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STANDARDS Australia

AS/NZS 2040.2:2021

AUSTRALIAN/NEW ZEALAND STANDARD

Performance of household electrical appliances – Clothes washing machines

Part 2: Energy efficiency labelling requirements

Superseding AS/NZS 2040.2:2005

AS/NZS 2040.2:2021

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 3 February 2021.

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Australian/New Zealand Standard

Performance of household electrical appliances – Clothes washing machines

Part 2: Energy efficiency labelling requirements

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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 2040.2:2005, *Performance of household electrical appliances — Clothes washing machines, Part 2: Energy efficiency labelling requirements.*

The objective of this Standard is to specify the energy efficiency labelling requirements for electric household clothes washing machines that are within the scope of the relevant legislation.

This Standard defines performance and energy efficiency labelling requirements that a household electric clothes washing machines is to meet in order to be supplied in Australia and New Zealand.

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*

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

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) Addition of a super-efficiency 10-star label and element alignment with other energy-regulated appliances.

(ii) Extension of the loading table from 10 kg up to 20 kg, aligning with market offerings and AS/NZS 2040.1, *Performance of household electrical appliances — Clothes washing machines, Part 1: Methods for measuring performance, energy and water consumption*.

(iii) Definition of multi-compartment clothes washing machines.

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

(v) 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. This Standard refers to AS/NZS 2040.1 for test procedures. AS/NZS 6400, *Water efficiency products — Rating and labelling*, references this Standard for water efficiency labelling requirements.

When check testing is undertaken, it will be to the relevant legislation to which the model has been registered. Check testing tolerances for all parameters in this Standard (including energy and performance) and details concerning check testing policies and tolerances are available at: www.energyrating.gov.au.

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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Australian/New Zealand Standard

Performance of household electrical appliances — Clothes washing machines

Part 2: Energy efficiency labelling requirements

Section 1 Scope and general

1.1 Scope

This Standard specifies the energy efficiency labelling requirements for 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.

This Standard covers the following:

(a) **Program for energy efficiency labelling** and water efficiency labelling.

(b) **Comparative energy consumption** (**CEC**).

(c) **Star rating** for energy efficiency labelling.

(d) **Energy rating label** requirements.

(e) Performance criteria.

(f) Content, format and affixing requirements for **clothes washing machine energy rating labels**.

(g) Test report content, example for the application for **registration** for energy efficiency labelling and water efficiency labelling.

(h) Details concerning appliance **registration** with the relevant regulator.

1.2 Application

This Standard **shall** be read in conjunction with AS/NZS 2040.1.

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 2040.1, *Performance of household electrical appliances — Clothes washing machines, Part 1: Methods for measuring performance, energy and water consumption*

AS/NZS 60335.1, *Household and similar electrical appliances — Safety, Part 1: General requirements (IEC 60335-1 Ed 5, MOD)*

1.4 Terms and definitions

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

NOTE The following defined terms are bolded in this Standard.

1.4.1
base energy consumption
BEC
nominal energy consumption of a **clothes washing machine** of a given rated load capacity with a **star rating index** of 1.00

Note 1 to entry: Units: kilowatt-hours/year (kWh/year).

Note 2 to entry: See also Clause 2.6.

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.

(c) *Product performance*.

Note 1 to entry: For water rating label information refer to AS/NZS 6400.

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
comparative energy consumption
CEC
nominal energy consumption of a model of **clothes washing machine**, based on the **$PAEC_{av}$** estimated for the model

Note 1 to entry: The **CEC** appears on the energy rating label.

Note 2 to entry: Units: kilowatt-hours/year (kWh/year).

Note 3 to entry: The warm wash **CEC** appears on the energy efficiency label. The cold wash **CEC may** also be included on the energy efficiency label, see also Clauses 2.3 and 2.4.

1.4.5
energy rating label
label that provides consumers with information concerning the energy consumption and energy efficiency of household **clothes washing machines**

Note 1 to entry: The **energy rating label** displays the product's **CEC**, **star rating**, rated load capacity and the **program** nominated for energy efficiency testing and the corresponding **program time**.

Note 2 to entry: The base **energy rating label** shows 1 to 6 stars and the super efficiency **energy rating label** shows 7 to 10 stars, see Section 5 for labelling requirements.

1.4.6
may
indicates the existence of an option

1.4.7
multi-compartment clothes washing machine(s)
clothes washing machine with more than one **washing compartment**, each of which —

(a) would fall within the scope of this Standard if it were a separate single compartment machine; and

(b) **may** differ in volume and washing method; and

(c) **may** operate with the same or differing **programs**, either

(i) independently; or

(ii) concurrently, either using fresh water in each compartment or re-using water from one compartment to another.

1.4.8
program(s)
series of operations pre-defined within the **clothes washing machine**, for specified types of washing loads

1.4.9
program for energy efficiency labelling
program, including all associated specific settings, nominated by the supplier as recommended to wash a normally soiled cotton load at rated load capacity and which meets the performance criteria specified in Section 3

Note 1 to entry: See also Clause 2.2.1.

1.4.10
program time
duration of time measured from the initiation of the **program** (excluding any user programmed delay) until the end of **program**

1.4.11
projected annual energy consumption
PAEC
estimation of energy used by a model or single unit on the **program for energy efficiency labelling** during one year's use, which assumes a particular number of uses in one year and includes the standby power for the remainder of the year

Note 1 to entry: Units: kilowatt-hours/year (kWh/year).

Note 2 to entry: The cold wash **PAEC** is determined, if applicable, on the cold wash **program**, see Clause 2.3.

1.4.12
rated load capacity
maximum mass of textile material, stated by the manufacturer for the applicable load material, in multiples of 0.5 kg, which the manufacturer claims can be treated in all operations by a **clothes washing machine**, in accordance with the requirements of this Standard

Note 1 to entry: Under typical conditions of storage, cotton fabrics contain approximately 8 % moisture; therefore, the maximum mass includes an 8 % allowance for moisture above the bone-dry mass, i.e. the nominal bone-dry mass of a test load is equal to 92.6 % of rated capacity.

1.4.13
registration(s)
process of registering products regulated for energy efficiency in Australia and New Zealand under the **relevant legislation** with the relevant regulator and meeting a number of legal requirements before they can be supplied or offered for **supply**

Note 1 to entry: For information on **registration**, see Appendix C.

1.4.14
relevant legislation
legislative requirements governing the **supply** of electric household **clothes washing machines** in Australia and New Zealand

Note 1 to entry: For Australia, the **relevant legislation** is *Greenhouse and Energy Minimum Standards (Clothes washing machines) Determination* (GEMS Determination) and *Greenhouse and Energy Minimum Standards Act 2012* (Cth) (GEMS Act), which can be accessed at www.legislation.gov.au. The GEMS Determination covers **clothes washing machines** that are ordinarily supplied and used for household or similar use. The GEMS Determination covers household **clothes washing machines** irrespective of the context in which they are used. For example, the GEMS Determination applies to household **clothes washing machines** used in a commercial context.

Note 2 to entry: For New Zealand, the relevant legislation is *Energy Efficiency (Energy Using Products) Regulations 2002* (New Zealand Regulations), which can be accessed at www.legislation.govt.nz/regulation/public/2002/0009/latest/DLM108730.html.

1.4.15
shall
indicates that a statement is mandatory

1.4.16
should
indicates a recommendation

1.4.17
star rating
number of stars displayed on the **energy rating label**

Note 1 to entry: Available stars are between a minimum of one and a maximum of 10.

Note 2 to entry: The **star rating** is calculated from the **star rating index** (SRI), see 1.4.18 and also Clause 2.8.

Note 3 to entry: Units: Dimensionless.

1.4.18
star rating index
SRI
indication of the claimed energy efficiency of a model

Note 1 to entry: A numerically larger **SRI** indicates a higher energy efficiency (see also Clause 2.7). (Units: Dimensionless.)

1.4.19
supply
supplying (or offering to **supply**) electric household **clothes washing machines** that are that are within the scope of the **relevant legislation**

Note 1 to entry: For Australia, **supply** covers sale, exchange, gift, lease, loan, hire or hire purchase. **Supply** is defined in the **relevant legislation**.

Note 2 to entry: For New Zealand, **supply** is offered for sale, lease, hire or hire purchase. **Supply** is defined in the **relevant legislation**.

1.4.20
tested energy consumption
E_t
sum of the **program** energy (including electrical and water energy components used during the **program**) and, if applicable, the post **program** energy (energy consumed during the period from the end of the **program** to the end of the **cycle**)

1.4.21
washing compartment
compartment or chamber in which the cleaning operation takes place

1.5 Measured quantities

Quantities used in this Standard **shall** be measured in tests completed in accordance with AS/NZS 2040.1.

1.6 Rounding

Unless otherwise stated, calculated numbers **shall** be rounded and recorded to not less than five significant figures in accordance with AS 2706.

NOTE Spreadsheets carry more than five significant figures in their calculations so specific adjustments to spreadsheets to conform to the rounding requirements in this Standard are not required.

