

Australian/New Zealand Standard™

**Performance of household electrical
appliances—Refrigerating appliances**

**Part 2: Energy labelling and minimum
energy performance standard
requirements**



AS/NZS 4474.2:2009

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 25 November 2008 and on behalf of the Council of Standards New Zealand on 18 March 2009. This Standard was published on 8 April 2009.

The following are represented on Committee EL-015:

Australian Greenhouse Office, Department of the Environment, Water, Heritage and the Arts
Australian Industry Group
Australian Retailers Association
Business New Zealand
CHOICE
Consumer Electronics Suppliers Association
Department of Employment and Industrial Relations, Qld
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This Standard was issued in draft form for comment as DR 08196.

Australian/New Zealand Standard™

Performance of household electrical appliances—Refrigerating appliances

Part 2: Energy labelling and minimum energy performance standard requirements

Originated in Australia as AS 2575—1982.
Originated in New Zealand as NZS 6205:1982.
Previous edition AS/NZS 4474.2:2001.
Fourth edition 2009.
Reissued incorporating Amendment No. 1 (March 2011).
Reissued incorporating Amendment No. 2 (January 2014).

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Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

ISBN 0 7337 8986 2

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 4474.2:2001 on publication.

This Standard incorporates Amendment No. 1 (March 2011) and Amendment No. 2 (January 2014). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

A1

Amendment 1 (2011) to this Standard includes the requirements in Amendment 2 (2011) to AS/NZS 4474.1:2007 and defines the transition arrangements for these requirements.

Amendment 1 (2011) forms part of this Standard on publication. Transition arrangements regarding the application of Amendment 1 (2011) are set out in Section 4.

The AS/NZS 4474 series comprises two Parts, as follows:

AS/NZS

4474 Performance of household electrical appliances—Refrigerating appliances

4474.1 Part 1: Energy consumption and performance

4474.2 Part 2: Energy labelling and minimum energy performance standard requirements (this Standard)

The overall objective of this series of Standards is to promote high levels of quality, performance and energy efficiency in refrigerating appliances.

The Parts of AS/NZS 4474 are summarized as follows:

- (a) Part 1 includes performance test procedures and minimum performance criteria for refrigerating appliances.
- (b) Part 2 includes algorithms for the calculation of the energy efficiency star rating and projected energy usage, performance requirements (including MEPS), details of the energy label and requirements for the valid application thereof. It has been structured to be suitable for reference in regulatory legislation and to be used in conjunction with Part 1.

This revision is to allow for the introduction of a new energy labelling algorithm and new energy label design. The new energy labelling algorithms and label design were developed and agreed on by industry and government representatives during 2007/2008 and were canvassed widely in various discussion papers, a cost–benefit analysis and a regulatory impact statement. The new energy label includes a label variant which awards additional stars for very efficient products where they rate 7 or more stars under the new algorithm.

This revision also mandates the use of AS/NZS 4474.1:2007 for test reports and energy labelling and MEPS registrations for registrations to this Standard. New Zealand has required the use of this Standard for new registrations and re-registrations since April 2008. The use of AS/NZS 4474.1:2007 is critical as it contains new rules for temperature sensor placements in some cases, differences in calculation of compartment temperature for frost free products and a number of anti-circumvention measures. For some refrigerating appliances, it may be possible to reissue a test report to the new Standard without the need for retesting if the original source data is still available and other settings and rules remain compatible.

Another important change in this Standard is a small adjustment to the MEPS levels to take account of the expected changes to the tested energy consumption when using AS/NZS 4474.1:2007. This occurs because the temperature determination period now includes the defrost and recovery period. The adjustment is 1% or less and only applies to Groups 5T, 5B, 5S and 7. The technical details are contained in a discussion paper released by the Equipment Energy Efficiency (E3, which is made up of officials from State and Federal governments in Australia and New Zealand) in October 2007 and is available from www.energyrating.gov.au in the electronic library.

This Standard also changes the definition of MEPS for all products within its scope from a value based on the average PAEC (as defined in AS/NZS 4474.2:2001 and previous editions) to a maximum permitted energy for any individual unit of a model. The Kf, Kv and feature allowances for MEPS have all been adjusted to reflect this change in MEPS definition. While the new MEPS levels are adjusted to be 'equivalent' to the previously published 2005 levels, it is necessary to re-register all products to the newly defined levels when making an application for the new energy label as there may be small variations at a model level. This change of MEPS definition (called MEPS 2010 in this Standard) also means that there is a change in the verification procedure for MEPS for refrigerators and freezers which are registered to this Standard. These procedures are included in the E3 Administrative Guidelines.

