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# **The Hong Kong Voluntary Energy Efficiency Labelling Scheme for**

## **Household Refrigeration Appliances**

**November 2009**

Energy Efficiency  **EMSD**

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## **Preface**

The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Household Refrigeration Appliances was revised to cover the types of household refrigeration appliances not regulated under the Energy Efficiency (Labelling of Products) Ordinance since November 2009. Basically, it included refrigeration appliances with a rated total storage volume exceeding 500 litres, which were not covered by the Ordinance.

For refrigerating appliances under the Energy Efficiency (Labelling of Products) Ordinance, please refer to requirements under the Ordinance. The Ordinance was enacted since 9 May 2008 with a grace period of 18 months. The Scheme was commonly referred as the Mandatory Energy Efficiency Labelling Scheme.

The importers or local manufacturers were encouraged to participate in the Voluntary Scheme if their products fall into the classification of the Scheme.

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## **1. Purpose**

This set of document intends to give a general description on the Hong Kong Voluntary Energy Efficiency Labelling Scheme (EELS) for Household Refrigeration Appliances. For refrigerating appliances regulated under the Energy Efficiency (Labelling of Products) Ordinance, please refer to the Ordinance.

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## **2. Background**

2.1 The EELS is an energy conservation initiative that the Government of the Hong Kong Special Administrative Region (HKSAR) has adopted. Under the scheme, some common types of appliances will incorporate an energy label that serves to inform consumers of the product's energy consumption and efficiency. Consumers should then be able to take those factors into account in making their purchasing decision.

2.2 The concept of EELS has been developed and implemented in several forms and in different stages of development. In some countries, as well as in Hong Kong, it is a compulsory requirement for certain kinds of electrical appliances to be provided with an energy label before they can be put on the market. The labelling requirements may apply to equipment such as household refrigerators, washing machines, air-conditioners, clothes dryers, compact fluorescent lamps, storage water heaters, etc. The EELS generally aims to achieve:

- greater public awareness of energy conservation and environmental improvement needs;
- provision of readily available, pre-purchase information on energy consumption and efficiency data to enable ordinary consumers to select more energy efficient products;
- stimulation to the manufactures/market for phasing out less energy efficient models; and
- actual energy savings and environmental improvements etc.

2.3 Hong Kong also aims at achieving the above objectives and the Hong Kong Voluntary EELS now covers eighteen types of household appliances and office equipment. Ten types of which are electrical appliances and seven types of office equipment. There is also one type of gas appliance for domestic gas instantaneous water heaters. The scope

of EELS has also been extended to cover petrol passenger cars.

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### **3. Mandatory Energy Efficiency Labelling Scheme**

- 3.1 The Government had introduced a mandatory Energy Efficiency Labelling Scheme (EELS) through the Energy Efficiency (Labelling of Products) Ordinance which was enacted since 9 May 2008 with a 18-month grace period ended on 8 November 2009.
- 3.2 Under the mandatory EELS, energy labels are required to be shown on prescribed products for supply in Hong Kong to inform consumers of their energy efficiency performance.
- 3.3 Refrigerating appliances that have a rated total storage volume not exceeding 500 litres are classified as prescribed products and are regulated under the Energy Efficiency (Labelling of Products) Ordinance. The manufacturers or importers who supply prescribed products shall apply the energy label through the mandatory EELS.

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### **4. Scope**

- 4.1 The scheme will only apply to the manufacturers and importers (local agents, retailers and the related parties) who have participated in the voluntary scheme.
- 4.2 The scheme commenced on 15 June 1995, revised in November 2009, and labels will expire on 31 December 2012 when re-registration is necessary.
- 4.3 The scheme covers only household refrigeration appliances that have a rated total storage volume exceeding 500 litres.
- 4.4 The scope of application covers all **new** registered household refrigeration appliances under the scope of the Scheme, imported to or manufactured in Hong Kong with effect from the date that is declared by the participant but does not cover the second-hand products, products already in existing use, under trans-shipment or manufactured for export, etc.

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## 5. Definitions & Terminologies

Unless otherwise specified, the following terminologies have meanings as stated:

<i>adjusted volume</i>	means the volume for the storage of foodstuff corrected for the relative contribution to the total energy consumption according to the different temperatures of the storage compartments
<i>appliance</i>	means household refrigeration appliances
<i>Authority</i>	means the Electrical and Mechanical Services Department
<i>cellar compartment</i>	means a compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the fresh food storage compartment
<i>chill compartment</i>	means a compartment intended specifically for the storage of highly perishable foodstuffs in which the temperatures can be maintained between $-2\text{ }^{\circ}\text{C}$ and $+3\text{ }^{\circ}\text{C}$ , and the volume of which is capable of accommodating at least 2 "M" packages
<i>Director</i>	means the Director of Electrical and Mechanical Services, The Government of Hong Kong Special Administrative Region
<i>freezer</i>	means an electrical appliance suitable for household use, in which foodstuff can be frozen and stored in frozen state
<i>freezer compartment</i>	means a space forming part of a combined refrigerator/freezer or a freezer in which foodstuff can be frozen and stored at a temperature lower than $-18\text{ }^{\circ}\text{C}$ . These compartments are rated with 4-stars under the star rating system as stated in section 6
<i>fresh food storage compartment</i>	means a space forming part of a refrigerator or a combined refrigerator/freezer in which foodstuff or drinking materials can be stored in a cooled state at a temperature higher than $0\text{ }^{\circ}\text{C}$

<i>frozen food storage compartment</i>	means a space forming part of a refrigerator or a combined refrigerator/freezer, in which foodstuff can be stored at a temperature lower than 0 °C or in which ice can be made and stored. This can either be an ice-making compartment or a frozen food storage compartment. These compartments are rated with 0 to 3-stars, depending on the temperature, under the star rating system as stated in section 6
<i>Government</i>	means the Government of the Hong Kong Special Administrative Region
<i>inspecting officer</i>	means the officer authorized by the Director to carry out inspection on appliances
<i>IEC</i>	means the International Electrotechnical Commission
<i>ISO</i>	means the International Organization for Standardization
<i>label</i>	means the energy label as described in section 8
<i>participant</i>	means the manufacturers, importers or the retailers of appliance participating in the scheme
<i>recognized laboratory</i>	means a laboratory that complies with the requirements as stated in section 10 and is acceptable to the Authority for carrying out tests and issuing test reports on refrigeration appliances.
<i>refrigerator</i>	means an electrical appliance suitable for household use, in which foodstuff or drinking materials can be stored in a cooled or frozen state and which is not a freezer or a combined refrigerator/freezer
<i>Refrigerator / freezer</i>	means an electrical appliance suitable for household use consisting of two components, in which foodstuff can be stored in a cooled state, or can be frozen and stored in a frozen state, respectively
<i>scheme</i>	means the voluntary energy efficiency labelling scheme-household refrigeration appliances

*storage volume* means that part of the total volume of any compartment which remains after deduction of the volume of components and spaces recognized as unusable for the storage of food

*"1-star" compartment* means a compartment in which the storage temperature measured as described in section 6, is not warmer than  $-6^{\circ}\text{C}$

*"2-star" compartment* means a compartment in which the storage temperature measured as described in section 6, is not warmer than  $-12^{\circ}\text{C}$

*"3-star" compartment* means a compartment in which the storage temperature measured as described in section 6, is not warmer than  $-18^{\circ}\text{C}$

*"4-star" freezer* means a three-star compartment with the added capability of freezing a certain amount of foodstuff which is no less than 4.5 kg per 100 litres, with a minimum of 2.0 kg within 24 hours

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## 6. Appliances Classification

### Basic Classification

6.1 The classification of appliances is based on a common set of conditions so that meaningful like-with-like comparison can be made.

#### i) Climate Class

Performance-wise the appliance should be able to operate in extreme ambient temperatures of Hong Kong. Hence to classify the appliance according to climatic working conditions is the basic step. The climatic classification used in the scheme follows the requirements of Climatic Class 'ST' of the ISO 8187, ISO 8561, ISO 7371 and ISO 5155 standards or ISO 15502 or IEC 62552 standard. In other words, the appliance should be suitable for use in sub-tropical areas with indoor ambient temperature listed in Table 1 below.

