PROPOSED MANDATORY ENERGY EFFICIENCY LABELLING SCHEME IN HONG KONG, CHINA

WTO Notification Document

INTRODUCTION

1. Since 1995, the Electrical and Mechanical Services Department (EMSD) of Hong Kong, China has been operating a voluntary energy efficiency labelling scheme (EELS) for household and office appliances and vehicles. The scheme aims to promote energy saving by informing customers of the energy efficiency performance of the products. The scheme also intends to encourage product suppliers to make available more energy-efficient products to meet customer demand. The voluntary scheme currently covers a total of 18 types of energy-using products.

2. As part of the ongoing efforts to promote the efficient use and conservation of energy, over 40 countries, including the United States, European Union, Australia, New Zealand, Canada and South Korea, have introduced mandatory EELS for various products. The Government of Hong Kong, China will introduce a similar mandatory EELS to achieve the following objectives -

(a) to increase public awareness of the importance of using energy-efficient products;
(b) to provide consumers with more energy-efficient products; and
(c) to provide incentive to product suppliers to market more energy-efficient products.

3. Three products, namely room air conditioners, refrigerating appliances and compact fluorescent lamps will be included in the initial phase of the mandatory scheme. These three products have been included in the voluntary EELS in the early stage and have the highest market penetration rates.

PRODUCT COVERAGE

4. The mandatory EELS will cover the three specified products which are supplied in Hong Kong, China. The following products will be excluded:

(a) products under transhipment or in transit through Hong Kong, China;
(b) products manufactured in Hong Kong, China for export;
(c) products supplied as scrap or in a place other than Hong Kong, China under a sale agreement entered into in Hong Kong, China; or
(d) second hand products, including products supplied as part of or in connection with a disposition of any premises unless the disposition is the first disposition made prior to the first occupation of the premises.

REGISTRATION

5. Local manufacturers or importers of the three specified products covered by the mandatory EELS will be required to register their product models with EMSD prior to supplying them to the local market in Hong Kong, China. To apply for registration of a product model, the applicant will be required to provide the following information relating to the product model concerned:

(a) applicant's name and address;
(b) basic product details;
(c) energy efficiency performance data;
(d) calculation on the energy efficiency grading; and
(e) test report for the energy efficiency performance.

6. The test methodology and standards are based on international standards and will be specified in the Codes of Practice for Room Air Conditioners, Refrigerating Appliances and Compact Fluorescent Lamps at Annex A, B and C respectively.

7. EMSD will accept the energy efficiency performance test report issued by the following organizations for registration of the product models:

(a) Laboratories which are accredited by the Hong Kong Accreditation Service (HKAS) under the Hong Kong Laboratory Accreditation Scheme, or a scheme with which HKAS has entered into a mutual recognition agreement;
(b) Laboratories which have been assessed by internationally recognized certification bodies, and the tests concerned have been evaluated and endorsed by the certification bodies; or
(c) Laboratories which have been assessed and recognised by EMSD under the existing voluntary EELS for conducting the relevant tests, and are currently certified under ISO 9001 of the International Organization for Standardization or equivalent standards.

8. A registration fee will be charged to recover the administration cost of the registration. The list of the registered product models with energy efficiency information will be made available to the public. Registration holders of the registered product models will be required to update information relating to their registered product models with EMSD at least once every five years.

9. An appeal mechanism will be put in place to allow applicants to appeal against the decision of EMSD in respect of product registration.

LABELLING REQUIREMENT

10. Under the mandatory EELS, no person shall supply a specified product unless the product bears an energy label in the prescribed format. The energy label shall be provided by the registration holder of the registered product model onto the product supplied by him. Such label shall contain the same information registered with EMSD. The formats of the energy labels for Room Air Conditioners, Refrigerating Appliances and Compact Fluorescent Lamps are specified in the Codes of Practice at Annex A, B and C respectively. The proposed mandatory EELS will not impose any minimum energy performance requirements for the three specified products. All specified products, disregard of their energy performance, could still be supplied in Hong Kong, China so long as they are registered with EMSD and bear energy labels in the prescribed format.

TRANSITIONAL ARRANGEMENT

11. A grace period will be allowed after enactment of the relevant new legislation. During the grace period, the three specified products currently registered under the voluntary EELS can be transferred to the mandatory scheme. The trade will also be allowed to apply

registration for the specified products or sell their existing stock without energy labels. After the grace period, all products covered by the mandatory EELS shall have their models registered and contain an energy label before they are supplied to the local market in Hong Kong, China.

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Annex A of WTO Notification Document

Code of Practice
on
Room Air Conditioners

under
the Mandatory Energy
Efficiency Labelling Scheme

Electrical and Mechanical Services Department

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Code of Practice on Room Air Conditioners

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Code of Practice on Room Air Conditioners

1 Introduction

1.1 The Government proposes to implement a mandatory energy efficiency labelling scheme (EELS) for specified electric appliances in Hong Kong. The room air conditioners will be included, amongst other products, in the initial phase of the mandatory EELS.

1.2 New legislation will be introduced to implement the mandatory EELS. The Code of Practice on Room Air Conditioners (the Code) is to be issued under the new legislation.

1.3 The Code sets out the technical details for compliance with the labelling requirements for room air conditioners under the mandatory EELS, including the scope, appliance classification, test standards, energy efficiency grading, and format of energy label.

2 Scope

2.1 The mandatory EELS shall apply to single package type and split type room air conditioners which –

(a) use the mains electricity as the prime power source;
(b) operate using the vapour compression cycle;
(c) are non-ducted;
(d) are air-cooled;
(e) are of either cooling only type or reverse cycle type; and
(f) have each a rated cooling capacity not exceeding 8.5 kilowatts.

2.2 It does not cover those air-conditioners which are –

(a) fan-coil air-conditioning units;
(b) water-cooled units;
(c) multiple split-system air conditioners;
(d) heat pumps for heating only;
(e) units designed for use with additional ducting or flexible pipes for air intake or exhaust; or
(f) ceiling-suspended type, cassette type or floor standing type air conditioners.

3 Definitions

Unless otherwise specified, the following definitions shall apply throughout the Code:

air-cooled	means, in relation to room air conditioner, employment of air-cooled condensers.
appliance	means room air conditioners in the Code.
coefficient of Performance (COP)	means ratio of the heating capacity to the effective power input of the unit, expressed in watt/watt.
cooling capacity	means amount of sensible and latent heat that the equipment can remove from the conditioned space in a defined interval of time.
cooling only type	means room air conditioners for cooling, but not for heating.
Director	means the Director of Electrical and Mechanical Services
effective power input(P_E)	means the average electrical power input to the equipment within a defined interval of time, obtained from: - the power input for operation of the compressor and any power input for defrosting, excluding additional electrical heating devices not used for defrosting; - the power input of all control and safety devices of the equipment; and - the power input of the conveying devices within the equipment for heating transport media (e.g. fan, pump).
energy efficiency ratio (EER)	means ratio of the cooling capacity to the effective power input of the unit, expressed in watt/watt.
fan-coil air-conditioning unit	means an air-conditioning unit equipped with a fan re-circulating air from the space through the coil, which contains either chilled or hot water for cooling or heating.