From April 2009, it is anticipated that regulatory authorities will begin accepting applications to register for AS/NZS 4474.2:2009.

In Australia, all appliances within the scope of this Standard, manufactured or imported for sale in Australia on or after 1 April 2010, are required to be registered to this Standard.

In New Zealand, this Standard is expected to be incorporated by reference into New Zealand law prior to 1 April 2010 to align with the Australian regulatory processes. Once incorporated all items that are within the scope of AS/NZS 4474.2:2009, that are manufactured in, or imported into New Zealand may not be sold to a consumer unless they comply with this Standard.

An overview of the regulatory requirements in New Zealand for energy labelling and MEPS is included in Appendix F.

Administrative arrangements during the transition period may vary so registration holders should contact their regulator to obtain detailed requirements with respect to labelling and registration requirements (see also Section 4 and Appendix F of this Standard).

This Standard is published with the approval of the combined state regulatory authorities and is structured to be suitable for reference in energy labelling regulatory legislation. It refers to Part 1 for test procedures.

Check testing, where applicable, will be undertaken to the version of the test Standard or the appropriate MEPS levels which have been used to support the current energy label for that model. A summary of the Administrative Guidelines has been included in Appendix F for the information of users of this Standard.

From 2009 it is anticipated that Fiji and other South Pacific Island nations may use the Australian/New Zealand energy labelling and MEPS system within their own jurisdictions on a cooperative basis.

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.

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FOREWORD

The desire of governments to improve the energy efficiency of appliances has led to the development of Minimum Energy Performance Standards (MEPS) and the associated energy labelling scheme. The first MEPS levels (MEPS 1999) for refrigerators and freezers were implemented on 1 October 1999 and revised MEPS levels (MEPS 2005) became applicable on 1 January 2005 (refer also to Clause 1.1). In this edition, the MEPS definition, which was previously based on a model average energy value, is altered to become a maximum energy value for any unit within a model (republished as MEPS 2010) in this Standard. MEPS 2010 levels are intended to be technically equivalent to MEPS 2005.

In this Standard, MEPS have allowances for special features such as extra doors and through-the-door water/ice dispensers which are excluded from the star rating calculations and associated labelling requirements.

The original energy labelling algorithm was introduced in 1986 and this was revised from a linear progression (fixed energy reduction per additional star) to a geometric progression in 2000 (fixed percentage reduction per addition star) and was implemented in conjunction with a new label design and format. The function for calculating the star rating of an appliance group in 2000 was broadly set at a one star rating generally coinciding with the 1999 MEPS requirements for groups that performed similar energy service. The 2010 algorithm introduced in this edition is a new approach which determines the Base Energy Consumption (BEC) using a volume function to the power of 0.67 to better reflect the surface area change (which is a key driver for energy consumption) as volume changes. The same geometric progression previously used has been retained but the energy reduction factor has been set to 0.23 (23% energy reduction per star) for all groups. Some refined label design elements have been included in this Standard and a new label variant has also been introduced to award products that achieve at least 7 stars under the new energy labelling algorithm. This will also extend the life of the algorithm and will allow a longer period between future energy label algorithm regrades.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Performance of household electrical appliances—Refrigerating appliances****Part 2: Energy labelling and minimum energy performance standard requirements**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the energy labelling and **minimum energy performance standard (MEPS)** requirements for vapour compression refrigerating appliances that can be connected to mains power and which are within the scope of AS/NZS 4474.1:2007. Such refrigerating appliances that are used in the commercial sector are included within the scope. This Standard does not specify safety requirements.

Separate stand alone wine storage cabinets are not specifically within the scope of this Standard. See Clause 1.9.

In particular, this Standard specifies the following:

- (a) **Projected annual energy consumption (PAEC).**
- (b) **Adjusted volume.**
- (c) **Comparative energy consumption (CEC).**
- (d) **Star rating.**
- (e) Performance criteria for energy label validity.
- (f) Some of the requirements for energy label validity.
- (g) **Minimum energy performance standards (MEPS)** for refrigerating appliances for MEPS 2010 requirements.
- (h) Test report format and printing requirements for refrigerating appliance energy labels.