Table 1 Climatic Classes

Class	Symbol	Range of ambient temperatures in which the appliances are intended to be used for which the required storage temperatures shall be fulfilled (Table 2) °C
Subtropical	ST	+18 to +38 (ISO 8187, ISO 8561, ISO 7371 and ISO 5155)  +16 to +38 (ISO 15502 or IEC 62552)

#### ii) Frozen Food Compartment(s)

Appliance should also be classified according to its capability to freeze food i.e. the performance of its frozen food compartment. 'Star' ratings should be used to distinguish the operating temperature of individual storage compartment under loaded conditions. The storage temperature requirements stipulated in the ISO 8187, ISO 8561, ISO 7371 and ISO 5155 standards or ISO 15502 or IEC 62552 standard with reference to its category should be used in EELS. Performance in this respect is denoted by stars according to the following tables:

**Table 2A Storage Compartment Temperature**

- Applicable to appliances other than those cooled by internal forced air circulation

Values in °C

Fresh Food Storage Compartment		"1-star" Compartment	"2-star" Compartment	"3-star" Compartment	"4-star" Freezer Compartment
$t_1, t_2, t_3$	$t_{m, max.}$	$t^*$	$t^{**}$	$t^{***}$	$t^{****}$
$0 < t_1, t_2, t_3 \leq +10$	+5	$\leq -6$	$\leq -12$	$\leq -18$	$\leq -18$ with added freezing capacity (see iii)

**Table 2B Storage Compartment Temperatures**

- Applicable to appliances cooled by internal forced air circulation

Values in °C

	Fresh Food Storage Compartment		Frozen food storage or food freezer compartment, cabinet or section, as applicable			Cellar Compartment	Chill Compartment
	$t_1, t_2, t_3$	$t_{m, max.}$	$t^*$	$t^{**}$	$t^{***}$	$t_{cm, max}$	$t_{cc, max, min}$
Storage temperatures	$0 < t_1, t_2, t_3 \leq +10$	+5	$\leq -6$	$\leq -12$	$\leq -18$	$+8 \leq t_{cm, max} \leq +14$	$-2 \leq t_{cc, min},$ $t_{cc, max} \leq +3$
Permitted deviations during defrost cycle	$0 < t_1, t_2, t_3 \leq +10$	+7	$\leq -6$	$\leq -12$	$\leq -15$	$+8 \leq t_{cm, max} \leq +14$	$-2 \leq t_{cc, min},$ $t_{cc, max} \leq +3$

*Note:*  $t_1, t_2, t_3$ , denote the temperatures at 3 sensing points spaced along the height of the fresh food storage compartment.  $t_m$  is their arithmetic mean.  $t^*, t^{**}, t^{***}, t^{****}$  denote the mean temperatures of frozen food storage compartments respectively.

### iii) Freezing Capacity

Appliance freezing capacity is also a parameter for classification consideration. Accurate and clear indication of the freezing capacity of a food freezer in terms of the mass of food in kilograms that can be frozen to -18 °C in 24 hours is also needed.

A "3-Star" compartment, with added capability of freezing certain amount of foodstuff, not less than 4.5 kg/100 litres volume, with a minimum of 2.0 kg within 24

hours is defined as a “4-Star” compartment.

### Proposed Overall Appliance Classification

6.2 All appliances should be classified in accordance with the Table 3, which also incorporates the various parameters involved in the classification :-

**Table 3 Overall Classifications \***

Types	Category No.	Functional Classification		
		Fresh food compartment temp. in °C	Frozen food compartment temp. in °C	Description
Refrigerator	Category 1	+5	Nil	A refrigerator without a frozen food compartment
	Category 2	+5	≤ -6	A refrigerator with a 1-star frozen food compartment
	Category 3	+5	≤ -12	A refrigerator with a 2-star frozen food compartment
	Category 4	+5	≤ -18	A refrigerator with a 3-star frozen food compartment
Refrigerator -freezer	Category 5	+5	≤ -18	A refrigerator with a 4-star frozen food compartment
	Category 6	+5	≤ -18	A Category 5 refrigerator incorporating means to prevent the formation of frost on contents
Freezer	Category 7	Nil	≤ -18	A refrigeration appliance in which the entire storage volume is intended for freezing food.
	Category 8	Nil	≤ -18	A Category 7 refrigeration appliance incorporating means to prevent the formation of frost.

*\* All appliances are designed to operate under 'ST' climatic class.*

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## 7. Test Methodology & Standards

### Measurement of Energy Consumption

- 7.1 The methodology for measuring energy consumption should be based on Annex 1, which is modelled along the international standards ISO 8187, ISO 8561, ISO 7371 and ISO 5155 or ISO 15502 or IEC 62552 standard. An outline of the test conditions, and general methodology are also provided in Annex 1. The specified international standards (ISOs or IEC) should be referred for actual performance requirements and procedural descriptions.

Standard reference in this document may have been amended or superseded by a later edition, and it is intended that the most recent amendments or editions of all referenced standards be used in determining compliance of an appliances with the requirements of the scheme.

To the extent that definitions in the ISO or IEC Standards do not conflict with the definitions of this document, the definitions in the aforesaid standard shall be included.

### Calculation of Adjusted Volume

- 7.2 The appliance volume in litres should be measured in accordance with ISO or IEC standards. The adjusted volume should be the sum of the volumes of the different compartments weighted by the difference in temperature between the interior of the compartment and the ambient temperature. The adjusted volume  $V_{adj}$  is calculated as follows:

$$V_{adj} = \sum V_i \times \Omega \dots\dots\dots(\text{eq. 1})$$

where  $V_i$  = the measured storage volume of an individual compartment

$\Omega$  = the weighting factor given by the following equation:

$$\Omega = \frac{T_a - T_i}{T_a - T_r} \dots\dots\dots(\text{eq. 2})$$

where  $T_a$  = test room ambient temperature which is taken as 25 °C

$T_i$  = the rated temperature in the individual compartment concerned

$T_r$  = the rated temperature in the fresh food compartment which is taken as 5°C

7.3 Specified in Table 4 are eight simple equations for calculating of the adjusted volume of each appliance category.

**Table 4 Adjusted Volume ( $V_{adj}$ ) calculation for all categories of refrigeration appliances**

(Where  $V_r$  = Volume of fresh food compartment  
 $V_{ffc}$  = Volume of frozen food compartment)

Appliance Category	Adjusted Volume (in litre)	Equation No.
Category 1	$V_r$	3
Category 2	$V_r + 1.55 \times V_{ffc}$	4
Category 3	$V_r + 1.85 \times V_{ffc}$	5
Category 4	$V_r + 2.15 \times V_{ffc}$	6
Category 5	$V_r + 2.15 \times V_{ffc}$	7
Category 6	$V_r + 2.15 \times V_{ffc}$	8
Category 7	$2.15 \times V_{ffc}$	9
Category 8	$2.15 \times V_{ffc}$	10

**Explanatory Note:**

*To illustrate how  $V_{adj}$  for a category 4 appliance (i.e. Equation 6) is calculated*

*Category 4 is defined as a refrigerator comprising one fresh food compartment ( $V_r$ ) and one 3-star frozen food compartment ( $V_{ffc}$ ).*

*By equation 1:  $V_{adj} = \sum V_i \times \Omega$ .*

*Total adjusted Volume = (Volume of fresh food compartment  $V_r$ ) + (Volume of 3-star compartment weighted to frozen food compartment  $V_{ffc}$ )*

*From equation 2:*

$$V_{adj} = V_r \times \left( \frac{T_a - T_r}{T_a - T_r} \right) + V_{ffc} \times \left( \frac{T_a - T_{ffc}}{T_a - T_r} \right) \dots\dots\dots(\text{eq. 11})$$

*Since Temperature of a 3-Star compartment  $T_i = T_{ffc} = -18$  °C,*

*Temperature of a fresh food compartment  $T_r = 5$  °C*

Hence 
$$V_{adj} = V_r \times \left( \frac{25-5}{25-5} \right) + V_{ffc} \times \left( \frac{25-(-18)}{25-5} \right)$$

$$V_{adj} = V_r + 2.15 \times V_{ffc}$$

*[The above is equation 6 for a category 4 appliance]*

## Methodology on Energy Efficiency Comparison

### Energy Efficiency Definition

- 7.4 The energy consumption value even measured with the well defined methodology in Section 7.1 above by itself gives only limited indication of the energy efficiency of an appliance. It does not cover two additional vital aspects i.e. the amount of energy consumption in relation to the size of the appliance and the appliance performance designed. The energy consumption of refrigeration appliance depends mainly on the appliance volume and on the temperature difference between the surroundings and its compartments. Therefore, the energy efficiency performance of refrigeration appliance should be related to these factors.
- 7.5 In this scheme, the energy efficiency performance of an appliance is defined as the maximum allowable energy consumed per unit volume for the storage of food stuff **adjusted for** the relative contribution to the total energy consumption according to the different temperatures of its compartments with the fresh food temperature 5 °C taken as the reference. Hence for an appliance with more than just the fresh food compartment, the energy consumption is not only a function of the appliance volume but also the relative sizes of the fresh food and other compartment volumes.
- 7.6 The energy consumption test in the standard measures the appliance in kWh/24 h. The annual energy consumption of the appliance is simply obtained by multiplying the kWh/24h figure by 365.
- 7.7 The energy efficiency of a refrigeration appliance is thus inversely related to the following ratio which is expressed in the unit of kWh/year/litre.