government	means the Government of the Hong Kong Special Administrative Region.
heat pump	means an encased assembly or assemblies designed as a unit to provide delivery of heat. It includes an electrically operated refrigeration system for heating.
ISO	means International Organisation for Standardization (the latest edition of the standard shall be followed)
mains electricity	means the electricity supply at a voltage of 380/220V and a frequency of 50 Hz in Hong Kong.
multiple split-system	means a split system incorporating a single or multiple refrigerant circuit(s), with one or more compressors, multiple indoor units and one outdoor unit. The system is capable of operating either as an air conditioner or a heat pump.
non-ducted	means the absence of any additional ducting or pipes required for air intake and exhaust.
rated cooling capacity	means the cooling capacity shown on the nameplate of the equipment.
rated energy consumption	means the power input shown on the nameplate of the equipment.
refrigeration circuit	means a physical circuit through which a refrigerant is compressed and liquefied, allowed to cool in a condenser, and then allowed to expand to become a gas in an evaporator (the expansion is accompanied by a strong cooling effect). In this operation the condenser becomes warm and the evaporator becomes cold as the heat is removed from the evaporator to the condenser.
reverse cycle type	means room air conditioners, which can operate in normal or reverse vapour compression cycle, for both cooling and heating.

room air conditioner	means an encased assembly or assemblies designed primarily to provide free delivery of conditioned air to an enclosed space, room or zone (conditioned space). It includes a prime source of refrigeration for cooling or heating. Where such equipment is provided in more than one assembly, the separated assemblies (split-systems) are to be designed to be used together.
single package type	means a room air conditioner which is assembled in factory and consists of components of refrigeration system fixed on a common mounting to form a discrete unit.
split type	means a room air conditioner with separate indoor and outdoor components that are connected with refrigerant piping. The indoor unit usually lies within the conditioned space.
water-cooled	means, in relation to room air conditioners, employment of water-cooled condensers.
vapour compression cycle	means the mechanism employed by room air conditioners throughout which the refrigerant undergoes alternate compression and expansion so that cooling or heating function can be achieved.

4 Classification of Room Air Conditioners

4.1 Room air conditioners which are regulated under the mandatory EELS are classified into two types, namely single package type and split type, as below:

(a) Single package type

It shall consist of one evaporator and one condenser that are fixed on a common mounting and together with all major assemblies are enclosed in one cabinet. It is primarily used and mounted in a window, or through a wall, or as a console.

(b) Split type

It shall consist of separated assemblies (evaporator and condenser) that are connected with a single refrigeration circuit and form a matched functional unit. The separated assemblies may be installed some distance apart with the connecting refrigerant pipes being provided on site to suit the particular installation.

4.2 All room air conditioners regulated under the mandatory EELS are categorised in accordance with the Table 1:

Table 1 – Overall Classifications

Type	Function	Category	Description
Single Package	Cooling Only	Category 1	A single package type room air conditioner with cooling function only
	Reverse Cycle	Category 2	A single package type room air conditioner with both cooling and heating functions
Split	Cooling Only	Category 3	A split type room air conditioner with cooling function only
	Reverse Cycle	Category 4	A split type room air conditioner with both cooling and heating functions

5 Tests Required under the Mandatory EELS

All the following tests are required to be carried out, where appropriate, in order to satisfy the relevant requirements under the mandatory EELS:

(a) Cooling capacity test for measuring cooling capacity and corresponding energy consumption for both cooling only type and reverse cycle type.

(b) Maximum cooling test for both cooling only type and reverse cycle type.

6 Test Methodology & Energy Efficiency Grading for Cooling Capacity

6.1 Test Conditions for the Determination of Cooling Capacity

With respect to the cooling performance of room air conditioner, the requirements of ISO 5151 standard test condition 'T1' for moderate climate as shown in Table 2 shall apply. In other words, room air conditioners designed and manufactured for use in a moderate climate environment shall be able to give the specified output (cooling capacity) while at the same time achieving the required energy performance.

Table 2 – Test conditions for the determination of cooling capacity

Parameter	Standard test conditions		
	T1	T2	T3
Temperature of air entering indoor side			
dry-bulb	27 °C	29 °C	21 °C
wet-bulb	19 °C	19 °C	15 °C
Temperature of air entering outdoor side			
dry-bulb	35 °C	46 °C	27 °C
wet-bulb	24 °C	24 °C	19 °C

6.2 Measurement of Cooling Capacity

The test conditions and the testing methodology for measurement of cooling capacity and energy consumption shall follow ISO 5151 or other equivalent international standards approved by the Director. Equipment shall be tested at a voltage of 380/220V and a frequency of 50Hz with tolerances as specified in the standard.

6.3 Calculation of Cooling Capacity (Φc)

The cooling capacity (Φc) of the appliance shall be calculated based on the mean of the measured values taken over the test period from the cooling capacity test in accordance with the test requirements and the method of calculation in ISO 5151 or other equivalent international standards approved by the Director. The value shall be in watts (W), or in kilowatts (kW).

6.4 Measurement of Energy Consumption

The energy consumption of the appliance shall be measured during the cooling capacity test as described in ISO 5151 or other equivalent international standards approved by

the Director. This is the mean of the measured values of the effective power input (P_E) to the equipment or individual power inputs to each of the electrical equipment components taken over the test period from the cooling capacity test, in watts (W), or in kilowatts (kW).

6.5 Average Appliance Energy Consumption

6.5.1 The Average Appliance Energy Consumption (E_{av}) figures are obtained using statistical method by plotting of the energy consumption data against cooling capacity for a particular appliance category, under the prevailing market situation. They can be approximated by a linear equation representing the average energy consumption with respect to the cooling capacity of appliances on sale in the market.

6.5.2 The Average Appliance Energy Consumption line equations so developed for Hong Kong appliances are shown in Table 3.

Table 3 – Proposed average appliance energy consumption

Appliance Category	Average Appliance Energy Consumption (kW)	Equation No.
Category 1 & 2	E av = 0.442 x Φc	1
Category 3 & 4	E av = 0.387 x Φc	2

Where Φc is defined in clause 6.3.
E av is average appliance energy consumption expressed in kW.

6.6 Energy Efficiency Grading for Cooling Capacity

6.6.1 Energy Consumption Indices (I_ε)

The energy consumption index (I_ε) of an appliance is defined as the ratio of the actual effective power input of the appliance to the Average Appliance Energy Consumption (as found from the associated average energy consumption line) of an appliance with similar cooling capacity and similar appliance category. The index is expressed in percentage. Thus, by comparing the energy consumption indices, all appliances can have a meaningful comparison of their energy efficiencies. In other words, within a category, an appliance with a lower energy consumption index (i.e. lower percentage) consumes less energy than an appliance with a higher energy consumption index (i.e. higher percentage). The energy consumption index is calculated as follows :-

$$\text{Energy Consumption Index } (I_\varepsilon) = \frac{P_E}{E_{av}} \times 100\% \quad \text{.....(eq.3)}$$

Where P_E = the effective power input (actual energy consumption) of the appliance measured in cooling capacity test.
E_{av} = Average Appliance Energy Consumption as determined from Table 3.

6.6.2 Energy Efficiency Grading

To make the concept of appliance energy efficiency more readily understood by ordinary consumers, appliance energy efficiency grade is introduced by linking the energy consumption index (percentage) to the 5 grades as shown in Table 4, with Grade 1 being the most energy efficient and Grade 5 the least.