1.2 EXCLUSIONS

The following products are excluded from the scope of energy labelling and MEPS:

- (a) Products that are designed exclusively for use in caravans, vehicles (e.g. mobile homes, campervans and/or rail cars) or boats and which have a total gross volume of less than 60 litres.
- (b) **Portable products** that have a gross volume of less than 30 litres.
- (c) Products that have a gross volume of less than 30 litres where the refrigeration function is secondary (e.g. boiling or cooled water dispensers).
- (d) Products that have no options for connection to a 230 V or 400 V 50 Hz mains electricity supply.
- (e) Products that cool using technologies other than the vapour compression cycle.

1.3 APPLICATION

This Standard **shall** be read in conjunction with AS/NZS 4474.1:2007.

1.4 OBJECTIVE

The objective of this Standard is to define performance, energy labelling and MEPS requirements which are to be met such that a refrigerating appliance can carry a valid energy efficiency label.

1.5 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

2706 Numerical values—Rounding and interpretation of limiting values

AS/NZS

4474 Performance of household electrical appliances—Refrigerating appliances

4474.1 Part 1: Energy consumption and performance

1.6 DEFINITIONS

For the purposes of this Standard, the definitions given in AS/NZS 4474.1, and those below apply.

1.6.1 Adjusted volume (V)

1.6.1.1 Adjusted volume (V_{adj})

The rated gross volume of a **compartment** adjusted to compensate for heat loadings on spaces which are at temperatures other than that of fresh food type space. It is determined as specified in Clause 2.5. (Units: litres.)

1.6.1.2 Total adjusted volume ($V_{adj\ tot}$)

The total of the V_{adj} of all **compartments** of the appliance. (Units: litres.)

1.6.2 Base energy consumption (BEC)

The nominal energy consumption of an appliance model of a given group and **total adjusted volume** with a SRI of 1.00. (Refer also to Clause 2.6.) (Units: kWh/y.)

1.6.3 Check test

A full or part test in accordance with the relevant Standard to verify the performance or energy consumption, or both, of an individual brand and model bearing an energy label.

1.6.4 Comparative energy consumption (CEC)

The nominal average energy consumption of a model of refrigerating appliance. It is based on the $PAEC_{av}$ of the model (refer also to Clause 2.4). The CEC appears on the energy label. (Units: kWh/y.)

1.6.5 Compartment and sub-compartment

These are defined as follows:

- (a) **Compartment** An enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors. A **compartment** may contain one or more **sub-compartments** and one or more convenience features.
- (b) **Sub-compartment** A permanently enclosed space within a **compartment** or **sub-compartment** which is designated as being a different type of food storage space, (i.e. has a different operating temperature range) from the **compartment** or **sub-compartment** within which it is located.

Throughout this Standard, except when referring to door allowances (A_d or $A_{d\ tot}$) or sealing face dimensions (see also Appendix A), the term ‘**compartment**’ means ‘**compartment** and **sub-compartment**’, or ‘**compartment** or **sub-compartment**’, or ‘**compartment** nor **sub-compartment**’ as appropriate for the context.

1.6.6 Family of models

A range of models of the one brand, to which a single set of test reports is applicable and where each of the models has the same relevant physical characteristics, **comparative energy consumption**, energy efficiency rating and performance characteristics and which are grouped for the purpose of **registration**. The term 'model' is synonymous with '**family of models**'.

1.6.7 Good

A **good** is a product to which this Standard applies.

1.6.8 Grandfathering

Refer to Appendix F for a definition of '**grandfathering**'.

1.6.9 Minimum energy performance standard (MEPS)

The mandatory level of energy efficiency which has to be met by each individual unit of an appliance model. The MEPS cut-off level is the maximum allowable energy consumption of the model determined from its size, features and configuration (refer to Clause 3.5). (Units: kWh/y.)

1.6.10 Projected annual energy consumption (PAEC)

The estimate of energy used by a single unit during one year's use. It assumes a particular ambient temperature and normally no door openings (refer also to Clause 2.3). (Units: kWh/y.)

1.6.11 Portable products

Units that are specifically designed to be moved from place to place as part of their normal use as stated in the accompanying product literature (i.e. operating manual or user instructions).

NOTE: Energy labelling and MEPS is only exempt for **portable products** where they have a gross volume of less than 30 litres.

1.6.12 Registration

In Australia The completion and submission of the prescribed application form to an Australian regulator as specified in the on-line **registration** system. An approved **registration** means a record that has been reviewed and accepted by the relevant regulator and marked with an approved status on the basis that the record is complete, all relevant documents have been provided, all relevant requirements of the Standard continue to be met and the relevant fee (where applicable) has been paid.