Appliance Energy Efficiency Ratio =

$$\frac{\text{Annual Energy Consumption}}{\text{Adjusted Volume}} \text{ kWh/yr/litre .....(eq. 12)}$$

(i.e. the lower the ratio the better is the energy efficiency)

### Average Appliance Energy Consumption

- 7.8 The above appliance energy efficiency ratio (kWh/year/litre), although being a much better indicator than the energy consumption (kWh/year) alone, is still not totally satisfactory because it does not give true meaningful like-with-like comparison. This stems from the fact that some recent field surveys and statistical studies indicate that

these ratios are always better for the larger appliances than for the smaller models. For this reason, this ratio cannot provide true comparison if adjusted volumes are not the same. It is necessary to establish another parameter in order to achieve like-with-like comparison, and this parameter is identified as the **Average Appliance Energy Consumption** figures for a particular appliance class.

7.9 In ideal situation, the **Average Appliance Energy Consumption** figures should be obtained from some acceptable statistical method by plotting of the annual energy consumption data with respect to the associated adjusted volumes for a particular appliance class under the prevailing market situation. They can be approximated by a line equation representing the average annual energy consumption with respect to the adjusted volume of appliances on sale in the market. These figures would change as the time changes because of advancement of energy efficient technologies and of the consumers' behaviour.

**Table 5: Proposed Average Annual Appliance Energy Consumption**

Appliance Category	Average Annual Energy Consumption <sup>•</sup> (kWh/yr)	Equation No.
Category 1	$V_{adj} \times 0.233 + 245$	13
Category 2	$V_{adj} \times 0.643 + 191$	14
Category 3	$V_{adj} \times 0.450 + 245$	15
Category 4	$V_{adj} \times 0.657 + 235$	16
Category 5	$V_{adj} \times 0.777 + 303$	17
Category 6	$1.35 \times (V_{adj} \times 0.777 + 303)$	18
Category 7	Chest freezer: $V_{adj} \times 0.446 + 181$	19
	Upright freezer: $V_{adj} \times 0.472 + 286$	20
Category 8	Chest freezer: $1.35 \times (V_{adj} \times 0.446 + 181)$	21
	Upright freezer: $1.35 \times (V_{adj} \times 0.472 + 286)$	22

( \* Where 1.35 is the correction factor for no-frost models.)

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**Note ①** *The equations adopted in Table 5 are extracted from the statistical analysis that is described in the Section 3 of the final report on "Study on Energy Efficiency Standards for domestic refrigeration appliances - Commission of European Communities 1993". The data for analysis are compiled on the existing 3771 refrigeration appliances available on the market of European*

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## 8. Energy Efficiency Grading

- 8.1 The availability of Table 5 enables formulation of a methodology to calculate the energy efficiency indices and the appliance efficiency grading. The methodology entails ultimate like-with-like meaningful comparison.

### Energy Efficiency Indices ( $I_{\epsilon}$ )

- 8.2 The energy efficiency index ( $I_{\epsilon}$ ) of an appliance is defined as the ratio of the actual energy consumption of the appliance to the average energy consumption (as found from the associated average energy consumption line) of a unit with similar adjusted volume and similar category. The indices are expressed in percentages. Thus, by comparing the energy efficiency indices, all appliances can have meaningful comparison of their energy efficiencies. In other words, within a category appliance that has a lower energy efficiency index (i.e. lower percentage) consumes less energy than an appliance of higher energy efficiency index (i.e. higher percentage). The energy efficiency index is calculated as follows:-

$$\text{Energy Efficiency Index } (I_{\epsilon}) = \frac{E}{E_{av}} \times 100\% \quad (\text{eq. 23})$$

Where  $E$  = the actual appliance Annual Energy Consumption obtained from energy consumption test.

$E_{av}$  = Average Annual Energy Consumption as determined from Table 5.

### Appliance Efficiency Grading

- 8.3 This is one further step to make the concept of appliance energy efficiency more easily understandable by ordinary consumers. The method is to link the energy efficiency index (percentage) to the 5 grades as shown in Table 6, with Grade 1 being the most energy efficient and Grade 5 the least.

Table 6 Converting Energy Efficiency Indices to Energy Efficiency Grades

Energy Efficiency Index : $I_{\epsilon}$ ( % )	Energy Efficiency Grade
$I_{\epsilon} \leq 63$	1
$63 < I_{\epsilon} \leq 80$	2
$80 < I_{\epsilon} \leq 100$	3
$100 < I_{\epsilon} \leq 125$	4
$125 < I_{\epsilon}$	5

- 8.4 An example illustrating the method on how to determine the energy efficiency grade of an appliance is shown in Annex 2.
- 8.5 A flow chart for developing the complete appliance energy efficiency grading is shown in Annex 3.

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## **9. Energy Label**

A self-adhesive label should be used.

### **Label Location**

- 9.1 The label should be affixed to the appliance at a prominent location and should be easily visible. It should be placed on top front door of the appliance. The participant should ensure that the label appears on every registered appliance on display, sale or hire.

### **Colour Scheme & Dimensions**

- 9.2 The label should be printed on white-coloured self-adhesive sheet material and should have dimensions as shown in Annex 4. It should be printed in English and in Chinese. Soft copy of this label can be obtained from Energy Efficiency Office, Electrical and Mechanical Services Department.

### **Paper Quality**

- 9.3 The paper used for the label should be durable and possess good wear and tear characteristics. It should stick tightly on the appliance surface and can be removed easily when needed.

### **Information on the Label**

- 9.4 The information that appears on the label should accord to the label format and meanings as indicated in the Annex 4.

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## 10. Testing Facilities, Laboratories & Accreditation Bodies

- 10.1 The testing is carried out either by independent test institutes or by the manufacturers or by importers themselves at their own test facilities. The Authority will accept the results and certificates issued by the test laboratory, which fulfils one of the following criteria as specified in Section 10.2, 10.3 or 10.4.
- 10.2 The laboratory is accredited by the Hong Kong Accreditation Service (HKAS) for the relevant test under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or a scheme with which HKAS has concluded a mutual recognition agreement #, and the results are issued in a test report or certificate bearing the accreditation mark.
- 10.3 (a) Self-certification by original manufacturers that the operations of their in-house laboratories satisfy the requirements of ISO/IEC 17025; and
- (b) The manufacturers are currently operating according to a recognized international quality system (such as ISO 9001); and
- (c) The manufacturer's in-house laboratories had been successful in carrying out tests on refrigeration appliances and where these tests had been evaluated and certified by internationally recognised third party certification organisations.

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# *HKAS has concluded mutual recognition arrangements with **fifty-eight** overseas accreditation bodies for testing laboratory accreditation, namely, **UKAS** of the United Kingdom, **NATA** of Australia, **AZLA, NVLAP, IAS** and **L-A-B** of the United States, **IANZ** of New Zealand, **RvA** of Netherlands, **SAC** of Singapore, **BMwa** of Austria, **BELAC** of Belgium, **DANAK** of Denmark, **FINAS** of Finland, **COFRAC** of France, **DAP, DACH** and **TAG** of Germany, **INAB** of Ireland, **ACCREDIA** of Italy; **NA** of Norway,, **ENAC** of Spain, **SWEDAC** of Sweden, **SAS** of Switzerland, **CNAS** of People's Republic of China, **TAF** of (Taiwan,China), **CAI** of Czech Republic, **INMETRO** of Brazil, **IAJapan, JAB** and **VLAC** of Japan, **KOLAS** of Korea, **SANAS** of South Africa, **SCC** of Canada, **NABL** of India, **BoA** of Viet Nam, **LA** of Lithuania, **SNAS** of Slovakia, **KAN** of Indonesia, **ISRAC** of Israel, **DSM** of Malaysia, **ema** of Mexico, **PNAC** of Pakistan, **PAO** of Philippines, **NSC-ONAC, DSS** and **DMSc** of Thailand, **TUNAC** of Tunisia, **TURKAK** of Turkey, **OAA** of Argentina, **ONARC** of Cuba, **NLAB** of Egypt, **EAK** of Estonia, **ESYD** of Greece, **LATAK** of Latvia, **PCA** of Poland, **SA** of Slovenia, etc. The list of mutual recognition arrangement partners may change from time to time and the up-to-date list is available from the HKAS website of [www.info.gov.hk/itc/hkas](http://www.info.gov.hk/itc/hkas). Partners to these arrangements recognise the accreditations granted by one another as equivalent.*

- 10.4 The Authority will also consider test results issued by a laboratory which is accredited by HKAS or is accredited by an accreditation body which has concluded a mutual recognition arrangement with HKAS for testing laboratories for laboratory testing of electrical and mechanical appliances other than testing based on the technical standards stipulated in this scheme; if the laboratory can demonstrate their capability of carrying out tests on refrigeration appliances in accordance with technical methods.

