AS/NZS 2007.1:2005

Australian/New Zealand Standard™

Performance of household electrical appliances—Dishwashers

Part 1: Methods for measuring performance, energy and water consumption

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-015, Quality and Performance of Household Electrical Appliances. It was approved on behalf of the Council of Standards Australia on 29 November 2005 and on behalf of the Council of Standards New Zealand on 9 December 2005. This Standard was published on 22 December 2005.

The following are represented on Committee EL-015:

Australian Consumers' Association
Australian Electrical and Electronic Manufacturers Association
Australian Industry Group
Australian Retailers Association
Business New Zealand
Consumer Electronics Suppliers Association
Consumers' Federation of Australia
Department of Energy, Utilities and Sustainability (NSW)
Department of Industrial Relations (QLD)
Electrical Compliance Testing Association
Energy Efficiency and Conservation Authority of New Zealand
Institution of Professional Engineers New Zealand
National Appliance and Equipment Energy Efficiency Committee
National Association of Testing Authorities Australia
Office of the Chief Electrical Inspector
Office of the Technical Regulator (SA)

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.standards.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

Alternatively, both organizations publish an annual printed Catalogue with full details of all current Standards. For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR 05236.

Australian/New Zealand Standard™

Performance of household electrical appliances—Dishwashers

Part 1: Methods for measuring performance, energy and water consumption

Originated as AS 2007—1977.
Jointly revised and redesignated as AS/NZS 2007.1:1998.
Fifth edition 2005.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-015, Quality and Performance of Household Electrical Appliances, to supersede AS/NZS 2007.1:2003, *Performance of household electrical appliances—Dishwashers*, Part 1: *Energy consumption and performance* on publication.

The AS/NZS 2007 series comprises two Parts, as follows:

AS/NZS

2007 Performance of household electrical appliances—Dishwashers

2007.1 Part 1: Methods for measuring performance, energy and water consumption (this Standard)

2007.2 Part 2: Energy efficiency labelling requirements

The Parts of AS/NZS 2007 are summarized as follows:

(a) *Part 1* Includes performance test procedures and minimum performance criteria for dishwashers.

(b) *Part 2* Includes algorithms for the calculation of the energy efficiency star rating and projected energy usage, performance requirements, details of the energy label and requirements for the valid application for registration for energy efficiency labelling. It also includes the application form for registration for water efficiency labelling. It has been structured to be suitable for reference in regulatory legislation and to be used in conjunction with Part 1.

The overall objective of the AS/NZS 2007 series is to promote high levels of performance, energy efficiency and water efficiency in electric dishwashers.

This Standard includes a number of requirements from the third edition of IEC 60436, published in February 2004, which will bring this Standard closer to the IEC Standard. It also incorporates the following significant changes in comparison to earlier editions of the Standard.

(i) Test methods have generally been made more repeatable and reproducible.

(ii) It is intended to phase out the AS/NZS test load by December 2007, until that date, the AS/NZS test load (without serving utensils and bowls) is allowed as an alternative to the IEC test load in this Standard.

(iii) A ‘test program’ has been defined and it has been clarified that any program can be tested to this Standard, but the performance requirements in Section 4 only apply to the program recommended for a normally soiled load. The program for a normally soiled load is the program mandated for energy efficiency labelling in AS/NZS 2007.2.

(iv) Definitions in this Standard are now generally aligned with IEC definitions.

(v) Program time and cycle time have been added to the definitions.

(vi) Power measurements on a number of standby modes are now required. Standby modes have been added to the definitions and examples of the types of standby modes have been added in Appendix M.

NOTE: The impact of communication by appliances over a network is under consideration.

(vii) There are improved instructions regarding the use of the reference machine.

(viii) A recommendation to purchase all test materials from the sources referred to at http://www.energyrating.gov.au has been added to minimize variations in test results. These materials will be used for check testing.

A summary of differences between this edition and the IEC 60436 Ed. 3 is included in the Foreword.

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.

CONTENTS

Page

SECTION 1 SCOPE AND GENERAL
1.1 SCOPE 8
1.2 OBJECTIVE 8
1.3 REFERENCED DOCUMENTS 8
1.4 DEFINITIONS 9
1.5 ROUNDING 11

SECTION 2 MEASUREMENTS TO BE PERFORMED AND REQUIREMENTS FOR TESTING
2.1 GENERAL 12
2.2 TEST CONDITIONS, INSTRUMENTATION AND MATERIALS 12
2.3 PREPARATION OF A DISHWASHER FOR TESTING 12
2.4 GENERAL TEST PROCEDURES 12
2.5 CHECK OF RATED CAPACITY 12
2.6 PREPARATION AND SOILING OF LOADS 12
2.7 DETERMINATION OF WASHING PERFORMANCE 12
2.8 DETERMINATION OF ENERGY CONSUMPTION AND STANDBY POWER 12
2.9 MEASUREMENT OF WATER CONSUMPTION 12
2.10 DETERMINATION OF DRYING PERFORMANCE 12
2.11 EVALUATION AND CALCULATION OF WASHING AND DRYING INDICES 12
2.12 SAMPLE CALCULATIONS 12
2.13 REFERENCE MACHINE SPECIFICATION 13