Table 4 – Converting energy consumption indices to energy efficiency grades

Energy Consumption Index : I_{ε}(%)	**Energy Efficiency Grade** *(Note 1)*
$I_{\varepsilon} \leq 85$	1
$85 < I_{\varepsilon} \leq 95$	2
$95 < I_{\varepsilon} \leq 105$	3
$105 < I_{\varepsilon} \leq 120$	4
$120 < I_{\varepsilon}$	5

Note 1: In order to obtain Grade 1 to 4, the appliance concerned shall also pass the maximum cooling test. Only Grade 5 will be accorded if the appliance does not pass the maximum cooling test or $I_{\varepsilon} > 120$.

An example illustrating the method on how to determine the energy efficiency grade of an appliance for cooling capacity is shown in Appendix 1.

A flow chart for developing the complete appliance energy efficiency grading for cooling capacity is shown in Appendix 2.

7 Performance Requirements

7.1 The appliance shall be tested for conformity with the following performance requirements in accordance with the relevant clauses of ISO 5151 or other equivalent international standards approved by the Director:

a) The measured cooling capacity for both cooling only type and reverse cycle type room air conditioners shall not be less than 95% of the rated cooling capacity of the appliance.

b) The measured energy consumption shall not be greater than 110% of the rated energy consumption of the appliance.

c) The appliance shall pass the maximum cooling test. Any appliance failing the maximum cooling test can only obtain Grade 5 for its cooling function.

7.2 In addition to the specific energy efficiency requirements, all appliances shall comply with the Electrical Products (Safety) Regulation of the HKSAR and the safety standards specified under the Regulation, and all other legislations concerning the safety of the appliance, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

8 Design and Format of Energy Label

The energy label for room air conditioner is shown in Appendix 3. After successful application for registration, the applicant (now the registration holder) shall print the energy label for his / her registered product model showing the agreed energy efficiency grade and associated information in strict accordance with the requirements as shown in Appendix 3.

Appendix 1

Example for Calculating the Energy Efficiency Grade for Cooling Capacity

The given appliance is of Category 1 (i.e. window-type with cooling only function).

Cooling Capacity (Φ_c) ..... 3,550 Watts

Effective Power Input (P_E) ..... 1,370 Watts

From the Table 3, the Average Appliance Energy Consumption for Category 1 appliance of the specified capacity should be :

E_{av} = 0.442 x Φ_c Watts

=0.442 x 3550 Watts

= 1569 Watts

Energy Consumption Index of the appliance $I\varepsilon = \dfrac{\text{Effective Power Input}}{\text{Average Appliance Energy Consumption}}$

$$I\varepsilon = \frac{P_E}{E_{av}}$$

$$I\varepsilon = \frac{1370}{1569}$$

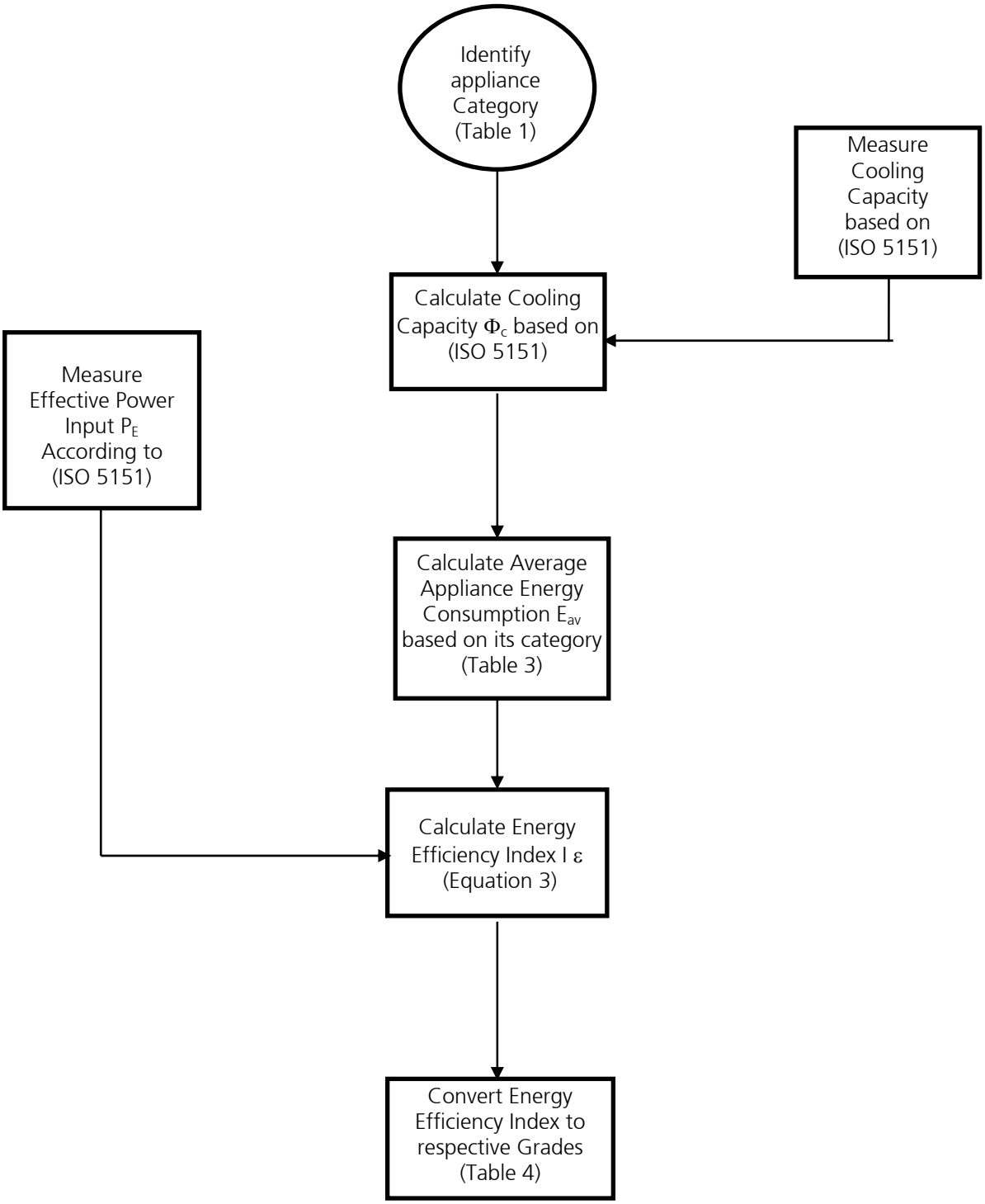
$$I\varepsilon = 87.3\ \%$$

$85 < I\varepsilon < 95$ %

The value of energy efficiency index of the appliance is 87.3%, which is more than 85% and less than 95%. According to Table 4 in Section 8, it should be rated as **Grade 2** appliance.