### **Laboratory Accreditation**

- 10.5 Government takes cognizance of the need to ensure acceptable and compatible quality standards of testing laboratories, and considers that they need to be periodically accredited by some independent bodies.
- 10.6 The criteria of accreditation should be based on ISO/IEC 17025 and accreditation bodies should operate in accordance with ISO/IEC 17011.
- 10.7 The Authority will recognize accreditation granted by the HKAS under the HOKLAS and by overseas accreditation bodies which have concluded mutual recognition agreements with HKAS for accreditation of testing laboratories. The Authority will consider accreditation by other bodies on a case-by- case basis.

### **Energy Efficiency Verification Service**

- 10.8 An increasing number of countries now accept, as proof of product conformance, energy efficiency verification services provided by third- party organisation that has been accredited as a certification organisation. In accordance with this trend, the Authority will consider seriously test results that have been evaluated and verified against the respective ISO or IEC standards by reputable third-party certification organisations.

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## **11. Registration & Participation**

### **Registration Procedures**

- 11.1 All manufacturers, importers and the other parties involved in the appliance distribution network are welcome and encouraged to participate in the scheme. For some known manufacturers and importers, invitation letters will be issued to them. However, all parties may submit their applications for registration no matter whether they are invited or not.
- 11.2 The proforma letter of invitation is shown in Annex 5.
- 11.3 Applicant should submit formal application to

*Chief Engineer/Energy Efficiency A  
Energy Efficiency Office  
Electrical and Mechanical Services Department  
3 Kai Shing Street, Kowloon  
Hong Kong*

by means of an application letter. In order to ensure effective implementation of the scheme, the applicant must commit himself to fully comply with the duties, responsibilities and obligations set out in this scheme. The proforma letter of application as shown in Annex 6 details the aforesaid obligations and should be used for application.

### **Information/Documents to be Submitted for Registration**

- 11.4 Each make and model of an appliance participating in the scheme should be provided with a test report issued by a recognized laboratory. The test report should contain energy consumption tests and performance test results. The details of the technical information to be submitted together with the application are listed as follows: -
- a) Information on the company  
Name, Address, Telephone number, Fax, Contact person, Importer, Distributor, etc.
  - b) Product to apply for participating in the scheme:  
Name of products, types, makes, models, countries of origin
  - c) Which parties will be responsible for making and fixing the Energy Labels;

d) Commencement date to affix Energy Label on appliance  
Year \_\_\_\_\_, Month \_\_\_\_\_

e) Completion of the Information stated in the Energy Label for each product including the following:

Brand & Model

Appliance category

Frozen food storage temperature symbol (star rating)

Freezing capacity

Annual energy consumption

Energy efficiency grade

Fresh food volume

Frozen food volume

f) Supporting Technical Information and Calculations

Test reports: -

Annual energy consumption test

Freezing capacity test

Performance tests

***Notes: All test reports submitted to the office should be certified true copy by appropriate organization.***

Calculations:-

Fresh food volume

Frozen food volume

Adjusted volume

Energy consumption index

Energy efficiency grading

g) Miscellaneous Technical Information:

Product information catalogue

Information of compressor and refrigerant

Defrost device

Others

h) Certificate of Safety Compliance prescribed by the Electrical Products (Safety) Regulation.

**Note: Company's name and chop should be stamped on all the documents provided.**

The above information can also be found in Annex 7, Information to be Submitted to Energy Efficiency Office.

### **Acceptance of Registration**

- 11.5 On receipt of the application, the Authority will process the application and verify whether the appliance to be registered falls into the appropriate appliance category, and the energy efficiency grade is correctly obtained based on the submitted data. The accuracy of the energy consumption data and the adjusted volume, their inconsistencies and non-compliance will be dealt with in accordance with Section 13.2.
- 11.6 If the application is accepted, the participants will be notified of the result in writing within 17 working days. The participants will then be allowed to affix the label onto the 'registered' appliances. Both manufacturer and importer of the registered appliance should ensure that the energy label is correctly printed and affixed on the appliance in accordance with Section 9. The proforma letter of acceptance is shown in Annex 8.
- 11.7 If the application is rejected, the notification letter as shown in Annex 9 will also be given within 17 working days upon receipt of all necessary information requested.
- 11.8 The flow chart for registration is shown in Annex 10

### **Participant's Duties, Responsibilities and Obligations**

- 11.9 The participant is obliged to:-
- a) submit application and information including test results in accordance with format & procedures set out in section 11.4;
  - b) conduct tests via recognized laboratories and to comply with the specified test methodology and classification scheme;
  - c) produce and affix labels at his own costs;
  - d) fully inform other sales agents in his distribution network once the particular make and model of an appliance is registered;
  - e) allow random/ad-hoc inspection to be conducted by persons authorized by the Authority on registered appliance at his premises;
  - f) conduct re-test(s) at his own costs at some recognized laboratories, if the results of inspection suggest inaccurate energy label information being displayed. The result of re-test(s) shall reach the Authority within the prescribed period of time specified by the Authority; normally three months;
  - g) inform the Authority of any change in the technical information and data that were previously submitted to the Authority together with the application letter;

h) accept the fact that if appliance fails to perform in accordance with the required standard performance as given in section 6 and this cannot be readily rectified, the Authority may order it be de- registered from the scheme; and

i) remove all labels from appliances which had been de-registered within three months.

11.10 The details of the registered appliances will be kept in a register maintained by the Authority. The register records will be regularly uploaded and maintained in the EMSD Internet for public and interested parties for access and information.

### **Termination**

11.11 Under circumstances of poor performance such as:

a) (repeated) failure to fulfil obligations set out under section 11.9;

b) once false or inaccurate or misleading information is given on a label; or

c) in any other case where the Director is of the opinion that registration of an appliance is contrary to the public interest,

the Authority may de-register a registered appliance with immediate effect by giving the participant notice in writing. Once an appliance is de- registered, no one is allowed to fix a label on it. However, participant will normally be given a grace period of three months to remove all labels from the de-registered appliances.

De-registration may occur even when there is no legal action taken under either the Trade Description Ordinance (cap. 362) or the Copyright Ordinance.

11.12 Participant who decides to discontinue participating in the scheme or to withdraw any registered model from the registered appliances list shall give at least three months' advance notice to the Authority.

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## 12. Legal Provisions

- 12.1 This is a voluntary scheme. However, a participant who abuses the scheme by giving false information on a label may contravene provisions of the Trade Description Ordinance (Cap. 362).
- 12.2 No one could take advantage of the scheme by using the label on his appliances without authorization of the Authority as that may constitute an infringement of copyright under the Copyright Ordinance.

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## 13. Compliance Monitoring & Inspection

### Purpose

- 13.1 To uphold credibility of the scheme and to maintain continuous confidence of the consumers, compliance check on energy labels on those appliances participating in the scheme are needed. Also to avoid the unsatisfactory situation that the non-participating parties taking advantage of the scheme by using unauthorized labels, suitable form of inspection on appliances which have not been registered under the scheme.

### Scope

- 13.2 The scope of inspection includes sample **checking** and **testing** the following items:-
- a) whether energy label is in fact placed on the registered appliance;
  - b) whether energy label on the registered appliance is in a prominent position;
  - c) whether energy label being displayed is of correct format in accordance with Section 9;
  - d) whether the registered appliance complies with the performance requirements;
  - e) whether the data submitted by the participants are correct by random re-testing; and
  - f) whether unregistered appliances display unauthorized energy labels.

- 13.3 The participants will be requested to take immediate remedial action and report of follow-up action taken if non-compliance is found on their appliances.
- 13.4 For a registered appliance which is found giving wrong energy consumption data on the label during random checking, the Authority may request the participant to conduct separate energy consumption test at his own cost, in accordance with the test methodology as stated in Section 7 in one of the testing laboratories agreed by the Authority. The value so measured on the first appliance test should not be greater than 15 % of the energy consumption declared in the label. If the value is greater than the declared value plus 15 %, the test should be carried out on further three similar appliances. The arithmetical mean of the energy consumption values of these three appliances should be less than or equal to the declared value plus 10 %. Otherwise, the Authority will require the participant to take appropriate remedial action including replacing a label with correct value for the registered appliance.
- 13.5 If a registered appliance carrying correct information energy label but found not meeting the performance test specified in accordance with the performance tests stipulated in the agreed standards as stated in Section 7, the participant will also be requested to repeat the performance tests by an agreed testing laboratory. If significant sub-standard performance is found on the appliance and this cannot be readily rectified, the Authority may order it be de-registered from the scheme. Failure to remove labels from the de-registered appliances after the Director has withheld his authorization for using such labels may contravene the relevant ordinances.