NOTE: Appendix F sets out special rules regarding **goods** from New Zealand that rely on the Trans Tasman Mutual Recognition Agreement (TTMRA) for enabling them to be sold in Australia.

In New Zealand The completion and submission of the prescribed form to the authority.

NOTE: In New Zealand, unless the prescribed form has been completed and submitted to the relevant Authority, the item may not be sold to a consumer. The Authority is defined in the Energy Efficiency (Energy Using Products) Regulations 2002. A product to which this Standard applies may not be sold in New Zealand unless the prescribed form has been completed and submitted to the relevant New Zealand Authority tasked with receiving and processing the prescribed forms. At the time of publication of this Standard the Authority is the Energy Efficiency and Conservation Authority.

Australian **registrations** are recognized by the New Zealand Government because of the TTMRA. See Appendix F for further details.

The prescribed application form is given in Appendix E of this Standard which is suitable for the registration of a product in New Zealand or Australia.

Regulators for the purposes of **registration** means those entities set out in the list of regulators maintained on the website www.energyrating.gov.au. A valid **registration** is one where the status remains approved on the relevant date. A **registration** status of 'expired' or '**grandfathered**' is valid only for existing stock that was manufactured or imported prior to the expiry or **grandfathering** date and where it had a status of 'approved' at the time of manufacture or importation. A **registration** status of 'cancelled' is not valid for any stock, irrespective of the date of manufacture or importation.

NOTE: In Australia, the term **registration** is normally used while in New Zealand the term listing is normally used. In this Standard, the term **registration** applies to both systems.

1.6.13 Star rating

The number of stars displayed on the energy label. Available stars are between a minimum of one and a maximum of ten. The **star rating** is calculated from the **Star Rating Index**. (Refer also to Clause 2.8.) (Dimensionless)

1.6.14 Star rating index (SRI)

An indication of the claimed energy efficiency of a model. A higher SRI indicates higher energy efficiency. It is derived from the CEC. (Refer also to Clause 2.7.) (Dimensionless)

1.6.15 Statements of intention

1.6.15.1 *Shall*

Indicates that a statement is mandatory.

1.6.15.2 *Should*

Indicates a recommendation.

1.6.16 Variant

A model **variant** is an alternative version of a model which has the same sales specification and the same model number or other form of designation as another version of the model, and offers the same performance except that it has a different $PAEC_{av}$, and may have a different SRI. (Refer also to Clause 2.4.2.)

1.7 MEASURED QUANTITIES

Quantities used in conjunction with this Standard **shall** be measured in accordance with AS/NZS 4474.1.

1.8 ROUNDING

Unless otherwise stated, numbers **shall** be rounded and recorded to five significant figures in accordance with AS 2706.

1.9 WINE STORAGE CABINETS

Such products may be tested to AS/NZS 4474.1 and labelled to this Standard on a voluntary basis. Any supplier, which elects to place an energy label on a wine storage cabinet, **shall** register the product with the relevant regulator. Before such products can be registered to carry an energy label, they must also meet the relevant MEPS and other performance requirements. Any cabinet which has other standard **compartments** in addition to a wine storage **compartment** is included within the scope of this Standard and **shall** meet all the relevant performance requirements for products within the scope of energy labelling and MEPS.

SECTION 2 CALCULATIONS FOR THE ENERGY LABEL

2.1 GENERAL

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

The process consists of measuring the tested energy consumption (E_t), of each unit tested, then calculating the **projected annual energy consumption (PAEC)** of the unit. The **comparative energy consumption (CEC)** for the model is determined from the values of PAEC for the units tested to determine the label particulars. The CEC and **total adjusted volume** ($V_{adj\ tot}$) are then used to calculate the **star rating index** and the **star rating**.

NOTE: For an example of calculations carried out on a typical set of test results, refer to Appendix B.

2.2 NUMBER OF TESTS AND PROCESSING OF DATA

2.2.1 Number of units required

For the purpose of determining the CEC of a model for labelling, three separate units of the nominated model **shall** be tested for energy consumption in accordance with Section 2 of AS/NZS 4474.1. At the supplier's discretion, more than three units may be tested.

