

Australian/New Zealand Standard™

**Household refrigerating appliances—
Energy labelling and minimum energy
performance standards requirements**



AS/NZS 4474:2018

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- CHOICE
- Consumer Electronics Suppliers Association
- Consumers Federation of Australia
- Department of the Environment and Energy (Australian Government)
- Electrical Compliance Testing Association of Australia
- Energy Efficiency & Conservation Authority of New Zealand
- Energy Safe Victoria

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Household refrigerating appliances— Energy labelling and minimum energy performance standards requirements

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-060 Household Refrigerating Appliances and will supersede AS/NZS 4474.2:2009.

This Standard incorporates Amendment No. 1 (March 2019). 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.

The overall objective of this Standard is to promote high levels of quality, performance and energy efficiency in refrigerating appliances. This Standard specifies the energy labelling and **MEPS** requirements for household vapour compression refrigerating appliances that —

- (a) can be connected to mains power;
- (b) are within the scope of the **test standard** Part 1; and
- (c) are not excluded in the **relevant legislation**.

The AS/NZS 4474 series was previously published in two parts but now comprises only one part, AS/NZS 4474 *Energy labelling and minimum energy performance standards requirements* (this Standard). The International Electrotechnical Commission (IEC) 62552:2015 Standard in three parts has been identically adopted. Throughout this Standard, these are referred to as the **test standard**, citing the relevant part.

The components previously covered by AS/NZS 4474.1 and AS/NZS 4474.2 are summarized as follows:

- (a) Determination of energy consumption and performance is prescribed in AS/NZS IEC 62552:2018 Parts 1 to 3, which replace AS/NZS 4474.1 as follows:
 - (i) AS/NZS IEC 62552.1:2018, *Household refrigerating appliances — Characteristics and test methods, Part 1: General requirements*.
 - (ii) AS/NZS IEC 62552.2:2018, *Household refrigerating appliances — Characteristics and test methods, Part 2: Performance requirements*.
 - (iii) AS/NZS IEC 62552.3:2018, *Household refrigerating appliances — Characteristics and test methods, Part 3: Energy consumption and volume*.
- (b) This Standard will replace AS/NZS 4474.2. It includes: algorithms for the calculation of the energy efficiency **star rating** and **projected annual energy consumption** (PAEC); performance requirements (including **MEPS**); details of the **energy rating label** and requirements for affixing it to a product. The scope of the **test standard** is broad and covers all mains electricity-using household appliances that store, cool, refrigerate or freeze food or beverages of any kind, whether perishable or not. The scope of this Standard covers **household refrigerating appliances** in Australia and New Zealand that are regulated for energy efficiency. It is narrower than the **test standard**. In this Standard, **household refrigerating appliance** means an insulated cabinet with one or more **compartments** used for the storage of foodstuffs that require refrigeration at specified temperature conditions.

This Standard has been developed in consultation with regulatory authorities and needs to be considered with reference to the **relevant legislation**.

The terms “refrigerating appliance”, “appliance” and “product” are used interchangeably in this Standard and all refer to refrigerating appliances within the scope of this Standard.

Statements in notes expressed in mandatory terms in text and/or footnotes and/or tables are deemed to be requirements of this Standard.

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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Introduction

In Australia, the *Greenhouse and Energy Minimum Standards Act 2012* (GEMS Act) is the sole national framework for the regulation of in-scope products' energy efficiency. The GEMS Regulator is the sole party responsible for administering the legislation in Australia. The specific requirements for household refrigerating appliances regulated under the GEMS Act are set out in a legislative instrument, the Greenhouse and Energy Minimum Standards (Household Refrigerating Appliances) Determination.

In New Zealand, the energy efficiency of household refrigerating appliances is regulated through the *Energy Efficiency (Energy Using Products) Regulations 2002* (the New Zealand Regulations) that are administered by the Ministry of Business, Innovation and Employment and enforced by the New Zealand Regulator, the Energy Efficiency and Conservation Authority (EECA). The New Zealand Regulations list the requirements for compliance with **MEPS** in New Zealand, including references to local and international Standards where applicable.

Henceforth, in this Standard, the Australian Determination and the New Zealand Regulations are referred to as the **relevant legislation**.

This Standard specifies many of the technical parameters used to determine the energy efficiency, performance and energy labelling requirements for in-scope appliances. The technical details in this Standard reflect the recommendations in the *Decision Regulation Impact Statement — Household Refrigerators and Freezers* that was endorsed by Council of Australian Governments (COAG) Energy Ministers on 24 November 2017 (see Bibliography Item [3]).

From the commencement date specified in the **relevant legislation**, all in-scope appliances that are **supplied**, offered for **supply** or used for a commercial purpose in Australia or offered for sale, lease, hire or hire purchase in New Zealand need to meet new **MEPS** levels and be registered to the **relevant legislation** using the **test standard** and the parameters specified in this Standard. This change is intended to closely align Australian and New Zealand household refrigeration **MEPS** levels with those introduced in the USA in 2014.

During the transition period from when **relevant legislation** commences and until new **MEPS** levels become effective, there are options available for suppliers to register products. Suppliers can contact the relevant regulator to obtain detailed requirements with respect to energy labelling and **registration** requirements (see also [Appendix E](#)).

Another important change in this Standard is a change to the basis on which energy consumption for energy labelling is determined. The **energy rating label** value will now take into account the measured energy consumption at two ambient temperatures and will also include additional energy consumed (measured by a load processing test) to remove a prescribed user heat load.

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

The desire of governments to improve the energy efficiency of appliances has led to the development of **MEPS** and the associated energy labelling scheme. The first **MEPS** levels (**MEPS 1999**) for **refrigerators** and **freezers** were implemented on 1 October 1999. These were then revised in 2005 and **MEPS** levels (**MEPS 2005**) became applicable on 1 January 2005 (see also [Clause 1.1](#)). The basis for **MEPS** was changed from an average to a maximum permitted value in 2010 (while maintaining the same technical levels). This approach has been used again with the introduction of the more stringent **MEPS** levels set out in this Standard that are proposed for implementation on 1 January 2021.