Section 2 Test requirements, calculations and algorithms for the energy rating label

2.1 General

2.1.1 Introduction

This Section sets out the test requirements, equations and procedures for calculating values of the **comparative energy consumption** (**CEC**) and **star rating**, which appear on an **energy rating label**.

The process consists of measuring the tested energy consumption (E_t) and standby power of each unit tested, then calculating the **projected annual energy consumption** (**PAEC**) of the unit.

The values of **PAEC** for the units tested are used to determine the **CEC** for the model. The warm wash **CEC**, the spin performance and the rated load capacity are then used to calculate the **star rating index** (**SRI**) and the **star rating**.

NOTE For an example of calculations carried out on a typical set of test results, see Appendix A.

2.1.2 Multi-compartment clothes washing machines

For **multi-compartment clothes washing machines**, the process outlined above applies to each **washing compartment** that, were it a separate single compartment machine, would fall within the scope of this Standard (specified in the **relevant legislation**).

If the compartments can operate independently and each has a **program** for washing a normally soiled load at rated load capacity, they **shall** each be separately tested against the full suite of performance criteria set out in Section 3, and each rated and labelled in accordance with this Standard. Such machines **shall** carry a separate **energy rating label** for each compartment.

If the compartments can only operate together then each **shall** be loaded to its rated load capacity and tested concurrently in accordance with Section 3 of this Standard. Such machines **shall** carry a single **energy rating label**.

2.2 Processing of data

2.2.1 Program for energy efficiency labelling

The **program for energy efficiency labelling shall** be as nominated by the supplier. This **shall** be the **program** recommended in the product literature (i.e. operating manual or user instructions) to wash a normally soiled cotton load at rated load capacity. The nominated **program shall** meet the performance criteria of Section 3. The test wash water temperature of this **program shall** be a minimum of 35 °C.

NOTE 1 If the **program** results in a test wash water temperature of less than 35 °C, minor adjustments as necessary **may** be used to achieve a minimum 35 °C warm wash temperature.

NOTE 2 When **check testing** is undertaken, it will be to the **relevant legislation** to which the model has been registered.

If there is a **program** nominated "Normal" in the product literature and/or marked on the **clothes washing machine**, or one that implies normal such as "Universal" "Regular" "Daily" or "Everyday", then that **program shall** be the one nominated as the **program** for washing a normally soiled load.

If there is more than one **program** recommended to wash a normally soiled cotton load at rated load capacity, e.g. "Normal", "Normal eco" and/or "Normal plus", then the percentage soil removal and standard deviation performance criteria of Section 3 **shall** be met by each of these **programs**.

2.2.2 Number of units required

For the purpose of determining the **CEC** and spin performance of a model for energy labelling, three separate units of the nominated model **shall** be tested for energy consumption and standby power in accordance with AS/NZS 2040.1. At the supplier's discretion, more than three units **may** be tested.

2.2.3 Number of tests per unit

Each unit **shall** be subjected to at least one valid test run to obtain values of E_t, standby power and Water Extraction Index (WEI) for that unit. The results **shall** be documented in a test report.

NOTE Refer to AS/NZS 2040.1:2021 Appendices E, F and L.

2.2.4 Multiple test runs

Where more than one test run is performed on a unit, the value of E_t and WEI **shall** be recorded for each run. For subsequent calculations, the values of E_t and WEI **shall** each be averaged and treated as the results for that unit.

2.2.5 Results

After testing three or more separate units in accordance with Clause 2.2.2, the separate values of **PAEC** and WEI **shall** be averaged and referred to as $\mathbf{PAEC}_{av}$ and WEI_{av} respectively.

2.3 Projected annual energy consumption (PAEC)

The **PAEC** of a single **clothes washing machine shall** be calculated from Equation 2.1:

$$PAEC = E_t \times 365 + \left[P_s \times (8.76 - T_c \times 0.365) \right] \text{ (kWh/year)} \quad 2.1$$

where

E_t = tested energy consumption, in kWh, in accordance with AS/NZS 2040.1 (includes post **program** operation up to the end of the cycle)

P_s = average measured standby power in watts, which is the average end of cycle mode and off mode (where this mode is present) where these have been determined, in accordance with AS/NZS 2040.1

T_c = **cycle time** (in hours)

when tested under the following conditions:

(a) At the rated load capacity of the **clothes washing machine** in accordance with AS/NZS 2040.1.

(b) For a warm wash $\mathbf{PAEC}_{av}$, using the **program** for **energy rating label**.

It is not mandatory to include the cold wash energy consumption on the energy rating label. If the cold wash energy consumption is to be included, then one of the following procedures **shall** be adopted:

(i) Where there is no internal water heating for a warm wash and where the wash temperature can be selected independently of the wash **program** and no external hot water is used the cold wash $\mathbf{PAEC}_{av}$ **shall** be determined from the average electrical energy shown in the test report. In this case, no re-testing is required

NOTE 1 See also the example calculations in Clause A.3.

(ii) Where the wash temperature can only be altered by the selection of a separate **program**, the **program** selected for cold wash energy and water consumption **shall** be for the lowest temperature setting available for a cotton load.

Where cold wash requires the selection of a separate **program** or if any internal water heating occurs on a warm wash or if a separate **program** is named in the product literature and/or marked on the machine for a cold wash, the cold $\mathbf{PAEC_{av}}$ **shall** be determined from separate tests on this **program**/setting.

NOTE 2 Where the manufacturer declares that the water consumption is the same on a separate cold and warm wash **program** and neither **program** has any internal water heating, then option (i) above is permitted.

The test **shall** be performed in accordance with AS/NZS 2040.1:2021 Appendix E, at the same rated capacity and detergent dosage specified for the **program for energy efficiency labelling**. Conformance to the performance criteria of Clauses 3.2 to 3.6 **shall** not be tested.

NOTE 3 Water consumption on a cold wash **program** is required for water efficiency labelling.

2.4 Comparative energy consumption (CEC)

The **CEC** for a model **shall** be an integer in units of kWh/year. It **shall** be not less than the $\mathbf{PAEC_{av}}$ (rounded to the nearest integer), which is the average energy consumption (in kWh/year) for the three (or more) units tested to determine the label particulars in accordance with Clause 2.3.

The declared **CEC may** be greater than the $\mathbf{PAEC_{av}}$ to allow for variations such as manufacturing tolerances.

2.5 Energy equivalent of residual moisture (E_m)

The energy equivalent of moisture remaining in the clothes at the end of the **program shall** be calculated from Equation 2.2(1):

$$E_m = \frac{F \times WEI_{av} \times RC \times 365}{1.08} \qquad 2.2(1)$$

where

F = an empirical weighting factor used to account for energy used in clothes dryers and is equal to 0.1

WEI_{av} = average water extraction index determined from AS/NZS 2040.1 for the three or more machines tested for energy efficiency labelling

RC = rated load capacity claimed by the manufacturer for a normally soiled load, in kilograms

1.08 = a conversion factor which equates to the ratio of the nominal mass of the load under ambient conditions to the bone-dry mass

NOTE F is derived from assuming average energy efficiency (1.0), ownership (0.5) and usage patterns (one load in five is dried) of clothes dryers in Australia.

The energy equivalent of moisture remaining in the clothes at the end of the **program** (E_{mref}) for a 1 star reference machine **shall** be calculated from Equation 2.2(2):

$$E_{mref} = \frac{F \times WEI_{ref} \times RC \times 365}{1.08} \qquad 2.2(2)$$

where

WEI_{ref} = a reference water extraction index for a 1 star machine

= 1.03

2.6 Base energy consumption (BEC)

The **base energy consumption** (**BEC**) for a **clothes washing machine** model **shall** be calculated from Equation 2.3:

$$BEC = 115 \times RC \quad 2.3$$

where

RC = rated load capacity claimed by the manufacturer for a normally soiled load, in kilograms

The **BEC shall** be rounded to the nearest whole kWh/year.

NOTE The value of 115 is a value based on market analysis.

2.7 Star rating index (SRI)

The **SRI shall** be calculated from Equation 2.4:

$$SRI = 1 + \left[\frac{\log_e \left(\frac{CEC + E_m}{BEC + E_{mref}} \right)}{\log_e \left(1 - 0.27 \right)} \right] \quad 2.4$$

NOTE 1 **SRI** is dimensionless.

NOTE 2 The value of 0.27 equates to an energy reduction of 27 % per additional star.

NOTE 3 **SRI** is calculated for a warm wash only, see Clause 2.1.

2.8 Star rating

The **star rating shall** be in accordance with Table 2.1.

NOTE For an example of calculations carried out on a set of test results, see Appendix A.

Table 2.1 — Derivation of star rating

SRI	Star rating
SRI < 1.5	1.0
1.5 ≤ SRI < 2.0	1.5
2.0 ≤ SRI < 2.5	2.0
2.5 ≤ SRI < 3	2.5
3.0 ≤ SRI < 3.5	3.0
3.5 ≤ SRI < 4	3.5
4.0 ≤ SRI < 4.5	4.0
4.5 ≤ SRI < 5.0	4.5
5.0 ≤ SRI < 5.5	5.0
5.5 ≤ SRI < 6.0	5.5
6.0 ≤ SRI < 7.0	6.0
7.0 ≤ SRI < 8.0	7.0
8.0 ≤ SRI < 9.0	8.0
9.0 ≤ SRI < 10.0	9.0
10.0 ≤ SRI	10.0

Section 3 Performance criteria

3.1 General

The performance criteria set out in Clauses 3.2 to 3.6 **shall** be met by each individual unit tested on the **program for energy efficiency labelling**.