The energy consumption declared on the energy label is based on the samples submitted for **registration** but it is the manufacturer's responsibility to ensure that all product supplied to the market complies with the relevant regulatory requirements. Monitoring production is advisable to ensure ongoing compliance. The purpose of testing the 3 (or more) samples for **registration** is to obtain representative spread of products on which to base the energy label declaration. A sample of three or more provides a better estimate than can be obtained from tests on a single sample.

Suppliers are not permitted to select results for submission for **registration** from a larger pool of results where data for the selected units provides an inaccurate estimate of the mean energy consumption for the model.

2.2.2 Number of tests per unit

Each unit **shall** be tested with sufficient test runs to enable a valid value of E_t to be determined for that unit. (Refer to AS/NZS 4474.1, Appendix K). This determination **shall** be documented in a test report containing the test results for all test runs used to derive E_t . (Refer to AS/NZS 4474.1).

2.2.3 Results

After testing three or more separate units in accordance with Clause 2.2, the separate values of PAEC **shall** be averaged and referred to as $PAEC_{av}$.

2.3 PROJECTED ANNUAL ENERGY CONSUMPTION (PAEC)

The PAEC of a single refrigerating appliance **shall** be calculated using the following equation:

$$PAEC = E_t \times \frac{365}{1000} (\text{kWh/y}) \quad \dots 2.1$$

where

E_t = tested energy consumption expressed in watt hours per 24 hours, rounded to the nearest whole number.

- A1 Where the refrigerating appliance has a **declared automatic control**, this **shall** be configured to operate as per **normal use** for the energy consumption test in accordance with AS/NZS 4474.1, where applicable.

NOTE: In accordance with Clause 3.1 of AS/NZS 4474.1:2007 (including A1 and A2), refrigerating appliances with **circumvention devices** do not comply with that Standard. Clause 3.7 and Paragraph K8 of AS/NZS 4474.1:2007 provide further guidance.

2.4 COMPARATIVE ENERGY CONSUMPTION (CEC)

2.4.1 General

The CEC for a model **shall** not be less than the average (rounded to a whole integer) PAEC value (i.e. $PAEC_{av}$) for the three (or more) units which are tested to determine the label particulars. The CEC **shall** be an integer with units of kWh/y.

The CEC declared on the energy label **should** be representative of the average production energy consumption.

NOTE: At the supplier's discretion, the declared CEC may be greater than the $PAEC_{av}$ to allow for variations such as manufacturing tolerances. Where the production variability is greater than 5%, it may be advisable to adjust the claimed CEC to be a value which is higher than the sample mean. However, the claimed CEC may not exceed MEPS level (refer Clause 3.5.1).

2.4.2 Variant

Two or more **variants** of a model may use a common label with a CEC not less than the highest $PAEC_{av}$ (rounded to the nearest kWh) of those **variants**.

2.5 ADJUSTED VOLUME (V_{adj})

To determine the **adjusted volume** of a **compartment**, the volume adjustment factor (K_s) **shall** first be determined as follows:

- (a) K_s for **compartments other than special compartments** K_s values **shall** be applied to food storage of cellar, fresh food, chill, ice-making, short-term frozen food and freezer types defined in Clause 1.3.11 of AS/NZS 4474.1:2007 in accordance with Table 2.1.

TABLE 2.1
VOLUME ADJUSTMENT FACTORS FOR
SPECIFIED TYPES OF COMPARTMENTS

Compartment type	Volume adjustment factor (K_s)
Cellar	0.7
Fresh food	1.0
Chill	1.1
Ice-making	1.2
Short term frozen food storage	1.4
Freezer	1.6

- (b) K_s for **special type compartments** K_s values **shall** be applied to special (unfrozen) and special (frozen) type **compartments** in accordance with Table 2.2 where the **compartment** cannot be classified into one of the standard types specified in Item (a).

For any special **compartment**, the value of K_s **shall** be determined by the warmest temperature of the continuous operating temperature range that is claimed for it by the manufacturer. For example, if the claimed range of a special (frozen) type **compartment** is -12°C or colder, then the warmest temperature of its claimed range lies in the range ‘warmer than -15°C but not warmer than -9°C ’, so the value of K_s is 1.4.