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 additional 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 a new approach which determined 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 size increases. The overall approach to the energy labelling algorithm has been retained in this edition, but there have been some significant changes to the way that the **Comparative Energy Consumption (CEC)** is determined. The measured value of energy at a lower ambient temperature is now taken into consideration and the load processing efficiency is also included in order to provide a better estimate of energy during normal use. For energy labelling, a proxy for the actual **volume** (called **normalized volume**) is now used to determine the **BEC**. Some refined label design elements have been included in this revision, including the addition of appliance **total volume**.

NOTES

Australian/New Zealand Standard

Household refrigerating appliances—Energy labelling and minimum energy performance standards requirements

Section 1 Scope and general

1.1 Scope

This Standard specifies the energy labelling and **MEPS** requirements for household vapour compression refrigerating appliances that —

- (a) can be connected to mains power;
- (b) are within the scope of the **test standard** Part 1; and
- (c) are not excluded in the **relevant legislation**.

NOTE 1 For Australia, information regarding the scope is contained in the Greenhouse and Energy Minimum Standards (Household Refrigerating Appliances) Determination, which can be accessed at:

<https://www.legislation.gov.au/>. The Determination covers household refrigerating appliances irrespective of the context in which they are used. For example, the Determination applies to household refrigerating appliances used in a commercial context.

NOTE 2 For New Zealand, information regarding the scope is contained in the *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

This Standard does not specify electrical safety requirements.

1.2 Exclusions

Information regarding exclusions from the scope (i.e. household refrigerating appliances that are not covered) is specified in the **relevant legislation**.

1.3 Application

This Standard specifies the following parameters:

- (a) **Projected annual energy consumption (PAEC).**
- (b) **Projected MEPS energy consumption (PMEC).**
- (c) **Volume.**
- (d) **Adjusted volume.**
- (e) **Normalized volume.**
- (f) **Comparative energy consumption (CEC).**
- (g) **Star rating.**
- (h) Performance criteria.
- (i) **MEPS** for refrigerating appliances.
- (j) **Registration** test report information.
- (k) Content, format and affixing requirements for refrigerating appliance **energy rating labels**.

The above parameters defined in this Standard need to be determined using test measurements conducted in accordance with the **test standard** Part 3.

1.4 Objective

The objective of this Standard is to define performance, energy labelling and **MEPS** requirements for **household refrigerating appliances supplied** in Australia and New Zealand.

1.5 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:

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

AS/NZS IEC 62552-1:2018, *Household refrigerating appliances — Characteristics and test methods, Part 1: General requirements*

AS/NZS IEC 62552-2:2018, *Household refrigerating appliances — Characteristics and test methods, Part 2: Performance requirements*

AS/NZS IEC 62552-3:2018, *Household refrigerating appliances — Characteristics and test methods, Part 3: Energy consumption and volume*

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

1.6 Definitions

For the purposes of this Standard, the definitions given in the **test standard** Part 1, and those below apply.

1.6.1

adjusted volume (V_{adj})

a **volume** metric where the **volume** of each **compartment** is adjusted to compensate for heat loadings on **compartment** types that are at temperatures other than that of fresh food type in a test room temperature of 32 °C. It is used for determination of the **MEPS** cut-off level for an appliance. (Units: litres)

Note 1 to entry: It is determined as specified in [Clause 4.2.3](#).

1.6.2

base energy consumption (BEC)

the nominal energy consumption of an appliance model of a given **Group** and **normalized volume** with a **star rating index (SRI)** of 1.00. (Units: kWh/y)

Note 1 to entry: See also [Clause 3.6](#).

1.6.3

built-in product

any **refrigerator**, **refrigerator-freezer** or **freezer** with a total external depth of 610 mm or less not including doors, handles, and custom front panels; with sides that are not designed to be visible after installation; and that is designed, intended, and marketed exclusively —

- (a) to be installed totally encased by cabinetry or panels that are attached during installation;
- (b) to be securely fastened to adjacent cabinetry, walls or floor; and
- (c) to either be equipped with an integral factory-finished face or accept a custom front panel.

1.6.4

check test

a test in accordance with the relevant part of the **test standard** to determine whether in-scope appliances comply with **relevant legislation**. Accordingly, a **check test** verifies claims about a model in relation to one or more of the following:

- (a) Energy consumption for determining **MEPS**.
- (b) Energy consumption for determining energy labelling.
- (c) Product performance.

1.6.5

circumvention device

any control, control device, software, component or part that alters an appliance's operating characteristics during any test procedure, resulting in measurements that are unrepresentative of the appliance's true characteristics that may occur during normal use under comparable conditions.

Note 1 to entry: This has the same meaning as that specified in the **test standard** Part 3, Section 7.

1.6.6

compact refrigerating appliance

a refrigerating appliance that has a footprint area (based on the external depth times the external width, in metres excluding handles, external condensers and other protrusions) of 0.36m² or less

1.6.7

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. The **CEC** appears on the **energy rating label**. (Units: kWh/y)

Note 1 to entry: See also [Clause 3.4](#).

1.6.8

compartment

an enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors, which may itself be divided into **sub-compartments**

Note 1 to entry: Throughout this Standard, the term "**compartment**" means "**compartment** and **sub-compartment**", or "**compartment** or **sub-compartment**", or "**compartment** nor **sub-compartment**" as appropriate for the context.

1.6.9

sub-compartment

a permanently enclosed space within a **compartment** or **sub-compartment** which has a different operating temperature range from the **compartment** or **sub-compartment** within which it is located

1.6.10

configuration

the **configuration** of a refrigerating appliance is defined as follows:

- (a) **Chest** — Where access is from the top. Also known as "top opening" type.
- (b) **Upright** — Where access is from the front, including drawer type. Also known as "vertical" type.
- (c) **Side by side** — An **upright refrigerator/freezer** where the largest fresh food **compartment** and the largest **freezer compartment** are **side by side**.