NOTE AS/NZS 6400 specifies performance requirements for **clothes washing machines** in addition to labelling of water consumption.

3.2 Percentage soil removal and standard deviation

The **clothes washing machine shall** meet the requirements for soil removal set out in Section 4 of AS/NZS 2040.1:2021.

3.3 Water consumption

The **clothes washing machine shall** meet the requirements for water consumption set out in Section 4 of AS/NZS 2040.1:2021.

3.4 Water extraction index

The **clothes washing machine shall** meet the requirements for water extraction index set out in Section 4 of AS/NZS 2040.1:2021.

3.5 Severity of washing action index

The **clothes washing machine shall** meet the requirements for severity of washing index set out in Section 4 of AS/NZS 2040.1:2021.

3.6 Rinse performance

The **clothes washing machine shall** meet the requirements for rinse performance set out in Section 4 of AS/NZS 2040.1:2021.

Section 4 Marking requirements

4.1 General

Clothes washing machine markings **shall** be in accordance with Clauses 4.2 to 4.4. Requirements legible and durable marking shall be in accordance with AS/NZS 60335.1.

4.2 Appliance details

The brand, model and serial number **shall** be durably and legibly marked on the appliance.

4.3 Marking location

Markings of brand and model **shall** be visible when the appliance is installed as in normal use.

Suitable marking locations **shall** include one of the following:

(a) Front of the appliance.

(b) Front of the appliance behind the door.

(c) Back, side or top face of the door.

4.4 Date of manufacture

The date of manufacture of each appliance **shall** be able to be determined from information legibly and durably marked on the appliance. The date of manufacture **may** be non-encrypted, encrypted or able to be determined from a serial number or other markings on the appliance. The date of manufacture **shall** be visible when the appliance is in its position of normal use. Information on how to determine the date of manufacture **shall** be provided in the **registration**.

NOTE The requirements of this Clause are also required for the **registration** of **clothes washing machines** for the Water Efficiency Labelling and Standards (WELS) scheme in accordance with AS/NZS 6400.

Section 5 Content, format and affixing energy rating labels

5.1 Affixing the label

When an **energy rating label** is required to accompany a product or its packaging, the following **shall apply** —

(a) for a product or its packaging that is displayed, the label shall —

(i) be clearly visible; and

(ii) either:

(A) adhere to, be printed on, or be part of; or

(B) be attached, in the form of a double-sided swing tag or a non-rotating single-sided swing tag, to;

the product or its packaging, whichever is displayed; and

(b) for a product or its packaging that is not displayed, the label shall —

(i) adhere to, be printed on, or be part of; or

(ii) be included in,

the product's packaging.

NOTE 1 Refer to the **relevant legislation** for requirements on when **energy rating labels** are required to accompany a product or its packaging.

NOTE 2 Where labels are removed from products that are on display at the point of sale, or otherwise not displayed in accordance with the **relevant legislation**, the retailer **may** be subject to enforcement action under energy labelling regulations.

NOTE 3 An **energy rating label** affixed to a product that is in its packaging is considered to be a label included in the product's packaging for the purpose of Clause 5.1(b)(ii).

5.2 Colours, energy rating label fonts and format

5.2.1 Colours

The **energy rating label shall** be printed in the following colours on a white background:

(a) *Red* — Pantone Warm Red.

(b) *Blue* — Pantone 299.

(c) *Yellow* — Pantone 116.

(d) *Black* — Pantone Black.

NOTE See Figures 5.1 to 5.5 for examples of labelling.

5.2.2 Fonts

The font **shall** be Gill Sans (preferred), Humanist 521 or Hammersmith. Only one font **shall** be used on a label. The text in an **energy rating label shall** be of the font size and colour shown in Figure 5.1. All type styles **shall** be normal unless otherwise specified.

5.2.3 Format

The dimensions and geometry for all **energy rating label** elements **shall** be consistent with those provided in Appendix B.

5.3 Label variants

There are two forms of the **energy rating label** for **clothes washing machines**: the base label and the super efficiency label.

The base **energy rating label** is shown in Figures 5.1, 5.3 and 5.4.

The super efficiency **energy rating label** is shown in Figures 5.2 and 5.5.

One of the following label variants **shall** be used for an **energy rating label** for **clothes washing machines** under the circumstances specified:

(a) Where a product achieves a **star rating** from 1 to 6 stars in accordance with Table 2.1 — base label (with the relevant **star rating** and energy consumption).

(b) Where a product achieves a **star rating** from 7 to 10 stars in accordance with Table 2.1 — the super efficiency label showing 6 stars in the lower arch and relevant energy consumption in the lower part and the earned stars (7, 8, 9 or 10) in the upper arch, as applicable.

NOTE 1 Electronic artwork **may** be accessed at www.energyrating.gov.au.

NOTE 2 **Energy rating labels** are registered as Trade Marks under the *Trade Marks Act 1995* (Cth). The Commonwealth of Australia is the registered owner of these Trade Marks. Guidelines for other use of the label, including who needs to seek permission to use the label, and the terms and conditions of use for the labels can be accessed at www.energyrating.gov.au.

NOTE 3 The labels are used by importers, manufacturers and suppliers, who are required by law to put the label on products at the point of sale.

5.4 Content of energy rating label elements

5.4.1 Base energy rating label elements

A base **energy rating label shall** include the following elements (see Figure 5.1):

(a) *Element a* — The element "a" band **shall** terminate according to the appliance **star rating** (see Table 2.1), either bisecting the relevant star for a rating involving a half star or bisecting the gap between the relevant star and the next highest on the scale, for a rating of only full stars.

(b) *Element b* — The brand, model and rated load capacity **shall** be inserted here as indicated by element "b" in Figure 5.1. The wording **shall** be complete and concise. The lines **shall** not exceed a length of 65 mm. They **shall** have normal spacing of letter, line and word. They **shall** be centred horizontally in the area allowed. Where required, the brand and model text **may** be placed on two lines centred within the available space.

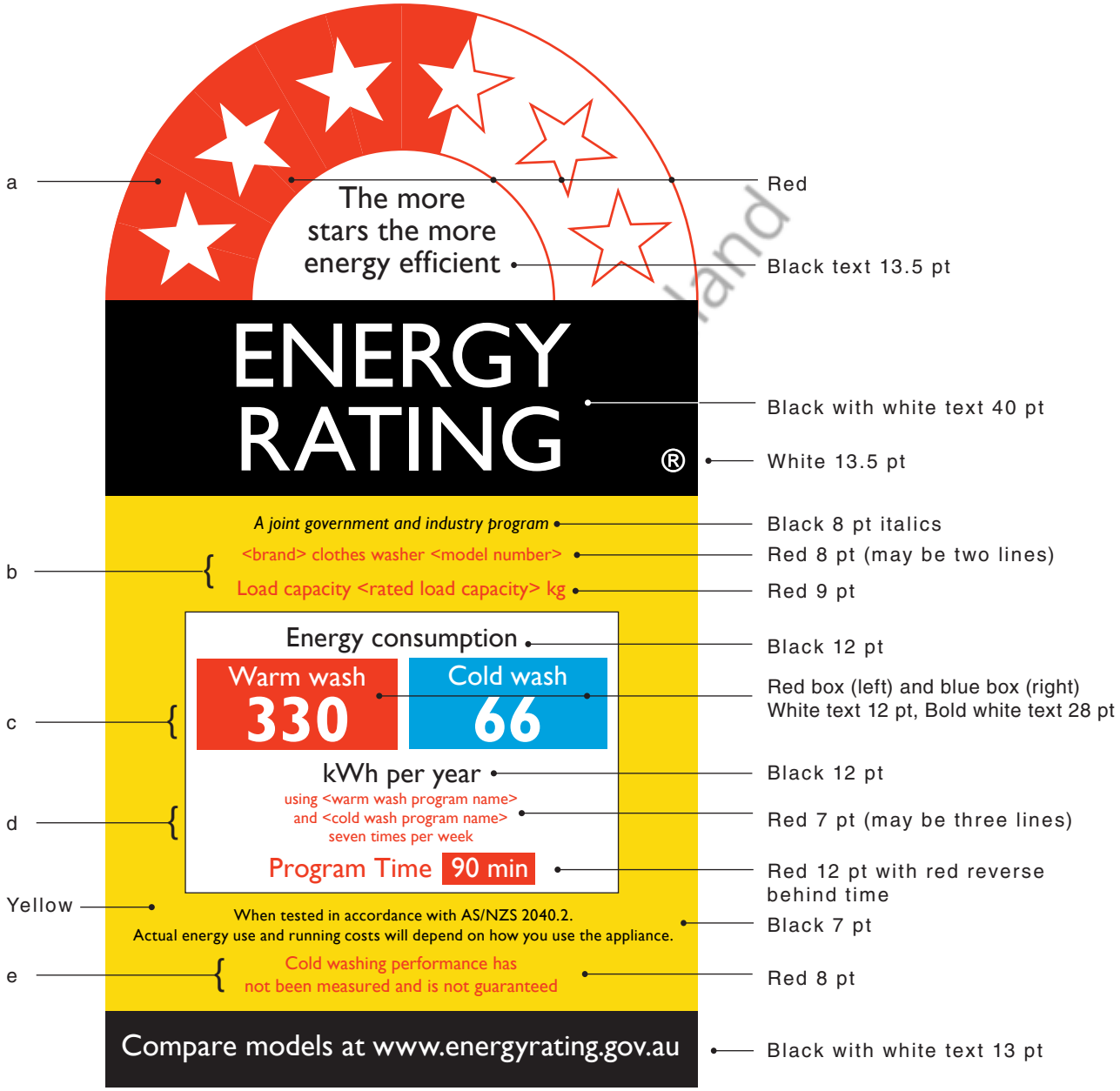
(c) *Element c* — The panel of element "c" **shall** contain the **comparative energy consumption** (**CEC**). Labels with omitted cold wash details **shall** not display a blue panel and the red panel **shall** be centred. The numeric figure that applies to the particular appliance **shall** be in the font and size indicated and centred in the panels. The spacing between the figures of a three-figure number is the same as for a four-figure number.