### **Inspecting Officers**

- 13.6 The Authority will authorize inspecting officers to carry out appliances compliance monitoring and inspection. The officers will carry proper identification cards which will be produced on request during their inspection operations. However, the officer will not inform the participants in advance of their intended inspection operation.
- 13.7 It is the participants' duty to allow the inspecting officers to gain access to their premises to carry out inspection.

### **Mode of Inspection**

- 13.8 Inspections will be carried out on registered appliances on random basis. Based on the record of the registration, random inspection programmes will be developed.
- 13.9 In addition to the random inspections, the inspecting officers will carry out ad-hoc

inspections in response to complaints. The items to be inspected for this type will depend upon the nature of complaint and may include all types of inspection as stated in Section 13.2.

- 13.10 Inspections will normally be carried at the retail outlets and appliances showrooms. Where necessary, inspection will also be done at warehouses.
- 13.11 The inspection results will be properly recorded for future analysis as well as on evaluation of the effectiveness of the scheme.

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## **14. Complaints and Appeal**

- 14.1 The Authority will be responsible for dealing with complaints from participant and other parties against matters related to the scheme.

### **Complaints Handling Procedure**

- 14.2 The Director shall ensure that complaints are properly recorded and handled without undue delay.
- 14.3 The Authority shall carry out preliminary investigation on complaints and reply to the complainants within a reasonable time. For complaints that require site inspection and laboratory test, the complainant shall be notified through an interim reply.
- 14.4 The Authority shall inform the complainant of the results or decisions made on the complaint.

### **Appeal Procedure**

- 14.5 A participant who is aggrieved by a decision or action referred to Section 13 taken by the Authority may appeal to the Director in writing stating the reason for the appeal.
- 14.6 The Director may decide to suspend the decision or action given by the Authority from the day on which the appeal is made until such appeal is disposed of, withdrawn or abandoned unless such suspension would, in the opinion of the Director, be contrary to public interest.

- 14.7 The Director may by notice to the appellant require that appellant to attend before him or his representative and provide documents and give evidence relevant to the appeal.
- 14.8 The Director shall notify the appellant of his decision and reasons for it. The decision will be final and binding.

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## **15. Maintenance of Scheme**

- 15.1 To ensure that the scheme can continue to operate effectively and efficiently after its introduction, a proper system of maintenance is needed.
- 15.2 The maintenance system consists essentially of:
- a) Continuous updating of the lists of participants in the scheme as follows:
    - i) registered appliances with details such as registration number, date of registration or de-registration if it occurs, energy consumption data, energy efficiency index, performance data, make, model, category and other related information; and
    - ii) registered importers, manufacturers, local agents etc. in the distribution network with details such as address, date of registration or de-registration if it occurs, etc.
  - b) Periodic review of the test methodology, and procedures for application registration and compliance monitoring, etc., to bring them in line with the latest needs of the manufacturers, importers and retailers, etc.
  - c) Continuous evaluation of the effectiveness of the scheme and assessment of what changes are necessary.

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## **16. Future Development**

It is hoped that following implementation of the scheme, the market will phase out models of low efficiency and public awareness of using energy efficient products will be improved.

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## **Methodology for Measurement of Energy Consumption**

### **1. Introduction**

The purpose of this document is to describe the proposed methodology for measuring energy consumption and energy efficiency standard of Household Refrigeration Appliances in Hong Kong.

### **2. Basic Principles**

The basic principles are to ensure meaningful like-to-like comparison among household refrigeration appliances be made possible, and to enable consumers be given the right information of choice. Hence the stated information (i.e. energy consumption, and efficiency standard) on label must be based on some common set of criteria and data on performance and operating requirements. In other words, appliance under measurement or comparison must be based on some common and pre-determined test conditions and procedures, while giving acceptable performance.

### **3. Test Methodology**

#### **3.1 Test Standards**

The test standards for measuring energy consumption for household refrigerating appliances are based on the following ISO or IEC standards. For detailed requirements and procedural descriptions one should refer to the respective standards.

- a) ISO 5155 applies to frozen food storage cabinets and food freezers not cooled by internal forced air circulation (i.e. Category 7)
- b) ISO 7371 applies to household refrigerators not cooled by internal forced air circulation (i.e. Category 1)
- c) ISO 8187 applies to household refrigerators-freezers not cooled by internal forced air circulation (i.e. Category 2, 3, 4 & 5)
- d) ISO 8561 applies to household frost-free refrigerating appliances – Refrigerators, refrigerator-freezers, frozen food storage cabinets and food freezers cooled by internal force air circulation (i.e. Category 6 & 8)
- e) ISO 15502 or IEC 62552 applies to all categories

### 3.2 Conditions for Measurement of Energy Consumption

The determination of energy consumption shall be carried out under the specified test room conditions, test load and test procedures as specified by the respective ISO or IEC standards, while achieving the required performance requirements and figures.

#### 3.2.1 The test room conditions

The tests shall be carried out under the following test room conditions:-

a) **Ambient Temperature**

The ambient room temperature shall be +25 °C controlled to the tolerance of  $\pm 0.5$  °C.

b) **Relative Humidity**

The relative humidity shall be kept within the range from 45% to 75%.

c) **Power Supply**

The appliance shall be tested at the voltage of 380/220 V  $\pm 1\%$  and frequency of 50  $\pm 1$  %.

d) **Installation of Appliance being tested**

The appliance being tested shall be installed, placed or shielded as to conform to the requirements stated in the relevant clauses of the respective ISO or IEC standards or its equivalent.

#### 3.2.2 Test Load

The test load shall be in the form of rectangular packs of dimensions and mass as follows:

Dimensions (mm)	Mass (g)
25 x 50 x 100	125
50 x 100 x 100	500
50 x 100 x 200	1000

Tolerances shall be as follows:

- Linear dimensions  $\pm 1.5$  mm for 25 mm and 50 mm
- $\pm 3.0$  mm for 100 mm and 200 mm

- Mass  $\pm 2\%$

The load packages shall be of composition as stated in the respective ISO or IEC standards or its equivalent.

### 3.2.3 Preparation of the Appliance

The appliance shall be installed and loaded as for the storage temperature test. If, however, anti-condensation heaters are provided which can be switched on and off by the user but are not necessary to withstand the water vapour condensation test, they shall not be switched on.

The measurement of energy consumption shall be carried out under storage condition with all compartments simultaneously being in operation.

The energy consumption is that which is obtained when all the storage temperature conditions in accordance with the specified requirements are met simultaneously, and which gives the lowest energy consumption.

### 3.2.4 Test Instrumentation

Temperature measuring instruments shall be accurate to within  $\pm 0.3$  °C. The accuracy of the relative humidity measurement shall be such that the result, expressed as the dew point, is accurate to within  $\pm 0.3$  °C. Watt-hour meters shall be readable to 0.01 kWh and be accurate to within  $\pm 1\%$ .

### 3.2.5 Test Period

The test period shall start at least 24 hrs after stable operating conditions have been attained. The test period shall start at the beginning of an operating cycle; shall be at least 24h duration and shall comprise a whole number of operating cycles. If an operating cycle starts but is not completed during the 24h period, the test shall continue until the end of the operating cycle.

### 3.2.6 Measurement of Energy Consumption

The energy consumption value measured in accordance with the above paragraphs while satisfying the performance requirements stated in clause 3.2.7 shall be expressed in kilowatt-hour per 24h (kWh/24h) to two decimal places. The value so measured on the first appliance shall not be greater than 15% of the energy consumption declared by the manufacturer. If the value is greater than the declared value plus 15%, the test shall be carried out on further three appliances. The arithmetical mean of the energy consumption values of these three appliances shall be equal to or less than the declared value plus 10%.

### 3.2.7 Performance Requirements

The appliance shall be tested for conformity with the performance requirements in accordance with the relevant clauses of ISO 8187, ISO 8561, ISO 7371 and ISO 5155 or ISO 15502 or IEC 62552 or its equivalent as follows:

- a) Measurement of temperature of fresh food storage compartment, chill compartment and cellar compartment, if applicable; and
- b) Measurement of temperature of freezer compartments and frozen food storage compartment; and
- c) Temperature rise test; and
- d) Freezing test, if applicable; and
- e) Ice making test, if applicable.

## **Example for Calculating the Energy Efficiency Grade**

The given appliance is a Category 6 no-frost refrigerator - freezer with a fresh food compartment at +5 °C, a 4-star freezer compartment at -18 °C, a chill compartment at 0 °C.