TABLE 2.2
VOLUME ADJUSTMENT FACTORS FOR
SPECIAL TYPE COMPARTMENTS

Claimed maximum of operating temperature range (T_m)	Volume adjustment factor (K_s)
Warmer than 6°C	$\frac{(32 - T_m)}{(32 - 3)}$
Warmer than 3°C but not warmer than 6°C	1.0
Warmer than -2°C but not warmer than 3°C	1.1
Warmer than -9°C but not warmer than -2°C	1.2
Warmer than -15°C but not warmer than -9°C	1.4
-15°C or colder	1.6

- (c) *Multi-use compartments* The volume adjustment factor to be applied to any multi-use type **compartment** **shall** be determined by the food storage type that is applicable when it is set to the function selected for continuous operation during the determination of energy consumption (usually the coldest function). Where this function is a special (unfrozen) or (frozen) **compartment** type, the applicable value of K_s **shall** be determined according to Item (b).

The **adjusted volume** of a **compartment** is then given by the following equation:

$$V_{\text{adj}} = V_g \times K_s \text{ (litres)} \quad \dots 2.3$$

where

$$V_g = \text{rated gross volume of the } \mathbf{compartment} \text{ in litres}$$

$$K_s = \text{Volume adjustment factor for the food storage type of the } \mathbf{compartment}, \text{ determined as specified in Items (a), (b) and (c). (Refer to Clause 3.5.3 for additional use of } K_s.)$$

2.6 BASE ENERGY CONSUMPTION (BEC)

The **base energy consumption** for an appliance model **shall** be calculated from the following equation:

$$BEC = C_f + (C_v \times (V_{\text{adj tot}})^{0.67}) \text{ (kWh/y)} \quad \dots 2.4$$

where

$$C_f = \text{fixed allowance factor for its group in kilowatt hours per year}$$

$$C_v = \text{variable allowance factor for its group in kilowatt hours per litre per year}$$

$$V_{\text{adj tot}} = \mathbf{total adjusted volume} \text{ for the model in litres.}$$

The BEC is not rounded.

Factors C_f and C_v **shall** be in accordance with Table 2.3.

TABLE 2.3
FIXED AND VARIABLE ALLOWANCE FACTORS

Appliance group	Fixed allowance factor (C_f) kWh/y	Variable allowance factor (C_v) kWh/y/L
1, 2 and 3	200	4.0
4, 5T, 5B and 5S	150	8.8
6C, 6U and 7	150	7.5

2.7 STAR RATING INDEX (SRI)

To determine the **star rating index** of a refrigerating appliance, an energy consumption reduction factor (ERF) of 0.23 **shall** be used for all groups.

The **star rating index** **shall** then be given by the following equation:

$$\text{Star rating index} = 1 + \left[\frac{\log_e \left(\frac{CEC}{BEC} \right)}{\log_e (1 - ERF)} \right] \quad \dots 2.5$$

where

CEC = **comparative energy consumption** for the model in kWh/year. See Clause 2.4.

BEC = **base energy consumption** for the model in kWh/y. See Clause 2.6.

ERF = energy consumption reduction factor = 0.23 for all appliance groups.

NOTES:

- 1 Where the CEC of a model is equal to its **base energy consumption (BEC)**, its **star rating index** is 1.00.
- 2 The energy consumption reduction factor is the proportion by which the CEC of a model would have to be reduced to increase its **star rating index** by 1.00. For all groups this is a 23% reduction in energy consumption per additional star earned.

2.8 STAR RATING

The **star rating** **shall** be obtained from Table 2.4 using the **star rating index (SRI)** determined in Clause 2.7.

NOTES:

- 1 Refer to Appendix C for a method to estimate the CEC required for any particular target **star rating**.
- 2 For an example of calculations carried out on a typical set of test results, refer to Appendix B.

TABLE 2.4
DETERMINATION OF STAR RATING

SRI	Star rating
SRI < 1.5	1
1.5 ≤ SRI < 2.0	1.5
2.0 ≤ SRI < 2.5	2
2.5 ≤ SRI < 3.0	2.5
3.0 ≤ SRI < 3.5	3
3.5 ≤ SRI < 4.0	3.5
4.0 ≤ SRI < 4.5	4
4.5 ≤ SRI < 5.0	4.5
5.0 ≤ SRI < 5.5	5
5.5 ≤ SRI < 6.0	5.5
6.0 ≤ SRI < 7.0	6
7.0 ≤ SRI < 8.0	7
8.0 ≤ SRI < 9.0	8
9.0 ≤ SRI < 10.0	9
10.0 ≤ SRI	10

2.9 ENERGY LABELLING AND MEPS FOR MULTI-GROUP PRODUCTS

As specified in AS/NZS 4474.1, the energy consumption of a refrigerating appliance **shall** be determined for the coldest claimed configuration for all multi-use **compartment(s)**. This value **shall** be used to determine the primary **comparative energy consumption** and the **star rating** for the appliance shown on the energy label.