(d) *Element d* — The words "warm wash **program** name" **shall** be replaced with the name of the **program for energy efficiency labelling** including any associated settings recommended by the manufacturer. Where provided, "cold wash **program** name" **shall** be replaced with the **program** name and any other associated settings for a cold wash recommended by the manufacturer. Where required, the **program** details **may** be placed on three lines centred

within the available space. Labels with omitted cold wash details **shall** not display cold wash related text. Red **program time** panel **shall** include the claimed warm wash **program time** in min rounded to the nearest whole minute.

(e) *Element e* — Labels with omitted cold wash details **shall** not display this cold wash related text.

NOTE For an example of the elements, see Figure 5.1.



NOTE 1 The 3 ½ **star rating** is shown as an example only.

NOTE 2 See Appendix B for more details regarding label dimensions and geometry.

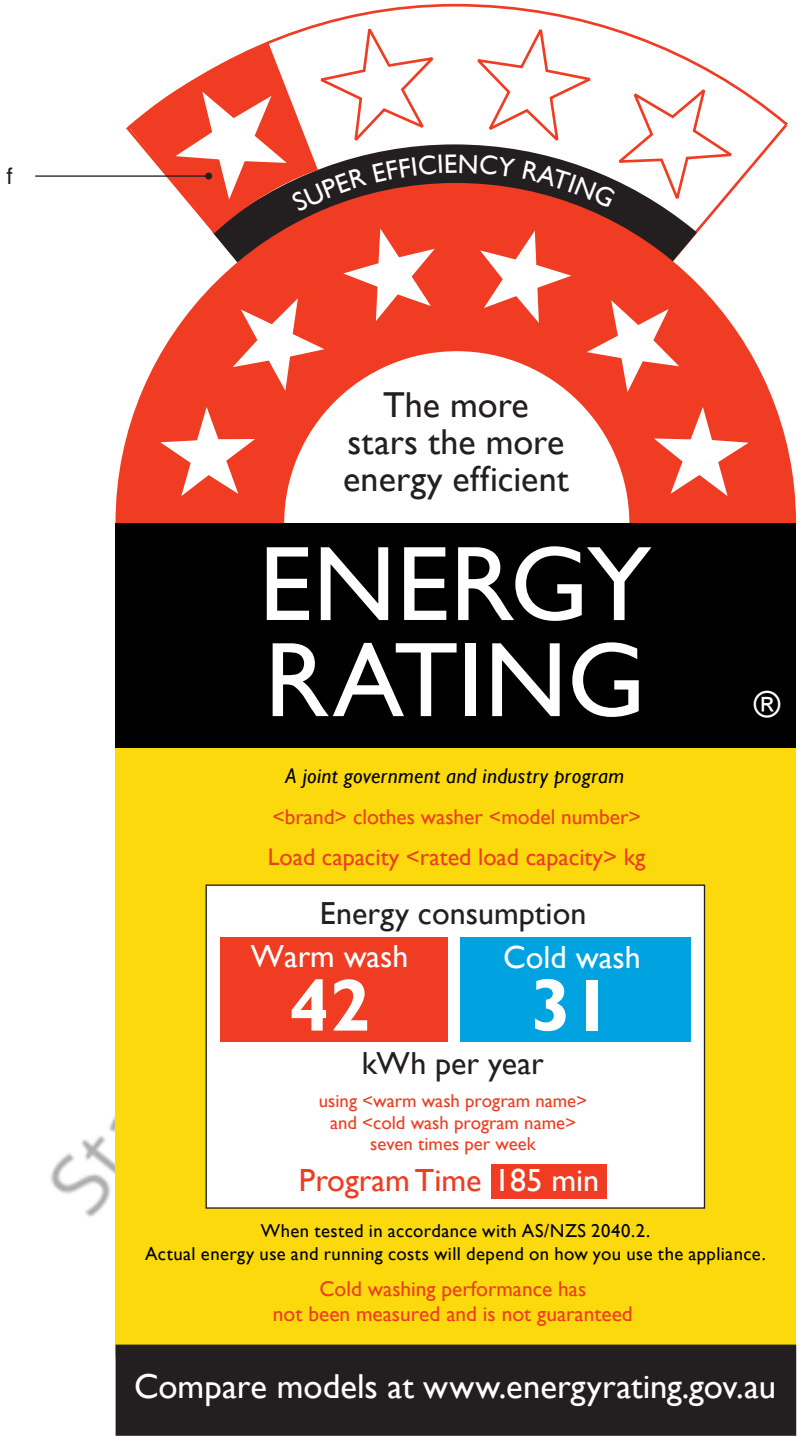
NOTE 3 See Clause 5.4.1 for field descriptions.

Figure 5.1 — Example of base energy rating label elements

5.4.2 Super efficiency energy rating label elements

A super efficiency **energy rating label shall** include the element “a” band terminating accordingly to a 6 star rating. In addition, a super efficiency energy rating label shall include the following element, see example in Figure 5.2.

Element “f” band **shall** terminate according to the appliance’s **star rating** (see Table 2.1), bisecting the gap between the relevant star and the next highest on the scale. Only whole stars are shown from 7 to 10 stars.



NOTE 1 The 7 **star rating** shown is an example only.

NOTE 2 See Appendix B for further details regarding label dimensions and geometry.

NOTE 3 See Clause 5.4.1 for element descriptions.

Figure 5.2 — Example of super efficiency energy rating label elements

5.4.3 Sample labels

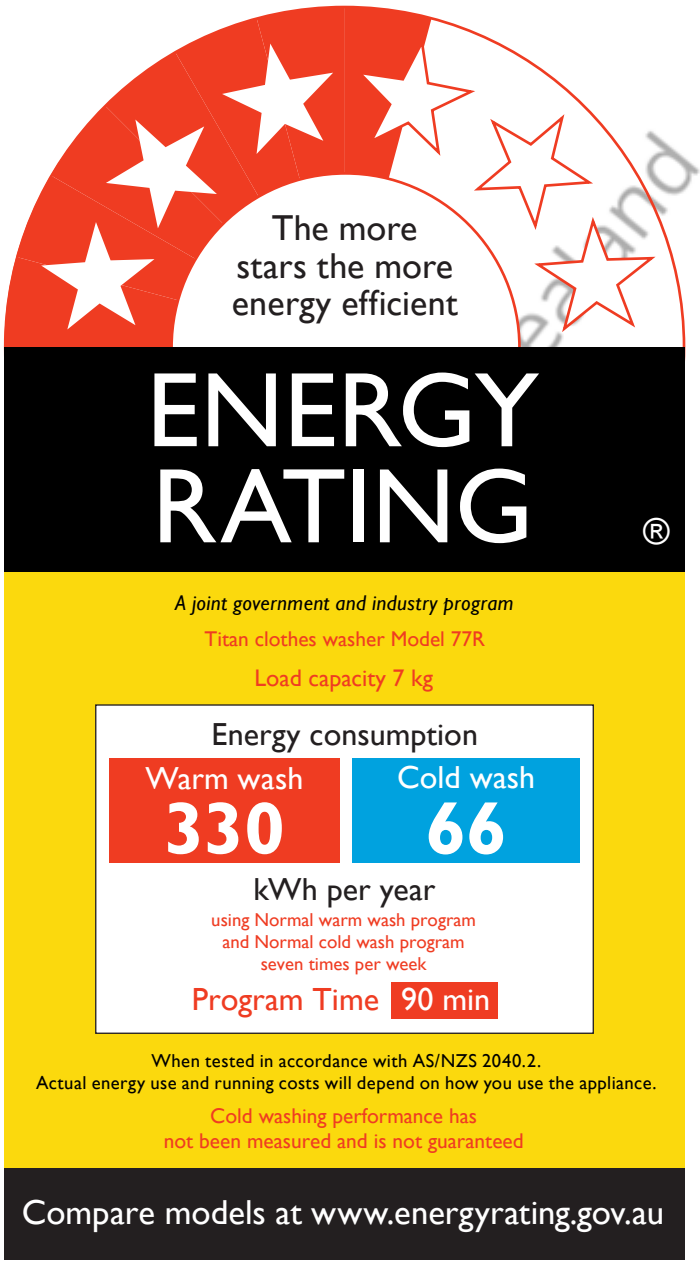
An example of a printed base **energy rating label** displaying both the warm and cold **CEC** values for a **clothes washing machine** is shown in Figure 5.3.