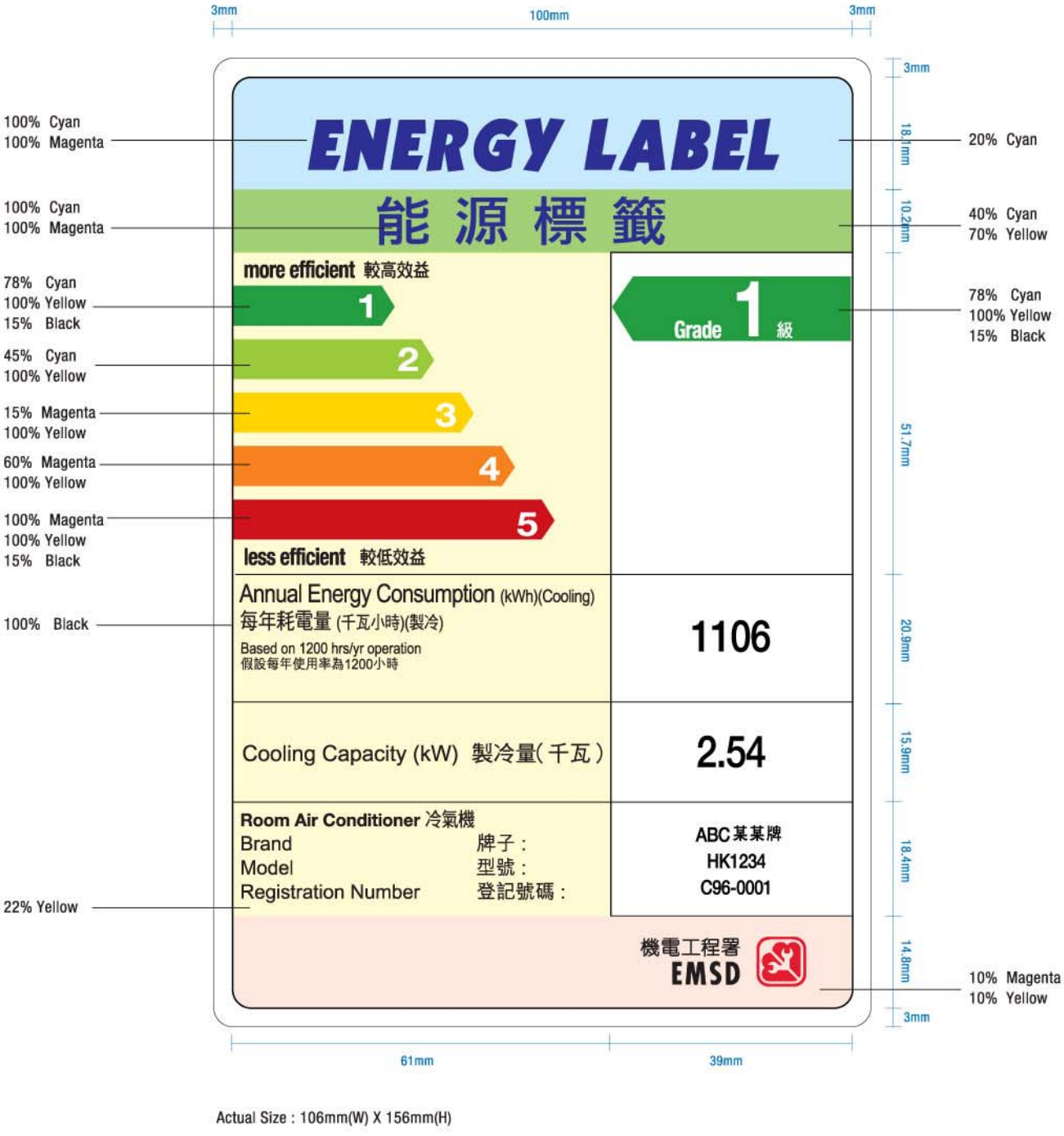
Appendix 2

Flowchart for Calculating the Energy Efficiency Grade for Cooling Capacity



Appendix 3

Energy Label Design and Format



Actual Size : 106mm(W) X 156mm(H)

The following notes define the information to be included in the energy label:

Annual energy consumption: Measured energy consumption as defined in clause 6.4.

Cooling capacity: Measured cooling capacity as defined in clause 6.2.

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Annex B of WTO Notification Document

Code of Practice
on
Refrigerating Appliances

under
the Mandatory Energy
Efficiency Labelling Scheme

Electrical and Mechanical Services Department

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Code of Practice on Refrigerating Appliances

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Code of Practice on Refrigerating Appliances

1 Introduction

1.1 The Government proposes to implement a mandatory energy efficiency labelling scheme (EELS) for specified electric appliances in Hong Kong. The refrigerating appliances will be included, amongst other products, in the initial phase of the mandatory EELS.

1.2 New legislation will be introduced to implement the mandatory EELS. The Code of Practice on Refrigerating Appliances (the Code) is to be issued under the new legislation.

1.3 The Code sets out the technical details for compliance with the labelling requirements for refrigerating appliances under the mandatory EELS, including the scope, appliance classification, test standards, energy efficiency grading, and format of energy label.

2 Scope

2.1 The mandatory EELS shall apply to refrigerating appliances which –

(a) operate using the vapour compression cycle;

(b) use mains electricity as the primary power source; and

(c) have each a rated volume capacity not exceeding 500 litres.

no matter whether or not they are sold or displayed for non-household use.

2.2 The mandatory EELS does not apply to appliances which –

(a) may also use other energy sources, such as batteries; or

(b) operate using absorption refrigerating system.

3 Definitions

Unless otherwise specified, the following definitions shall apply throughout the Code:

absorption refrigerating system	means a process by which refrigeration effect is produced through the use of two fluids and some quantity of heat input. In this system, a secondary fluid or absorbent, rather than a mechanical compressor, is used to circulate the refrigerant.
adjusted	means the volume for the storage of foodstuff corrected for the

volume	relative contribution to the total energy consumption according to the different temperatures of the storage compartments.
appliance	means refrigerating appliances in the Code.
cellar compartment	means a compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the fresh food storage compartment.
chill compartment	means a compartment intended specifically for the storage of highly perishable foodstuffs whose volume is capable of containing at least 2 "M" packages.
food freezer	means a refrigerating appliance having one or more compartments suitable for freezing foodstuffs from ambient temperature down to a temperature of -18^{o}C and which is also suitable for the storage of frozen food under three-star storage conditions.
food freezer compartment	means a compartment suitable for freezing foodstuffs from ambient temperature down to –18 ºC, and which is also suitable for the storage of frozen food under three-star storage conditions.
frozen food storage cabinet	means a refrigerating appliance having one or more compartments suitable for the storage of frozen food.
fresh food storage compartment	means a compartment intended for the storage of unfrozen food, which may itself be divided into sub-compartments.
frozen food storage compartment	means a low-temperature compartment intended specifically for the storage of frozen food. Frozen food storage compartments are classified according to temperature as shown in clause 4.
Government	means the Government of the Hong Kong Special Administrative Region.
IEC	means the International Electrotechnical Commission (the latest edition of the standard shall be followed).
ISO	means the International Organization for Standardization (the latest edition of the standard shall be used).

mains electricity	means the electricity supply at a voltage of 380/220 V and a frequency of 50 Hz in Hong Kong.
rated energy consumption	means the power input shown on the nameplate of the equipment.
rated freezing capacity	means the freezing capacity shown on the nameplate of the equipment.
rated storage volume	means the storage volume shown on the nameplate of the equipment.
refrigerating appliance	means a factory-assembled insulated cabinet with one or more compartments and of suitable volume and equipment for household use, cooled by internal natural convection or a frost-free system whereby the cooling is obtained by one or more energy-consuming means. It includes refrigerator, frozen food storage cabinet, food freezer, and their combinations.
refrigerator	means a refrigerating appliance intended for the preservation of food, one of whose compartments is suitable for the storage of fresh food.
refrigerator / freezer	means a refrigerating appliance having at least one compartment suitable for the storage of fresh food (the fresh food storage compartment) and at least one other (the food freezer compartment) suitable for the freezing of fresh food and the storage of frozen food under three-star storage conditions.
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.
vapour compression cycle	means the mechanism employed by refrigerating appliances throughout which the refrigerant undergoes alternate compression and expansion so that cooling function can be achieved.
"1-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in section 4, is not warmer than –6 ^{o}C.

