Code of Practice on Energy Labelling of Products 2020

Electrical and Mechanical Services Department
The Government of the Hong Kong Special Administrative Region

EMSD

History of Revision

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Initial Version	23 May 2008	N.A.
Rev. 1	10 March 2010	Inclusion of washing machines and dehumidifiers
Rev. 2	31 October 2014	Upgrading of energy efficiency standards for room air conditioners, refrigerating appliances and washing machines
Rev. 3	1 June 2018	- Inclusion of televisions, storage type electric water heaters and induction cookers - Revision of room air conditioners and washing machines
Rev. 4	31 December 2020	- Upgrading of energy efficiency standards for single package type room air conditioners, compact fluorescent lamps and dehumidifiers - Revision of Appendices 6A and 7A

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1. Introduction

1.1. This Code of Practice on Energy Labelling of Products 2020 is approved and issued under section 42 of the Energy Efficiency (Labelling of Products) Ordinance, Chapter 598, (cited as the "Ordinance") and is hereinafter referred to as the "Code".

1.2. The Code sets out the practical guidance and technical details in respect of the requirements on energy efficiency labelling for room air conditioners, refrigerating appliances, compact fluorescent lamps, washing machines, dehumidifiers, televisions, storage type electric water heaters and induction cookers under the Ordinance.

1.3. This version of the Code contains new calculation methods of the energy efficiency grading of single package type room air conditioners, compact fluorescent lamps, and dehumidifiers which takes effect on 31 December 2020. The energy labels of these three products supplied on or after 31 December 2021 shall conform with this version of Code.

1.4. For details of the transitional arrangement, please refer to the relevant notice (English version only) on the Energy Label Net (https://www.emsd.gov.hk/energylabel/en/cop.html).

1.5. The Code may be reviewed and updated on a regular basis by appropriate notices to cope with technological advancement or the latest development of international/national standards (if applicable).

1.6. The Electrical and Mechanical Services Department of the Government of the Hong Kong Special Administrative Region (HKSAR) thanks:

(a) the International Organization for Standardization (ISO) for permission to reproduce information from its International Standard ISO 5151: 2017 and ISO 16358-1:2013. The text taken from ISO 5151: 2017, Non-ducted air conditioners and heat pumps – Testing and rating for performance, ISO 16358-1 Air-cooled air conditioners and air-to-air heat pumps – Testing and calculating methods for seasonal performance factors – Part 1: Cooling seasonal performance factor and ISO 16358-2:2013 Air-cooled air conditioners and air-to-air heat pumps – Testing and calculating methods for seasonal performance factors – Part 2: Heating seasonal performance factor, is reproduced with the permission of the International Organization for Standardization, ISO. These standards can be obtained from any ISO member and from the website of the ISO Central Secretariat at the following address: www.iso.org. Copyright remains with ISO.

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(g) the Guobiao (GB) Standards as GB 21456:2014 is quoted.

2. Interpretation of Terms

This clause provides definitions of terms used in the Code. Unless otherwise specified, the definitions adopted in the Code follow those stipulated in the Ordinance, if any.

Director	means the Director of Electrical and Mechanical Services.
disposition	in relation to any specified premises, includes a sale of, a lease of, and a licence and permission to occupy the specified premises.
family of models	means a range of models of a prescribed product where in each model— (a) the physical characteristics that affect the energy efficiency are the same; and (b) the output, energy consumption, energy efficiency and performance characteristics are the same.

listed model	in relation to a product model, means a model the reference number of which is included in the record kept under section 14 of the Ordinance.
mains electricity	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50 Hz.
prescribed product	means a product specified in Part 1 of Schedule 1 of the Ordinance (that is, the products specified in clauses 7.1, 8.1, 9.1, 10.1, 11.1, 12.1, 13.1 and 14.1 of the Code).
reference number	means a number assigned to a product model by the Director under section 8 of the Ordinance.
second-hand product	means a prescribed product that has previously been used by a consumer.
specified document	means a document within the meaning of section 6 of the Ordinance.
specified information	means the information within the meaning of section 6 of the Ordinance.
specified person	in relation to a product model, means a person who has submitted the specified information in respect of the model under section 6 of the Ordinance.
specified premises	means newly completed premises, whether domestic or not— (a) subject to paragraph (b), the first disposition of which has not been made; or (b) if the first occupation of which is made before the first disposition, the first occupation of which has not been made.
supply	in relation to the supply of a prescribed product, means— (a) to sell or hire out the prescribed product; (b) to offer, keep or exhibit the prescribed product or any part of the product for sale or for hiring out; (c) to exchange or dispose of the prescribed product for consideration;

(d) to transmit, convey or deliver the prescribed product in pursuance of—

(i) a sale;

(ii) a hiring out; or

(iii) an exchange or disposal for consideration; or

(e) for commercial purposes, to give the prescribed product as a prize or to make a gift of such a product.

3. Application

3.1. Subject to clause 3.2 of the Code, this Code applies to a prescribed product that is supplied in Hong Kong, including a prescribed product supplied as part of or in connection with the disposition of any specified premises.

3.2. This Code does not apply to a prescribed product that is—

(a) under trans-shipment or in transit through Hong Kong;

(b) manufactured in Hong Kong for export;

(c) supplied as scrap;

(d) supplied in a place other than Hong Kong under a sale agreement which is entered into in Hong Kong;

(e) a second-hand product; or

(f) supplied as part of or in connection with the disposition of any premises other than specified premises.

4. Requirements on Testing Laboratory

4.1. When a specified person submits the specified information and specified documents under section 6 of the Ordinance, the Director will accept the test reports issued by a testing laboratory which meets any one of the following criteria:

(a) The laboratory is accredited—

(i) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) operated by the Hong Kong Accreditation Service (HKAS) for the relevant test;

(ii) under an accreditation scheme operated by a laboratory accreditation body in other economies with which HKAS has concluded a mutual recognition arrangement (MRA) for the relevant test;

(b) The laboratory has been assessed and evaluated by a recognized independent certification body, and is certified by the certification body to be competent for carrying out the relevant test; or

(c) The laboratory has been assessed and recognized by the Director under the voluntary energy efficiency labelling scheme for conducting the relevant test, and is certified under ISO 9001 or equivalent standards for quality system.

4.2. The recognized independent certification body mentioned in clause 4.1(b) shall meet the following minimum requirements—

(a) Being recognized internationally to be competent for certifying product energy efficiency performance tests;

(b) Having experience in assessing and certifying the relevant energy efficiency performance tests; and

(c) Having well established assessment procedures, including staff training and assessment criteria, relating to assessment and certification of energy efficiency performance tests.

4.3. When the specified information and specified documents are submitted under section 6 of the Ordinance, necessary supporting documents shall be submitted to prove that the testing laboratory and/or the independent certification body concerned meet the requirements in clauses 4.1 and 4.2.

5. Requirements on Test Report

5.1. The test report to be submitted under section 6 of the Ordinance shall be issued by a testing laboratory which satisfies the requirements as stipulated in clause 4 of the Code.

5.2. The test report shall contain at least the following information—

(a) the name, address and particulars of the testing laboratory that carried out the test;

(b) the date of the test and the report;

(c) the name and designation of the test supervisor;

(d) the test objective;

(e) the testing standards adopted;

(f) the information given on the nameplate of the product;

(g) a description of the tests carried out, the test requirements and procedures as specified in the Code;

(h) the energy efficiency and performance characteristics of the product model as measured by the tests;

(i) the test data and results showing that the product model being tested conforms with the relevant standard; and

(j) other results of the test.

5.3. The test shall be carried out to the standards as specified in the Code for the product type concerned.

5.4. The test report shall be endorsed and signed by the test supervisor of the testing laboratory.

5.5. The test report submitted in connection with the submission of specified information and specified documents shall be either the original copy or a certified true copy.

6. Duty of Specified Person and Enforcement of the Ordinance

6.1. In accordance with section 9(1) of the Ordinance, a specified person shall, within 21 days after any change in the information submitted to the Director under section 6 occurs, notify the Director in writing of the change. Also in accordance with section 9(2), if, after a specified person has submitted the specified information and specified documents in respect of a product model ("first-mentioned model") under section 6, the model has been modified ("modified model") to such an extent that its energy efficiency and performance characteristics differ from those submitted, sections 4, 5, 6, 7 and 8 apply to the modified model from the date of modification, as if it were a new model different from the first-mentioned model, and the specified person is to obtain a new reference number for the modified model.

6.2. In accordance with section 10 of the Ordinance, a specified person who has submitted the specified information in respect of a product model under section 6 of the Ordinance shall submit to the Director up-to-date information at intervals not exceeding 5 years from the date of last submission in the specified form. The information shall include (a) the reference number of the model; (b) the particulars of the model; (c) whether the specified person still supplies the model in Hong Kong; and (d) whether the model has been modified, and if so, whether the modification changes the energy efficiency and performance characteristics of the models. The Director, after receiving the information

under section 9(1) of the Ordinance, shall make such amendment in the record as he considers necessary to record the changes. If a specified person has notified to the Director that he no longer supplies a listed model in Hong Kong, this clause cease to apply to that person in respect of that model after the notification.

6.3. In accordance with section 11(1) of the Ordinance, after a reference number has been assigned to a product model in the name of a specified person, the specified person shall ensure that the prescribed products of the listed model conform with the specified information and specified documents, or their updates if any, submitted to the Director. Also in accordance with sections 11(2) and (3) of the Ordinance, the specified person shall ensure that the information set out on an energy label conforms with the specified information, or their updates if any, submitted to the Director, and the specified person shall not engage in any conduct that deceives or misleads others as to the energy efficiency or performance characteristics of the listed model.

6.4. In order to check that the requirement under section 11(1) of the Ordinance is complied with, the Director will routinely select samples of listed models for compliance monitoring testing by independent accredited laboratories, and the Government will bear the cost of such tests. If the Director has reasonable grounds to suspect that a prescribed product does not conform with the test results submitted to the Director, the Director may under section 28 of the Ordinance require the specified person to cause the product to be tested in such manner as the Director specifies and to bear the cost of testing. The Director will also carry out routine inspections to outlets of prescribed products to check that the requirements under sections 11(2) and (3) are complied with.

6.5. Under the Ordinance, the Director may also take other enforcement actions, including serving improvement notices or prohibition notices, or removing the reference number of a listed model from the record, if the relevant requirements in the Ordinance are not complied with.

6.6. If a person is aggrieved by the Director's decision to refuse to assign a reference number or by the enforcement actions mentioned in clause 6.5 above, he may appeal to the appeal board under the Ordinance. An appeal does not suspend the Director's decision/direction that is under appeal unless he decides otherwise. The Director will take into account the relevant factors such as the nature of the contravention, impact of the non-compliance on the public and any new information that was not made known to the Director before etc., when deciding whether or not to suspend his decision/direction.

7. Energy Efficiency Labelling for Room Air Conditioners

7.1. Scope

7.1.1. Clause 7 of the Code, unless the Director provides otherwise, applies to a room air conditioner defined in the Ordinance, that is, the products specified in clauses 7.1.2 and 7.1.3.

7.1.2. "Room air conditioner", subject to clause 7.1.3 of the Code, means a product—

(a) that is an encased assembly or encased assemblies that are designed to be used together where—

(i) the assembly or assemblies is or are designed primarily to provide free delivery of conditioned air to an enclosed space, room or zone ("conditioned space"); and

(ii) the assembly or assemblies has or have a prime source of refrigeration for cooling or heating; and

(b) that is of single package type or split type, and —

(i) uses mains electricity as the only power source;

(ii) operates by using the vapour compression cycle;

(iii) is non-ducted;

(iv) is air-cooled or air-heated (or both);

(v) is of either cooling only type or reverse cycle type; and

(vi) has a rated cooling capacity not exceeding 7.5 kilowatts.

7.1.3. "Room air conditioner" does not include air-conditioners that are—

(a) fan-coil air-conditioning units;

(b) water-cooled units;

(ba) water-heated 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-mounted type or floor standing type air conditioners.