SECTION 3 USE OF REFERENCE MACHINE
3.1 GENERAL 14
3.2 PROGRAM 14
3.3 DETERGENT 14
3.4 WATER SOFTENER 14
3.5 TEST CONDITIONS 14
3.6 USE OF REFERENCE MACHINE 15
3.7 REFERENCE MACHINE LOG 15
3.8 RESULTS RECORD 15
3.9 CALIBRATION CHECKS 15

SECTION 4 PERFORMANCE REQUIREMENTS
4.1 GENERAL 17
4.2 WATER PRESSURE 17
4.3 RATED CAPACITY 17
4.4 WASHING INDEX 17
4.5 WATER CONSUMPTION 17
4.6 DRYING INDEX 17

SECTION 5 REQUIREMENTS FOR ACCOMPANYING INFORMATION
5.1 GENERAL 18
5.2 RATED CAPACITY 18
5.3 LOADING PATTERN 18
5.4 DETERGENT 18
5.5 RINSE AGENT 18
5.6 PROGRAM 18
5.7 OTHER 18

Page

APPENDICES

A TEST CONDITIONS, INSTRUMENTATION AND MATERIALS 20
B PREPARATION OF A DISHWASHER FOR TESTING AND GENERAL TEST PROCEDURES 33
C PREPARATION AND SOILING OF LOADS 36
D DETERMINATION OF WASHING PERFORMANCE, ENERGY AND WATER CONSUMPTION AND STANDBY POWER 42
E DETERMINATION OF DRYING PERFORMANCE 48
F EVALUATION AND CALCULATION OF WASHING AND DRYING INDICES 49
G EXAMPLE CALCULATIONS OF WASHING AND DRYING INDICES AND ENERGY CONSUMPTION 56
H REFERENCE MACHINE DETAILS 60
I ADJUSTING WATER CONSUMPTION IN THE REFERENCE MACHINE 62
J CORRECTING FOR VARIATIONS IN ENERGY CONSUMPTION DURING A TEST SERIES 63
K DISHWASHER TEST REPORT FORMAT 65
L VIEWING CABINET 69
M EXAMPLES OF STANDBY MODES 70

FOREWORD

For comparative testing, the most reliable results will be obtained from the methods of measurement given in this Standard when the measurements are conducted in the same laboratory, at one time, by the same operators. However, compliance with the performance and test requirements of this Standard should ensure that a dishwasher will give satisfactory performance in service.

For determination of the washing and drying indices, the procedure and timing in Appendices D and E is provided to ensure consistent results. For determination of washing performance in accordance with this Standard, it is essential to use a reference machine.

This Standard is broadly based on IEC 60436:1981, *Methods for measuring the performance of electric dishwashers* and more recently has drawn from work undertaken within the IEC SC59A on a revised international dishwasher test method, which was published in IEC 60436, Edition 3, February 2004. The work within IEC has drawn on both European CENELEC Standard EN 50242 and US industry Standard AHAM DW-1. Acknowledgment is made of the assistance received from all of these Standards.

IEC 60436, Edition 3 uses the Universal 65°C as the reference program, but this is used to determine a relative performance index for declaration by the manufacturer (wash and dry performance is included on the EU energy label). The reference program on the reference machine used in this Standard is Gentle 45°C which is used to set a pass/fail for wash performance, rather than a manufacturer declaration of wash performance as is the case in Europe. IEC 60436, Edition 3 also uses the reference machine to assess drying performance whereas it is not used for assessing drying performance in this Standard.

This Standard has differences from and similarities to IEC 60436, Edition 3 in a number of ways, as follows:

(a) This Standard allows the use of an IEC load (without serving items) or the original AS/NZS load as an alternative. IEC also allow an AHAM (US) load as an alternative to the ‘European’ load.

NOTE: The AS/NZS load is to be phased out by December 2007.

(b) There are slight differences in the ambient humidity requirements between AS/NZS (60%) and IEC (55% or 65% dependent on the soil drying method).

(c) The food items used for soiling the load in this Standard are slightly different to IEC 60436, Edition 3. AS/NZS more closely resembles the soiling from IEC 60436:1981. AS/NZS still uses tomato juice while the IEC 60436, Edition 3 uses milk treated in a microwave as well as minced meat. Some soil items are slightly different (e.g. tinned spinach versus frozen spinach) and the preparation of some items and the allocation of soils to the load itself are also slightly different.

(d) AS/NZS cold water supply temperature is 20°C while IEC is 15°C.

(e) AS/NZS water hardness is soft (45 ppm) while IEC specify both soft (≤70 ppm) and hard (250 ppm) water alternatives.

(f) AS/NZS water pressure is 320 kPa while IEC is 240 kPa.

(g) AS/NZS reference detergent is based on the old IEC type A (phosphate based with chlorine bleach), while IEC specifies type C detergent (phosphate based with oxygen bleach and enzymes). IEC also have new rinse agent formulations (types III and IV).

NOTE: CENELEC still use detergent B and the older rinse aid formulations at the time of publication.