"2-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in section 4, is not warmer than –12 ^{o}C.
"3-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in section 4, is not warmer than –18 ^{o} 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.

4 Appliance Classification

4.1 Basic Classification

All refrigerating appliances regulated under the mandatory EELS are categorised according to the following classification.

i) Climatic Class

Performance-wise the appliance shall be able to operate in extreme ambient temperatures of Hong Kong. The appliance is classified according to climatic working conditions. The climatic classification used in the Code follows the requirements of Climatic Class 'ST' of the ISO 5155, ISO 7371, ISO 8187 and ISO 8561 standards. In other words, the appliance shall be suitable for use in sub-tropical areas with indoor ambient temperature anywhere between +18 °C to +38 °C at the same time achieving the required performance. Table 1 is an extract from the ISO standards.

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 2A & 2B) ºC**
Extended temperate	SN	+10 to +32
Temperate	N	+16 to +32
Subtropical	ST	+18 to +38
Tropical	T	+18 to +43

ii) Frozen Food Compartment(s)

The appliance shall be classified according to its capability to freeze food, i.e. the performance of its frozen food compartment. 'Star' rating system shall be used to distinguish the operating temperature of individual storage compartment under loaded conditions. The storage temperature requirements stipulated in the ISO 5155, ISO 7371, ISO 8187 and ISO 8561 standards with reference to its category shall be used. Performance in this respect is denoted by the number of stars according to Tables 2A & 2B:

Table 2A – Storage Compartment Temperature

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

Values in ºC

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	≤ -6	≤ -12	≤ -18	≤ -18 with added freezing capacity [see 4.1(iii)

Table 2B – Storage Compartment Temperatures

- Applicable to appliances cooled by internal forced air circulation

Values in ºC

	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	≤ -6	≤ -12	≤ -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	≤ -6	≤ -12	≤ -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

A compartment, which meets the requirement of a "3-Star" compartment and has an added capability of freezing a certain amount of foodstuff (not less than 4.5 kg/100 litres volume, with a minimum of 2.0 kg) to -18 °C in 24 hours, is defined as a "4-Star" compartment.

4.2 Overall Appliance Classification

All appliances shall 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 ºC	**Frozen food compartment temp. in ºC**	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.*

5 Test Methodology & Standards

5.1 Measurement of Energy Consumption

The methodology for measuring energy consumption shall be based on ISO 5155, ISO 7371, ISO 8187 and ISO 8561, or other equivalent international standards approved by the Director. The specified international standards (ISOs) shall be referred to for actual performance requirements and procedural descriptions.

(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 refrigerators with or without low-temperature compartment not cooled by internal forced air circulation (i.e. Category 1)

(c) ISO 8187 applies to refrigerator-freezer not cooled by internal forced air circulation (i.e. Categories 2, 3, 4 and 5)

(d) ISO 8561 applies to frost-free refrigerating appliances – refrigerators, refrigerator-freezer, frozen food storage cabinets and food freezers cooled by internal forced air circulation.

5.1.2 Where contradiction between the definitions of the Code and the relevant standards exist, the definitions in the Code shall be followed.

5.2 Calculation of Adjusted Volume

The appliance volume in litres shall be measured in accordance with the ISO standards specified in clause 5.1 and shall be the sum of the volumes of the different compartments weighted by the difference in temperatures between the interior of the compartments and the ambient temperature. The adjusted volume V_{adj} is calculated as follows:

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

where V_i = the measured storage volume of an individual compartment

Ω = the weighting factor given by the following equation:

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

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

A summary of eight simple equations for calculating the adjusted volume of each appliance category is shown in Table 4.

Table 4 – Adjusted Volume (V_{adj}) calculation for all categories of the 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

**Note: These equations are used for those refrigerating appliances with fresh food compartment and frozen food compartment only. For the refrigerating appliances with additional chill compartment and/or cellar compartment, additional terms obtained by calculating equation 2 shall be added to these equations. For illustration, please refer to Appendix 1.*

Explanatory Note for Sample calculations:

To illustrate how Equation 6 is derived.

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: $V_{adj} = \Sigma V_i \times \Omega$.

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:

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

Since Temperature of a 3-Star compartment $T_i = T_{ffc} = -18$ ℃,
Temperature of a fresh food compartment $T_r = 5$ ℃

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]

5.3 Energy Efficiency Definition

5.3.1 In the Code, 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. 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.

5.3.2 The energy consumption test measures the energy consumption of the appliance in kWh/24 h. The annual energy consumption of the appliance is obtained by multiplying the kWh/24h figure by 365.

5.3.3 The energy efficiency of a refrigerating appliance is inversely related to the appliance energy efficiency ratio which is expressed in the unit of kWh/year/litre.

Appliance Energy Efficiency Ratio =

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

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

5.4 Average Appliance Energy Consumption

5.4.1 The Average Appliance Energy Consumption is a linear equation developed from equation (12) representing the average annual energy consumption with respect to the adjusted volume of appliances on sale in the market.

5.4.2 The Average Energy Consumption of an appliance shall be determined in accordance with Table 5.

Table 5 – Average Annual Appliance Energy Consumption

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

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

6 Energy Efficiency Grading

6.1 Energy Efficiency Indices (I_ε)

The energy efficiency index (I_ε) 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 corresponding average energy consumption equation). The indices are expressed in percentages. In other words, within a category, an appliance with a lower energy efficiency index (i.e. lower percentage) consumes less energy than an appliance with a higher energy efficiency index (i.e. higher percentage). The energy efficiency index is calculated as follows:-

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

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

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

6.2 Appliance Energy Efficiency Grading

6.2.1 The energy efficiency grading of an appliance shall be determined in accordance with Table 6. The method is to link the energy efficiency index (I ε) (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_ε (%)	Energy Efficiency Grade
$I_\varepsilon \leq 63$	1
$63 < I_\varepsilon \leq 80$	2
$80 < I_\varepsilon \leq 100$	3
$100 < I_\varepsilon \leq 125$	4
$125 < I_\varepsilon$	5

6.2.2 An example illustrating the method on how to determine the energy efficiency grade of an appliance is shown in Appendix 1.

6.2.3 A flow chart for developing the complete appliance energy efficiency grading is shown in Appendix 2.

7 Performance Requirements

7.1 The appliance shall be tested at a voltage of 380/220V and a frequency of 50Hz with tolerances as specified in the relevant ISO standards, and for conformity with all of the following performance requirements, where applicable, in accordance with the relevant clauses of ISO 5155, ISO 7371, ISO 8187 and ISO 8561 or other equivalent international standards approved by the Director:

7.1.1 Measurement of Storage Temperature

The measured storage temperatures of fresh food storage compartment, frozen food storage compartment, freezer compartment, chill compartment and cellar compartment, where applicable, shall comply with the requirements of Tables 2A and 2B.
(Note: This measurement test shall be carried out before the energy consumption test is performed.)