7.2. Definitions

This clause provides definitions of terms used in clause 7 of the Code. Unless otherwise specified, the definitions adopted in clause 7 follow those stipulated in the Ordinance, if any.

air-cooled	in relation to a room air conditioner, means the employment of air-cooled condensers in the room air conditioner.
air-heated	in relation to a room air conditioner, means the employment of air-heated evaporators in the room air conditioner.
ceiling-mounted type air conditioner	means a split type room air conditioner whose indoor unit— (a) is equipped with mounting brackets or hooks on its body at appropriate locations; (b) is intended to be installed with mounting rods or mounting bolts fastened on the ceiling in accordance with the manufacturer's installation procedures; (c) is intended to be installed directly under the ceiling; and (d) has an intake grille, which may or may not be installed at the same level as the adjacent false ceiling panels (if there are such false ceiling panels).
cooling capacity	means the amount of sensible and latent heat that a room air conditioner can remove from the conditioned space in a defined interval of time.
cooling only type	means a room air conditioner which is used for cooling, but not for heating.

cooling seasonal total load (CSTL)	means the total annual amount of heat that is removed from the indoor air when the equipment is operated for cooling in active mode.
cooling seasonal energy consumption (CSEC)	means the total annual amount of energy consumed by the equipment when it is operated for cooling in active mode.
cooling seasonal performance factor (CSPF)	means the ratio of the total annual amount of heat that the equipment can remove from the indoor air when operated for cooling in active mode to the total annual amount of energy consumed by the equipment during the same period.
effective power input (P_E)	means the average electrical power input to the room air conditioner obtained from— (a) the power input from the compressor(s) (b) the power input to electric heating devices used only for defrosting, (c) the power input to all control and safety devices of the room air conditioner, and (d) the power input for operation of all fans Note: This is expressed in units of watts.
fan-coil air-conditioning unit	means an air-conditioning unit equipped with a fan re-circulating air from the conditioned space through the coil, that contains either chilled or hot water for cooling or heating.
fixed capacity type room air conditioner	means a room air conditioner which does not have possibility to change its capacity.
floor standing type air conditioner	means a split type room air conditioner whose indoor unit is intended to be installed directly on the floor in accordance with the manufacturer's installation procedures.

heat pump	means an encased assembly or assemblies designed as a unit to provide delivery of heat, which includes an electrically operated refrigeration system for heating.
heating capacity	means the amount of sensible and latent heat that a room air conditioner can add to the conditioned space in a defined interval of time.
heating seasonal energy consumption (HSEC)	means the total annual amount of energy consumed by the equipment when it is operated for heating in active mode.
heating seasonal total load (HSTL)	means the total annual amount of heat that is added to the indoor air when the equipment is operated for heating in active mode.
heating seasonal performance factor (HSPF)	means the ratio of the total annual amount of heat that the equipment can add to the indoor air when operated for heating in active mode to the total annual amount of energy consumed by the equipment during the same period.
ISO	means International Organization for Standardization (the latest edition of the standard shall be followed for test methodology).
multiple split-system	means a split system that— (a) incorporates a single or multiple refrigerant circuits; (b) has one or more compressors; (c) has multiple indoor units; (d) has one or more outdoor units; and (e) is capable of operating either as an air conditioner or a heat pump.
multi-stage capacity type room air conditioner	means a room air conditioner where the capacity is varied by three or four steps.

non-ducted	means not having any additional ductings or pipes required for air intake and exhaust.
non-fixed capacity type room air conditioner	means a room air conditioner which has possibility to change its capacity.
rated cooling capacity	means the cooling capacity of a room air conditioner as determined and declared by the manufacturer or importer of the room air conditioner in accordance with the standard and requirements specified in the Code.
rated heating capacity	means the heating capacity of a room air conditioner as determined and declared by the manufacturer or importer of the room air conditioner in accordance with the standard and requirements specified in the Code.
rated power consumption	means the power input of a room air conditioner as determined and declared by the manufacturer or importer of the room air conditioner in accordance with the standard and requirements specified in the Code.
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 a room air conditioner which can operate in normal or reverse vapour compression cycle, used for both cooling and heating.
single package type	means a room air conditioner which consists of components of a refrigeration system fixed on a common mounting to form a discrete unit.
split type	means a room air conditioner which has separate indoor and outdoor components that are connected with the refrigerant piping, and the indoor unit of which usually lies within the conditioned space.

two-stage capacity type room air conditioner	means a room air conditioner where the capacity is varied by two steps.
variable capacity type room air conditioner	means a room air conditioner where the capacity is varied by five or more steps to represent continuously variable capacity.
water-cooled	in relation to a room air conditioner, means the employment of water-cooled condensers in the room air conditioner.
water-heated	in relation to a room air conditioner, means the employment of water-heated evaporators in the room air conditioner.
vapour compression cycle	means a mechanism employed by a room air conditioner throughout which the refrigerant undergoes alternate compression and expansion to achieve the cooling or heating function.

7.3. Classification of Room Air Conditioners

All room air conditioners regulated under the Ordinance are classified in accordance with Table 7.1—

Table 7.1 – 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

For all categories of room air conditioner, room air conditioner is further classified into four types, they are namely fixed capacity type room air conditioner, two-stage capacity type room air conditioner, multi-stage capacity type room air conditioner, and variable capacity type.

7.4. Tests Required to be Carried Out

The tests specified below are required to be carried out, in accordance with ISO 5151, ISO 16358-1, ISO 16358-2 or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a room air conditioner. The accuracy of the instruments used for tests shall conform to the test methods and uncertainties of measurements specified in ISO 5151.

(a) Cooling capacity tests required to be carried out are shown in Table 7.2.

(b) Heating capacity tests required to be carried out for room air conditioners of reverse cycle type are shown in Table 7.3.

(c) Maximum cooling performance test.

(d) Maximum heating performance test for room air conditioners of reverse cycle type.

Any test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

Table 7.2 – Cooling performance test required to be carried out, test conditions and default values

Test	Characteristics	Fixed	Two-stage	Multi-stage	Variable
Standard cooling capacity Indoor DB 27°C WB 19°C Outdoor DB 35°C WB 24°C	Full capacity $\phi_{ful}(35)$ (W)	Test Required	Test Required	Test Required	Test Required
	Full power input $P_{ful}(35)$ (W)				
	Half capacity $\phi_{haf}(35)$ (W)	---	---	*Note 1*	Test Required
	Half power input $P_{haf}(35)$ (W)				
	Minimum capacity $\phi_{min}(35)$ (W)	---	*Note 1*	---	---
	Minimum power input $P_{min}(35)$ (W)				
Low temp. cooling capacity Indoor DB 27°C WB 19°C Outdoor DB 29°C WB 24°C	Full capacity $\phi_{ful}(29)$ (W)	*Note 1*	*Note 1*	*Note 1*	*Note 1*
	Full power input $P_{ful}(29)$ (W)				
	Half capacity $\phi_{haf}(29)$ (W)	---	---	Test Required	*Note 1*
	Half power input $P_{haf}(29)$ (W)				
	Minimum capacity $\phi_{min}(29)$ (W)	---	Test Required	---	---
	Minimum power input $P_{min}(29)$ (W)				

Note 1: Default values shall be used: $\phi_{ful}(35) = \phi_{ful}(29)/1.077$, $P_{ful}(35) = P_{ful}(29)/0.914$
$\phi_{haf}(35) = \phi_{haf}(29)/1.077$, $P_{haf}(35) = P_{haf}(29)/0.914$
$\phi_{min}(35) = \phi_{min}(29)/1.077$, $P_{min}(35) = P_{min}(29)/0.914$

Note 2: Default value of degradation coefficient: $C_D = 0.25$

Table 7.3 – Heating performance test required to be carried out, test conditions and default values for room air conditioners of reverse cycle type

Test	Characteristics	Fixed	Two-stage	Multi-stage	Variable
Standard heating capacity Indoor DB 20°C WB 15°C Max. Outdoor DB 7°C WB 6°C	Full capacity $\phi_{ful}(7)$ (W)	*Test Required*	*Test Required*	*Test Required*	*Test Required*
	Full power input $P_{ful}(7)$ (W)				
	Half capacity $\phi_{haf}(7)$ (W)	---	---	*Test Required*	*Test Required*
	Half power input $P_{haf}(7)$ (W)				
	Minimum capacity $\phi_{min}(7)$ (W)	---	*Test Required*	----	---
	Minimum power input $P_{min}(7)$ (W)				
Low temp. heating capacity Indoor DB 20°C WB 15°C Max. Outdoor DB 2°C WB 1°C	Full capacity $\phi_{ful,f}(2)$ (W)	*Note 1*	*Note 1*	*Note 1*	*Note 1*
	Full power input $P_{ful,f}(2)$ (W)				
	Half capacity $\phi_{haf,f}(2)$ (W)	---	---	*Note 1*	*Note 1*
	Half power input $P_{haf,f}(2)$ (W)				
	Minimum capacity $\phi_{min,f}(2)$ (W)	---	*Note 1*	---	---
	Minimum power input $P_{min,f}$ (2) (W)				

Note 1: Default values shall be used: $\phi_{ful,f}(2) = \phi_{ful}(2)/1.12$, $P_{ful,f}(2) = P_{ful}(2)/1.06$

$\phi_{haf,f}(2) = \phi_{haf}(2)/1.12$, $P_{haf,f}(2) = P_{haf}(2)/1.06$

$\phi_{min.f}(2) = \phi_{min}(2)/1.12$, $P_{min,f}(2) = P_{min}(2)/1.06$

Note 2: The following two equations apply to the full capacity, half capacity and minimum capacity when $\phi_{x,f}(2)$ and $P_{x,f}(2)$ are calculated:

$$\phi_x(2) = \phi_x(-7) + \frac{\phi_x(7)-\phi_x(-7)}{7-(-7)} \times (2-(-7)), \qquad P_x(2) = P_x(-7) + \frac{P_x(7)-P_x(-7)}{7-(-7)} \times (2-(-7))$$

Note 3: Default value of degradation coefficient: $C_D = 0.25$

7.5. Test Methodology

7.5.1. Standard Cooling Capacity Tests and Heating Capacity Tests

The standard cooling capacity tests and heating capacity tests, if applicable, shall be conducted in accordance with Annex A of ISO 5151. The cooling capacity and its corresponding effective power input shall be measured during the standard cooling capacity tests whereas the heating capacity and its corresponding effective power input shall be measured during the heating capacity tests.

The cooling full capacity test and heating full capacity test shall be conducted at full load operating conditions.

The cooling half capacity test, if required, shall be conducted at 50 % of full load operation. The test tolerance shall be ± 5 % of the tested full load capacity for continuously variable room air conditioner.

The heating half capacity test, if required, shall be conducted at 50% of full load operation. The test tolerance shall be ± 5 % of the tested full load capacity for continuously variable room air conditioner.

For multi-stage room air conditioner, if 50% heating capacity is not achievable, then the test shall be conducted at the next step above 50%.

For two stage room air conditioner, the heating minimum capacity test shall be conducted at the lowest capacity control setting which allows steady-state operation of the room air conditioner at the given test conditions.

The method of fixing the capacity shall be clearly indicated in the test report.

7.5.2. Low Temperature Cooling Capacity Tests

The low temperature cooling capacity test, if required, shall be conducted in accordance with Annex A of ISO 5151.

For multi-stage room air conditioner, the cooling half capacity test shall be conducted at 50 % of full load operation. If 50 % capacity is not achievable, then the tests shall be conducted at the next step above 50 %.

For two stage room air conditioner, the cooling minimum capacity test shall be conducted at the lowest capacity control setting which allows steady-state operation of the room air conditioner at the given test conditions.

The method of fixing the capacity shall be clearly indicated in the test report.

7.5.3. Measurement of Cooling Capacity, Heating Capacity and Power Consumption

The test conditions and the testing methodology for measurement of cooling capacity, heating capacity and power consumption shall follow ISO 5151, ISO 16358-1, ISO 16358-2 or other equivalent international standards approved by the Director. The room air conditioner shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified in the standard. The power consumption shall be measured correspondingly when the output is fixed at specific cooling capacity or heating capacity.

The measured cooling capacity of the room air conditioner 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 measured heating capacity of the room air conditioner shall be calculated based on the mean of the measured values taken over the test period from the heating 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).

The measured power consumption of the room air conditioner shall be measured during the cooling and heating capacity tests as described in ISO 5151 or other equivalent international standards approved by the Director. This is the effective power input to the room air conditioner taken over the test period from the cooling capacity test and heating capacity tests, in watts (W), or in kilowatts (kW).

7.5.4. Maximum Cooling Performance and Heating Performance Tests

The maximum cooling performance test shall be conducted in accordance with the test methodology and performance requirements as specified in clause 5.2 of ISO 5151. The maximum heating performance test shall be conducted for room air conditioners of reverse cycle type in accordance with the test methodology and performance requirements as specified in clause 6.2 of ISO 5151.