However, where one or more multi-use **compartments** can be operated in a way that can change the product group, the manufacturer may elect to claim the energy consumption and **star rating** for each such group configuration in addition to the primary **comparative energy consumption**. Where any additional groups are claimed, the manufacturer **shall** nominate which group is the primary group for the purposes of energy labelling.

Any claimed additional groups for a model which are documented in the product literature, **shall** be separately registered for energy labelling and MEPS for the model. Each configuration registered will be individually listed on the energy rating website. Each additional configuration registered **shall** comply with the relevant MEPS requirements for the group registered.

The product must be capable of meeting pull down test and temperature operation test requirements (refer Clauses 3.3 and 3.4) for all claimed groups. However, only a single set of test reports for the group configuration that is most onerous is required to demonstrate compliance with temperature operation test or pull down test requirements for energy labelling and MEPS **registration**.

The energy label displayed on the product **shall** be the registered details for the primary group nominated.

NOTE: A separate application for each group claimed needs to be submitted for the model.

2.10 ENERGY LABEL VALIDITY AND CHECKING TESTING

The CEC value **shall** be accepted as valid if, when a single sample of a labelled model is tested for an initial screening test, its PAEC is such that—

$$PAEC \leq 1.075 \times CEC \quad \dots 2.6$$

If this is not the case, the CEC **shall** be accepted as valid if three additional units are tested and the average PAEC of these additional units is such that—

$$PAEC_{(av)} \leq 1.075 \times CEC \quad \dots 2.7$$

NOTE: The 7.5% in Equations 2.6 and 2.7 are not to be applied as a tolerance on the original test measurements which are used to support an application for **registration**. The 7.5% is only an allowance for possible variation in test results for test samples due to production variability, sampling error and all measurement uncertainties in or between laboratories which is applied when assessing a **check test** result. The administrative guidelines (summarised in Appendix F) set out important information and the methodology used by government for check testing of product registered to this Standard. These guidelines can be found on www.energyrating.gov.au under E3 Committee. Note that different criteria are applied to the verification of MEPS compliance and energy labelling validity.

SECTION 3 PERFORMANCE CRITERIA

3.1 GENERAL

The criteria set out in Clauses 3.2 to 3.5 **shall** be met by each unit tested, for the refrigerating appliance model to comply with energy labelling and MEPS requirements.

NOTE: The administrative guidelines set out important information and the methodology used by government for check testing of product registered to this Standard. These guidelines can be found on www.energyrating.gov.au under E3 Committee and are summarized in Appendix F.

3.2 RATED VOLUME

Each **compartment** gross and storage volume and total gross and storage volume of the appliance **shall** meet the requirements set out in Section 3 of AS/NZS 4474.1.

3.3 PULL-DOWN

The appliance **shall** meet the requirements set out in Section 3 of AS/NZS 4474.1.

While all units within a model are required to meet the pull down requirements in Part 1, only a test report for a single unit is required to confirm this for the purposes of energy labelling and MEPS **registration**.

3.4 OPERATING TEMPERATURE PERFORMANCE

The appliance **shall** meet the requirements set out in Section 3 of AS/NZS 4474.1.

While all units within a model are required to meet the temperature operation performance requirements in Part 1, only a test report for a single unit is required to confirm this for the purposes of energy labelling and MEPS **registration**.

3.5 MINIMUM ENERGY PERFORMANCE STANDARDS

3.5.1 For a refrigerating appliance model manufactured or imported after 31 March 2010

The *PAEC* for each unit **shall** not exceed the MEPS 2010 cut-off level, which is determined as follows:

$$\text{MEPS 2010 cut-off level} = [K_f + (K_v \times V_{\text{adj tot}})] \times K_a + A_{\text{d tot}} + A_{\text{wi}} \quad \dots 3.1$$

(kWh/y)

where

- K_f = fixed allowance factor for its appliance group. (Refer to Table 3.1) (kWh/year)
- K_v = variable allowance factor. (Refer to Table 3.1) (kWh/y/L)
- K_a = adaptive defrost adjustment factor; $K_a = 1.05$ where an adaptive defrost system is present (for groups 1, 5T, 5B, 5S and 7 only), or $K_a = 1.00$ where the feature is not present (dimensionless)
- $V_{\text{adj tot}}$ = **total adjusted volume**. (Refer to Clause 2.5) (litres)
- $A_{\text{d tot}}$ = an allowance which is made where the external doors provided on an appliance differ from the regular arrangement for that appliance group as described in Table 3.2. It is calculated by the method set out in Clause 3.5.3 (kWh/y)

A2

A_{wi} = an allowance of 128 kWh/y which applies where an appliance has a 'through-the-door ice dispenser', i.e. it has an automatic ice-maker coupled with a device for delivery on demand of ice externally through a door. This allowance also applies if the through-the-door ice dispenser also dispenses chilled water.