7.1.2 Measurement of Storage Volume

The measured storage volume for each of the fresh food storage compartment and the frozen food storage compartment shall not be less than the rated storage volume by more than 3% or 1 litre whichever is the greater value. Where the volumes of the cellar compartment and fresh food storage compartment are adjustable relative to one another by the user, this requirement applies when the cellar compartment is adjusted to its minimum volume.

7.1.3 Energy consumption test

The measured energy consumption value shall not be greater than the rated energy consumption by more than 15% of the latter.

7.1.4 Freezing test

(For only food freezer or refrigerating appliance having food freezer compartment)

The freezing capacity shall meet the requirements of at least 4.5 kg of test packages per 100-litre of its storage volume in 24-hour, and in no case less than 2 kg. The measured freezing capacity shall not be less than the rated freezing capacity by more than 15% of the latter.

7.2 In addition to the specific energy efficiency requirements, all appliances shall comply with the Electrical Products (Safety) Regulation of the HKSAR and the safety standards specified under the Regulation, and all other legislations concerning the safety of the appliance, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

8 Design and Format of Energy Label

The energy label for refrigerating appliance is shown in Appendix 3. After successful application for registration, the applicant (now the registration holder) shall print the energy label for his / her registered product model showing the agreed energy efficiency grade and associated information in strict accordance with the requirements as shown in Appendix 3.

Appendix 1

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.

	Volume (litre)	Weighting Factor Ω given by eq.2	Adjusted Volume (litre) *Vadj given by eq. 1*
Fresh food storage (V_r)	174	$\Omega_r = 1.00$	$V_r \times \Omega_r = 174$
Frozen food storage (V_{ffc})	100	$\Omega_{ffc} = 2.15$	$V_{ffc} \times \Omega_{ffc} = 215$
Chill storage (V_c)	67	$\Omega_c = 1.25$	$V_c \times \Omega_c = 83.75$
Total:	341		$\Sigma V \times \Omega = 472.75$

Annual Energy Consumption 456 kWh/year

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

$V_{adj} = \Sigma V \times \Omega = V_r \times \Omega r + V_{ffc} \times \Omega_{ffc} + V_c \times \Omega c$

$= 174 + 215 + 83.75$

$= 472.75$ litres

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

$= V_{adj} \times 0.777 + 303$

$= 472.75 \times 0.777 + 303$

$= 670.3$ kWh/year

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

Therefore, it is $1.35 \times 670.3 = 905$ kWh/year

Energy Efficiency Index of the appliance $I\varepsilon = \dfrac{\text{Annual Energy Consumption}}{\text{Average Annual Energy Consumption}}$

$$I\varepsilon = \frac{456}{905}$$

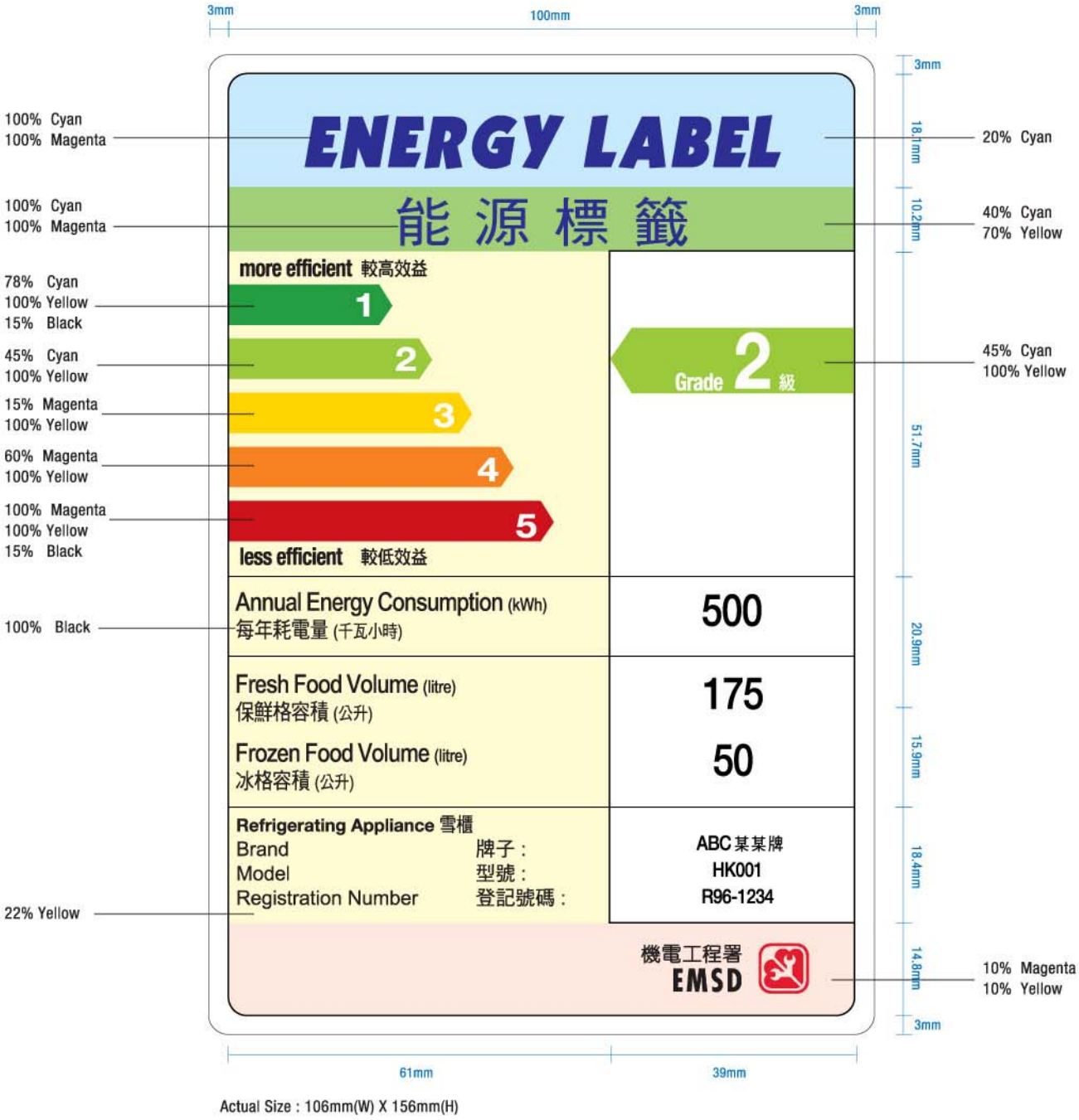
$$I\varepsilon = 50.4\ \%$$

$I\varepsilon < 63\ \%$

The value of energy efficiency index of the appliance is 50.4 % which is less than 63%. According to Table 6 in section 8, it shall be rated as **Grade 1** appliance.

Appendix 2

Energy Label Design and Format



Actual Size : 106mm(W) X 156mm(H)

The following notes define the information to be included in the energy label:

Annual energy consumption:	Measured energy consumption as defined in clause 5.3.2.
Fresh food volume:	Sum of net storage volume of all compartments that do not merit a star rating (i.e. operating temperature > -6^{o}C).
Frozen food volume:	Sum of net storage volume of all frozen food storage compartments which merit a star rating (i.e. operating temperature ≦ -6^{o}C).