7.6. Determination of Energy Efficiency Grading

7.6.1. Cooling Seasonal Performance Factor (CSPF) and Heating Seasonal Performance Factor (HSPF)

The cooling seasonal performance factor (CSPF), F_{CSP}, of the room air conditioner shall be calculated as follows –

$$F_{CSP} = \frac{L_{CST}}{C_{CSE}} \quad \text{…..……..(eq. 1)}$$

where L_{CST} is the cooling seasonal total load (CSTL) to be calculated in accordance with ISO 16358-1 (Unit: Wh) using the defined cooling load and the outdoor temperature bin distribution specified in Table 7.4 and Table 7.6 of the Code respectively.

C_{CSE} is the cooling seasonal energy consumption (CSEC) to be calculated in accordance with ISO 16358-1 (Unit: Wh) using the defined cooling load and the outdoor temperature bin distribution specified in Table 7.4 and Table 7.6 of the Code respectively.

The cooling seasonal performance factor shall be calculated based on the measurement results and default values as specified in Table 7.2. Data from other sources are not allowed for use in the calculation.

The heating seasonal performance factor (HSPF), F_{HSP} of the room air conditioner of reverse cycle type shall be calculated as follows –

$$F_{HSP} = \frac{L_{HST}}{C_{HSE}} \quad \text{…..……..(eq. 2)}$$

where L_{HST} is the heating seasonal total load (HSTL) to be calculated in accordance with ISO 16358-2 (Unit: Wh) using the defined heating load and the outdoor temperature bin distribution specified in Table 7.5 and Table 7.7 of the Code respectively.

C_{HSE} is the heating seasonal energy consumption (HSEC) to be calculated in accordance with ISO 16358-2 (Unit: Wh) using the defined heating load and the outdoor temperature bin distribution specified in Table 7.5 and Table 7.7 of the Code respectively.

The heating seasonal performance factor shall be calculated based on the measurement results and default values as specified in Table 7.3. Data from other sources are not allowed for use in the calculation.

7.6.2. Cooling Load and Heating Load

The defined cooling load is assumed linearly changing depending on the change in outdoor temperature as shown in Table 7.4.

Table 7.4 – Defined cooling load

Parameter	Load zero (0)	Load 100%
Cooling load (W)	0	$\phi_{ful}(t_{100})$
Outdoor Temperature (°C)	t_0 = 23°C	t_{100} = 35°C

where $\phi_{ful}(t_{100})$ is the cooling capacity at t_{100} at full load operation condition.

t_{100} is the outdoor temperature at 100 % load and t_0 is the outdoor temperature at 0 % load.

The defined heating load is assumed linearly changing depending on the change in outdoor temperature as shown in Table 7.5.

Table 7.5 – Defined heating load

Parameter	Load zero (0)	Load 100%
Heating load (W)	0	$\phi_{ful}(t_{100})$
Outdoor Temperature (°C)	t_0 = 17°C	t_{100} = 0°C

where $\phi_{ful}(t_{100})$ is the heating capacity at t_{100} at full load operation condition, where

$\phi_{ful}(t_{100})$ = 0.82 x $\phi_{ful}(7)$

t_{100} is the outdoor temperature at 100 % load and t_0 is the outdoor temperature at 0 % load.

7.6.3. Outdoor Temperature Bin Distribution for Cooling and Heating

The cooling seasonal performance factor (CSPF) shall be calculated at outdoor temperature bin distribution shown in Table 7.6.

Table 7.6 – Outdoor temperature bin distribution for cooling

Bin no. j	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Outdoor temperature t_j (°C)	24	25	26	27	28	29	30	31	32	33	34	35	36	---
Bin hours n_j (hour)	67	117	147	177	210	183	114	75	56	33	15	5	1	1200

The heating seasonal performance factor (HSPF) shall be calculated at outdoor temperature bin distribution shown in Table 7.7.

Table 7.7 – Outdoor temperature bin distribution for heating

Bin no. j	1	2	3	4	5	6	7	8	9	10	11	12	Total
Outdoor temperature t_j (°C)	5	6	7	8	9	10	11	12	13	14	15	16	---
Bin hours n_j (hour)	0	1	4	6	11	15	19	24	29	38	44	49	240

7.6.4. Energy Efficiency Grading

The energy efficiency grade for cooling performance of the room air conditioner shall be determined as shown in Table 7.8, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 7.8 – Derivation of energy efficiency grades for cooling performance

Cooling Seasonal Performance Factor (CSPF), F_{CSP}	**Energy Efficiency Grade for Cooling Performance** *(Note)*
Categories 1 - 4	
$4.50 \leq F_{CSP}$	1
$3.50 \leq F_{CSP} < 4.50$	2
$3.15 \leq F_{CSP} < 3.50$	3
$2.80 \leq F_{CSP} < 3.15$	4
$F_{CSP} < 2.80$	5

Note:

In order to obtain Grade 1 to 4 for cooling performance, the room air conditioner

concerned shall also pass the maximum cooling performance test. Only Grade 5 will be accorded if the room air conditioner does not pass the maximum cooling performance test; or the $F_{CSP} < 2.80$.

The energy efficiency grade for heating performance of the room air conditioner of reverse cycle type shall be determined as shown in Table 7.9, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 7.9 – Derivation of energy efficiency grades for heating performance

Heating Seasonal Performance Factor (HSPF), F_{HSP}	**Energy Efficiency Grade for Heating Performance** *(Note)*
Categories 2 and 4	
$3.60 \leq F_{HSP}$	1
$3.10 \leq F_{HSP} < 3.60$	2
$2.80 \leq F_{HSP} < 3.10$	3
$2.50 \leq F_{HSP} < 2.80$	4
$F_{HSP} < 2.50$	5

Note:
In order to obtain Grade 1 to 4 for heating performance, the room air conditioner of reverse cycle type concerned shall also pass the maximum heating performance test. Only Grade 5 for heating will be accorded if the room air conditioner of reverse cycle type does not pass the maximum heating performance test; or the $F_{HSP} < 2.50$.

Examples illustrating the method on how to determine the energy efficiency grade of room air conditioner are shown in Appendix 1A.

7.7. Performance Requirements

7.7.1 In the test report submitted to the Director under section 6 of the Ordinance, the results of the tests carried out in accordance with the relevant clauses of ISO 5151, ISO 16358-1, ISO 16358-2 or other equivalent international standards approved by the Director shall show that the concerned model conforms with the following performance requirements—

(a) The measured cooling capacity $\phi_{ful}(35)$ from cooling full capacity test at standard cooling condition (T1 climate) 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 room air conditioner. The measured heating capacity $\phi_{ful}(7)$ from heating full

capacity test at standard heating condition (H1 climate) for reverse cycle type room air conditioners shall not be less than 95% of the rated heating capacity of the room air conditioner.

(b) The measured power consumption $P_{ful}(35)$ from cooling full capacity test at standard cooling condition (T1 climate) shall not be greater than 110% of the rated power consumption for both cooling only type and reverse cycle type of the room air conditioner. The measured power consumption $P_{ful}(7)$ from heating full capacity test at standard heating condition (H1 climate) shall not be greater than 110% of the rated power consumption of the reverse cycle type room air conditioner.

(c) The calculated cooling seasonal performance factor shall not be less than 92% of the rated cooling seasonal performance factor for both cooling only type and reverse cycle type of room air conditioners. The calculated heating seasonal performance factor shall not be less than 92% of the rated heating seasonal performance factor for reverse cycle type room air conditioners.

(d) The cooling only type and reverse cycle room air conditioners shall pass the maximum cooling performance test. Any room air conditioner failing the maximum cooling performance test can only obtain Grade 5 for its cooling function. The reverse cycle type room air conditioner shall also pass the maximum heating performance test. Any reverse cycle type room air conditioner failing the maximum heating performance test can only obtain Grade 5 for its heating function.

7.7.2 The rated cooling and heating capacities, rated power consumptions and rated cooling and heating seasonal performance factors as declared by the manufacturer or importer shall meet the requirements specified in clause 7.7.1 of the Code.

7.8. Safety Requirements

In addition to the energy efficiency performance requirements, all room air conditioners shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the room air conditioners, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

7.9. Number of Samples to be Tested

7.9.1 For submission of product information of a model under section 6 of the Ordinance, subject to clause 7.9.2 of the Code, a test report on one sample of the model shall be submitted.

7.9.2 However, if the test results of one sample indicate that the measured cooling capacity $\phi_{ful}(35)$ from cooling full capacity test at standard cooling condition (T1 climate) or measured heating capacity $\phi_{ful}(7)$ from heating full capacity test at standard heating condition (H1 climate), if applicable, is equal to or greater than 95%, and is less than 97.5% of its corresponding rated capacity, and the corresponding measured power consumption is greater than 106%, and is equal to or less than 110% of the rated power consumption, the test report shall include the tests of two samples of the same model. In such case, each individual sample shall meet all the performance requirements in clause 7.7 of the Code. Also, the information on the energy label shall be based on the test results of the lower cooling seasonal performance factor (F_{CSP}) and the lower heating seasonal performance factor (F_{HSP}), if applicable.

7.10. Energy Label

7.10.1 The specification of the energy label for room air conditioner is shown in Appendix 1B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 1B.

7.10.2 (a) Subject to clause 7.10.2(c), the energy label is to be attached or affixed to a prominent position of the room air conditioner and is to be clearly visible.

(b) For the avoidance of doubt, if only part of the room air conditioner is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the room air conditioner or its packaging in a manner specified by the Director where the Director has approved its being so attached.

7.10.3 The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 1B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

7.10.4 The paper used for the energy label shall be durable with good wear and tear characteristics.

7.11. Compliance

7.11.1 During the compliance monitoring testing carried out by the Director, a listed model of room air conditioner will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested cooling capacity $\phi_{ful}(35)$ from cooling full capacity test at standard cooling condition (T1 climate) being not less than 90% of the rated cooling capacity. The tested heating capacity $\phi_{ful}(7)$ from heating full capacity test at standard heating condition (H1 climate) being not less than 90% of the rated heating capacity;

(b) The tested power consumption $P_{ful}(35)$ from cooling full capacity test at standard cooling condition (T1 climate) being not greater than 110% of the rated power consumption. The tested power consumption $P_{ful}(7)$ from heating full capacity test at standard heating condition (H1 climate) being not greater than 110% of the rated power consumption;

(c) The calculated cooling seasonal performance factor being not less than 92% of the rated cooling seasonal performance factor. The calculated heating seasonal performance factor being not less than 92% of the rated heating seasonal performance factor;

(d) The cooling only type and reverse cycle type room air conditioner (with a Grade 1, 2, 3 or 4 energy label) passing the maximum cooling performance test. The reverse cycle type room air conditioner (with a Grade 1, 2, 3 or 4 energy label) passing the maximum heating performance test; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The cooling energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the cooling energy efficiency grade determined by the test results submitted to the Director by the specified person. The heating energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the heating energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the cooling energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the cooling energy efficiency grade determined by the test results submitted to the Director, the cooling seasonal performance factor calculated in the compliance monitoring testing being not less than 92% of the cooling seasonal performance factor calculated by the test results submitted to the Director, and in any cases not less than the lowest cooling seasonal performance factor allowed in the next lower cooling energy efficiency grade. If the heating energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the heating energy efficiency grade determined by the test results submitted to the Director, the

heating seasonal performance factor calculated in the compliance monitoring testing being not less than 92% of the heating seasonal performance factor calculated by the test results submitted to the Director, and in any cases not less than the lowest heating seasonal performance factor allowed in the next lower heating energy efficiency grade.

7.11.2 The Director may remove from the record the reference number of a listed model of room air conditioner, if he has reasonable grounds to believe that the room air conditioner does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 7.11.1 above and apply for further testing of the concerned model for the Director's consideration.