An example of a printed **energy rating label** displaying only the warm **CEC** value for a **clothes washing machine** is shown in Figure 5.4.

An example of a printed super efficiency **energy rating label** for a **clothes washing machine** is shown in Figure 5.5.

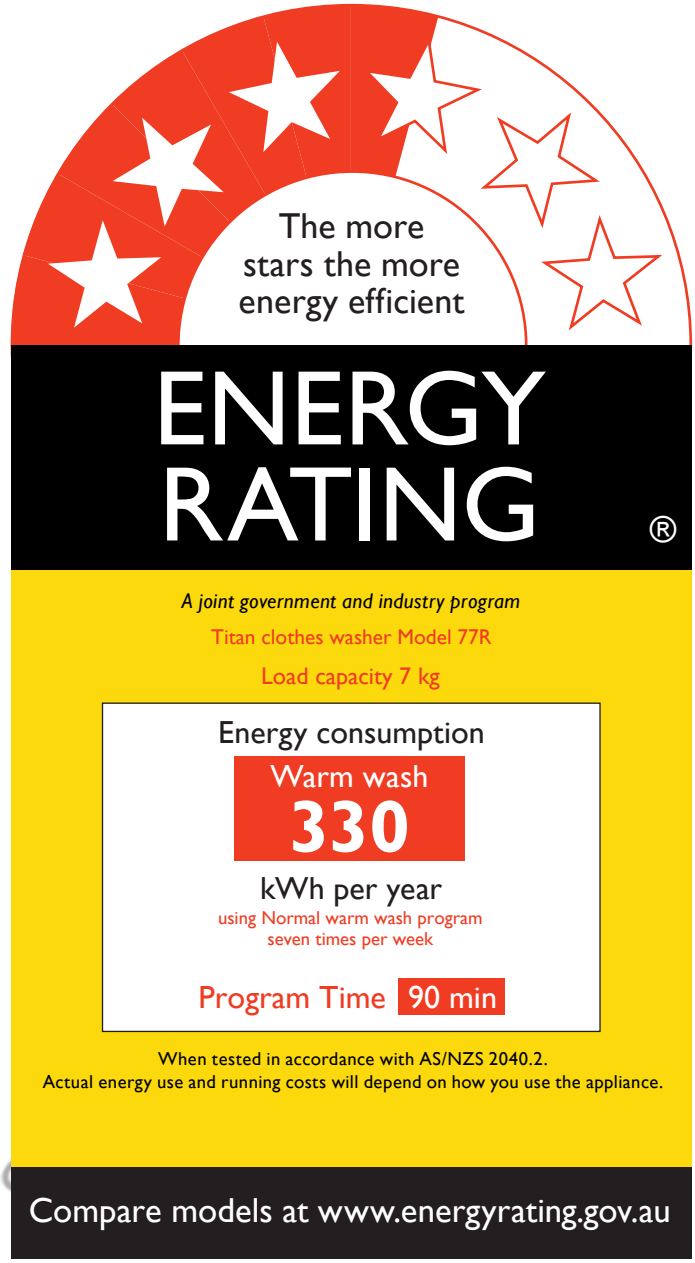
NOTE 1 The brand, model, **rated load capacity**, **program** for energy efficiency labelling, **program time** and CEC are to be provided on the labels.

NOTE 2 See Clause 5.2 for specification of colours. On some printers and display devices, the colours in the sample labels may appear different to those specified.



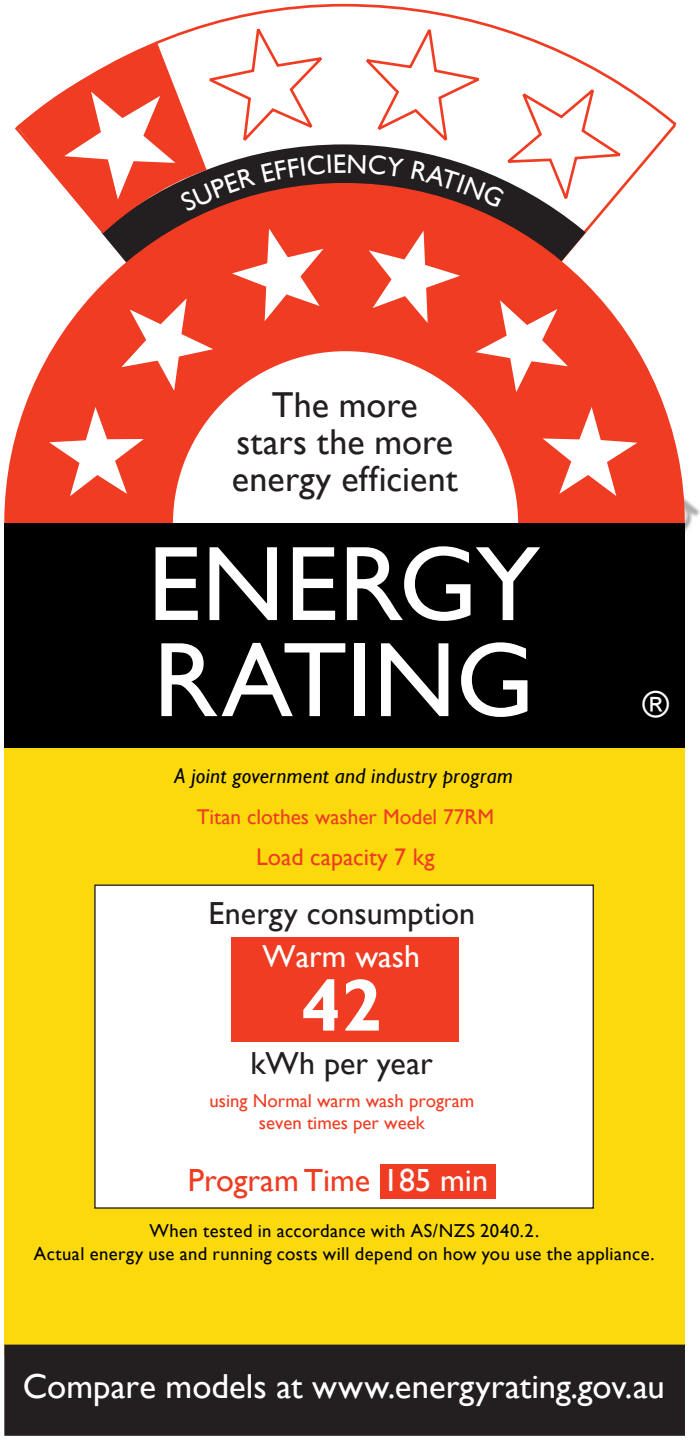
NOTE The 3 ½ **star rating** is an example only.

Figure 5.3 — Example of a clothes washing machine base energy rating label (cold and warm wash CEC)



NOTE The 3 ½ **star rating** is shown as an example only.

Figure 5.4 — Example of a clothes washing machine base energy rating label (warm wash CEC only)



NOTE This 7 **star rating** is shown as an example only.

Figure 5.5 — Example of a clothes washing machine super efficiency energy rating label

Appendix A
(informative)

Example of energy efficiency calculations

A.1 General

This Appendix provides an example set of test results. It demonstrates the procedures required to calculate the **CEC**, **SRI** and **star rating** for each unit and checks for conformance to the performance requirements of AS/NZS 2040.1.

A.2 Measured test results

This example sets out the **energy rating label** calculations required for a **clothes washing machine**.

Three units of a 6.5 kg rated load capacity **clothes washing machine** model have each been tested once in order to prepare information for inclusion on an energy efficiency label. The model has connections for both hot and cold water, so the machine has been tested with dual water connection. The example results and measured test results for the model are set out in Table A.1.

Table A.1 — Example test results

Unit	Soil removal	Standard deviation	Soil removal — 2 × SD	Water extraction index	Rinse performance score	Severity of washing index
1	82.1 %	4.1 %	73.9 %	0.746	1.8	0.185
2	82.3 %	4.3 %	73.7 %	0.756	2.0	0.192
3	81.8 %	3.8 %	74.2 %	0.760	2.1	0.179
Average				0.754		

A.3 Initial calculations

The soil removal is to be determined against the performance criteria set out in Clause 3.2. The soil removal for each unit is greater than 80 % and the soil removal minus twice the standard deviation for each unit is greater than 72 % so the model meets this requirement.

The water extraction index for each of the units is to be determined against the performance criteria set out in Clause 3.4. The water extraction index is less than 1.1 for each unit so the model meets this requirement.