1.6.11

declared automatic controls

controls that are declared in the product **registration**, operate automatically over a restricted, specific range of conditions and have a legitimate basis for their operation during normal use and under the test procedure for energy consumption

Note 1 to entry: Requirements for **declared automatic controls** are set out in [Clause 4.8](#).

1.6.12

energy rating label

provides consumers with information concerning the energy consumption and energy efficiency of household refrigerating products. It displays the product's **CEC**, **star rating** and **total volume**

Note 1 to entry: See [Section 6](#) for further details.

1.6.13

grandfathering

in Australia, under the GEMS Act, **grandfathering** refers to arrangements which allow previously complying and registered products that become non-complying following the introduction of new regulatory requirements to continue to be legally offered for **supply** until existing stock in Australia is exhausted

In New Zealand, the *Energy Efficiency (Energy Using Products) Regulations* contain similar provisions to allow the continued **supply** of products already imported or manufactured in New Zealand before the effective date of a new or revised regulatory requirement

1.6.14

Group

category into which a refrigerating appliance is classified for the purpose of applying **MEPS** and energy labelling rules.

Note 1 to entry: Specified for any appliance by [Table 2.1](#) and the accompanying notes.

1.6.15

household refrigerating appliance

an insulated cabinet with one or more **compartments** used for the storage of foodstuffs that require refrigeration at specified temperature conditions

Note 1 to entry: A comprehensive definition is specified in the **relevant legislation**.

1.6.16

minimum energy performance standards (MEPS)

the mandatory level of energy efficiency which needs 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 measured at an ambient temperature of 32 °C determined from its **adjusted volume**, features and **configuration**. (Units: kWh/y)

Note 1 to entry: All production of a model **should** have a measured energy consumption that is less than the relevant **MEPS** level.

Note 2 to entry: See [Clause 4.2.4](#).

1.6.17

normalized volume (V_{norm})

a **volume** metric to provide a comparative overall measure of the size of a product when compared to other products of a similar **Group** at an ambient temperature of 22 °C. It is used for determination of the **BEC** for an appliance. (Units: litres)

Note 1 to entry: **Normalized volume** is determined as specified in [Clause 3.5](#).

1.6.18**projected annual energy consumption (PAEC)**

the estimate of energy used by a single unit during one year's typical use. It combines data from several different measurements. (Units: kWh/y)

Note 1 to entry: See also [Clause 3.3](#).

1.6.19**projected MEPS energy consumption (PMEC)**

the estimate of energy used by a single unit during one year under a specified operating condition that is used to assess a product's compliance with **MEPS** levels. (Units: kWh/y)

Note 1 to entry: See [Clause 4.2.2](#).

1.6.20**refrigerating appliance designation**

all refrigerating appliances are classified into one of the following **refrigerating appliance designations**:

- (a) **Refrigerator** — An appliance for storage of unfrozen food in which at least half of the **volume** of the **unfrozen compartments** is of the fresh food type. It may contain other **compartments** of other unfrozen or frozen types, but does not contain a **freezer compartment**.
- (b) **Refrigerator/freezer** — An appliance for storage of both unfrozen and frozen food and containing both fresh food and **freezer compartments**. It may contain other **compartment** types where —
 - (i) not less than half of the **volume** of all unfrozen **compartments** is of the fresh food type; and
 - (ii) not less than 80 % of the **volume** of all frozen **compartments** is of the **freezer** type. In addition, the sum of the **volume** of all frozen **compartments** of types other than the **freezer** type does not exceed 30 l.
- (c) **Freezer** — An appliance for storage of frozen food and containing only, or mostly, **freezer** space. It may contain other **frozen compartments**. However, not less than 80 % of the **volume** of all **frozen compartments** is of the **freezer** type. In addition, the sum of the **volume** of all **frozen compartments** of types other than **freezer** type does not exceed 30 l.
- (d) **Cooled appliance** — An appliance which cannot be classified as either a **refrigerator**, **refrigerator/freezer** or **freezer**.

1.6.21**registration**

products regulated for energy efficiency in Australia and New Zealand under the **relevant legislation** are registered with the relevant regulator and meet a number of legal requirements before they can be **supplied** or offered for **supply**

Note 1 to entry: For further information on **registration**, see [Appendix E](#).

1.6.22**relevant legislation**

in Australia, this refers to the *Greenhouse and Energy Minimum Standards Act 2012*, the Greenhouse and Energy Minimum Standards (Household Refrigerating Appliances) Determination and relevant legislative instruments that are in force at the time. In New Zealand, this refers to the *Energy Efficiency (Energy Using Products) Regulations 2002*

1.6.23**shall**

indicates that a statement is mandatory

1.6.24**should**

indicates a recommendation

1.6.25**smart features**

functions and/or features that may consume energy and are not otherwise covered by **test standard** Part 3 and are not directly related to cooling and/or the maintenance of **compartment** temperatures. Examples of such features include (but are not limited to) network connections, cameras, screens, demand response capability and data processing capability

1.6.26**star rating**

the number of stars displayed on the **energy rating label**. Available stars are between a minimum of one and a maximum of ten. The **star rating** is calculated from the **star rating index**. (Dimensionless)

Note 1 to entry: See also [Clause 3.8](#).

1.6.27**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**, **BEC** and the **Group**. (Dimensionless)

Note 1 to entry: See also [Clause 3.7](#).

