVAL	16
C	DETERMINATION OF PERCENTAGE WHITENESS RETENTION	21
D	DETERMINATION OF RINSE EFFECTIVENESS INDEX	24
E	DETERMINATION OF WATER EXTRACTION INDEX	26
F	DETERMINATION OF SEVERITY OF WASHING ACTION INDEX	27
G	DETERMINATION OF ENERGY AND WATER CONSUMPTION	29
H	VIBRATION WALKING TEST	31
I	STANDARD MIXED COTTON TEST LOADS	33
J	REFLECTOMETER REQUIREMENTS AND CALCULATION OF PERCENTAGE SOIL REMOVAL	34

# STANDARDS AUSTRALIA

## Australian Standard

### Performance of household electrical appliances—Clothes washing machines

#### SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE** This Standard specifies requirements for the design and construction of automatic, non-automatic and semi-automatic electric clothes washing machines for household use, and specifies levels for the principal performance characteristics.

For clothes washing machines designed to wash at more than one water level, this Standard applies to the performance of clothes washing machines at rated load capacity only, or at the calculated load capacity ( $M_c$ ) if the rated load capacity is not stated.

For clothes washing machines that wash at one water level only, this Standard applies to the performance of clothes washing machines at both full and half rated or calculated load capacity.

It applies to top-loading, agitator-type and impeller-type and to front-loading drum-type clothes washing machines that—

- (a) connect to the cold water supply and provide a heating device for the washing water;
- (b) connect to both cold and hot water supplies with or without a heating device for supplementary heating of the washing water; or
- (c) are filled manually without the use of dedicated connections to the water supply(s).

This Standard also applies to electric clothes washing machines that form part of clothes washer dryer combinations for household use.

NOTE: AS 2442 specifies the performance requirements for rotary clothes dryers.

It does not apply to clothes washing machines intended for use in commercial laundries and laundrettes.

This Standard should not be used for the evaluation or comparison of the performance of washing agents or other laundry aids.

The application of this Standard to clothes washing machines designed to wash only in cold water is under consideration.

**1.2 REFERENCED DOCUMENTS** The documents below are referred to in this Standard:

AS

1284 Electricity meters

1284.2 Part 2: Portable alternating current rotating standard watt-hour meters

2202 Code of practice for the provision of warranties/guarantees for household goods

2323 Provision of point-of-sale information for household goods (Buy guide)

2442 Performance of household electrical appliances—Rotary clothes dryers

3163 Approval and test specification—Electric washing machines for household use

3500 National Plumbing and Drainage Code

3500.1 Part 1: Water supply

AWC\* Test Method 102: Method for the measurement of the felting severity of the wool product wash cycle or washing action of domestic washing machines

**1.3 SAFETY REQUIREMENTS** This Standard does not include the electrical safety requirements needed to secure approval for connection or sale of household electric clothes washing machines. An electric clothes washing machine shall, in addition to complying with this Standard, comply with AS 3163.

**1.4 DEFINITIONS** For the purpose of this Standard, the definitions below apply:

**1.4.1 Washing machine**—an appliance designed to wash textile materials in water by mechanical action, and extract water therefrom, usually by centrifugal action.

**1.4.2 Agitator-type washing machine**—a top-loading clothes washing machine in which the textile material is substantially immersed in the washing water; in which the mechanical action is produced by a device moving about or along its axis with a regularly reversing rotary motion. This device extends above the maximum water level.

\* AWC Australian Wool Corporation.