The severity of washing index for each of the units is to be determined against the performance criteria set out in Clause 3.5. The severity of washing is less than 0.3 for each unit so the model meets this requirement.

The rinse performance for each of the units is to be determined against the performance criteria set out in Clause 3.6. The rinse performance score is less than 2.25 for each unit so the model meets this requirement.

The **PAEC** for each unit is determined using Equation 2.1, which requires values for tested energy consumption (E_t), cycle time and standby power.

The standby power measurements for this model are as follows:

(a) End of cycle mode = 4.2 W and Off mode = 0.3 W.

(b) Standby power is the average of End of cycle and Off mode = 2.25 W.

(c) Average cycle time (T_c) is 1 h and 6 min, 1.10 h for both the warm and cold program.

The value of **PAEC** is calculated as shown in the following worked example.

EXAMPLE Using Equation 2.1

$$\text{PAEC} = E_t \times 365 + \left[P_s \times \left(8.76 - T_c \times 0.365\right)\right] \left(\text{kWh/year}\right)$$

The example results and measured test results for the model are set out in Table A.2.

Table A.2 — Example PAEC

Unit	Warm wash tested energy consumption	Warm wash PAEC	Cold wash tested energy consumption	Cold wash PAEC
1	1.056	404.25	0.172	81.587
2	1.110	423.96	0.183	85.602
3	1.113	425.06	0.186	86.697
Average		417.76		84.629

The minimum value of the **CEC** is determined from the average of the three **PAEC** values when rounded to the nearest whole kWh/year. Where the **program** is the same for cold and warm wash and the temperature can be independently selected, the cold wash tested energy consumption comprises of E_e (electrical energy consumed during the test **program**) without cold water energy correction and warm water energy. In this case the minimum warm wash **CEC** permissible is 418 kWh/year and minimum cold wash **CEC** permissible is 85 kWh/year. A higher value of **CEC** may be chosen for warm wash **CEC**; however, this would have to be used in all subsequent calculations (i.e. in the calculation of **SRI** below).

To determine the energy equivalent of residual moisture (E_m), it is first necessary to calculate the average water extraction index from the data for the three test units. This is 0.754 for these units, see Table A.1.

The calculation of E_m for the test using Equation 2.2(1) is shown in the following worked example.

EXAMPLE Using Equation 2.2(1)

$$E_m = \frac{F \times \text{WEI}_{av} \times \text{RC} \times 365}{1.08}$$

$$= \frac{0.1 \times 0.754 \times 6.5 \times 365}{1.08}$$

$$= 165.64$$

The calculation of E_{mref} for a 1 star reference machine is given in Equation 2.2(2), as shown in the following worked example.

EXAMPLE Using Equation 2.2(2)

$$E_{mref} = \frac{F \times \text{WEI}_{ref} \times \text{RC} \times 365}{1.08}$$

$$= \frac{0.1 \times 1.03 \times 6.5 \times 365}{1.08}$$

$$= 226.27$$

The **base energy consumption** (**BEC**) for a 1 star machine using Equation 2.3 is shown in the following worked example.

EXAMPLE Using Equation 2.3

BEC = 115 × RC

= 115 × 6.5

= 747.5

= 748 (rounded to the nearest whole kWh)

A.4 Star rating index (SRI)

The **star rating index** (**SRI**) is determined using Equation 2.4, as shown in the following worked example.

EXAMPLE Using Equation 2.4

$$\text{SRI} = 1 + \left[\frac{\log_e \left[\frac{\left(\text{CEC} + E_m\right)}{\left(\text{BEC} + E_{mref}\right)} \right]}{\log_e (1 - 0.27)} \right]$$

$$= 1 + \left(\frac{\log_e 0.59905}{\log_e 0.73} \right)$$

$$= 1 + \left(\frac{-0.51240}{-0.31471} \right)$$

$$= 1 + 1.6282$$

$$= 2.6282$$

The **star rating** is determined from Table 2.1. In this case the **star rating** is 2.5.

Appendix B
(normative)

Energy rating label dimensions

This Appendix sets our the dimensional information required to create a valid base **energy rating label**, see Figures B.1, B.2, B.3 and B.4.