1.6.28**supply**

in Australia, **supply** means **supply** by way of sale, exchange, gift, lease, loan, hire or hire purchase. In New Zealand, **supply** means offered for sale, lease, hire or hire purchase. This term is defined in the **relevant legislation**

1.6.29**test standard**

AS/NZS IEC 62552.1:2018, *Household refrigerating appliances — Characteristics and test methods, Part 1: General Requirements*, referred to as the **test standard** Part 1

AS/NZS IEC 62552.2:2018, *Household refrigerating appliances — Characteristics and test methods, Part 2: Performance Requirements*, referred to as the **test standard** Part 2

AS/NZS IEC 62552.3:2018, *Household refrigerating appliances — Characteristics and test methods, Part 3: Energy Consumption and Volume*, referred to as the **test standard** Part 3

1.6.30**total volume (V_{tot})**

the sum of the **volume** of all **compartments** in a refrigerating appliance (Units: litres)

1.6.31**total adjusted volume ($V_{\text{adj-tot}}$)**

the total of the **adjusted volume** (V_{adj}) of all **compartments** in the refrigerating appliance (Units: litres)

Note 1 to entry: See also [Clause 4.2.3.3](#).

1.6.32**volume (V)**

the rated **volume** of a **compartment** as determined in accordance with the **test standard** Part 3, Annex H (Units: litres)

Section 2 Determination of energy consumption

2.1 General

This section sets out the required methods and settings to be applied when determining the energy consumption of a refrigerating appliance within the scope of this Standard.

The relevant components of energy consumption of a refrigerating appliance **shall** be determined in accordance with the test methods as described in the **test standard** and in particular the **test standard** Part 3, Sections, 4, 5 and 6. Equation numbers from the **test standard** are indicated in parentheses throughout this Standard. Where required, a test report submitted as part of a **registration shall** contain the applicable information specified in [Appendix F](#).

All refrigerating appliances shall be allocated a **Group** in accordance with [Table 2.1](#). Refer to [Clause 3.9](#) where a refrigerating appliance can be configured to be more than one **Group**.

Different approaches for the determination of energy consumption and required settings are to be applied for as follows:

- (a) Calculations in relation to the **energy rating label** (see [Clause 2.2](#)).
- (b) Calculations in relation to **MEPS** requirements (see [Clause 2.3](#)).

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 many more than five significant figures in their calculations so specific adjustments to spreadsheets to comply with the rounding requirements in this Standard are not required.

Valid test data used for energy labelling at an ambient of 32 °C will satisfy the testing requirements for **MEPS**.

Where a single point is used to determine the daily energy consumption for energy labelling or **MEPS**, the calculated temperature in all **compartments shall** be at or below the relevant target temperature defined in the **test standard** Part 3, Table 1. Otherwise, a more accurate value for daily energy consumption may be estimated using two or three point interpolation as follows:

- (i) Where two point interpolation is used to determine daily energy consumption, this **shall** be performed in accordance with the **test standard** Part 3, Annex E. The energy-temperature slope S_i of the **compartment** used for interpolation in accordance with the **test standard** Part 3, Equation (32) **shall** be reported as well as the temperature in all **compartments** at the point of interpolation.
- (ii) Where three or more point interpolation is used, this **shall** be performed in accordance with the **test standard** Part 3, Annex E. The coefficients E_0 , A and B **shall** be reported as well as the temperature in all **compartments** at the point of interpolation.

Where the appliance has an ambient controlled anti-condensation heater, the average heater power $W_{\text{heaters-AU}}$ **shall** be determined using the methodology set out in the **test standard** Part 3, Clause F.2 using the Australasian relative humidity map specified in [Table 2.4](#) for energy labelling and the average heater power $W_{\text{heaters-US}}$ **shall** be determined using the US relative humidity map specified in [Table 2.5](#) for **MEPS**.

When determining energy consumption, any refrigerating appliance that has **smart features shall** be configured in accordance with the user instructions supplied by the manufacturer for use in the home. Such features **shall** be configured as ready for use, but **should** not be actively used by the test laboratory during tests.

Any **declared automatic control** that reduces energy consumption under energy test conditions (including management of heaters) but which is not generally saving energy during normal use **shall** be defeated where possible. Where the refrigerating appliance has a **declared automatic control** that

could not be disabled for the energy consumption test, or where a **circumvention device** is discovered, the energy impact of this feature **shall** be quantified and this value used to adjust each measured energy consumption in accordance with [Equation 2.1](#). The value of $E_{\text{daily-adjusted}}$ is then used (as applicable for each ambient temperature) to calculate the **PAEC**.

$$E_{\text{daily-adjusted}} = E_{\text{daily}} + 2 \times P_r \times 0.024 \text{ (kWh/day)} \quad 2.1$$

where

P_r = the average power reduction resulting from the activation of the feature in watts

NOTE See [Clause 3.3.1](#) for details regarding the application of this adjustment where necessary.

Table 2.1 — Refrigerating appliance designations and Groups

Refrigerating appliance designation (see Note 1)	Compartment type (see Note 4)								Configuration requirements (see Note 5)	Defrost system requirements (see Note 6)	Group (see Note 14)
	Unfrozen compartments					Frozen compartments					
	Wine storage	Cellar or pantry	Fresh food	Chill	Zero- star	One- star	Two- star	Freezer (three or four- star)			
Refrigerator	O	O	Y	O	O	N	N	N		Automatic defrost in all	1
Cooled appliance	L	L	L	L	L	N	N	N			
Refrigerator	O	O	Y	O	O	O	N	N			2
Cooled appliance	L	L	L	L	L	O	N	N			
Refrigerator	O	O	Y	O	O	O	Y	N			3
Cooled appliance	L	L	L	L	L	O	Y	N			
Refrigerator/freezer	O	O	Y	O	O	O	O	Y		Automatic defrost in unfrozen compartments (see Note 7)	4
Cooled appliance	L	L	L	L	L	O	O	Y			
Refrigerator/freezer	O	O	Y	O	O	O	O	Y	Bottom freezer	Automatic defrost in all	5B
Refrigerator/freezer	O	O	Y	O	O	O	O	Y	Side by side	Automatic defrost in all	5S
Refrigerator/freezer	O	O	Y	O	O	O	O	Y	Not Group 5S or 5B	Automatic defrost in all	5T
Cooled appliance	L	L	L	L	L	O	O	Y			
Freezer	N	N	N	N	N	O	O	Y	Chest		6C
Cooled appliance	N	N	N	N	N	L	L	L			
Freezer	N	N	N	N	N	O	O	Y	Upright	Manual defrost	6U
Cooled appliance	N	N	N	N	N	L	L	L			
Freezer	N	N	N	N	N	O	O	Y	Upright	Automatic defrost in all	7
Cooled appliance	N	N	N	N	N	L	L	L			

Notes to [Table 2.1](#):

NOTE 1 See [Clause 1.6.20](#) for definitions of **refrigerating appliance designations**.

