AS/NZS 2040.1:2021

Australian/New Zealand Standard™

Performance of household electrical appliances — Clothes washing machines

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

AS/NZS 2040.1:2021

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-059, Dishwashers, Clothes Washers and Dryers. It was approved on behalf of the Council of Standards Australia on 24 November 2020 and by the New Zealand Standards Approval Board on 03 February 2021.

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Consumers' Federation of Australia
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Department of Industry, Science, Energy and Resources (Australian Government)
Electrical Compliance Testing Association of Australia
Energy Efficiency and Conservation Authority of New Zealand
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Australian/New Zealand Standard™

Performance of household electrical appliances — Clothes washing machines

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

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-059, Dishwashers, Clothes Washers and Dryers, to supersede AS/NZS 2040.1:2005, *Performance of household electrical appliances — Clothes washing Machines Part 1: Methods for measuring performance, energy and water consumption*.

The objective of this Standard is to specify test procedures and minimum performance criteria for determining the performance characteristics of electric household clothes washing machines that are within the scope of the relevant legislation.

This Standard does not specify safety requirements.

The AS/NZS 2040 series comprises two parts, as follows:

AS/NZS 2040.1, *Performance of household electrical appliances — Clothes washing machines, Part 1: Methods for measuring performance, energy and water consumption* (this Standard)

AS/NZS 2040.2, *Performance of household electrical appliances — Clothes washing machines, Part 2: Energy efficiency labelling requirements*

The parts of this series are summarized as follows:

(a) *Part 1* — Specifies performance test procedures and minimum performance criteria for clothes washing machines.

(b) *Part 2* — Includes algorithms for the calculation of the energy efficiency star rating and comparative energy consumption, performance requirements, details of the energy rating label and information on the requirements for the valid application for registration for energy efficiency labelling. It also includes information for registration for water efficiency labelling. Part 2 is to be used in conjunction with Part 1.

The overall objective of the AS/NZS 2040 series is to promote high levels of performance, energy efficiency and water efficiency in clothes washing machines.

The main changes in this Standard are as follows:

(i) Extension of the loading table from 10 kg up to 20 kg, aligning with market offerings and AS/NZS 2442 series, *Performance of household electrical appliances — Rotary clothes dryers.*

(ii) Definition and test procedure for multi-compartment clothes washing machines.

(iii) The test voltage is specified as 230 V.

(iv) The relevant legislation is described.

As documented in ISO 80000-1, *Quantities and units —Part 1: General,* the SI unit for litres may be either "L" or "l". For the purpose of this document, and in conformance with Australian and New Zealand Standards, "L" is used as the unit for litres.

This Standard has been developed in consultation with regulatory authorities and is intended to be considered with reference to the relevant legislation. It refers to AS/NZS 2040.2 for energy efficiency labelling requirements. AS/NZS 6400, *Water efficient products — Rating and labelling,* references this Standard for water efficiency labelling requirements.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

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Introduction

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. Conformance to the performance and test requirements of this Standard should ensure that a clothes washing machine will give satisfactory performance in service.

This Standard is based on concepts initially published in IEC 60456:2003 (Edition 4), *Clothes washing machines for household use — Methods for measuring the performance*. This Standard has differences from and similarities to IEC 60456 Ed. 5:2003, as follows [with differences with IEC 60456: 2010 (Edition 5) noted in square brackets like this, if any]:

(a) Specific minimum performance requirements for washing, spinning, rinsing and severity of washing are included in this standard. IEC does not specify minimum performance requirements.

(b) Water hardness is specified as 0.45 mmol/L (45 ppm CaCO3 equivalent) in this standard. IEC 60456: 2003 specifies 2.5 mmol/L (250 ppm). [IEC 60456:2010 permits both 2.5 mmol/L (hard water) and 0.5 mmol/L (soft water)].

(c) Cold water temperature is 20 °C in this standard while IEC 60456 specifies 15 °C.

(d) Ambient temperature for testing is 20 °C in this standard. [IEC 60456:2010 specifies an ambient temperature for testing of 23 °C].

(e) Only IEC Type B phosphate-based detergent is used for drum type machines in this standard. IEC 60456:2003 does not cover non-drum machines and nominates Type A detergent for drum machines, while Type B was deleted. [IEC 60456:2010 specifies detergent Type A* for all machines].

(f) AS9 soil swatches are used in this standard. IEC 60456:2003 specifies four separate soil swatches which include carbon, blood, red wine and chocolate. [IEC 60456:2010 specifies an additional soil swatch with sebum, making a total of 5 soil swatches].

(g) A mixed cotton is used in this standard made up of nine representative load items (one load item (shirt) is a cotton/polyester blend). IEC specifies only sheets, hand-towels and pillowcases for a cotton load.

(h) Each AS9 soil batch is calibrated against a reference batch in this standard. IEC does not specify soil batch calibration but there are other performance controls on each batch.