Neither tested energy consumption of all the samples submitted for **registration** nor the claimed CEC (refer Clause 2.5) **shall** exceed the specified MEPS level.

NOTES:

- 1 An example of a calculation of a MEPS 2010 cut off level is included in Appendix B.
- 2 Where it is considered that other feature-related allowances **should** be provided, particularly where the feature will reduce energy consumption in use but that reduction would not be evident on energy consumption tests conducted in accordance with AS/NZS 4474.1, then those allowances **should** be made only by amendment to this Standard.
- 3 If any of the individual test results are close to the MEPS limit or if there is significant variation in the sample results, manufacturers **should** only proceed with caution after additional testing indicates that they are confident that all production units are likely to pass the MEPS requirement.
- 4 The administrative guidelines (summarized in Appendix F) set out important information and the methodology used by government for check testing of product registered to this Standard. These guidelines can be found on www.energyrating.gov.au under E3 Committee. Note that different criteria are applied to the verification of MEPS compliance and energy labelling validity.

3.5.2 Fixed and variable allowance factors (K_f and K_v)

The fixed and variable allowance factors are determined from the group classification of the appliance (refer to AS/NZS 4474.1) and to Table 3.1.

TABLE 3.1
MEPS 2010 CUT-OFF LEVEL FACTORS

Appliance group	Fixed allowance factor (K_f) kWh/y	Variable allowance factor (K_v) kWh/y/L
1	296	0.356
2	308	0.309
3	301	0.366
4	295	0.351
5T	334	0.384
5B	440	0.382
5S	607	0.180
6C	202	0.514
6U	299	0.317
7	383	0.514

3.5.3 Door allowance ($A_{d \text{ tot}}$)

The door allowance applies when the arrangement of external doors on an upright appliance differs from that set out in Table 3.2, either in the number of doors on the appliance or because the **compartments** to which they give access are of different food storage types from those specified in Table 3.2.

There **shall** be no door allowances for chest-type appliances, irrespective of the configuration.

TABLE 3.2
REGULAR DOOR PROVISIONS
FOR APPLIANCE GROUPS

Appliance group	External doors into compartment type	
	Fresh food storage	Freezer
1, 2 and 3	1	0
4, 5T, 5B and 5S	1	1
6U and 7	0	1

$A_{d \text{ tot}}$ of an appliance **shall** be the sum of the door allowances (A_d) for each food storage **compartment** type. A_d **shall** be derived for external doors only, i.e. doors on **sub-compartments** do not affect door allowances. A_d for a **compartment** type or $A_{d \text{ tot}}$ for an appliance may be either positive or negative.

A_d for each door that accesses a **compartment** of a nominated food storage type **shall** be derived as follows:

$$A_d = K_d \times K_s \times (L_a - L_e) \text{ (kWh/y)} \quad \dots 3.2$$

where

- K_d = door allowance factor. (Refer to Table 3.3) (kWh/y/m)
- K_s = volume adjustment factor. (Refer to Table 2.1 or 2.2 as applicable)
- L_a = sum of the lengths of the actual sealing face perimeters of all external doors to **compartments** of the food storage **compartment** type (see Notes 1 to 4) (metres)
- L_e = estimated length of the sealing face perimeter of the external door of a fresh food or freezer **compartment** on an equivalent regular appliance (see Note 5) (metres)

Where there is more than one **compartment** of the type, then all those **compartments shall** be taken into account.

Where there is more than one door to a **compartment** then all doors **shall** be taken into account, including any door within a door.

Where, on one **compartment**, two doors seal one against the other along a common edge but not on a cabinet rail (e.g. French doors) then a single seal face length, not two, **shall** be included for that edge. (Refer to Figure 3.1.)

Each perimeter **shall** be measured on the centre-line of the sealing face. (Refer to Figure 3.2.) Where seal faces are not in one plane, extra seal length that results from transitions between planes **shall** not be included.