7.11.3 If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of room air conditioner will be accepted as conformance if the results of further testing meet the following criteria:

(a) The average of the tested cooling capacities $\phi_{ful}(35)$ from cooling full capacity tests at standard cooling condition (T1 climate) of all the samples being not less than 90% of the rated cooling capacity. The average of the tested heating capacities $\phi_{ful}(7)$ from heating full capacity tests at standard heating condition (H1 climate) of all the samples being not less than 90% of the rated heating capacity;

(b) The average of the tested power consumptions $P_{ful}(35)$ from cooling full capacity tests at standard cooling condition (T1 climate) of all the samples being not greater than 110% of the rated power consumption. The average of the tested power consumption $P_{ful}(7)$ from heating full capacity tests at standard heating condition (H1 climate) of all the samples being not greater than 110% of the rated power consumption;

(c) The average of the calculated cooling seasonal performance factors of all the samples being not less than 92% of the rated cooling seasonal performance factor. The average of the calculated heating seasonal performance factors of all the samples being not less than 92% of the rated heating seasonal performance factor;

(d) Each sample passing the maximum cooling and heating performance test for Grade 1 to 4; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The cooling energy efficiency grade determined by the average of the calculated cooling seasonal performance factors of all the samples calculated

in the further testing being equal to or better than the cooling energy efficiency grade determined by the test results submitted to the Director by the specified person. The heating energy efficiency grade determined by the average of the calculated heating seasonal performance factors of all the samples calculated in the further testing being equal to or better than the heating energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the cooling energy efficiency grade determined by the average of the calculated cooling seasonal performance factors of all the samples calculated in the further testing being not equal to nor better than the cooling energy efficiency grade determined by the test results submitted to the Director, the average of the cooling seasonal performance factors of all the samples calculated in the further testing being not less than 92% of the cooling seasonal performance factor calculated by the test results submitted to the Director, and in any cases not less than the lowest cooling seasonal performance factor allowed in the next lower energy efficiency grade. If the heating energy efficiency grade determined by the average of the calculated heating seasonal performance factors of all the samples calculated in the further testing being not equal to nor better than the heating energy efficiency grade determined by the test results submitted to the Director, the average of the heating seasonal performance factors of all the samples calculated in the further testing being not less than 92% of the heating seasonal performance factor calculated by the test results submitted to the Director, and in any cases not less than the lowest heating seasonal performance factor allowed in the next lower energy efficiency grade

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

8. Energy Efficiency Labelling for Refrigerating Appliances

8.1. Scope

8.1.1. Clause 8 of the Code, unless the Director provides otherwise, applies to a refrigerating appliance defined in the Ordinance, that is, the products specified in clauses 8.1.2 and 8.1.3.

8.1.2. "Refrigerating appliance", subject to clause 8.1.3 of the Code, means a product —

(a) that is 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 where the cooling is obtained by one or more energy-consuming means;

(b) that is a refrigerator, frozen food storage cabinet or food freezer (or a combination of any of them); and

(c) that —

(i) uses mains electricity as the only power source;

(ii) operates by using the vapour compression cycle; and

(iii) has a rated total storage volume not exceeding 500 litres.

8.1.3. "Refrigerating appliance" does not include refrigerating appliances that operate by using absorption refrigerating system.

8.2. Definitions

This clause provides definitions of terms used in clause 8 of the Code. Unless otherwise specified, the definitions adopted in the clause 8 follow those stipulated in the Ordinance, if any.

absorption refrigerating system	means a system— (a) by which refrigeration effect is produced through the use of two fluids and some quantity of heat input; and (b) in which a secondary fluid or absorbent, rather than a mechanical compressor, is used to circulate the refrigerant.

adjusted volume	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.
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 ºC 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.
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 cabinet	means a refrigerating appliance having one or more compartments suitable for the storage of frozen food.
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 8.3 of the Code.
ice-making compartment	means a compartment intended specifically for the freezing and storage of water ice-cubes.
IEC	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).

low temperature compartment	means a compartment which may be either an ice-making compartment or a frozen food storage compartment.
rated energy consumption	means the energy consumption of a refrigerating appliance as determined and declared by the manufacturer or importer of the refrigerating appliance in accordance with the standard and requirements specified in the Code.
rated freezing capacity	means the freezing capacity of a refrigerating appliance as determined and declared by the manufacturer or importer of the refrigerating appliance in accordance with the standard and requirements specified in the Code.
rated storage volume	means the storage volume of a refrigerating appliance as determined and declared by the manufacturer or importer of the refrigerating appliance in accordance with the standard and requirements specified in the Code.
rated total storage volume	means the total storage volume of a refrigerating appliance as determined and declared by the manufacturer or importer of the refrigerating appliance in accordance with the standard and requirements specified in the Code.
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, determined in accordance with the standard.

total storage volume	means the sum of the storage volumes of the refrigerating appliance, comprising the storage volumes of the fresh food storage compartment(s), low temperature compartment(s), food freezer compartment [including any "two star" section(s) and/or compartment(s) contained therein], and cellar compartment(s).
vapour compression cycle	means a mechanism employed by a refrigerating appliance throughout which the refrigerant undergoes alternate compression and expansion to achieve the cooling function.
"1-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in clause 8.3 of the Code, is not warmer than –6 °C.
"2-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in clause 8.3 of the Code, is not warmer than –12 °C.
"3-star" compartment	means a frozen food storage compartment in which the storage temperature measured as described in clause 8.3 of the Code, is not warmer than –18 °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.

8.3. Classification of Refrigerating Appliances

8.3.1 Basic Classification

All refrigerating appliances regulated under the Ordinance are classified as below—

(a) Climate Class

The classification used in the Code follows the requirements of subtropical climate class 'ST' of the IEC 62552 standard as shown in Table 8.1

Therefore all the tests required according to the Code shall be carried out under the conditions of measured ambient temperature for climate class 'ST' stipulated in the above standard.

Table 8.1 – Climate class

Class	Symbol	Ambient temperature range (ºC)*Note*
		IEC 62552*Note*
Subtropical	ST	+16 to +38

Note:

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(b) Frozen Food Compartment(s)

The refrigerating 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 Table 8.2

Table 8.2 – Storage compartment temperature

Values in ºC

	Fresh food storage compartment		"1-star" compartment	"2-star" compartment / section	Food freezer & "3-star" compartment / cabinet	Cellar compartment	Chill compartment
	t_{1m}, t_{2m}, t_{3m}	t_{ma}	t*	t**	t***	t_{cm}	t_{cc}
Storage temperatures	$0 < t_{1m}, t_{2m}, t_{3m} \leq +8$	$\leq +4$	≤ -6	≤ -12	≤ -18	$+8 \leq t_{cm} \leq +14$	$-2 \leq t_{cc} \leq +3$
Permitted deviations during defrost cycle	$0 < t_{1m}, t_{2m}, t_{3m} \leq +8$	$\leq +4$	≤ -6	≤ -9	≤ -15	$+8 \leq t_{cm} \leq +14$	$-2 \leq t_{cc} \leq +3$

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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.*

(c) 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.

8.3.2 Overall Classification

All refrigerating appliances shall be classified in accordance with Table 8.3, which also incorporates the various parameters involved in the classification—

Table 8.3 – Overall classification

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 refrigerating appliance in which the entire storage volume is intended for freezing food.
	Category 8	Nil	≤ –18	A Category 7 refrigerating appliance incorporating means to prevent the formation of frost.

8.4. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with IEC 62552, or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a refrigerating appliance. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Measurement of storage temperatures of compartments.

(b) Measurement of storage volumes of compartments.

(c) Energy consumption test.

(d) Freezing test (for only food freezer or refrigerating appliance having food freezer compartment).

The refrigerating appliance shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified in the relevant standard.

8.5. Test Methodology and Energy Efficiency Grading

8.5.1 Measurement of Energy Consumption

The methodology for measuring energy consumption (kWh/24h) shall be based on:

(a) IEC 62552; or

(b) other equivalent international standards approved by the Director.

The specified international standard shall be referred to for actual performance requirements and procedural descriptions. The importer or manufacturer shall clearly indicate which test standard(s) they follow in testing their refrigerating appliances.

8.5.2 Calculation of Adjusted Volume

The refrigerating appliance storage volumes of the different compartments in litres shall be measured in accordance with the standard specified in clause 8 of the Code. The respective adjusted volume of the refrigerating appliance shall then be the sum of the measured storage 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—

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

where V_i = the measured storage volume of an individual compartment

Ω = the weighting factor given by the following equation:

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

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 refrigerating appliance category is shown in Table 8.4.

Table 8.4 – Adjusted volume (V_{adj}) calculation for all categories of the refrigerating appliances

Refrigerating Appliance Category	Adjusted Volume (in litre)	Equation No.*(Note)*
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

where V_r = *Storage volume of fresh food compartment*

V_{ffc} = *Storage volume of frozen food compartment*

Note: These equations are used for those refrigerating appliances with fresh food compartment and frozen food compartment only. For 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 2A.

Explanatory note for sample calculation of adjusted volume:

To illustrate how Equation 6 is derived for a category 4 refrigerating appliance:

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 = (Storage volume of fresh food compartment V_r) + (Storage volume of weighted 3-star frozen food compartment V_{ffc})

From equation 2:

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

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

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

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

8.5.3 Energy Efficiency Definition of Refrigerating Appliances

(a) The energy efficiency performance of a refrigerating appliance is defined as the maximum allowable energy consumed per unit storage 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 storage temperature 5 °C taken as the reference. For a refrigerating appliance with more than just the fresh food compartment, the energy consumption is not only a function of the refrigerating appliance storage volumes but also the relative sizes of the fresh food and other compartment storage volumes.

(b) The energy consumption test measures the energy consumption of the refrigerating appliance in kWh/24h. The annual energy consumption of the refrigerating appliance is obtained by multiplying the figure of the measured energy consumption (kWh/24h) by 365.

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

Refrigerating 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)

8.5.4 Average Appliance Energy Consumption

(a) The Average Appliance Energy Consumption line equations developed from equation (12) represent the average annual energy consumption for refrigerating appliances in Hong Kong.

(b) The Average Annual Energy Consumption of a refrigerating appliance shall be determined in accordance with Table 8.5.

Table 8.5 – Average appliance energy consumption

Refrigerating 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 x (V_{adj} x 0.777 + 303)*(Note)*	18
Category 7	Chest freezer: V_{adj} x 0.446 + 181	19
	Upright freezer: V_{adj} x 0.472 + 286	20
Category 8	Chest freezer: 1.35 x (V_{adj} x 0.446 + 181)*(Note)*	21
	Upright freezer: 1.35 x (V_{adj} x 0.472 + 286)*(Note)*	22

Note: The figure 1.35 in these equations is the correction factor for no-frost models.

8.5.5 Energy Efficiency Grading

(a) Energy Consumption Index (Iε)

The energy consumption index (I_ε) of a refrigerating appliance is defined as the ratio of the actual energy consumption of the refrigerating appliance to the Average Appliance Energy Consumption (as found from the associated average annual energy consumption equations in clause 8.5.4 of the Code). The indices are expressed in percentages. Thus, within a category, a refrigerating appliance with a lower energy consumption index (i.e. a lower percentage) consumes less energy than a refrigerating appliance with a higher energy consumption index (i.e. a higher percentage). The energy consumption index is calculated as follows—

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

where

E = actual annual energy consumption of the refrigerating appliance measured in energy consumption test.

E_{av} = average annual energy consumption as determined from Table 8.5.

(b) Refrigerating Appliance Energy Efficiency Grading

The energy efficiency grading of a refrigerating appliance shall be determined as shown in Table 8.6, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 8.6 – Derivation of energy efficiency grades

Energy Consumption Index : I_ε (%)	**Energy Efficiency Grade**
$I_\varepsilon \leq 35$	1
$35 < I_\varepsilon \leq 44$	2
$44 < I_\varepsilon \leq 55$	3
$55 < I_\varepsilon \leq 69$	4
$69 < I_\varepsilon$	5

An example illustrating the method on how to determine the energy efficiency grade of a refrigerating appliance is shown in Appendix 2A.

8.6. Performance Requirements

8.6.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the test carried out in accordance with IEC 62552, or other equivalent international standards approved by the Director shall show that the concerned model of the refrigerating appliance conforms with the following performance requirements—

(a) Measurement of Storage Temperature

The measured storage temperatures of fresh food storage compartment, frozen food storage compartment, food freezer compartment, chill compartment and cellar compartment, where applicable, shall comply with the requirements of Table 8.2 (Note: This measurement test shall be carried out before the energy consumption test is performed.)

(b) Measurement of Storage Volume

The measured storage volume for each of the compartments 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.

(c) Energy Consumption Test

The measured energy consumption (kWh/24h) in the energy consumption test shall not be greater than the rated energy consumption by more than 15%.

(d) 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. For food freezer, it shall have one or more compartments suitable for freezing foodstuffs from ambient temperature down to a temperature of –18°C and which is also suitable for the storage of frozen food under three-star storage conditions.

8.6.2. The rated storage volume, the rated energy consumption and the rated freezing capacity as declared by the manufacturer or importer shall meet the requirements in clause 8.6.1 of the Code. The rated total storage volume shall be the sum of the rated storage volumes of all the compartments of the refrigerating appliance.

8.7. Safety Requirements

In addition to the energy efficiency performance requirements, all refrigerating appliances shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the refrigerating appliance, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

8.8. Number of Samples to be Tested

For submission of product information of a model under section 6 of the Ordinance, a test report on one sample of the model shall be submitted.