NOTE 2 To determine the **Group** to which an appliance belongs, its **refrigerating appliance designation** ([Clause 1.6.20](#)), constituent **compartment** types (**test standard** Part 1), **configuration** ([Clause 1.6.10](#)), defrost system (**test standard** Part 1) and defrost type for each **compartment** (**test standard** Part 1) need to first be established. Each row of [Table 2.1](#) is then considered from the top until the applicable row, and hence the **Group**, is established. The target temperature for energy determination for each **compartment** type is defined in the **test standard** Part 3.

NOTE 3 In determining the **Group** of an appliance, [Table 2.1](#) is applied to **compartments** and **sub-compartments**. Convenience features are not considered as per the **test standard** Part 1.

NOTE 4 Requirements to be met by the appliance in question regarding food storage **compartment** types: “Y” — indicates “yes” (i.e. the appliance **shall** have at least one **compartment** of each of the types marked Y). “N” — indicates “no” (i.e. the appliance **shall** have no **compartments** of the types marked N). “L” — indicates “at least one” (i.e. the appliance **shall** have at least one **compartment** from the types marked L within each of the food storages types [unfrozen or frozen, as applicable]). “O” — indicates “optional” (i.e. the appliance may or may not have any **compartments** from the types marked O).

NOTE 5 This column sets out the requirements to be met by the appliance regarding **configuration**. A blank cell in this column indicates no particular requirements regarding **configuration** and therefore includes any **configuration**. A frost-free **cooled appliance** with a **freezer** and unfrozen **compartment shall** be classified as **Group 5T** irrespective of **configuration**.

NOTE 6 This column sets out the system requirements to be met by the appliance regarding the prevention or removal of frost. A blank cell in this column indicates no particular system requirements. The entry “manual defrost” indicates that the appliance **shall** have at least one frozen **compartment** that is not automatic defrost.

NOTE 7 Any refrigerating appliance which is configured as a **Group 4** appliance but does not meet the defrost type criteria **shall** be deemed to be a **Group 3** appliance. This particular requirement applies even though the appliance contains a **freezer compartment**.

NOTE 8 An appliance with frozen **compartments** with both **chest** and **upright configurations shall** be classified as **Group 6C** where the **volume** of the **chest** component exceeds 50 % of the **total volume**. Otherwise it **shall** be classified in the appropriate **upright Group**.

NOTE 9 If a product can be classified as either **Group 1** or **Group 2**, it **shall** be assigned **Group 1**.

NOTE 10 The following **compartment** types are defined as unfrozen: wine storage, cellar, pantry, fresh food, chill, zero-star.

NOTE 11 The following **compartment** types are defined as frozen: ice-making (one-star), short-term frozen food storage (two-star), **freezer** (three-star and four-star).

NOTE 12 The terms zero-star, one-star, two-star, three-star and four-star are definitions of **compartment** temperature performance as set out in the **test standard** Part 1 and are not related to star ratings defined in this Standard.

NOTE 13 See [Appendix A](#) for examples of hypothetical appliances and the applicable **Group** for each.

NOTE 14 Where a refrigerating appliance contains variable temperature **compartments** that may alter the **Group**, the **refrigerating appliance designation** is determined for the primary **Group** as required for energy labelling and **MEPS**. Where additional **Groups** are declared for energy labelling, the relevant **refrigerating appliance designation** is separately determined for each additional **Group**. See [Clause 3.9](#).

2.2 Energy consumption determination for energy labelling

2.2.1 General

Energy consumption for the **energy rating label** shall be determined using the following measurements:

- (a) The steady-state power consumption as determined in accordance with Annex B of the **test standard** Part 3.
- (b) The incremental energy for defrost and recovery as determined in accordance with Annex C of the **test standard** Part 3.
- (c) The defrost interval as determined in accordance with Annex D of the **test standard** Part 3.
- (d) The energy consumption of specified auxiliaries as determined in accordance with Annex F of the **test standard** Part 3, where applicable.
- (e) The load processing efficiency as determined in accordance with Annex G of the **test standard** Part 3.

2.2.2 Test requirements for energy labelling

[Table 2.2](#) sets out requirements to be applied when undertaking tests for energy labelling.

Table 2.2 — Energy consumption testing — requirements for energy labelling

Test Standard	Section or Clause of the test standard	Aspect	Requirement
Part 1	Section 4	Climate class	Climate class is not specified in this Standard and a declared climate class in accordance with the test standard Part 1 does not affect conditions for energy testing
Part 1	Clause A.3.3	Electricity supply	230V and 50Hz
Part 3	Section 5	Target temperatures	As per Table 1
Part 3	Section 6	Ambient temperatures to be used for the determination of energy consumption	Both 16 °C and 32 °C
Part 3	Section 6	Method for calculating and optimizing the estimate of the daily energy consumption for a given ambient temperature	Interpolation in accordance with Annex E — optional
Part 3	Clause A.2.5	Manually switched anti-condensation heaters	These shall be set in the ON position for energy labelling tests or in the maximum (highest energy) position where there is a variable control
Part 3	Clause A.2.6	Automatic icemakers	Storage bin to remain in place and all associated auxiliaries to be operating as per Clause A.2.6
Part 3	Annex B	Ambient temperatures to be used for the determination of steady-state power consumption during stable operation	Both 16 °C and 32 °C
Part 3	Annex B	Ambient temperatures to be used for the determination of compartment internal temperature during stable operation	Both 16 °C and 32 °C