(i) The laboratory **reference machine** is not used to normalize results in this standard . IEC specifies a Wascator reference machine to normalize washing performance results. [IEC 60456:2010 more tightly defines the specifications for a reference machine].

(j) The water extraction (spin) index is based on bone-dry mass in this standard. IEC remaining moisture content (RMC) index is based on normalized mass with a nominal 6 % moisture content at equilibrium. The IEC Standard permits bone-dry method as a method of conditioning the load to determine the mass of load items.

(k) Whiteness retention test (informative) is included in this standard. IEC does not specify this performance parameter.

(l) Rinse performance testing in this standard relies on measurement of an added chemical marker (PBIS) remaining in the rinse liquor extracted from the damp clothes load at the end of the program. IEC measure residual alkalinity of the rinse liquor extracted as an indicator of rinse performance.

(m) There is a separate IEC Standard for noise.

(n) Standby power measurements are required on a number of low power modes in this standard which are measured in accordance with IEC 62301. IEC 60456:2003 does not specify low

power modes. [IEC 60456:2010 does specify low power modes (measured in accordance with IEC 62301) and while the modes defined are very similar, there are some minor differences].

(o) Spectrophotometer specification is broader in this standard in that it allows D/8° geometry as well as 0°/45° and 45°/0°. IEC only allow D/8 geometry. However, other aspects of the spectrophotometer specification are comparable in both standards, such as the UV-filter specification and the aperture size.

Australian/New Zealand Standard

Performance of household electrical appliances — Clothes washing machines

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

Section 1 Scope and general

1.1 Scope

This Standard specifies test procedures and minimum performance criteria for determining the performance characteristics of electric household **clothes washing machines** that are within the scope of the **relevant legislation**.

NOTE Examples of appliances covered by this Standard are top loading non-drum type washers (usually impeller or agitator), front and top loading drum type washers, **multi-compartment clothes washing machines** and the washer function of combination washer/dryer units.

In particular, this Standard specifies the following:

(a) States and defines the principal performance characteristics of electric **clothes washing machines**, which are —

(i) soil removal;

(ii) water extraction;

(iii) severity of washing;

(iv) energy and water consumption;

(v) degree of vibration;

(vi) rinse performance; and

(vii) **standby power**.

(b) Specifies methods of measuring these characteristics.

(c) Sets levels of acceptable performance.

1.2 Application

This Standard **shall** be read in conjunction with AS/NZS 2040.2.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document:

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 2706, *Numerical values — Rounding and interpretation of limiting values*

AS/NZS 2040.2, *Performance of household electrical appliances — Clothes washing machines, Part 2: Energy efficiency labelling requirements*

AS/NZS 2442.1, *Performance of household electrical appliances — Rotary clothes dryers, Part 1: Methods for measuring performance, energy and water consumption*

AS/NZS 62301, *Household electrical appliances — Measurement of standby power (IEC 62301, Ed. 1.0 (2005) MOD)*

ISO/CIE 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants*

IEC 60456, *Clothes washing machines for household use — Methods for measuring the performance*

CIE 015, *Colorimetry*, 4th Edition

1.4 Terms and definitions

For the purpose of this Standard, the definitions below apply.

NOTE The following defined terms have been bolded throughout this Standard.

1.4.1
automatic clothes washing machine(s)
clothes washing machine in which the load is fully treated by the machine without the need for user intervention at any point during the **program** prior to its completion

Note 1 to entry: All **automatic clothes washing machines** have at least one **program** that meets all the performance requirements specified in this Standard without user intervention.

Note 2 to entry: Examples of user intervention include manual fill (non-automatic water level), transfer of the load between a washing drum and spin extractor drum or manual draining. A machine that stops in response to an abnormal operating condition (e.g. out of balance) **should** still be considered as automatic under normal use.

1.4.2
check test
test to determine whether an appliance complies with the **relevant legislation**, which is intended to verify claims about a model in relation to one or more of the following:

(a) *Energy consumption* — Indicated on the **energy rating label**.

(b) *Water consumption* — Indicated on the water rating label in accordance with AS/NZS 6400.

(c) *Product performance*.

1.4.3
clothes washing machine(s)
appliance designed to wash textile materials in water by mechanical and chemical action, and extract water therefrom, usually by centrifugal action

1.4.4
cycle
series of **operations** and other activities that occur within the **cycle time**

1.4.5
cycle time
duration of time measured from the initiation of the **program** (excluding any user programmed delay) until all activity ceases

Note 1 to entry: Activity is considered to have ceased when the power consumption reverts to a steady-state condition that persists indefinitely without user intervention. If there is no activity after the end of the **program**, the **cycle time** is equal to the **program time**.

Note 2 to entry: **Cycle time** includes any activity that **may** occur after the **program** is completed until a steady-state condition is reached. This could include fans, any electronic activity or any additional mechanical activity that occurs for a limited period after any end of **program** indicator. Any cyclic event that occurs indefinitely is considered to be steady-state, see Appendix O for examples.