8.9. Energy Label

8.9.1. The specification of the energy label for refrigerating appliance is shown in Appendix 2B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in strict accordance with the requirements in Appendix 2B.

8.9.2. (a) Subject to clause 8.9.2(c), the energy label is to be attached or affixed to the top front door or a prominent position of the refrigerating appliance and is to be clearly visible.

(b) For the avoidance of doubt, if only part of the refrigerating appliance is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the refrigerating appliance or its packaging in a manner specified by the Director where the Director has approved its being so attached.

8.9.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 2B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

8.9.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

8.10. Compliance

8.10.1. During the compliance monitoring testing carried out by the Director, a listed model of refrigerating appliance will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested storage temperatures of the compartments complying with the requirements of Table 8.2 of the Code, using the testing standard specified in the test report submitted to the Director by the specified person;

(b) The tested storage volume for each of the compartments being not 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;

(c) The tested energy consumption (kWh/24h) being not greater than the rated energy consumption by more than 15%;

(d) (For only food freezer or refrigerating appliance having food freezer compartment) The tested freezing capacity meeting 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 tested freezing capacity being not less than the rated freezing capacity by more than 15% of the latter. For food freezer, it having one or more compartments suitable for freezing foodstuffs from ambient temperature down to a temperature of –18ºC and which being also suitable for the storage of frozen food under three-star storage conditions; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested energy consumption index calculated in the compliance monitoring testing being not greater than 115% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.

8.10.2. The Director may remove from the record the reference number of a listed model of refrigerating appliance, if he has reasonable grounds to believe that the refrigerating appliance does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 8.10.1 above and apply for further testing of the concerned model for the Director's consideration.

8.10.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of refrigerating appliance will be accepted as conformance if the results of further testing meet the following criteria:

(a) The tested storage temperatures of the compartments of each sample complying with the requirements of Tables 8.2 of the Code, using the testing standard specified in the test report submitted to the Director by the specified person;

(b) The average of the tested storage volumes for each of the compartments of all the samples being not 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;

(c) The tested energy consumption (kWh/24h) of each sample being not greater than the rated energy consumption by more than 15%;

(d) (For only food freezer or refrigerating appliance having food freezer compartment) The average of the tested freezing capacities of all the samples meeting 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 tested freezing capacity of each sample being not less than the rated freezing capacity by more than 15% of the latter. For food freezer, it having one or more compartments suitable for freezing foodstuffs from ambient temperature down to a temperature of –18ºC and which being also suitable for the storage of frozen food under three-star storage conditions; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade of each sample calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade of any sample calculated in the further testing

being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested energy consumption index of that sample calculated in the further testing being not greater than 115% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

9. Energy Efficiency Labelling for Compact Fluorescent Lamps

9.1. Scope

9.1.1 Clause 9 of the Code, unless the Director provides otherwise, applies to a compact fluorescent lamp defined in the Ordinance, that is, the products specified in clauses 9.1.2 and 9.1.3.

9.1.2 "Compact fluorescent lamp", subject to clause 9.1.3 of the Code, means a product —

(a) that is a type of fluorescent lamp which has a single lamp cap; and

(b) that is of integrated type, and —

(i) uses mains electricity as the only power source;

(ii) has a rated lamp wattage up to 60 watts; and

(iii) has a screw or bayonet cap.

9.1.3 "Compact fluorescent lamp" does not include—

(a) non-integrated type compact fluorescent lamps;

(b) reflector compact fluorescent lamps; or

(c) cold cathode fluorescent lamps.

9.2. Definitions

This clause provides definitions of terms used in clause 9 of the Code. Unless otherwise specified, the definitions adopted in the clause 9 follow those stipulated in the Ordinance, if any.

ageing period	means the time required for the initial burn-in of the lamp.
ballast	means a device used with an electric-discharge lamp having cathodes to obtain the necessary circuit conditions (voltage, current, and wave form) for starting and operating.
bayonet cap	means the bayonet cap as defined in IEC 60061 or other equivalent international standards approved by the Director.
CIE	means International Commission on Illumination (the latest edition of the standard shall be followed for test methodology).

cold cathode fluorescent lamp	means a lamp of a type whose principle of illumination is the same as that of a conventional fluorescent lamp except that it—
	(a) does not require heating of electrodes during starting and operating; and
	(b) operates at a much higher voltage and lower current to start and maintain the discharge.
full test report	in relation to a compact fluorescent lamp, means a test report that presents the results of a test carried out—
	(a) to find out all aspects of the lamp's energy efficiency and performance characteristics specified in the Code; and
	(b) to a standard specified in the Code.
IEC	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).
integrated type CFL	means a compact fluorescent lamp of a type that—
	(a) is a single integrated assembly comprising a lamp cap, a light source and additional elements necessary for starting and for stable operation of the light source, and
	(b) cannot be dismantled without being permanently damaged.
interim test report	in relation to a compact fluorescent lamp, means a test report that presents the results of a test carried out—
	(a) to find out certain aspects of the lamp's energy efficiency and performance characteristics specified in the Code; and
	(b) to a standard specified in the Code.

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.
non-integrated type CFL	means a compact fluorescent lamp of a type that is electrically connected to an external ballast for operation.
progress test report	in relation to a compact fluorescent lamp, means a test report—

(a) that is submitted together with or after the submission of an interim test report; and

(b) that presents the results of a test carried out—

(i) to find out the aspects of the lamp's energy efficiency and performance characteristics that have not been covered by the interim test report and have been specified in the Code; and

(ii) to a standard specified in the Code.

rated lamp wattage	means the wattage of a CFL as determined and declared by the manufacturer or importer of the CFL in accordance with the standard and requirements specified in the Code. (Note: the rated lamp wattage is identical with the rated power consumption in value.)

rated life to 50% failures (rated average life)	means the life to 50% failures of a CFL as determined and declared by the manufacturer or importer of the CFL in accordance with the standard and requirements specified in the Code .
rated lumen maintenance	means the lumen maintenance of a CFL as determined and declared by the manufacturer or importer of the CFL in accordance with the standard and requirements specified in the Code.
rated luminous flux	means the luminous flux of a CFL as determined and declared by the manufacturer or importer of the CFL in accordance with the standard and requirements specified in the Code.
rated power consumption	means the power input of a CFL as determined and declared by the manufacturer or importer of the CFL in accordance with the standard and requirements specified in the Code.
reflector CFL	means a compact fluorescent lamp of a type that comprises one or more compact fluorescent arc tubes mounted into a reflector housing for directing light from light source, both of which cannot be dismantled without being permanently damaged.
screw cap	means the screw cap as defined in IEC 60061 or other equivalent international standards approved by the Director.

9.3. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with IEC 60969 and CIE 84, or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a compact fluorescent lamp. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Measurement of power consumption at the end of 100-hour ageing period.

(b) Measurement of lumen output (luminous flux) at the end of 100-hour ageing period (i.e. the initial value of luminous flux).

(c) Measurement of lumen maintenance at 2,000-hour.

(d) Measurement of life to 50% failures (average life).

9.4. Test Methodology and Standards

9.4.1. Test Standards – Technical Performance

(a) 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.

(b) 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.

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

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

9.4.2. Test Conditions

(a) The tests shall be carried out at a voltage and frequency of mains electricity in Hong Kong as specified in the standards mentioned in clause 9.4 of the Code. The sample size for carrying out all the tests shall be determined in accordance with clause 9.8 of the Code.

(b) For CFLs of the same characteristics but with different colour temperatures, they shall be tested individually as their energy efficiency performances are different. For CFLs with same energy efficiency and performance characteristics (including colour temperatures) but with different lamp caps, they may be treated as belonging to the same family of models and adopt the same test report.

(c) The test conditions shall be as follows—

(i) the selection, seasoning and stabilization of test lamps, and the test conditions shall be as described in IEC 60969; and

(ii) test lamps shall be tested in a vertical base-up position.

9.4.3. Measurement of Luminous Flux of Test Lamp

The lamp luminous flux at the test conditions shall be measured in accordance with the requirements of CIE 84.

9.4.4. Measurement of Electrical Characteristics of Test Lamp

The electrical characteristics shall be measured in accordance with IEC 60969.

9.4.5. Measurement of Lumen Maintenance and Lamp Life

The lumen maintenance and lamp life at the test conditions shall be measured in accordance with IEC 60969.

9.4.6. Determination of Lamp Luminous Efficacy

Lamp luminous efficacy (E_m) shall be determined by computing the ratio of the measured luminous flux and the corresponding electrical power input at equilibrium for the test conditions.

9.5. Energy Efficiency Grading

9.5.1. The energy efficiency grade of CFLs shall be determined as shown in Table 9.1, with Grade 1 having the best performance and Grade 5 having the worst performance.

9.5.2. In order to determine the energy efficiency grade according to clause 9.5.3 of the Code, the measured lamp luminous efficacy (E_m) obtained in clause 9.4 of the Code shall be compared with the following rated lamp luminous efficacy (E_r) which is determined and calculated based on the rated luminous flux and the rated wattage of the same product model—

$$\text{Rated Lamp Luminous Efficacy } (E_r) = \frac{\text{Rated Luminous Flux}}{\text{Rated Wattage}}$$

The energy efficiency grade is determined by using the measured lamp luminous efficacy (E_m) or the rated lamp luminous efficacy (E_r), whichever is smaller.

9.5.3. In Table 9.1, for any CFL having a Grade 1 or 2 label, both the measured average life and the rated average life shall not be less than 8,000 hours, and both the measured lumen maintenance and the rated lumen maintenance at 2,000 hours shall not be less than 80%, and for any CFL having a Grade 3 or 4 label, both the measured average life and the rated average life shall not be less than 6,000 hours, and both the measured lumen maintenance and the rated lumen maintenance at 2,000 hours shall not be less than 78%. Any CFL with the measured average life or the rated average life less than 6,000 hours, or the measured lumen maintenance or the rated lumen maintenance at 2,000 hours less than 78%, can only obtain a Grade 5 label.

Table 9.1 – Derivation of energy efficiency grades

X *Note (1)* (Lumen/W)				
Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Note (2)		*Note (3)*		*Note (4)*
$X \geqq 110$	$110 > X \geqq 90$	$90 > X \geqq 63$	$63 > X \geqq 50$	$50 > X$

Note:

(1) Where X = measured lamp luminous efficacy (E_m) or rated lamp luminous efficacy (E_r), whichever is smaller.

(2) Applicable to a CFL with both measured average life and rated average life not less than 8,000 hours, and both measured lumen maintenance and rated lumen maintenance at 2,000 hours not less than 80%.

(3) Applicable to a CFL with both measured average life and rated average life not less than 6,000 hours, and both measured lumen maintenance and rated lumen maintenance at 2,000 hours not less than 78%.

(4) Applicable to a CFL with measured average life or rated average life less than 6,000 hours, or measured lumen maintenance or rated lumen maintenance at 2,000 hours less than 78%.

9.5.4. The aforesaid measured lamp luminous efficacy refers to the average values (both luminous flux and power consumption) measured at the end of the 100-hour ageing period. The aforesaid lumen maintenance refers to the average value measured at the end of 2,000 hours. The determination of the average values shall be in accordance with Table 9.3.

9.5.5. 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.

9.5.6. An example illustrating the method on how to determine the energy efficiency grade of a CFL is shown in Appendix 3A.

9.6. Performance Requirements

9.6.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the test carried out in accordance with CIE 84 and IEC 60969, or other equivalent international standards approved by the Director shall show that the model concerned of

the CFL conforms with the following performance requirements—

(a) The measured power consumption at the end of 100-hour ageing period shall be neither less than 85% nor greater than 115% of the rated power 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 lumen maintenance at 2,000 hours shall not be less than the rated lumen maintenance (both the measured lumen maintenance and the rated lumen maintenance at 2,000 hours shall not be less than 80% for obtaining a Grade 1 or 2 label or 78% for obtaining a Grade 3 or 4 label).

(d) The measured life to 50% failures (average life) shall not be less than the rated life to 50% failures (rated average life) (both the measured average life and the rated average life shall not be less than 8,000 hours for obtaining a Grade 1 or 2 label or 6,000 hours for obtaining a Grade 3 or 4 label).

9.6.2. The rated power consumption, rated lumen output, rated life to 50% failures and rated lumen maintenance as declared by the manufacturer or importer shall meet the requirements specified in clause 9.6.1 of the Code.

9.7. Safety Requirements

In addition to the energy efficiency performance requirements, all CFLs shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of CFLs.