Table 2.2 (continued)

Test Standard	Section or Clause of the test standard	Aspect	Requirement
Part 3	Annex C	Ambient temperatures to be used for the determination of the representative incremental energy for defrost and recovery	Both 16 °C and 32 °C
Part 3	Annex C	Values of ΔE_{df} representative incremental energy for defrost and recovery	Measured value times 1.3 for run-time defrost controllers to give ΔE_{df-a} Measured value times 1.9 for all other defrost controller types to give ΔE_{df-a} NOTE: These values are empirical corrections to account for differences between laboratory measurements and normal use. See Bibliography Item [7].
Part 3	Annex C	Values of $\Delta T_{h_{df-i}}$ representative temperature difference for defrost and recovery used for determining the calculated compartment temperature	As measured
Part 3	Annex D	Defrost interval (t_{df}) to be used when determining energy consumption	Defrost interval as determined in the relevant section of Annex D
Part 3	Clause F.2.4	Map of probability of temperature and relative humidity data to be used to undertake the required calculations for the operation of any ambient controlled anti-condensation heater(s)	Based on Australasian Data — see Table 2.4 of this Standard — only applicable to products with ambient controlled anti-condensation heaters. Where a product has user adjustment in addition to automatic control, this shall be set to the maximum energy position
Part 3	Annex G	The deemed processing load to be used for determination of the load processing efficiency	Processing load as defined in Annex G of the test standard Part 3. The required parameter is the load processing efficiency as defined in Equation (52) of the test standard Part 3.
Part 3	Annex G	Ambient temperatures to be used for determination of the load processing efficiency	If testing for processing efficiency, then testing at 32 °C is required. Additional optional testing at 16 °C may be performed. However processing efficiency may be calculated in accordance with Clause 3.3.1(c) .
Part 3	Annex H	Determination of compartment volume	Rated value stated by the supplier.

2.2.3 Calculation of energy consumption for the energy rating label

2.2.3.1 General

Energy consumption in relation to the **energy rating label** shall be calculated using measured data at each ambient temperature and load processing efficiency as set out below.

2.2.3.2 Ambient temperatures

For separate ambient test temperatures at both 32 °C and 16 °C, determine the following values:

- (a) The steady-state power P_{ss} for the selected temperature control setting in accordance with the **test standard** Part 3, Annex B. Ensure that this steady-state power value is corrected for the measured ambient test room temperature in accordance with the **test standard** Part 3, Equation (15).
- (b) The representative incremental energy for defrost and recovery ΔE_{df} in accordance with the **test standard** Part 3, Annex C. The number of valid defrost and recovery periods to determine a representative value **shall** meet the requirements as set out in the **test standard** Part 3, Clause C.4, Option 1 or Option 2. Any defrost cycle that has been initiated by the test laboratory (forced defrost) **should** be omitted when determining representative incremental energy for defrost and recovery.

NOTE An appliance tested with a dry evaporator (e.g. after a period of not operating) or subject to forced defrosts will give an artificially low value for incremental energy for defrost and recovery. Check testing will be conducted using only unforced defrosts.

- (c) For each valid value for incremental energy for defrost and recovery ΔE_{df} in accordance with the **test standard** Part 3, Annex C (Clause C.4, Option 1 or Option 2), the measured defrost heater energy $E_{df-heater\ ij}$ for defrost system i and defrost j **shall** be reported and the defrost adder for each valid defrost, for defrost system i , as specified in [Equation 2.2](#) **shall** be calculated and reported.

$$\Delta E_{df-adder\ ij} = \Delta E_{df\ ij} - E_{df-heater\ ij} \quad 2.2$$

where

$E_{df-heater\ ij}$ is the measured defrost heater energy for defrost system i and defrost j

For all valid defrosts at each ambient temperature, an average defrost adder $\Delta E_{df-adder\ i}$ for each defrost system i shall be calculated.

- (d) Measured values of ΔE_{df} **shall** be multiplied by the AU/NZ scaling factors set out in [Table 2.2](#) to give ΔE_{df-a} for use in the determination of daily energy consumption E_{daily} .
- (e) The representative temperature difference for defrost and recovery in each **compartment** i ΔTh_{df-i} in accordance with the **test standard** Part 3, Annex C **shall** be determined where there is automatic defrost system.
- (f) The defrost interval t_{df} in accordance with the **test standard** Part 3, Annex D **shall** be calculated where there is automatic defrost system.
- (g) The **compartment** temperature in each **compartment** for the selected temperature control setting in accordance with the **test standard** Part 3, Equation 3, which **shall** include the representative temperature difference for defrost and recovery in each **compartment** (where applicable).
- (h) The daily energy consumption E_{daily} at the selected control setting in accordance with the **test standard** Part 3, Equation (2). The final values, after interpolation where applicable, **shall** be recorded as $E_{daily32C-label}$ and $E_{daily16C-label}$ as applicable.

2.2.3.3 Load processing efficiency

The procedure specified in Annex G of the **test standard** Part 3 is used to measure the load processing efficiency. This efficiency is then used to calculate the additional energy that the refrigerating appliance would require to remove a known amount of user heat load. A nominal user heat load of 0.75 Wh per day per litre of unfrozen **volume** and 0.25 Wh per day per litre of frozen **volume** is assigned for all **Groups** when determining the **PAEC**.