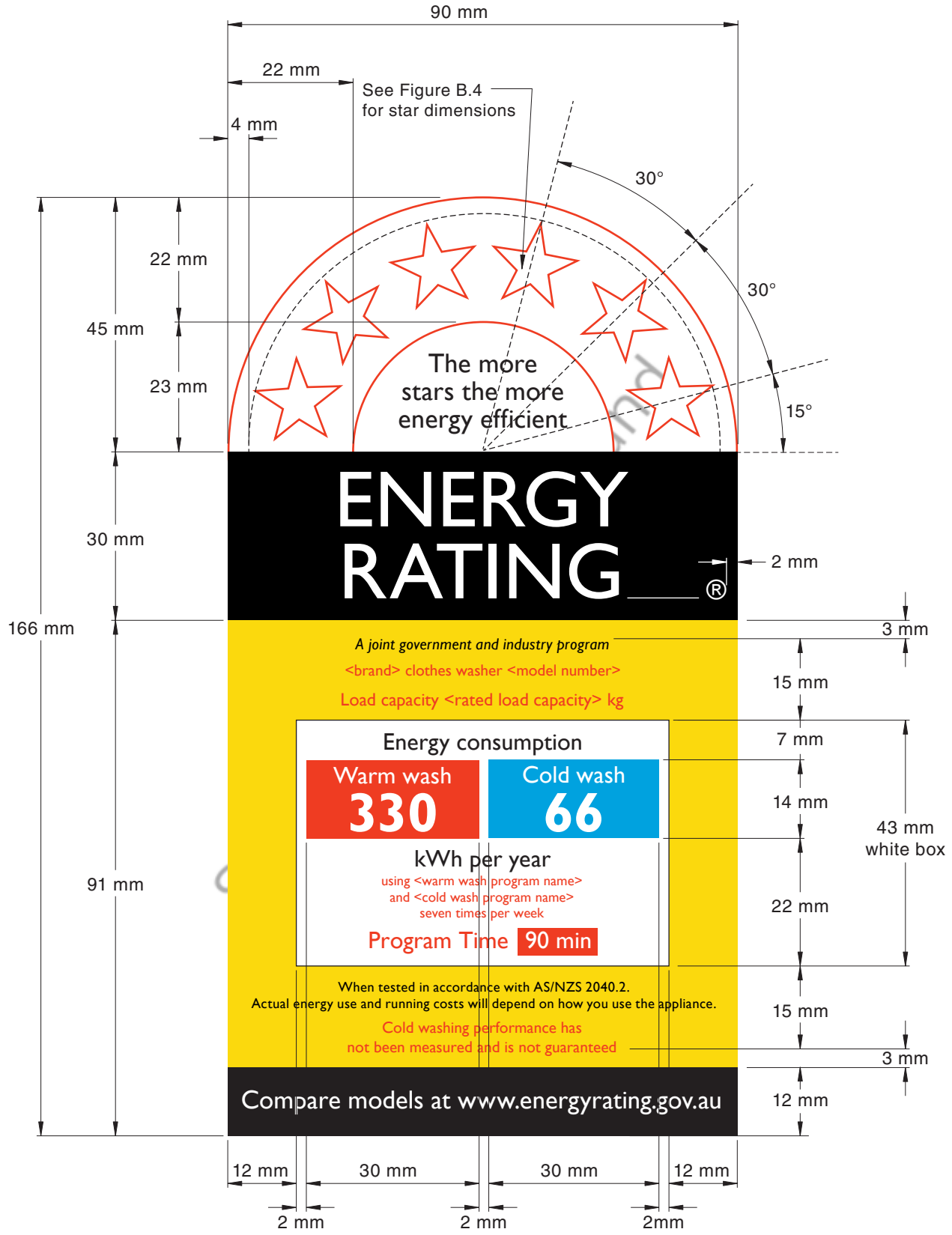


Figure B.1 — Base cold wash/warm wash energy rating label dimensions

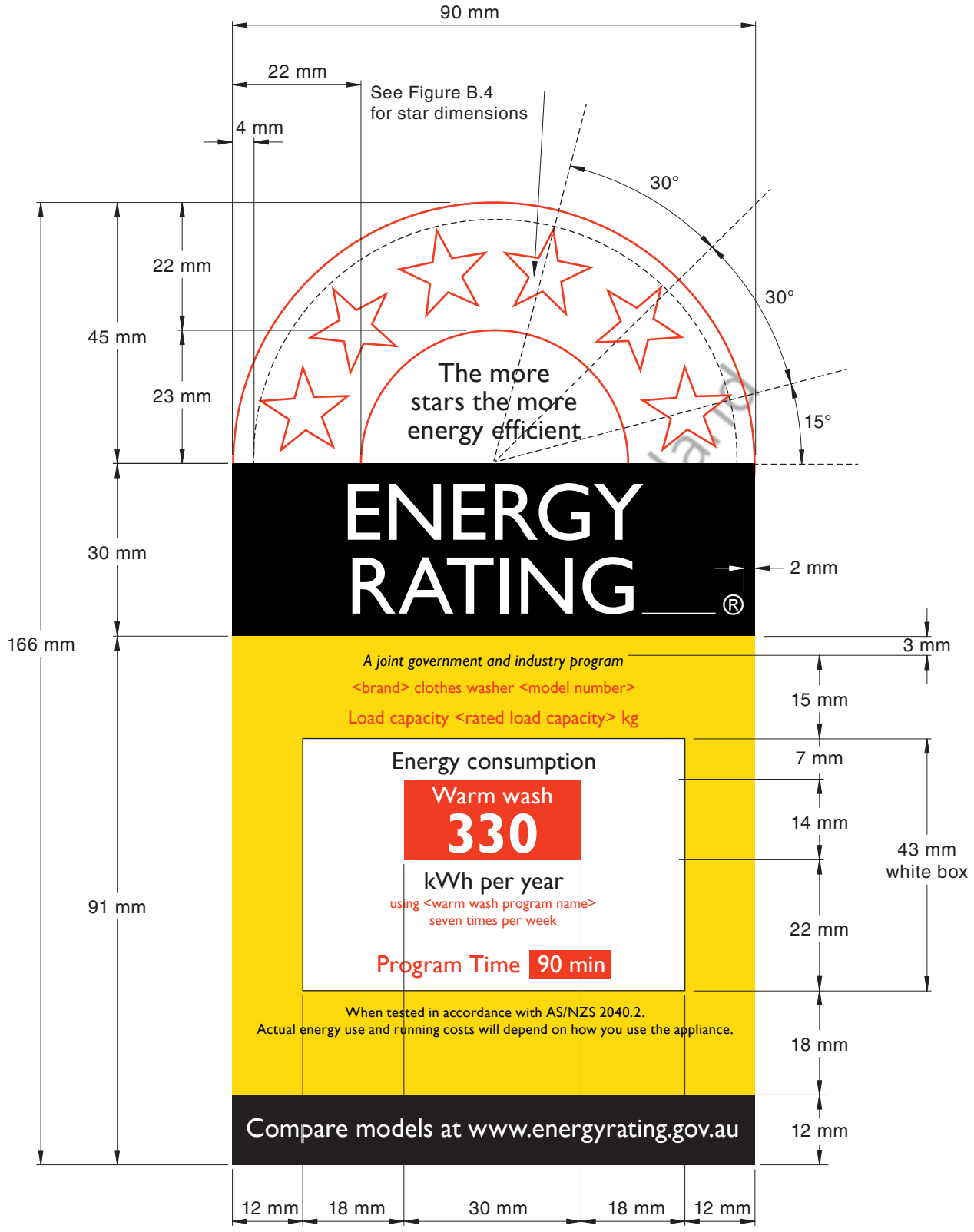


Figure B.2 — Warm wash energy rating label dimensions

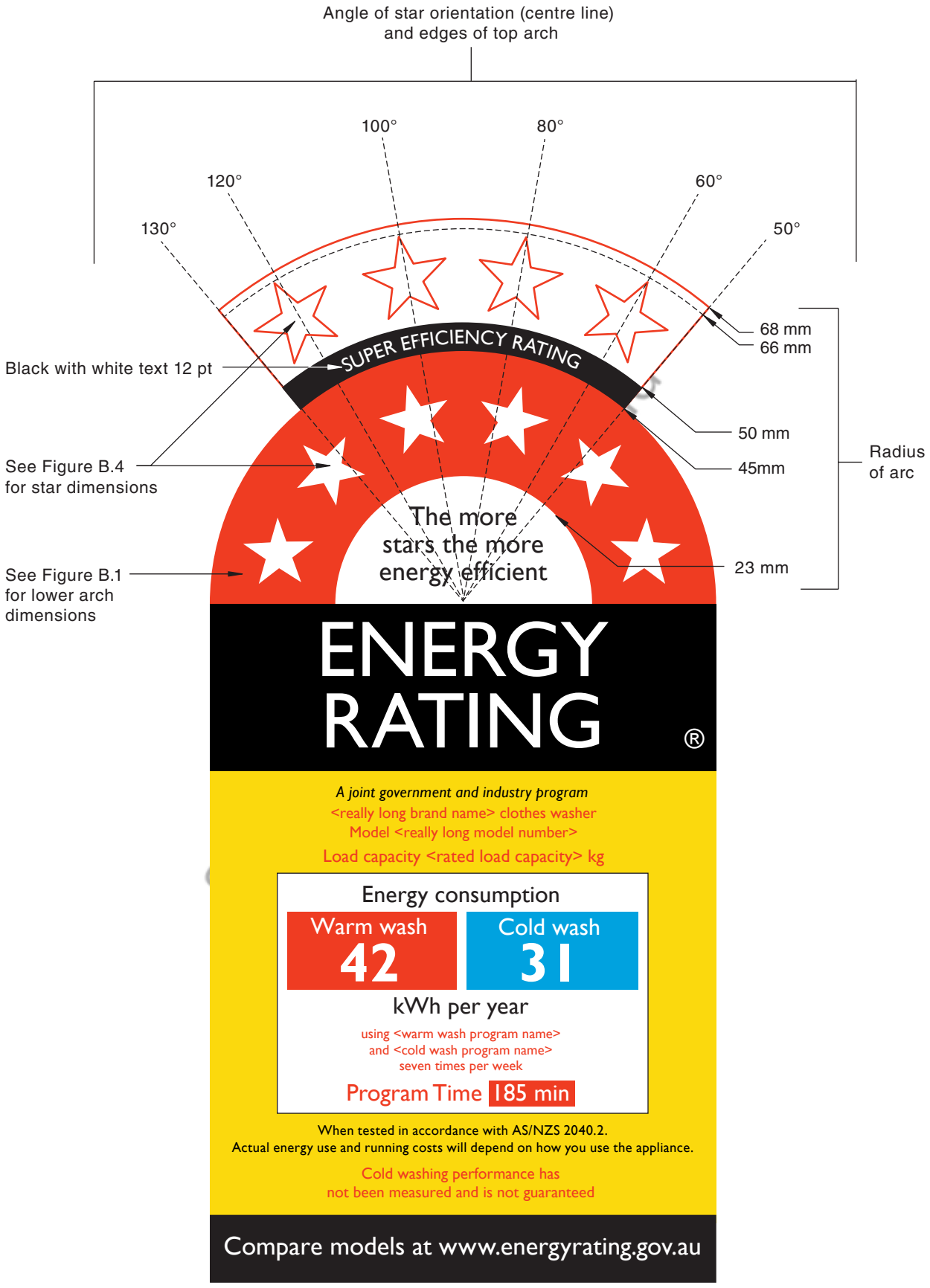
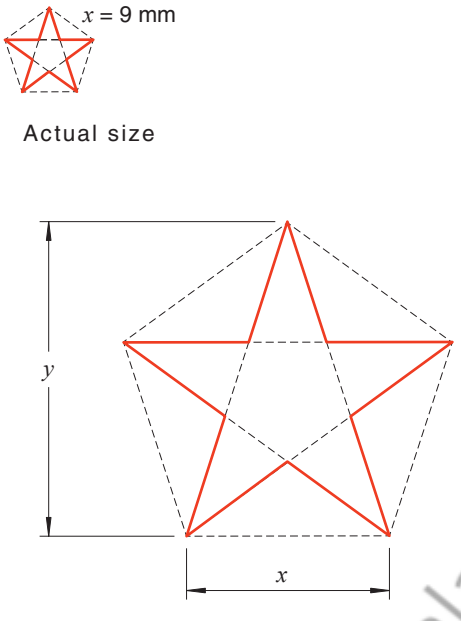


Figure B.3 — Super-efficiency energy rating label dimensions



The apex for each star point lies on the corner of a pentagon.
Angles are 108° for the pentagon and 36° for each star apex.

The pentagon side x is 9 mm (height y is 13.9 mm)

Figure B.4 — Star dimensions and geometry

Appendix C
(informative)

Application for registration of a clothes washing machine for energy and water efficiency labelling

C.1 General

The Australian and New Zealand legislative frameworks impose certain legal obligations relating to the **registration** of in-scope products. All appliances within the scope of the **relevant legislation** are required to be registered with the relevant regulator before being offered for **supply**.

For **registration** of products for energy labelling, applicants will be required to provide the information set out in this Appendix.

NOTE 1 The *Greenhouse and Energy Minimum Standards Act 2012* (Cth) (GEMS Act) s 169 contains provisions making it an offence for a person to disclose commercially sensitive information that has been obtained by or disclosed to persons in connection with the GEMS Act. This includes information that is provided by registrants at the time of **registration**.

NOTE 2 The GEMS Act does permit authorized disclosures of **registration** information in certain circumstances including for the purposes of performing a duty or function, or exercising a power, under or in relation to the GEMS Act s 170.

C.2 Scope

This Appendix provides information that will assist suppliers, importers and manufacturers of products to submit an application for **registration** of products to the relevant regulator.

Refer to the relevant regulator and **relevant legislation** for accurate and up to date requirements.

C.3 Product registration

Products **supplied** in Australia or New Zealand are to be registered with the relevant regulator for energy labelling and performance requirements.