9.8. Number of Samples to be Tested

9.8.1. For submission of product information of a model under section 6 of the Ordinance, a test report on samples of the model shall be submitted. The minimum numbers of samples for the tests are indicated in Table 9.2.

Table 9.2 – Minimum number of samples for tests

Tests Required	Minimum Number of Samples
Power consumption and luminous flux	20
Lumen maintenance	10
Life to 50% failures	20

(Remark: The same samples shall be used for the above tests.)

9.8.2. The test results of the samples shall be determined in accordance with the requirements in Table 9.3 and meet the performance requirements in clause 9.6 of the Code.

Table 9.3 – Determination of test results

Tests Required	Test Results
Power consumption (at the end of 100-hour ageing period)	The average of the measured values of all the tested samples shall meet the performance requirements in clause 9.6 of the Code
Luminous flux (at the end of 100-hour ageing period)	
Lumen maintenance (at the end of 2,000-hour including the ageing period)	The average of the measured values of all the tested samples (which are still alive at the end of 2,000-hour) shall meet the performance requirements in clause 9.6 of the Code
Life to 50% failures	Measured life to 50% failures (measured average life) $\geqq$ rated life to 50% failures (rated average life)

9.8.3. The measured lamp luminous efficacy shall be determined by computing the ratio of the average value of the luminous flux and the average value of the power consumption as determined in accordance with clause 9.4 of the Code.

9.9. Submission of Test Reports

9.9.1. Since it may take a long time to complete the full tests for CFLs, the person submitting the specified information of a product model may submit the test reports in stages, namely interim test report, progress test report and full test report as specified in sections 6 and 7 of the Ordinance.

9.9.2. Initially, an interim test report may be submitted under section 6 of the Ordinance. The interim test report shall contain the results of the tests carried out to find out—

(a) the measured power consumption (at the end of 100-hour);

(b) the measured lumen output (luminous flux) (at the end of 100-hour);

(c) the measured lamp luminous efficacy (at the end of 100-hour);

(d) the lumen maintenance (at the end of 2,000-hour); and

(e) the lamp life (up to at least 2,000 hours).

If the Director is satisfied that the specified information and specified documents (including the interim test report) have been submitted as required under section 6 of the Ordinance, a reference number shall then be assigned to the model.

9.9.3. After submitting the interim test report, the specified person is to submit progress test reports to the Director at intervals of not exceeding 6 months after the date of the submission of the interim test report until the specified person submits a full test report as required under section 7 of the Ordinance.

9.9.4. The progress test reports shall present the latest results of the test in progress with respect to the lamp life. The full test report shall present the final results of all the tests required in the Code.

9.9.5. The results of the lamp life test presented in the interim test report, progress test reports and full test report shall refer to the same test on the same set of samples.

9.9.6. The interim test report, progress test reports and full test report shall be issued by a testing laboratory meeting the requirements in clause 4 of the Code, and these test reports shall meet the requirements in clause 5 of the Code.

9.9.7. If the test results in the progress test reports and full test report show that the requirements as stipulated in clause 9.6 of the Code cannot be met, the reference number previously assigned to the product model will be removed from the record pursuant to section 17 of the Ordinance.

9.10. Energy Label

9.10.1. The specification of the energy label for CFL is shown in Appendix 3B. After a reference number has been assigned to a product model in the name of the specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 3B.

9.10.2. The energy label is to be—

(a) printed on or affixed to a prominent position of the individual product packaging and is to be clearly visible; or

(b) attached to the product packaging in a manner approved by the Director.

9.10.3. The energy label shall be self-adhesive, if it is to be affixed on each individual packaging, and shall be cut to the outline shown in Appendix 3B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

9.10.4. The size of the energy label is to be chosen according to the following criteria—

(a) The energy label is to be contained in a blank border, the width of which must be at least 2 mm. The energy label must not cover more than 50% of the surface area of the largest side of the product packaging.

(b) The largest energy label is to be first chosen and checked whether it complies with all the requirements in clause 9.10.4(a). If those requirements cannot be met, then the second largest energy label (in the descending order of 90%, 80%, 70% or 60% (by length) of the largest energy label) is to be chosen. 60% (by length) of the largest energy label is the minimum size to be used. This selection process is to be repeated until an appropriate energy label is chosen.

(c) Where the product packaging is too small to accommodate the smallest energy label specified in this clause, the specified person of the product is to apply for the Director's directions on the manner of displaying the energy label on the packaging.

9.11. Compliance

9.11.1. During the compliance monitoring testing carried out by the Director, a listed model of compact fluorescent lamp will be accepted as conformance if the test results of the listed model meet the following criteria:

(Note: The minimum number of samples and the determination of test results are shown in Tables 9.2 and 9.3 respectively.)

(a) The average of the tested power consumptions at the end of 100-hour ageing period being neither less than 85% nor greater than 115% of the rated power consumption;

(b) The average of the tested lumen outputs (luminous flux) at the end of 100-hour ageing period being not less than 90% of the rated lumen output (luminous flux);

(c) The average of the tested lumen maintenances at 2,000 hours being not less than the rated lumen maintenance, and being not less than 80% for a Grade 1 or 2 label or 78% for a Grade 3 or 4 label;

(d) The tested life to 50% failures (average life) being not less than the rated life to 50% failures (rated average life), and being not less than 8,000 hours for a Grade 1 or 2 label or 6,000 hours for a Grade 3 or 4 label; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director due to decrease in lamp luminous efficacy, the tested lamp luminous efficacy calculated in the compliance monitoring testing being not less than 85% of the measured lamp luminous efficacy calculated by the test results submitted to the Director or the rated lamp luminous efficacy, whichever is smaller (where the tested lamp luminous efficacy shall be determined by computing the ratio of the average of the tested luminous flux and the average of the tested power consumption).

9.11.2. The Director may remove from the record the reference number of a listed model of CFL, if he has reasonable grounds to believe that the CFL does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 9.11.1 above and apply for further testing of the concerned model for the Director's consideration.

9.11.3. If further testing is approved to be carried out, the number of samples of the same model as indicated in Table 9.2 of the Code shall be tested at the specified person's own costs and the determination of test results as indicated in Table 9.3 shall be followed. A listed model of compact fluorescent lamp will be accepted as conformance if the results of further testing meet the following criteria:

(a) The average of the tested power consumptions at the end of 100-hour ageing period being neither less than 85% nor greater than 115% of the rated power consumption;

(b) The average of the tested lumen outputs (luminous flux) at the end of 100-hour ageing period being not less than 90% of the rated lumen output (luminous flux);

(c) The average of the tested lumen maintenances at 2,000 hours being not less than the rated lumen maintenance, and being not less than 80% for a Grade 1 or 2 label or 78% for a Grade 3 or 4 label;

(d) The tested life to 50% failures (average life) being not less than the rated life to 50% failures (rated average life), and being not less than 8,000 hours for a Grade 1 or 2 label or 6,000 hours for a Grade 3 or 4 label; and

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the further testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director due to decrease in lamp luminous efficacy, the tested lamp luminous efficacy calculated in the further testing being not less than 85% of the measured lamp luminous efficacy calculated by the test results submitted to the Director or the rated lamp luminous efficacy, whichever is smaller (where the tested lamp luminous efficacy shall be determined by computing the ratio of the average of the tested luminous flux and the average of the tested power consumption).

10. Energy Efficiency Labelling for Washing Machines

10.1. Scope

10.1.1. Clause 10 of the Code, unless the Director provides otherwise, applies to a washing machine defined in the Ordinance, that is, the products specified in clauses 10.1.2 and 10.1.3.

10.1.2. "Washing machine", subject to clause 10.1.3 of the Code, means a product —

(a) that is a household appliance for cleaning and rinsing of textiles using water with or without a means of extracting excess water from the textiles; and

(b) that—

(i) uses mains electricity as the only power source; and

(ii) has a rated washing capacity not exceeding 10 kilograms,

whether or not having built-in dryers for drying textiles by means of heating.

10.1.3. "Washing machine" does not include washing machines that have no spin extraction capability.

10.2. Definitions

This clause provides definitions of terms used in clause 10 of the Code. Unless otherwise specified, the definitions adopted in the clause 10 follow those stipulated in the Ordinance, if any.

Cycle	means complete washing process, as defined by the programme selected, consisting of a series of different operations (wash, rinse, spin, etc.) and including any operations that occur after the completion of the programme.
horizontal axis washing machine	means washing machine in which the load is placed in a drum which rotates around an axis which is horizontal or close to horizontal. Horizontal axis is where the angle of the axis of rotation is less than or equal to 45 degrees to horizontal.
IEC	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).

JIS	means Japanese Industrial Standard (the latest edition of the standard shall be followed for test methodology).
rated washing capacity	means the washing capacity of a washing machine as determined and declared by the manufacturer or importer of the washing machine in accordance with the standard and requirements specified in the Code.
spin extraction	means water-extracting function by which water is removed from textiles by centrifugal action. This is included as a function (built in operation) of an automatic washing machine but may also be performed in a spin extractor.
spin extractor	means separate water-extracting appliance in which water is removed from textiles by centrifugal action.
vertical axis washing machine	means washing machine in which the load is placed in a drum which rotates around an axis which is vertical or close to vertical. Vertical axis is where the angle of the axis of rotation is more than 45 degrees to horizontal. Where the drum does not rotate, the washing machine shall be classified as a vertical axis washing machine.

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10.3. Classification of Washing Machines

All washing machines regulated under the Ordinance are classified in accordance with Table 10.1—

Table 10.1 – Classification of washing machines

Category	Description
1	Horizontal axis washing machine
2	Vertical axis washing machine

Note: In each category, it also includes washing machines operating with similar working principle.

10.4. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with IEC 60456 or JIS C 9606 or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a washing machine. The importer or manufacturer shall clearly indicate which test standard(s) they follow in testing their washing machines:

(a) IEC 60456 applies to horizontal axis washing machines (i.e. category 1)

(b) JIS C 9606 applies to vertical axis washing machines (i.e. category 2)

A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Energy consumption;

(b) Water consumption;

(c) Washing performance; and

(d) Water extraction performance.

10.5. Test Methodology and Energy Efficiency Grading

10.5.1. Test Conditions

In carrying out the tests as specified in clause 10.4 of the Code, the washing machine shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified in the relevant IEC or JIS standards. Moreover, unless the Director approves otherwise, the following test conditions shall be followed:

(a) In testing horizontal axis washing machines (category 1), the 60 ºC cotton programme shall be used without pre-wash in accordance with the manufacturer's instruction.

(b) In testing vertical axis washing machines (category 2), at the start of the test, the temperature of water shall be 30 ± 2 ºC.

In cases of washing machines without any programmes, the recommended times for washing, rinsing, and spin extracting operations shall be in accordance with the manufacturer's instructions for the rated washing capacity to be tested.

10.5.2. Measurement of Energy Consumption

The methodology for measuring energy consumption (kWh) shall be based on:

(a) IEC 60456;

(b) JIS C 9606; or

(c) Other equivalent international standards approved by the Director.

The specified international standards (IEC or JIS) shall be referred to for actual performance requirements and procedural descriptions.

The energy consumption shall be measured as follows:

(i) For horizontal axis washing machine with built-in water heating device, the measured energy consumption (E) of the washing machine shall include the energy consumptions of both the washing function (including washing, rinsing and spin extraction processes) and the built-in water heating device for heating water. This measured energy consumption (E) shall be shown on the energy label after it is calculated to annual energy consumption based on 260 washes / year operation.

(ii) For horizontal axis washing machine without built-in water heating device, only the measured energy consumption (E) of the washing machine shall be shown on the energy label after it is calculated to annual energy consumption based on 260 washes / year operation.

(iii) For vertical axis washing machine, only the measured energy consumption (E) of the washing function (including washing, rinsing and spin extraction processes) shall be shown on the energy label after it is calculated to annual energy consumption based on 260 washes / year operation.

In cases of washing machines combined with built-in dryers for drying textiles by means of heating, only the energy consumption (E) of the washing machine shall be measured and the drying function is excluded.

10.5.3. Measurement of Water Consumption

The water consumption (litres/cycle) shall be measured during the energy consumption test in accordance with IEC 60456, JIS C 9606, or other equivalent international standards approved by the Director.

10.5.4. Measurement of Washing Performance and Water Extraction Performance

The washing performance and water extraction performance shall be measured and evaluated during the test period in accordance with IEC 60456, JIS C 9606, or other equivalent international standards approved by the Director.