	<u>Volume (litre)</u>	<u>Weighting Factor <math>\Omega</math> given by eq.2</u>	<u>Adjusted Volume (litre) <math>V_{adj}</math> given by eq. 1</u>
Fresh food storage ( $V_r$ )	250	$\Omega_r = 1.00$	$V_r \times \Omega_r = 250$
Frozen food storage ( $V_{ffc}$ )	200	$\Omega_{ffc} = 2.15$	$V_{ffc} \times \Omega_{ffc} = 430$
Chill storage ( $V_c$ )	90	$\Omega_c = 1.25$	$V_c \times \Omega_c = 112.5$
<b>Total:</b>	<b>540</b>		<b><math>\Sigma V \times \Omega = 792.5</math></b>

**Annual Energy Consumption**

750 kWh/year

The adjusted volumes for the appliance are calculated according to the equations 1, 2, 11 in section 7.

$$\begin{aligned} V_{adj} &= \Sigma V \times \Omega = V_r \times \Omega_r + V_{ffc} \times \Omega_{ffc} + V_c \times \Omega_c \\ &= 250 + 430 + 112.5 \\ &= 792.5 \text{ litres} \end{aligned}$$

From the Table 5, the Average Appliance Energy Consumption for Category 6 appliance should be:

$$\begin{aligned} &= V_{adj} \times 0.777 + 303 \\ &= 792.5 \times 0.777 + 303 \\ &= 918.8 \text{ kWh/year} \end{aligned}$$

Considering it is a no-frost model, the actual average energy consumption should be multiplied by a factor of 1.35.

Therefore, it is  $1.35 \times 918.8 = 1,240.38$  kWh/year

Energy Efficiency Index of the appliance  $I_{\epsilon} = \frac{\text{Annual Energy Consumption}}{\text{Average Annual Energy Consumption}}$

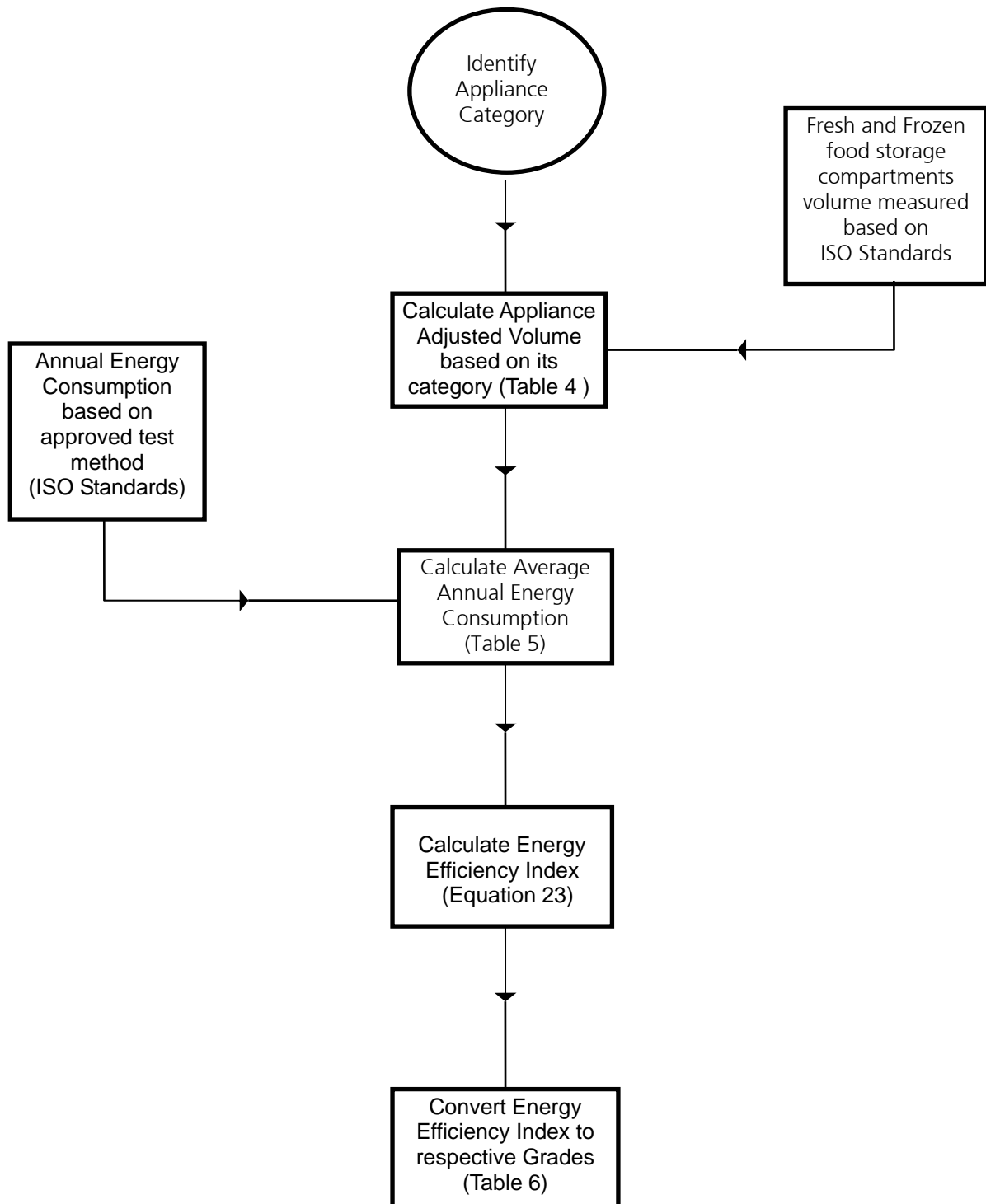
$$I_{\epsilon} = 750/1240.38$$

$$I_{\epsilon} = 60.5 \%$$

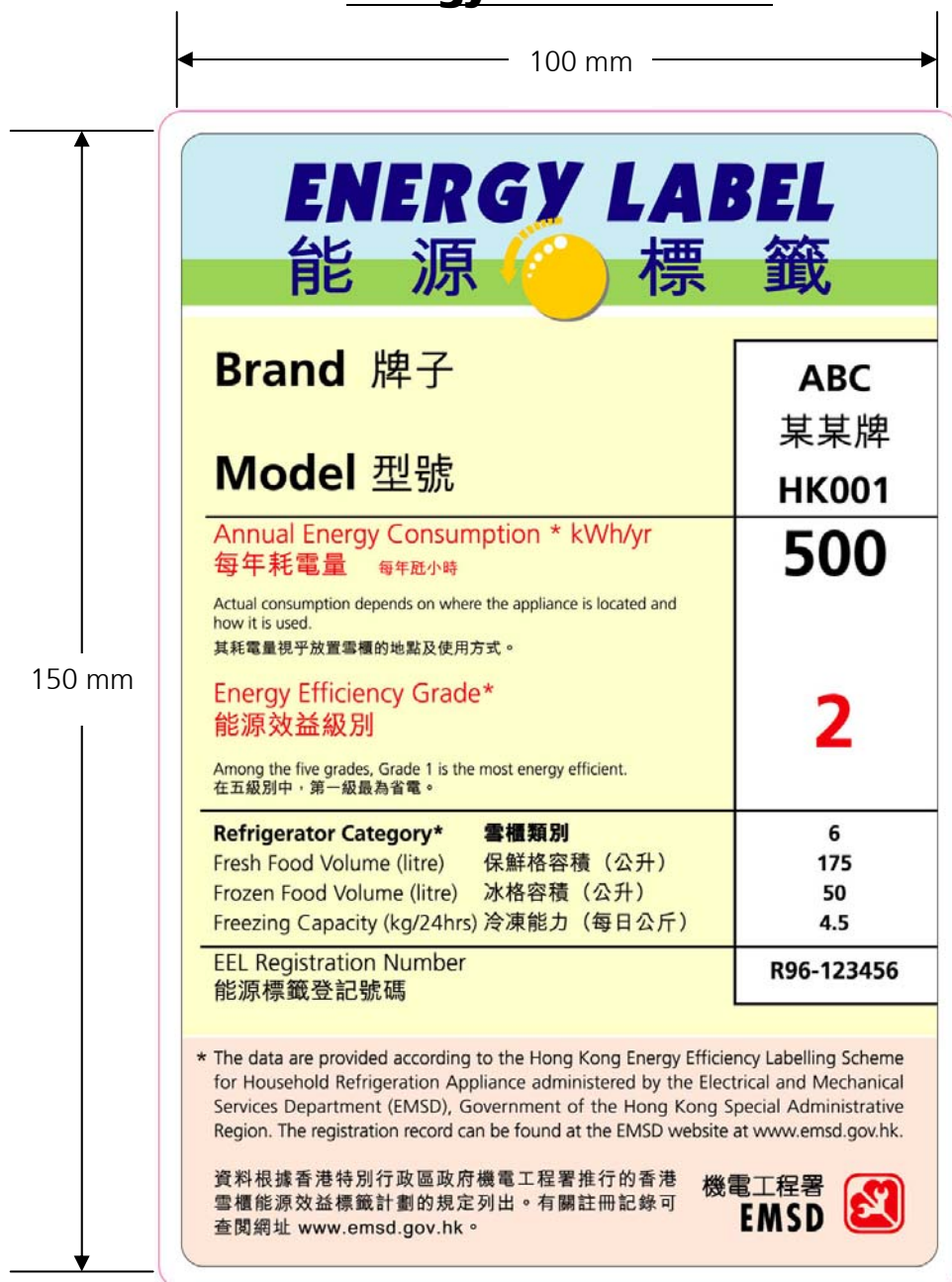

$$I_{\epsilon} < 63 \%$$

The value of energy efficiency index of the appliance is 60.5 % which is less than 63%. According to Table 6 in section 8, it should be rated as **Grade 1** appliance.