DRAFT

Annex C of WTO Notification Document

Code of Practice
on
Compact Fluorescent Lamps

under
the Mandatory Energy
Efficiency Labelling Scheme

Electrical and Mechanical Services Department

DRAFT

Code of Practice on Compact Fluorescent Lamps

Table of Contents

DRAFT

Code of Practice on Compact Fluorescent Lamps

1 Introduction

1.1 The Government proposes to implement a mandatory energy efficiency labelling scheme (EELS) for specified electric appliances in Hong Kong. The compact fluorescent lamps (CFLs) will be included, amongst other products, in the initial phase of the mandatory EELS.

1.2 For the mandatory EELS, a "Grading Type" energy label will be adopted for CFLs.

1.3 New legislation will be introduced to implement the mandatory EELS. The Code of Practice on Compact Fluorescent Lamps (the Code) is to be issued under the new legislation.

1.4 The Code sets out the technical details for compliance with the labelling requirements for CFLs under the mandatory EELS, including the scope, appliance classification, test standards, energy efficiency grading, format of energy label and manner of labelling.

2 Scope

2.1 The mandatory EELS shall apply to electrically operated CFLs which –

(a) with a built-in control gear or with a separate control gear, use the mains electricity as the prime power source; and

(b) have a rated lamp wattage up to 60 watts.

2.2 The mandatory EELS shall not apply to cold cathode fluorescent lamps.

3 Definitions

Unless otherwise specified, the following definitions shall apply throughout the Code:

ageing period	means the time required for the initial burn-in of the lamp.
ballast	means a device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current, and wave form) for starting and operating.
CIE	means International Commission on Illumination. (the latest edition of the standard shall be followed)
cold cathode fluorescent lamp	means a type of lamps whose principle of illumination is same as that of conventional fluorescent lamps except that it does not require heating of electrode during starting and operating, and it operates at a much higher voltage and lower current to start and maintain the discharge.
compact fluorescent lamp	means any type of small diameter fluorescent lamp which has a single cap with or without built-in control gear for operation.
control gear	means all necessary electrical elements that are required for starting and maintaining stable operation of the lamp.
Government	means the Government of the Hong Kong Special Administrative Region.
IEC	means International Electrotechnical Commission. (the latest edition of the standard shall be followed)
integrated type CFL <u>with</u> built-in control gear	means a single integrated assembly of lamp, ballast, and lamp base or a two-part CFL that fits into a standard incandescent lamp socket.
life to 50% failures (average life)	means the length of time during which 50% of the compact fluorescent lamps reach the end of their individual lives.
lumen maintenance	means the luminous flux of a lamp at a given time in the rated average life of a lamp, including the initial operating hours, divided by the initial value of the luminous flux of the lamp and expressed as a percentage of the initial luminous flux.
luminous efficacy (lm/W)	means a ratio of luminous flux emitted by a lamp to the electrical power consumed by the lamp.
luminous flux (lm)	means a quantitative measure of light emitted by a light

	source. The quantity is derived from radiant flux (power in watts) by evaluating the radiation in accordance with the spectral sensitivity of the standard eye as described by the CIE Standard Photometric Observer.
mains electricity	means the electricity supply at a voltage of 380/220V and a frequency of 50Hz in Hong Kong.
non-integrated type CFL without built-in control gear	means a separate lamp that is electrically connected to a permanently-wired external ballast.
rated energy consumption	means the power input marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
rated frequency	means the frequency marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
rated life to 50% failures (rated average life)	means the life declared by the manufacturer as being the expected time at which 50% of any large number of lamps reach the end of their individual lives.
rated lumen maintenance	means the lumen maintenance marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
rated luminous flux	means the luminous flux marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
rated voltage	means the voltage marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
rated wattage	means the wattage marked on the lamp or declared as such by the manufacturer or responsible distributor for the lamp.
reference ballast	means special ballast that at its rated frequency it has a stable voltage/current ratio which is relatively uninfluenced by variations in current, temperature and magnetic surroundings.
two-part CFL	means a complete package that consists of a CFL and a lamp holder with an integrated ballast, both of which are manufactured by the same manufacturer, and tested, packaged for supply as a single entity.

4 Appliance Classification

4.1 CFLs shall be classified into the following two types, namely integrated type and non-integrated type, according to their configurations:

(a) integrated type with built-in control gear, which is either –

(i) a single integrated assembly consisting of lamp, ballast, and lamp base; or

(ii) a two-part CFL consisting of lamp(s) and a lamp holder with integrated ballast, both of which are manufactured by the same manufacturer, and tested and packaged for supply as a single entity.

(b) non-integrated type without built-in control gear, which is a separate lamp electrically connected to a permanently wired external ballast for operation.

5 Test Methodology & Standards

5.1 General

All test standards specified in the Code are only related to checking compliance with the energy efficiency and general performance requirements. It is not the intention of the Code to detail out the test standards and requirements for checking compliance with the Electrical Products (Safety) Regulation of the Government. The supplier shall conduct appropriate tests, where necessary, in addition to those specified in the Code in order to obtain Certificates of Safety Compliance for his appliances.

5.2 Test Standards - Safety Requirements

The testing standards for checking compliance with the safety requirements are based on the following standards or other equivalent international standards approved by the Director. For detailed requirements and procedural descriptions one shall refer to the respective standards.

(a) IEC 60968, Self-ballasted Lamps for General Lighting Services - Safety Requirements; and

(b) IEC 61199, Single-capped Fluorescent Lamps - Safety Specifications.

5.3 Test Standards - Technical Performances

5.3.1 The efficacy value (lumens/watt) is the major criterion to determine whether a lamp can meet the specific energy efficiency requirement specified in the Code.

5.3.2 The testing standards for measurement of electrical and photometric performances are based on the following standards or other equivalent international standards approved by the Director. For detailed requirements and procedural descriptions one shall refer to the respective standards.

(a) IEC 60969, Self-ballasted Lamps for General Lighting Services - Performance Requirements;

(b) IEC 60901, Single-capped Fluorescent Lamps - Performance Specifications; and

(c) CIE 84, The Measurement of Luminous Flux.

5.4 Test Conditions

5.4.1 The tests shall be carried out at a voltage of 380/220V and a frequency of 50Hz with tolerances as specified in the standards mentioned in Section 5.3 of the Code. During testing, the sample size for carrying out all the tests shall be at least 20.

5.4.2 For integrated type CFLs with built-in control gear, the test conditions shall be as follows:

(a) the selection, seasoning and stabilization of test lamps, and the test conditions shall be as described in Section 2 and Annex A of IEC 60969; and

(b) test lamps shall be tested in the base-up position.

5.4.3 For non-integrated type CFLs without built-in control gear, the test conditions shall be as follows:

(a) the selection, seasoning and stabilization of test lamps, and the test conditions shall be as described in Section 1 and Annex B of IEC 60901; and

(b) test lamps shall be tested either in base-up or horizontal mounted position.

5.5 Measurement of Lumen Output of Test Lamp

For all types of CFLs, lamp lumen output at the test conditions shall be measured in accordance with the requirements of CIE 84.

5.6 Measurement of Electrical Characterstics of Test Lamp

For all types of CFLs, the electrical characteristics measurement and procedures shall be as described in Section 1 and Annex B of IEC 60901 except that the provisions of IEC 60901 which refer to the operation of the lamp using a reference ballast do not apply to the testing of integrated type CFLs with built-in control gear.