10.5.5. Calculation of Specific Energy Consumption

The specific energy consumption of a washing machine shall be calculated as follows:

(a) For horizontal axis washing machine with built-in water heating device and vertical axis washing machine, the specific energy consumption is calculated as follows:

$$\text{Specific Energy Consumption } (E_{sp}) = \frac{E}{W_r} \quad \text{…..……...……..(eq. 1)}$$

where E = *measured energy consumption per cycle (kWh/cycle)*

W_r = *rated washing capacity (kg)*

(b) For horizontal axis washing machine without built-in water heating device, the specific energy consumption is calculated as follows:

$$\text{Specific Energy Consumption } (E_{sp}) = \frac{E + W_h}{W_r} \quad \text{……...……..(eq. 2)}$$

where E = *measured energy consumption per cycle (kWh/cycle)*

W_r = *rated washing capacity (kg)*

W_h = *calculated hot water energy (kWh/cycle)*

The calculated hot water energy is the theoretical energy requirement for heating water from 15 ºC to 60 ºC and shall be calculated as follows:

$$W_h = \frac{(V_h \times (t_h - 15))}{860} \quad \text{..…….....(eq. 3)}$$

where W_h = the calculated hot water energy in kWh for the operation

V_h = the volume of external hot water used in litres during the operation

t_h = the hot water inlet temperature in ºC, i.e. 60 ºC

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10.5.6. Energy Efficiency Grading

The energy efficiency grading of a washing machine shall be determined as shown in Table 10.2, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 10.2 – Derivation of energy efficiency grades

Specific Energy Consumption, E_{sp} (kWh/kg/cycle)		**Energy Efficiency Grade** *(Note)*
Horizontal Axis Type Category 1	Vertical Axis Type Category 2	
$E_{sp} \leq 0.130$	$E_{sp} \leq 0.0160$	1
$0.130 < E_{sp} \leq 0.150$	$0.0160 < E_{sp} \leq 0.0184$	2
$0.150 < E_{sp} \leq 0.172$	$0.0184 < E_{sp} \leq 0.0208$	3
$0.172 < E_{sp} \leq 0.195$	$0.0208 < E_{sp} \leq 0.0232$	4
$0.195 < E_{sp}$	$0.0232 < E_{sp}$	5

Note:

In order to obtain Grade 1 to 4, the washing machine concerned shall also meet all the performance requirements as stipulated in clause 10.6.1(c), i.e. washing performance and water extraction performance. Only Grade 5 will be accorded if the washing machine does not meet any one of these performance requirements or $E_{sp} > 0.195$ for horizontal axis washing machine or $E_{sp} > 0.0232$ for vertical axis washing machine.

An example illustrating the method on how to determine the energy efficiency grade of a washing machine is shown in Appendix 4A.

10.6. Performance Requirements

10.6.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the tests carried out in accordance with IEC 60456 or JIS C 9606 or other equivalent international standards approved by the Director shall show that the concerned model conforms with the following performance requirements—

(a) The measured energy consumption (kWh/cycle) shall not be greater than the rated energy consumption by more than 15%.

(b) The measured water consumption (litres/cycle) shall not be greater than the rated water consumption by more than 15%.

(c) The measured washing performance and measured water extraction performance shall conform with the minimum requirements in accordance with the respective

test standards as shown in Table 10.3 for Grade 1 to 4:

Table 10.3 – Performance requirements

Category	**Category 1**	**Category 2**
Performance Requirements[Note (1)]		
Test Standard	**IEC 60456**[Note (4)]	**JIS C 9606**
Washing Performance[Note (2)]	q ≧ 0.7	C ≧ 0.55
Water Extraction Performance[Note (3)]	RM ≦ 1.1	Water extracting efficiency ≧ 0.47

Note:

(1) Each of the performance shall be determined in accordance with the test standard of the respective category.

(2) The washing performance shall be determined in accordance with the following equations (extracted from the respective test standards):

$$q = \frac{\overline{C}_{test}}{\overline{C}_{ref}} \quad , or \quad C = \frac{D_r}{D_s}$$

where q *= ratio of the average sum of the reflectance values*

$\overline{C}_{test}$ *= average sum of the reflectance values for the washing machine under test*

$\overline{C}_{ref}$ *= average sum of the reflectance values for the reference washing machine*

C *= washability ratio*

D_r *= washability by the washing machine under test*

D_s *= washability by the reference washing machine*

For details on the definitions of the parameters and their calculation, the respective test standards shall be referred to.

(3) The water extraction performance shall be determined in accordance with

the following equations (extracted from the respective test standards):

$$RM = \frac{M_r - M}{M} \quad , or$$

$$Water\ extracting\ efficiency = \frac{Mass\ of\ cloth\ in\ dry\ state}{Mass\ of\ cloth\ after\ water\ extraction}$$

where RM = *remaining moisture*

M = *the mass of the conditioned base load*

M_r = *the mass of the base load after spin extraction*

For details on the definitions of the parameters and their calculation, the respective test standards shall be referred to.

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(5) In order to obtain Grade 1 to 4, the washing machine concerned shall also meet all the above performance requirements, i.e. washing performance and water extraction performance. Only Grade 5 will be accorded if the washing machine does not meet any one of the above performance requirements or Esp >0.195 for horizontal axis washing machine or Esp > 0.0232 for vertical axis washing machine.

10.6.2. The rated energy consumption and rated water consumption as declared by the manufacturer or importer shall meet the requirements specified in clause 10.6.1 of the Code.

10.7. Safety Requirements

In addition to the energy efficiency performance requirements, all washing machines shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the washing machines.

10.8. Number of Samples to be Tested

10.8.1. For submission of product information of a model under section 6 of the Ordinance, subject to clause 10.8.2 of the Code, a test report on one sample of the model shall be submitted.

10.8.2. However, if the test results of one sample indicate that the measured energy consumption is greater than the rated energy consumption by more than 10%, the test report shall

include the tests of two samples of the same model. In such case, each individual sample shall meet all the performance requirements in clause 10.6 of the Code. Also, the information on the energy label shall be based on the test results of the tested sample with a higher specific energy consumption (E_{sp}).

10.9. Energy Label

10.9.1. The specification of the energy label for washing machines is shown in Appendix 4B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 4B.

10.9.2. (a) Subject to clause 10.9.2(c), the energy label is to be attached or affixed to a prominent position of the washing machine and is to be clearly visible.

(b) To avoid doubt, if only part of the washing machine is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the washing machine or its packaging in a manner specified by the Director where the Director has approved its being so attached.

10.9.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 4B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

10.9.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

10.10. Compliance

10.10.1. During the compliance monitoring testing carried out by the Director, a listed model of washing machine will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested energy consumption (kWh/cycle) being not greater than the rated energy consumption by more than 15%.

(b) The tested water consumption (litres/cycle) being not greater than the rated water consumption by more than 15%.

(c) The tested washing performance and tested water extraction performance conforming with the minimum requirements in accordance with the respective test standards as shown in Table 10.3 for Grade 1 to 4.

(d) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested specific energy consumption calculated in the compliance monitoring testing being not greater than 115% of the measured specific energy consumption calculated by the test results submitted to the Director, and in any cases not greater than the highest specific energy consumption allowed in the next lower energy efficiency grade.

10.10.2. The Director may remove from the record the reference number of a listed model of washing machine, if he has reasonable grounds to believe that the washing machine does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 10.10.1 above and apply for further testing of the concerned model for the Director's consideration.

10.10.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of washing machine will be accepted as conformance if the results of further testing meet the following criteria:

(a) The tested energy consumption (kWh/cycle) of each sample being not greater than the rated energy consumption by more than 15%.

(b) The tested water consumption (litres/cycle) of each sample being not greater than the rated water consumption by more than 15%.

(c) The tested washing performance and tested water extraction performance of each sample conforming with the minimum requirements in accordance with the respective test standards as shown in Table 10.3 for Grade 1 to 4.

(d) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade of each sample calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade of any sample calculated in the further testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested specific energy consumption of that sample calculated in the further testing being not greater than 115% of the measured specific energy consumption calculated by the test results submitted to the Director, and in any cases not greater than the highest specific energy consumption allowed in the next lower energy efficiency grade.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

11. Energy Efficiency Labelling for Dehumidifiers

11.1. Scope

11.1.1. Clause 11 of the Code, unless the Director provides otherwise, applies to a dehumidifier defined in the Ordinance, that is, the products specified in clauses 11.1.2 and 11.1.3.

11.1.2. "Dehumidifier", subject to clause 11.1.3 of the Code, means a product —

(a) that is an encased assembly for removing moisture from its surrounding atmosphere; and

(b) that is self-contained, electrically operated and mechanically-refrigerated, and —

(i) uses mains electricity as the only power source;

(ii) operates by using the vapour compression cycle;

(iii) consists of –

(A) a refrigerated surface (commonly known as an evaporator) that condenses moisture from the atmosphere;

(B) a refrigerating system, including an electric motor;

(C) an air circulating fan; and

(D) a drain system for collecting or disposing of the condensate; and

(iv) has a rated dehumidifying capacity not exceeding 35 litres per day.

11.1.3. "Dehumidifier" does not include dehumidifiers that—

(a) may also operate by using desiccant materials; or

(b) are room air conditioners having dehumidifying function.

11.2. Definitions

This clause provides definitions of terms used in clause 11 of the Code. Unless otherwise specified, the definitions adopted in the clause 11 follow those stipulated in the Ordinance, if any.

ANSI / AHAM	means American National Standards Institute / Association of Home Appliance Manufacturers (the latest edition of the standard shall be followed for test methodology).

CAN/CSA	means Canada / Canadian Standards Association(the latest edition of the standard shall be followed for test methodology).
dehumidifying capacity	means a measure of the ability of a dehumidifier to remove moisture from its surrounding atmosphere, measured in litres of moisture removed per 24 hours of period.
energy factor	means the energy efficiency of a dehumidifier that is measured in litres of water removed per kilowatt-hour (kWh) of energy consumed at standard test condition.
rated dehumidifying capacity	means the dehumidifying capacity of a dehumidifier as determined and declared by the manufacturer or importer of the dehumidifier in accordance with the standard and requirements specified in the Code.
vapour compression cycle	means a mechanism employed by a dehumidifier throughout which the refrigerant undergoes alternate compression and expansion to achieve the cooling or heating function.

11.3. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with ANSI/AHAM DH-1 or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a dehumidifier. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Dehumidifying capacity test for measuring dehumidifying capacity and corresponding energy consumption; and

(b) Maximum operating conditions test.

11.4. Test Methodology and Energy Efficiency Grading

11.4.1. Test Condition for the Determination of Dehumidifying Capacity

With respect to the measurement of the dehumidifying capacity of a dehumidifier, the requirements of ANSI/AHAM DH-1 standard test condition as shown in Table 11.1 shall apply.

Table 11.1 – Test condition for the determination of dehumidifying capacity

Parameter	Standard test conditions
Dry-bulb temperature	26.7ºC
Wet-bulb temperature	20.9ºC
Relative humidity	60%

11.4.2. Measurement of Dehumidifying Capacity and Energy Consumption

The testing methodology for measurement of the dehumidifying capacity and the corresponding energy consumption of a dehumidifier shall follow ANSI/AHAM DH-1 or other equivalent international standards approved by the Director. The dehumidifier shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified in the standard. The annual energy consumption shall first be calculated by dividing the measured energy consumption per day (kWh/day) by 24 hours and then multiplying by 450 hours per year.

11.4.3. Determination of Dehumidifying Capacity

The dehumidifying capacity of a dehumidifier shall be determined by using the test results of the test as measured in accordance with clause 11.4.2 of the Code and the relevant clause of ANSI/AHAM DH-1. In conversion of the dehumidifying capacity to litres per day, reference shall be made to the relevant clause of CAN/CSA-C749.

11.4.4. Determination of Energy Factor (EF)

The energy factor (litres/kWh) is used to measure the energy efficiency of a dehumidifier at the test condition and is calculated as follows—

$$\text{Energy Factor (EF)} = \frac{V}{E} \quad \text{.....(eq. 1)}$$

Where V = amount of water removed (litres) measured in dehumidifying capacity test.

E = corresponding energy consumption (kWh) measured in dehumidifying capacity test.