Determine the load processing efficiency $Efficiency_{load, ambient}$ at an ambient test temperature of 32 °C in accordance with the **test standard** Part 3, Annex G, Equation (52). The supplier may also elect to

determine the load processing efficiency $Efficiency_{load,ambient}$ at an ambient test temperature of 16 °C in accordance with the **test standard** Part 3, Annex G, Equation (52), in which case the average value for 16 °C and 32 °C is used for the energy labelling calculation. Where a supplier elects not to measure the load processing efficiency, a calculated value for $Efficiency_{load}$ is specified in [Clause 3.3.1](#). Where one or more defrosts occur during a load processing efficiency test, the **test standard** Part 3, Annex G, Equation (51) is replaced by [Equation 2.3](#) and **shall** be used to calculate $\Delta E_{additional-test}$:

$$\Delta E_{additional-test} = (E_{end} - E_{start}) - P_{after} \times (t_{end} - t_{start}) - z_i \times \Delta E_{df-adder\ i} - \sum E_{df-heater\ ij} \quad 2.3$$

where

- z_i = the number of defrosts for defrost system i
- $\sum E_{df-heater\ ij}$ = the sum of defrost heater energy for the j defrosts that occur during the load processing test for defrost system i
- $\Delta E_{df-adder\ i}$ = the average defrost adder calculated for all valid defrosts specified in [Clause 2.2.3.2\(c\)](#) for defrost system i for the relevant ambient temperature.

Where there is more than one defrost system, the value of z and the value of $\Delta E_{df-adder}$ for each defrost system shall be included in [Equation 2.3](#), as applicable.

Determine the **volume** of each **compartment** in accordance with the **test standard** Part 3, Annex H. Allocate the **volume** of each **compartment** as either frozen (V_{frozen}) or unfrozen ($V_{unfrozen}$), as classified under [Table 2.1](#).

2.3 Energy consumption determination for MEPS

2.3.1 General

Energy consumption for **MEPS** shall be determined using the following measurements:

- (a) The steady-state power consumption as determined in accordance with Annex B of the **test standard** Part 3.
- (b) The incremental energy for defrost and recovery as determined in accordance with Annex C of the **test standard** Part 3.
- (c) The defrost interval as specified in [Table 2.3](#) for the relevant defrost controller type.
- (d) The energy consumption of specified auxiliaries as determined in accordance with Annex F of the **test standard** Part 3 where applicable.

NOTE The load processing efficiency is not used to quantify the energy consumption when assessing **MEPS**.

2.3.2 Test requirements for determining MEPS compliance

[Table 2.3](#) sets out requirements to be applied when undertaking tests for energy consumption demonstrating compliance with the **MEPS** requirements.

Table 2.3 — Energy consumption testing — requirements for MEPS compliance

Test Standard	Section or Clause of the test standard	Aspect	Requirement
Part 1	Section 4	Climate class	Climate class is not specified in this Standard and a declared climate class in accordance with the test standard Part 1 does not affect conditions for energy testing
Part 1	Clause A.3.3	Electricity supply	230V and 50Hz
Part 3	Section 5	Target temperatures	As per Table 1
Part 3	Section 6	Ambient temperatures to be used for the determination of energy consumption	32 °C only (i.e. a measurement at 16 °C is not required for MEPS)
Part 3	Section 6	Method for calculating and optimising the estimate of the daily energy consumption for a given ambient temperature	Interpolation in accordance with Annex E — optional
Part 3	Clause A.2.5	Manually switched anti-condensation heaters	These shall be set in the ON position for MEPS tests or in the maximum (highest energy) position where there is a variable control
Part 3	Clause A.2.6	Automatic icemakers	Storage bin to remain in place and all associated auxiliaries to be operating as per Clause A.2.6
Part 3	Annex B	Ambient temperatures to be used for the determination of steady-state power consumption during stable operation	32 °C only (i.e. a test at 16 °C is not required for MEPS)
Part 3	Annex B	Ambient temperatures to be used for the determination of compartment internal temperature during stable operation	32 °C only (i.e. a test at 16 °C is not required for MEPS)
Part 3	Annex C	Ambient temperatures to be used for the determination of representative incremental energy for defrost and recovery	32 °C only (i.e. a test at 16 °C is not required for MEPS)
Part 3	Annex C	Values of ΔE_{df} representative incremental energy for defrost and recovery	Measured value used without adjustment
Part 3	Annex C	Assumed value of ΔTh_{df} representative temperature difference for defrost and recovery used for determining the calculated compartment temperature	0 K.h (this is a deemed value, measured value is not used)
Part 3	Annex D	The defrost interval (t_{df}) to be used when determining energy consumption according to the relevant defrost controller type	Elapsed time defrost controllers - measured value as set out in the test standard Part 3, Clause D.2. Compressor run time defrost controllers — calculated value in accordance with the test standard Part 3 Clause D.3.

Table 2.3 (continued)

Test Standard	Section or Clause of the test standard	Aspect	Requirement
			Compliant variable defrost controllers — a deemed defrost interval of 60 h is applied where the controller complies with the test standard Part 3, Clause D.4.2 or Clause D.4.3 Non-compliant variable defrost controllers — measured or determined value in accordance with the test standard Part 3, Clause D.4.4
Part 3	Clause F.2.4	Map of probability of temperature and relative humidity data to be used to undertake the required calculations for the operation of any ambient controlled anti-condensation heater(s)	Based on US Data — see Table 2.5 in this Standard— only applicable to products with ambient controlled anti-condensation heaters. Where a product has user adjustment in addition to automatic control, this shall be set to the maximum value
Part 3	Annex H	Determination of compartment volume	Rated value stated by the supplier

2.3.3 Calculation of energy consumption for MEPS requirements

Energy consumption in relation to **MEPS** **shall** be calculated using measured data at 32 °C as set out below.