To make an application to register products for energy labelling and/or performance requirements, there is an online **registration** system, which requires applying for a username and password. Details on how to apply for a username and password and how to log on to the online system can be found at www.energyrating.gov.au.

During the online application for the **registration** process, the applicant will need to enter information prescribed in the legislative requirements including a declaration of the Standard used when testing the appliance and the results of the tests as indicated in the test report.

NOTE A PDF version of the application form that lists information required by the online registration system can be accessed at www.energyrating.gov.au, search "GEMS application forms". Both Australian and New Zealand versions of the form are provided. Guidance concerning specific information requirements is also defined within the online registration system.

C.4 Trans-Tasman Mutual Recognition Arrangement

The Trans-Tasman Mutual Recognition Arrangement provides that products meeting New Zealand legal requirements can be sold in Australia without the need for an Australian **registration**, provided the product was imported into Australia from New Zealand.

Likewise, products registered in Australia are considered registered under New Zealand's *Energy Efficiency (Energy using Products) Regulations 2002* and the product can be supplied in New Zealand provided the energy performance characteristics of the product conform to the Standards for that item's product class.

NOTE 1 For Australia, the **relevant legislation** is *Trans-Tasman Mutual Recognition Act 1997* (Cth), which can be accessed at www.legislation.gov.au.

NOTE 2 For New Zealand, the **relevant legislation** is *Trans-Tasman Mutual Recognition Arrangement*, which can be accessed at www.legislation.govt.nz.

C.5 Registration status

There are four types of **registration** status:

(a) *Approved* — A **registration** status of "approved" means that a model has been registered with the relevant regulator and is approved for **supply**.

(b) *Expired* — A **registration** status of "expired" means that a model **may** not be supplied under any circumstances. "Expired" means the **registration** period has run out. Further **supply** of such models is only permitted if the **registration** is renewed prior to expiry, or re-registered after expiry.

(c) *Superseded* — A **registration** status of "superseded" means that a model registered prior to new legislation becoming effective (e.g. legislation that changes Minimum Energy Performance Standards (MEPS) levels) no longer meets legislative requirements. These models are commonly referred as "grandfathered" models. Superseded models that were imported to, or made in, the applicable country prior to the time the legislative change occurred **may** be supplied at any time into the future. However, no new stocks of non-conforming products can be supplied after the date when new legislation becomes applicable.

(d) *Cancelled* — A **registration** status of "cancelled" is not valid for any stock, irrespective of the date of manufacture or importation. Models that have had their **registrations** cancelled **may** not be supplied under any circumstances.

C.6 Registration in Australia

C.6.1 General

This Clause is applicable for the **registration** of products intended for **supply** in Australia. See Clause C.4 for special conditions regarding the validity of a New Zealand **registration** for **supply** in Australia.

Where the GEMS Regulator requires **registration** or approval of products for energy labelling in Australia, Clauses C.6.2 to C.6.7 apply.

C.6.2 Registration

Applications for **registration** of products are submitted to the GEMS Regulator in electronic format through the online **registration** system at www.energyrating.gov.au by selecting the option to register for **supply** in Australia.

The application for **registration** will then be reviewed and accepted by the GEMS Regulator and approved on the basis that —

(a) the record is accurate and complete;

(b) all relevant documents have been provided;

(c) all relevant requirements for the GEMS Act, the GEMS Determination and Standard requirements are met; and

(d) the relevant fee (where applicable) has been paid.

Queries concerning **registrations** for **supply** in Australia can be initiated online at https://www.energyrating.gov.au/contact-us.

C.6.3 Data entry requirements

Using the online system to apply for a product **registration** requires entering the information outlined in the form mentioned in Clause C.3 and also uploading a test report. In the event the required information specified in the PDF application form differs from that required by the online application form, the requirements of the online application form take precedence.

C.6.4 Energy rating label requirements

In addition to being registered, all appliances within the scope of the GEMS Determination that are offered for **supply** are required to carry the **energy rating label** specified in Section 5. Electronic artwork for **energy rating labels may** be available within the registration system.

C.6.5 Test method requirements

The online application form requires applicants to submit test results from testing undertaken according to the test method specified in the GEMS Determination, refer to AS/NZS 2040.1.

C.6.6 Duration of registration

Registrations are valid for 5 years. The **registration** system automatically reminds registrants to renew their **registrations** six months before the **registration** expires. **Re-registration** occurs via an expedited process that does not require additional information, if the model's specifications do not change.

C.6.7 Transition to the requirements of a replacement GEMS Determination

Applications to register to a new (replacement) GEMS Determination using the test standard AS/NZS 2040.1 and the parameters in this Standard will be accepted from the date the replacement GEMS Determination is registered on the Federal Register of Legislation accessible online at www.legislation.gov.au.

Applications to register to previous versions of the GEMS Determination will not be accepted after the commencement date set out in the replacement GEMS Determination.

C.7 Registration in New Zealand

C.7.1 General

This Clause applies to the **registration** of products intended for **supply** in New Zealand.

NOTE See Clause C.6 for details concerning Australian **registrations.**

Where the regulator requires **registration** or approval of products for energy labelling in New Zealand, Clauses C.7.2 to C.7.7 apply.

C.7.2 Registration

Applications for **registration** of products can be submitted to the New Zealand Regulator in electronic format via the online **registration** system at www.energyrating.gov.au, by selecting the option to register for **supply** in New Zealand.

C.7.3 Obligations of suppliers

In-scope products **may** not be supplied in New Zealand unless the prescribed online **registration** form has been completed with mandatory information and submitted to EECA which is tasked with receiving and processing the prescribed forms. Requirements are defined in the *Energy Efficiency (Energy Using Products) Regulations 2002*. New Zealand legislation can be accessed at

www.legislation.govt.nz/regulation/public/2002/0009/latest/DLM108730.html.

A person who manufactures in New Zealand or imports into New Zealand an item within the scope of **relevant legislation** is to provide EECA with the following information every year no later than four months after the end of each year:

(a) Number of items of each model that the person sold in New Zealand in that year.

(b) Number of items of each model that the person imported to or exported from New Zealand in that year.

(c) Name of each model that the person discontinued manufacturing, exporting or importing in that year.

(d) Copy of any existing test report, or other energy performance data as specified by EECA.

Additional information can be accessed at:

www.legislation.govt.nz/regulation/public/2002/0009/latest/DLM108730.html.

C.7.4 Test report requirements

A test report prepared in accordance with the test standard AS/NZS 2040.1 for each model of clothes washing appliance is to be held by the manufacturer or importer and made available to EECA on request. **Registration** applicants **may** also choose to upload the test reports when completing and submitting the prescribed form.

NOTE Under the *Energy Efficiency (Energy Using Products) Regulations 2002*, a test report is to be made available within five days of receiving a request.

C.7.5 Duration of registration

Importers relying on the goods access provisions of the Trans-Tasman Mutual Recognition Arrangement to **supply** Australian-registered items in New Zealand, **should** be aware that if Australian **registration** expires, that product **may** no longer be supplied to New Zealand consumers.

C.7.6 Transition to this Standard

Registrations to this Standard will be received by the regulator from the date that it is incorporated by reference in regulation.

Applications to register to previous versions of this Standard will not be accepted after the date that it is incorporated by reference in regulation.

NOTE Products with existing **registrations** for energy labelling to a previous edition of this Standard can continue to display previously approved and affixed labels on existing stock manufactured or imported prior to the date the new regulations are cited for an indefinite period while their status remains superseded.

C.7.7 Transitional requirements for energy rating label

Items within the scope of this Standard that are manufactured in, or imported into New Zealand and supplied to consumers on or after the date this Standard is incorporated by reference in regulation, need to carry the **energy rating label** in accordance with Section 5 of this Standard.

NOTE Products with **energy rating labels** to previous editions of this Standard, which are manufactured or imported prior to the relevant regulatory date, **may** be supplied directly from a warehouse without the need to re-label for an indefinite period.

C.8 Application form

To assist users of this Standard, a PDF version of the application form that lists information that is required by the online **registration** system can be accessed at the www.energyrating.gov.au, search "GEMS application forms". Both Australian and New Zealand versions of the form are provided. Guidance concerning specific information requirements is also defined within the online **registration** system.

Bibliography

AS/NZS 6400, *Water efficient products — Rating and labelling*

Energy Efficiency (Energy Using Products) Regulations 2002 (NZ)

Trans-Tasman Mutual Recognition Act 1997 (Cth)

Trans-Tasman Mutual Recognition Arrangement 1997 (NZ)

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognised as Australia's peak national standards body.

Standards New Zealand

The first national standards organisation was created in New Zealand in 1932. The New Zealand Standards Executive is established under the Standards and Accreditation Act 2015 and is the national body responsible for the production of standards.

Australian/New Zealand Standards

Under a Memorandum of Understanding between Standards Australia and Standards New Zealand, Australian/New Zealand standards are prepared by committees of experts from industry, governments, consumers, and other sectors. The requirements or recommendations contained in published standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian/New Zealand standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

International involvement

Standards Australia and Standards New Zealand are responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international standards and that the latest international experience is incorporated in national and joint standards. This role is vital in assisting local industry to compete in international markets. Both organisations are the national members of ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission).

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