**Flow Chart**  
**for**  
**Developing the Appliance Energy Efficiency Grade**



## Energy Label Format

 <p>100 mm</p>	
<b>ENERGY LABEL</b> <b>能源標籤</b>	
<b>Brand 牌子</b>	<b>ABC</b> 某某牌
<b>Model 型號</b>	<b>HK001</b>
<b>Annual Energy Consumption * kWh/yr</b> <b>每年耗電量 每年耗小時</b> <small>Actual consumption depends on where the appliance is located and how it is used. 其耗電量視乎放置雪櫃的地點及使用方式。</small>	<b>500</b>
<b>Energy Efficiency Grade*</b> <b>能源效益級別</b> <small>Among the five grades, Grade 1 is the most energy efficient. 在五級別中，第一級最為省電。</small>	<b>2</b>
<b>Refrigerator Category* 雪櫃類別</b> Fresh Food Volume (litre) 保鮮格容積 (公升) Frozen Food Volume (litre) 冰格容積 (公升) Freezing Capacity (kg/24hrs) 冷凍能力 (每日公斤)	<b>6</b> <b>175</b> <b>50</b> <b>4.5</b>
<b>EEL Registration Number</b> <b>能源標籤登記號碼</b>	<b>R96-123456</b>
<small>* The data are provided according to the Hong Kong Energy Efficiency Labelling Scheme for Household Refrigeration Appliance administered by the Electrical and Mechanical Services Department (EMSD), Government of the Hong Kong Special Administrative Region. The registration record can be found at the EMSD website at <a href="http://www.emsd.gov.hk">www.emsd.gov.hk</a>.</small>	
<small>資料根據香港特別行政區政府機電工程署推行的香港雪櫃能源效益標籤計劃的規定列出。有關註冊記錄可查閱網址 <a href="http://www.emsd.gov.hk">www.emsd.gov.hk</a>。</small>	
機電工程署 <b>EMSD</b> 	
<p>150 mm</p>	

Soft copy of this label can be obtained from Energy Efficiency Office, Electrical and Mechanical Services Department.

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## **Proforma Letter of Invitation**

Our ref. EEO/LB/02

Your ref.

Tel.

Fax.

Date

[Name and Address of  
Manufacturers/Importers/Agents]

Dear Sir/Madam,

### **Invitation of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for Household Refrigeration Appliances**

Having gone through the necessary consultations and duly considered the views from various concerned parties, the government has decided to introduce a voluntary energy efficiency labelling scheme for household refrigeration appliances to Hong Kong with effect from (\_\_\_\_\_). The details of the scheme<sup>①</sup> have been finalized and I enclose herewith a guide of the scheme for your reference.

Being one of the major household refrigeration appliances manufacturers / importers / agents<sup>②</sup> in Hong Kong, you are invited to participate in the scheme so as to take part in promoting public awareness in energy conservation and environmental improvement to Hong Kong. If you are interested to participate in the scheme, please apply in accordance with the proforma letter of application (Annex 6) and submit details including technical information in accordance with the attached Annex 7 to the 'Chief Engineer / Energy Efficiency A' at the following address.

Energy Efficiency Office  
Electrical and Mechanical Services Department  
3 Kai Shing Street, Kowloon  
Hong Kong

Please be reminded to submit accurate test data to support your application. Under this Scheme, routine compliance monitoring and checking will be performed and if a registered household refrigeration appliance is found to be non-compliant, we may consider deregistering the household refrigeration appliances from the Scheme.

Should you need further clarification or information, you are most welcome to contact the undersigned or Mr. \_\_\_\_\_, at the telephone number \_\_\_\_\_.

Yours faithfully,

for Director of Electrical & Mechanical Services

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(Note : <sup>①</sup> 'scheme' means 'The Voluntary Energy Efficiency Labelling Scheme for household refrigeration appliances '

<sup>②</sup> delete as appropriate)

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## **Proforma Letter of Application**

Your ref. EEO/LB/02

Our ref.

Tel.

Date

Chief Engineer/Energy Efficiency A  
Electrical & Mechanical Services Department  
3 Kai Shing Street, Kowloon  
Hong Kong

Dear Sir/Madam,

### **Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for Household Refrigeration Appliances**

Our company is the (manufacturer/importer/agent\*) of \_\_\_\_\_ in Hong Kong. We support the introduction the labelling scheme to Hong Kong and would like to be one of the participants in the scheme to promote energy efficiency.

I understand fully the obligations and duties stated in the scheme and will comply with all relevant requirements, in particular those specified below:

- i) conduct tests via recognized laboratories and to comply with the specified test standards;
- ii) produce and affix specified labels at my own costs;
- iii) allow random/ad-hoc inspection to be conducted by persons authorized by the issuing Authority on registered appliance at my premises;
- iv) conduct re-test(s) at my own costs at some recognized laboratories, if the results of inspection suggest inaccurate energy label information being displayed. The result of re-test(s) shall reach the Authority within the prescribed period time specified by the Authority;
- v) inform the Authority of any change in the technical information and data that were previously submitted to the Authority together with the application letter; and
- vi) accept the fact that if appliance fails to perform in accordance with the required energy efficiency standards and performance as given in Section 7 and this cannot be readily rectified, the Authority may order it be de-registered from the scheme.

The details of information of those appliances which we intend to register with the Authority are shown in the attached document, (Annex 7) and are submitted herewith for your vetting.

Yours faithfully,

(Manufacturer/Importer/Agent's Name and Company Chop)

\* *delete as appropriate*

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**Information to be Submitted to Energy Efficiency Office**

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1. Information on the company:  
Name, Address, Telephone number, Fax, Contact person, Importer, Distributor, etc.
2. Product to apply for participating in the scheme:  
Name of products, types, make, model references, countries of origin
3. Parties will be responsible for making and fixing the Energy Label
4. Commencement date to affix Energy Labels on appliance package  
Year \_\_\_\_\_, Month \_\_\_\_\_
5. Detailed test reports providing at least the following relevant technical data for the participating appliances:  
  
Brand & Model  
Appliance category  
Frozen food storage temperature symbol (star rating)  
Freezing capacity  
Annual energy consumption  
Energy efficiency grade  
Fresh food volume  
Frozen food volume
6. Supporting Technical Information and Calculations:-  
Test reports: -  
Annual energy consumption test  
Freezing capacity test  
Performance tests  
  
Calculations:-  
Fresh food volume  
Frozen food volume  
Adjusted volume  
Energy consumption index  
Energy efficiency grading
7. Miscellaneous Technical Information:

Product information catalogue  
Information of compressor and refrigerant  
Defrost device  
Others

8. Certificate of Safety Compliance prescribed by the Electrical Products (Safety) Regulation.

*Note: Company's name and chop should be stamped on the all documents provided.  
All test reports submitted to the office should be certified true copy by appropriate organization.*

---

## **Proforma Letter of Acceptance**

Your ref.  
Our ref. EEO/LB/02

Tel:  
Fax:

Date

[  
Manufacturers/Importers/Agents  
]

Dear Sir/Madam,

### **Acceptance of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for Household Refrigeration Appliances**

With reference to your letter of ref. \_\_\_\_\_ dated \_\_\_\_\_, I am pleased to inform you that your application to participate in the captioned scheme has been accepted.

I enclose herewith the registration certificates of Household Refrigeration Appliances registered. The registered Household Refrigeration Appliances are as follows:

<u>Brand/Make/Model</u>	<u>Registration No.</u>	<u>Effective date</u>
( )	( )	( )

You are allowed to affix a specified energy label onto each and every appliance package registered under the scheme. The contents of the energy label should be based on the information that you have provided in your application ref. \_\_\_\_\_ and dated \_\_\_\_\_.