5.7 Measurement of Lumen Maintenance and Lamp Life

For all types of CFLs, lumen maintenance and lamp life at the test conditions shall be measured in accordance with Section 2 and Annex A of IEC 60969.

5.8 Determination of Lamp Luminous Efficacy

Lamp luminous efficacy shall be determined by computing the ratio of the measured lamp lumen output and lamp electrical power input at equilibrium for the test conditions.

6 Energy Efficiency Grading

6.1 The mandatory EELS shall adopt the "Grading Type" energy label to determine the degree of energy efficiency for CFLs. The "Grading Type" energy label is divided into 5 grades. A CFL with a Grade 1 label means that it is the most energy efficient product in the market.

6.2 The luminous efficacy, average lamp life and lumen maintenance measured and obtained from the tests will be the key factors to classify the energy efficiency grading of CFLs. For grading of any CFL of a type as listed in Table 1 or Table 2, the corresponding minimum allowable luminous efficacy shall be as indicated in the Tables. In addition, for any CFL having Grade 1, 2, 3 or 4 label, the average lamp life shall not be less than 6,000 hours and the lumen maintenance at 2,000 hours shall not be less than 78%. Any CFL product with the average lamp life less than 6,000 hours, and/or the lumen maintenance at 2,000 hours less than 78%, can only obtain Grade 5 label.

Table 1 - Minimum Allowable Luminous Efficacy for Integrated Type CFLs <u>with</u> Built-in Control Gear

Rated Lamp Wattage (L_w)	Minimum Allowable Luminous Efficacy (Lumen/W)				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
	Note (1a)				Note (1b)
≦10W	≧49.5	49.5>X≧45.0	45.0>X≧40.5	< 40.5	N/A
11-20W	≧55.0	55.0>X≧50.0	50.0>X≧45.0	< 45.0	N/A
21-30W	≧60.5	60.5>X≧55.0	55.0>X≧49.5	< 49.5	N/A
≧31W	≧66.0	66.0>X≧60.0	60.0>X≧54.0	< 54.0	N/A

Note:

(1a) Average lamp life not less than 6,000 hours and lumen maintenance at 2,000 hours not less than 78%

(1b) Average lamp life less than 6,000 hours and/or lumen maintenance at 2,000 hours less than 78%

Table 2 - Minimum Allowable Luminous Efficacy for Non-integrated Type CFLs without Built-in Control Gear

Rated Lamp Wattage (L_w)	Minimum Allowable Luminous Efficacy (Lumen/W)				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
	Note (2a)				Note (2b)
≦10W	≧55.0	55.0>X≧50.0	50.0>X≧45.0	< 45.0	N/A
11-30W	≧71.5	71.5>X≧65.0	65.0>X≧58.5	< 58.5	N/A
≧31W	≧82.5	82.5>X≧75.0	75.0>X≧67.5	< 67.5	N/A

Note:

(2a) Average lamp life not less than 6,000 hours and lumen maintenance at 2,000 hours not less than 78%

(2b) Average lamp life less than 6,000 hours and/or lumen maintenance at 2,000 hours less than 78%

6.3 The aforesaid lamp luminous efficacy refers to values (both lumen output and electrical power input) measured at the end of the 100-hour ageing period.

6.4 Unless otherwise indicated, the requirements set forth in the Code shall apply to non-dimmable CFLs, and also to multi-level and/or dimmable CFLs that are operating at maximum power.

6.5 The luminous efficacy for an integrated type CFL with built-in control gear includes the lamp control gear loss.

6.6 The luminous efficacy for a non-integrated type CFL without built-in control gear excludes the lamp control gear loss.

7 Performance Requirements

7.1 The CFL shall be tested for conformity with the following performance requirements in accordance with the relevant clauses of CIE 84, IEC 60901 and IEC 60969 or other equivalent international standards approved by the Director:

(a) The measured energy consumption at the end of 100-hour ageing period shall not exceed 115% of the rated energy consumption.

(b) The measured lumen output (luminous flux) at the end of 100-hour ageing period shall be not less than 90% of the rated lumen output (luminous flux).

(c) The measured life to 50% failures (average life) shall not be less than the rated life to 50% failures (rated average life)

(d) The measured lumen maintenance shall not be less than the rated lumen maintenance.

7.2 In addition to the specific energy efficiency requirements, all CFLs shall comply with the Electrical Products (Safety) Regulation, and all other legislations concerning the safety of the CFLs.

8 Design and Format of Energy Label

8.1 The energy label for CFL is shown in Appendix 3. After successful application for registration, the applicant (now the registration holder) shall print the energy label for his / her registered product model showing the agreed energy efficiency grade and associated information in strict accordance with the requirements as shown in Appendix 3.

9 Manner of Labelling

9.1 The energy label shall be printed or affixed on product packaging at a prominent location.

9.2 The energy label as shown in Appendix 3 shall be appropriately chosen according to the following criteria:

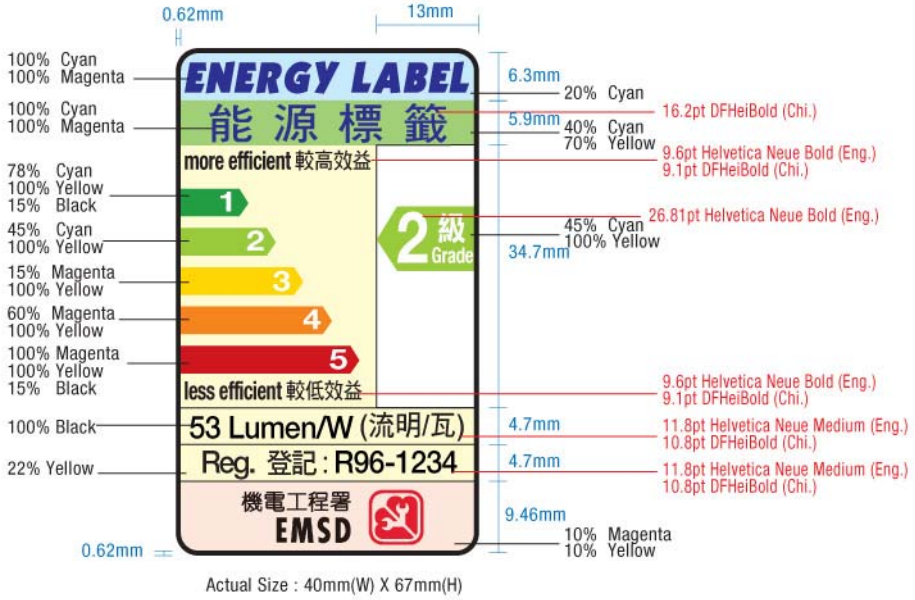
(a) The largest energy label shall first be chosen and checked on its compliance with all the requirements in this clause. If all the requirements in this clause cannot be met, then the second largest energy label shall be chosen. This selection process shall be iteratively carried out until an appropriate energy label is chosen.

(b) The energy label shall be contained in a blank border of at least 5mm and shall not cover more than 50% of the surface area of the largest side of the product packaging.

(c) In case that the packaging is too small to take the smallest energy label in Appendix 3, the registration holder shall apply for the Director’s approval for a special method on attaching the energy label to the product packaging.

Appendix 1

Energy Label Design and Format



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Appendix 1 (Cont'd)

Energy Label Design and Format

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