For an ambient test temperature of 32 °C only determine the following values:

- The steady-state power P_{ss} for the selected temperature control setting in accordance with the **test standard** Part 3, Annex B. Ensure that this steady-state power value is corrected for the measured test room ambient temperature in accordance with the **test standard** Part 3, Equation (15).
- The representative incremental energy for defrost and recovery ΔE_{df} in accordance with the **test standard** Part 3, Annex C. The number of valid defrost and recovery periods to determine a representative value **shall** meet the requirements as set out in the **test standard** Part 3, Clause C.4, Option 1 or Option 2. Any defrost cycle that has been initiated by the test laboratory (forced defrosts) **should** be omitted when determining a representative incremental energy for defrost and recovery.

NOTE An appliance tested with a dry evaporator (e.g. after a period of not operating) or subject to forced defrosts will give an artificially low value for incremental energy for defrost and recovery. Check testing will be conducted using only unforced defrosts.

- The defrost interval t_{df} in accordance with the **test standard** Part 3, Annex D, except for a qualifying variable defrost control, the defrost interval is set to a deemed value of 60 h.

NOTE The incremental energy for defrost and recovery, the temperature difference during defrost and recovery and the defrost interval for variable defrost controllers are specified to align with US **MEPS** levels.

- The daily energy consumption E_{daily} at the selected control setting in accordance with the **test standard** Part 3, Equation (2).
- The steady-state **compartment** temperature in each **compartment** for the selected temperature control setting in accordance with the **test standard** Part 3, Annex B.

NOTE For **MEPS** energy determination, the temperature difference during defrost and recovery ΔT_{hdf} is not taken into account (this is set to a value of zero), so only the measured steady-state temperature is used for single point values and interpolation.

2.4 Maps of probability of temperature and relative humidity data

Tables 2.4 and 2.5 provide “maps” of probability of temperature and relative humidity data as referred to in Table 2.2 (energy labelling) and Table 2.3 (MEPS).

Table 2.4 — Population-weighted relative humidity probabilities for energy labelling calculations (Australasian data)

Relative humidity band	RH band mid-point	Probability at 16 °C	Probability at 22 °C	Probability at 32 °C
0 %–10 %	5 %	0.00 %	0.00 %	0.03 %
10 %–20 %	15 %	0.06 %	0.06 %	0.33 %
20 %–30 %	25 %	0.60 %	1.62 %	2.35 %
30 %–40 %	35 %	2.76 %	9.24 %	2.56 %
40 %–50 %	45 %	6.93 %	12.72 %	3.57 %
50 %–60 %	55 %	8.01 %	11.70 %	1.11 %
60 %–70 %	65 %	5.55 %	11.40 %	0.05 %
70 %–80 %	75 %	3.30 %	7.92 %	0.00 %
80 %–90 %	85 %	1.80 %	3.48 %	0.00 %
90 %–100 %	95 %	0.99 %	1.86 %	0.00 %

Table 2.5 — Population-weighted relative humidity probabilities for MEPS calculations (US data)

Relative humidity band	RH band mid-point	Probability at 16 °C	Probability at 22 °C	Probability at 32 °C
0 %–10 %	5 %	0.00 %	3.40 %	0.00 %
10 %–20 %	15 %	0.00 %	21.10 %	0.00 %
20 %–30 %	25 %	0.00 %	20.40 %	0.00 %
30 %–40 %	35 %	0.00 %	16.60 %	0.00 %
40 %–50 %	45 %	0.00 %	12.60 %	0.00 %
50 %–60 %	55 %	0.00 %	11.90 %	0.00 %
60 %–70 %	65 %	0.00 %	6.90 %	0.00 %
70 %–80 %	75 %	0.00 %	4.70 %	0.00 %
80 %–90 %	85 %	0.00 %	0.80 %	0.00 %
90 %–100 %	95 %	0.00 %	1.50 %	0.00 %

NOTE The US probabilities add up to 99.90 % — these are as specified in US regulations.

Section 3 Calculations for the energy rating label

3.1 General

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

The process consists of measuring the energy consumption and other relevant characteristics of each unit tested (see [Section 2](#)), then calculating the **projected annual energy consumption (PAEC)** of the unit. The **comparative energy consumption (CEC)** for the appliance model is determined from the values of **PAEC** for the units tested to determine the label particulars. The **CEC** and **normalized volume (V_{norm})** are then used to calculate the **BEC**, **star rating index** and the **star rating**.

NOTE For an example of calculations carried out on a set of test results, see [Appendix B](#).

3.2 Number of tests and processing of data

3.2.1 Number of units required

When determining the **CEC** of a model for labelling, at least one unit of the nominated model **shall** be tested for energy consumption in accordance with the requirements of [Clause 2.2](#). At the supplier's discretion, energy consumption tests can be performed on multiple units and the results aggregated into a single test report for a representative single unit. Suppliers may choose to run tests on multiple units of the same model and submit a test report for more than one unit.

The energy consumption declared on the **energy rating label** is based on the test results submitted for **registration**. All products **supplied** to the market need to comply with the relevant regulatory requirements.

3.2.2 Number of tests per model

Each model **shall** be tested with sufficient test runs to enable a valid value of **PAEC** to be calculated for that model. This calculation **shall** be documented in a test report containing the test results for all test runs used to derive **PAEC**. (See [Clause 2.2](#).)

3.3 Projected annual energy consumption (PAEC)

3.3.1 PAEC calculation for one appliance

The **PAEC** of a single refrigerating appliance **shall** be calculated to represent energy consumption at 22 °C according to [Equation 3.1](#) as follows:

$$PAEC = 117 \times E_{\text{daily32C-label}} + 248 \times E_{\text{daily16C-label}} + W_{\text{heaters-AU}} \times 8.76 + \frac{V_{\text{frozen}} \times 0.091 + V_{\text{unfrozen}} \times 0.274}{\text{Efficiency}_{\text{load}}} \quad 3.1$$

where

- 117 = the prescribed number of days operating at an ambient temperature of 32 °C
- $E_{\text{daily32C-label}}$ = the daily energy consumption in kWh/day determined at an ambient temperature of 32 °C as specified in [Clause 2.2](#)
- 248 = the prescribed number of days operating at an ambient temperature of 16 °C