Should you have any queries regarding the scheme, please contact this office.

Yours faithfully,

for Director of Electrical & Mechanical Services

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## **Proforma Letter of Rejection**

Our ref. EEO/LB/02

Your ref.

Tel.

Fax.

Date

[  
Manufacturers/Importers/Agents  
]

Dear Sir/Madam,

### **Rejection of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for Household Refrigeration Appliances**

With reference to your letter of application ref. \_\_\_\_\_ dated \_\_\_\_\_, I regret to inform you that your application for registration to participate in the scheme has not been accepted for the following reasons:-

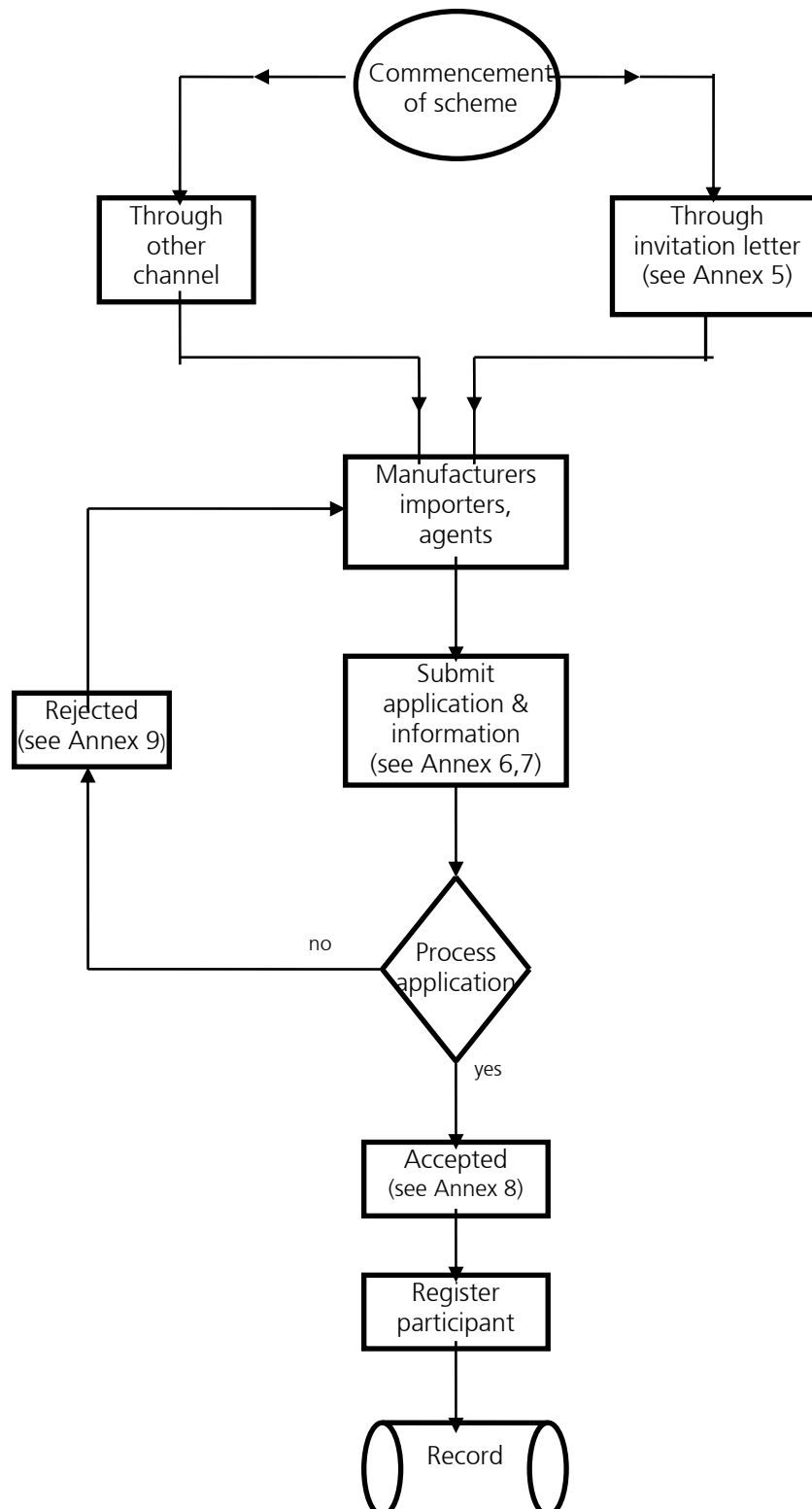
1. \_\_\_\_\_ etc.

You are most welcome to submit new application again in future, when you have the necessary documents / information to support your application.

Yours faithfully,

for Director of Electrical & Mechanical Services

## Flow Chart for Registration



## **Summary of Equations**

Equation	Page
1 $V_{adj} = \sum V_i \times \Omega$ Adjusted Volume General formula .....	9
2 $\Omega = \frac{T_a - T_i}{T_a - T_r}$ Weighting factor for compartments.....	9
3 $V_{adj} = V_r$ Adjusted Volume for Category 1 appliance .....	10
4 $V_{adj} = V_r + 1.55 \times V_{ffc}$ Adjusted Volume for Category 2 appliance.....	10
5 $V_{adj} = V_r + 1.85 \times V_{ffc}$ Adjusted Volume for Category 3 appliance.....	10
6 $V_{adj} = V_r + 2.15 \times V_{ffc}$ Adjusted Volume for Category 4 appliance.....	10
7 $V_{adj} = V_r + 2.15 \times V_{ffc}$ Adjusted Volume for Category 5 appliance.....	10
8 $V_{adj} = V_r + 2.15 \times V_{ffc}$ Adjusted Volume for Category 6 appliance.....	10
9 $V_{adj} = 2.15 \times V_{ffc}$ Adjusted Volume for Category 7 appliance .....	10
10 $V_{adj} = 2.15 \times V_{ffc}$ Adjusted Volume for Category 8 appliance .....	10
11 $V_{adj} = V_r \times \left( \frac{T_a - T_r}{T_a - T_r} \right) + V_{ffc} \times \left( \frac{T_a - T_{ffc}}{T_a - T_r} \right)$ .....	10
12 Appliance Energy Efficiency Ratio = $\frac{\text{Annual Energy Consumption}}{\text{Adjusted Volume}}$ .....	11
13 $V_{adj} \times 0.233 + 245$ Average Annual Energy Consumption for Category 1 appliance .....	13
14 $V_{adj} \times 0.643 + 191$ Average Annual Energy Consumption for Category 2 appliance .....	13
15 $V_{adj} \times 0.450 + 245$ Average Annual Energy Consumption for Category 3 appliance .....	13
16 $V_{adj} \times 0.657 + 235$ Average Annual Energy Consumption for Category 4 appliance .....	13
17 $V_{adj} \times 0.777 + 303$ Average Annual Energy Consumption for Category 5 appliance .....	13
18 $1.35 (V_{adj} \times 0.777 + 303)$ Average Annual Energy Consumption for Category 6 appliance.....	13
19 $V_{adj} \times 0.446 + 181$ Average Annual Energy Consumption for Category 7 appliance- Chest freezer .....	13
20 $V_{adj} \times 0.472 + 286$ Average Annual Energy Consumption for Category 7 appliance- Upright freezer .....	13
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## **Symbols used**

Symbol	Quantity
$\Sigma$	Sum of
$\Omega$	Weighting factor of difference in temperature between compartment and ambient temperature
$\leq$	Smaller or equal to
$\propto$	Proportion to
$^{\circ}\text{C}$	Degree Celsius
%	Percentage
E	Actual Appliance Annual Energy Consumption
$E_{av}$	Average Annual Energy Consumption
g, kg	Gram, kilogram, mass unit
h, hrs	Hour(s), time
$I_{\varepsilon}$	Energy Efficiency Index
kWh	Kilowatt-hour, energy unit
l	Litre, the unit of volume
mm	Milli-meter, length unit
$t_1, t_2, t_3$	Recorded temperatures at the measured points in fresh food compartment
$t_m$	Mean temperature of fresh food compartment
$t_{cm}$	Recorded temperature of cellar compartment
$t_{cc}$	Recorded temperature of chill compartment
$T_a$	Test room ambient temperature which is taken as 25 °C
$T_{ffc}$	The rated temperature in the frozen food compartment
$T_i$	The rated temperature in the individual compartment concerned
$T_r$	The rated temperature in the fresh food compartment which is taken as 5°C
$V_{adj}$	Adjusted volume
$V_{ffc}$	Volume of frozen food compartment
$V_i$	Measured storage volume of an individual compartment
$V_r$	Volume of fresh food compartment