11.4.5. Energy Efficiency Grading

The energy efficiency grade of the dehumidifier shall be determined as shown in Table 11.2, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 11.2 – Derivation of energy efficiency grades

Rated dehumidifying capacity (D_R) (litres/day)	Energy Factor (EF) (litres/kWh)				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
< 10	EF ≥ 2.00	2.00 > EF ≥ 1.70	1.70 > EF ≥ 1.45	1.45 > EF ≥ 1.25	1.25 > EF
$10 \leq D_R < 15$	EF ≥ 2.30	2.30 > EF ≥ 1.95	1.95 > EF ≥ 1.70	1.70 > EF ≥ 1.50	1.50 > EF
$15 \leq D_R < 20$	EF ≥ 2.50	2.50 > EF ≥ 2.05	2.05 > EF ≥ 1.80	1.80 > EF ≥ 1.55	1.55 > EF
$20 \leq D_R < 25$	EF ≥ 2.65	2.65 > EF ≥ 2.20	2.20 > EF ≥ 1.95	1.95 > EF ≥ 1.70	1.70 > EF
$25 \leq D_R \leq 35$	EF ≥ 2.95	2.95 > EF ≥ 2.50	2.50 > EF ≥ 2.15	2.15 > EF ≥ 1.90	1.90 > EF

Note:

In order to obtain Grade 1 to 4, the dehumidifier concerned shall also pass the maximum operating conditions test as stipulated in clause 11.5.1(c). Only Grade 5 will be accorded if the dehumidifier does not pass the maximum operating conditions test or the energy factor falls into Grade 5.

An example illustrating the method on how to determine the energy efficiency grade of a dehumidifier is shown in Appendix 5A.

11.5. Performance Requirements

11.5.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the tests carried out in accordance with the relevant clauses of ANSI/AHAM DH-1 or other equivalent international standards approved by the Director shall show that the concerned model conforms with the following performance requirements—

(a) The measured dehumidifying capacity shall not be less than 95% of the rated dehumidifying capacity.

(b) The measured energy consumption shall not be greater than 105% of the rated energy consumption.

(c) The dehumidifier shall pass the maximum operating conditions test. Any dehumidifier failing the maximum operating conditions test can only obtain Grade 5.

11.5.2. The rated dehumidifying capacity and the rated energy consumption as declared by the manufacturer or importer shall meet the requirements specified in clause 11.5.1 of the Code.

11.6. Safety Requirements

In addition to the energy efficiency performance requirements, all dehumidifiers shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the dehumidifiers, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

11.7. Number of Samples to be Tested

For submission of product information of a model under section 6 of the Ordinance, a test report on one sample of the model shall be submitted.

11.8. Energy Label

11.8.1. The specification of the energy label for dehumidifier is shown in Appendix 5B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 5B.

11.8.2. (a) Subject to clause 11.8.2(c), the energy label is to be attached or affixed to a prominent position of the dehumidifier and is to be clearly visible.

(b) To avoid doubt, if only part of the dehumidifier is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the dehumidifier or its packaging in a manner specified by the Director where the Director has approved its being so attached.

11.8.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 5B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

11.8.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

11.9. Compliance

11.9.1. During the compliance monitoring testing carried out by the Director, a listed model of dehumidifier will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested dehumidifying capacity being not less than 90% of the rated dehumidifying capacity.

(b) The tested energy consumption being not greater than 110% of the rated energy consumption.

(c) The dehumidifier passing the maximum operating conditions test for Grade 1 to 4.

(d) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director due to decrease in energy factor, the tested energy factor calculated in the compliance monitoring testing being not less than 90% of the measured energy factor calculated by the test results submitted to the Director.

11.9.2. The Director may remove from the record the reference number of a listed model of dehumidifier, if he has reasonable grounds to believe that the dehumidifier does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 11.9.1 above and apply for further testing of the concerned model for the Director's consideration.

11.9.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of dehumidifier will be accepted as conformance if the results of further testing meet the following criteria:

(a) The average of the tested dehumidifying capacities of all the samples being not less than 90% of the rated dehumidifying capacity.

(b) The average of the tested energy consumptions of all the samples being not greater than 110% of the rated energy consumption.

(c) Each sample passing the maximum operating conditions test for Grade 1 to 4.

(d) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade determined by the average of the tested energy factors of all the samples calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade determined by the average of the tested energy factors of all the samples calculated in the further testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director due to decrease in energy factor, the average of the tested energy factors of all the samples calculated in the further testing being not less than 90% of the measured energy factor calculated by the test results submitted to the Director.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

12. Energy Efficiency Labelling for Televisions

12.1. Scope

12.1.1. Clause 12 of the Code, unless the Director provides otherwise, applies to a television defined in the Ordinance, that is, the products specified in clauses 12.1.2 and 12.1.3.

12.1.2. "Television", subject to clause 12.1.3 of the Code, means a product —

(a) that is an appliance for the reception and display of television broadcasts; and

(b) that—

(i) uses mains electricity as the only power source;

(ii) has a rated visible diagonal screen size exceeding 50 centimeters but not exceeding 250 centimeters; and

(iii) has a built-in television tuner.

12.1.3. "Television" does not include a product that displays broadcasts by means of front or rear projection.

12.2. Definitions

This clause provides definitions of terms used in clause 12 of the Code. Unless otherwise specified, the definitions adopted in clause 12 follow those stipulated in the Ordinance, if any.

default picture setting	means picture setting for televisions in the home or default configuration.
IEC	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).
luminance	means photometric measure of the luminous intensity per unit area of light travelling in a given direction.
mains electricity	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50 Hz.
on-mode	means the condition where the television is connected to the mains power sources and produces sound and picture.

on-mode power	means the power being used when the television is in "on-mode" at the default picture setting.
overall brightest preset picture setting	means the brightest selectable preset picture setting that produces highest luminance picture.
peak luminance ratio	means the ratio of peak luminance produced between the default picture setting and the overall brightest preset picture setting.
rated visible diagonal screen size	means the visible diagonal screen size as determined and declared by the manufacturer or importer of the television in accordance with the standard and requirements specified in the Code.
standby-mode	means the television is connected to a power source, produces neither sound nor picture, does not transmit nor receive program information and/or data, and is waiting to be switched to "on-mode".
standby power	means the power being used when the television is in "standby-mode".

12.3. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with IEC 62087, IEC 62301 or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a television. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) On-mode power consumption test;

(b) Standby power consumption test;

(c) Peak luminance ratio test; and

(d) Measurement of diagonal screen size.

12.4. Test Methodology and Energy Efficiency Grading

12.4.1. Test Conditions

In carrying out the tests as specified in clause 12.3, the television shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified in relevant standards. Moreover, unless the Director approves otherwise, the following test conditions shall be followed:

(a)	Electrical supply	220Va.c. ± 6%
(b)	Frequency	50Hz ± 1Hz
(c)	Line impedance	< 0.25 ohm
(d)	Total harmonic distortion	< 2% (voltage)
(e)	Test room temperature	23 °C ± 5 °C

12.4.2. Measurement of On-mode Power Consumption

(a) The on-mode power consumption test using dynamic broadcast-content video signal at the default picture setting shall be conducted in accordance with IEC 62087 or other equivalent international standards approved by the Director.

(b) The measurements of on-mode power consumption at the default picture setting shall be the average power consumed over ten consecutive minutes.

(c) The annual energy consumption shall be calculated by multiplying the measured power consumption by an average of 1460 hours per year.

12.4.3. Measurement of Standby Power Consumption

(a) The standby power consumption test shall be conducted in accordance with IEC 62301 or other equivalent international standards approved by the Director.

(b) The average standby power consumption of the television shall be determined by computing the average value of five (5) respective separate power consumption measurements.

12.4.4. Measurement of Peak Luminance Ratio

(a) The measurement for peak luminance ratio (L_{ratio}) produced between the default picture setting ($L_{default}$) and the overall brightest preset picture setting ($L_{brightest}$) shall be conducted in accordance with IEC 62087 or other equivalent standards approved by the Director. The peak luminance ratio shall be calculated as follows:-

$$L_{ratio} = L_{default} / L_{brightest}$$

(b) The peak luminance ratio of the default picture setting of the television as delivered by the manufacturer shall not be less than 65% of the peak luminance of the brightest on-mode condition provided by the television. Any television with the peak luminance ratio below 65% can only obtain a Grade 5 level.

12.4.5. Determination of Energy Efficiency Index (EEI)

The Energy Efficiency Index (EEI) is used to determine the energy efficiency of a television at the test condition and is calculated as follows:-

$$\text{Energy Efficiency Index (EEI)} = \frac{P}{P_{ref}\,A}$$

where A = *Television visible screen area (cm2)*

P = *On-mode power consumption (W)*

$P_{ref}\,A = P_{basic} + (A/100)$ x 4.3224 *Watts/ cm2*

P_{basic} = *20 Watts for televisions with one tuner and no hard disc*

P_{basic} = *24 Watts for televisions with one tuner with a hard disc; or two or more tuners*

P_{basic} = *28 Watts for televisions with hard disc(s) and two or more tuners*

12.4.6. Energy Efficiency Grading

The energy efficiency grading of a television shall be determined as shown in Table 12.1, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 12.1 – Derivation of energy efficiency grades

Energy Efficiency Index (EEI)	Energy Efficiency Grade (Notes)
EEI < 0.13	1
0.13 ≤ EEI < 0.195	2
0.195 ≤ EEI < 0.265	3
0.265 ≤ EEI < 0.36	4
0.36 ≤ EEI	5

Notes:

Any television with the maximum allowable standby power more than 0.5W or peak luminance ratio below 65% can only obtain a Grade 5 level.

An example illustrating the method on how to determine the energy efficiency grade of a television is shown in Appendix 6A.

12.5. Performance Requirements

12.5.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the tests carried out in accordance with IEC 62087, IEC 62301 or other equivalent international standards approved by the Director shall show that the concerned model conforms with the following performance requirements—

(a) The measured on-mode power consumption at the default picture setting shall not exceed the rated on-mode power consumption at the default picture setting by more than 5%.

(b) The average of measured standby power consumption shall not exceed 0.5W. Any television with the average measured standby power more than 0.5W can only obtain a Grade 5 level.

(c) The measured peak luminance ratio at the default picture setting of a television as delivered by the manufacturer shall not be less than 65% of the peak luminance of the brightest on-mode condition provided by the television. Any television with the measured peak luminance ratio below 65% can only obtain a Grade 5 level.

(d) The measured visible screen size diagonal dimension shall not exceed the rated visible screen size by ± 1cm.

12.5.2. The rated on-mode power consumption, rated standby power consumption, rated peak luminance and rated visible screen size diagonal as declared by the manufacturer or importer shall meet the requirements in clause 12.5.1 of the Code.

12.6. Safety Requirements

In addition to the energy efficiency performance requirements, all televisions shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the televisions.

12.7. Number of Samples to be Tested

12.7.1. For submission of product information of a model under section 6 of the Ordinance, a test report on one sample of the model shall be submitted.

12.8. Energy Label

12.8.1. The specification of the energy label for television is shown in Appendix 6B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 6B.

12.8.2. (a) Subject to clause 12.8.2 (c), the energy label is to be attached or affixed to a prominent position of the television and is to be clearly visible.

(b) To avoid doubt, if only part of the television is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the television or its packaging in a manner specified by the Director where the Director has approved its being so attached.

12.8.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 6B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

12.8.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

12.9. Compliance

12.9.1. During the compliance monitoring testing carried out by the Director, a listed model of television will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested on-mode power consumption at the default picture setting shall not exceed the rated power consumption by more than 7%.

(b) The average of tested standby power consumption shall not be greater than the rated standby power consumption by more than 0.1W.

(c) The tested peak luminance ratio at the default picture setting of a television as delivered by the manufacturer shall not be less than 60% of the peak luminance of the brightest on-mode condition provided by the television for Grade 1 to 4. For

Grade 5, the tested peak luminance ratio at the default picture setting shall not be less than 95% of the peak luminance at the default picture setting determined by the test results submitted to the Director by the specified person.

(d) The tested visible screen size diagonal dimension shall not exceed the rated visible screen size by ± 1cm.

(e) The tested energy efficiency grade meeting either one of the followings:-

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested energy efficiency index calculated in the compliance monitoring testing being not greater than 110% of the measured energy efficiency index calculated by the test results submitted to the Director.

12.9.2. The Director may remove from the record the reference number of a listed model of television, if he has reasonable grounds to believe that the television does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 12.9.1 above and apply for further testing of the concerned model for the Director's consideration.

12.9.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of television will be accepted as conformance if the results of further testing meet the following criteria:

(a) The tested on-mode power consumption at the default picture setting shall not exceed the rated power consumption by more than 7%.

(b) The average of tested standby power consumption shall not be greater than the rated standby power consumption by more than 0.1W.

(c) The tested peak luminance ratio at the default picture setting of a television as delivered by the manufacturer shall not be less than 60% of the peak luminance of the brightest on-mode condition provided by the television for Grade 1 to 4. For Grade 5, the tested peak luminance ratio at the default picture setting shall not be less than 95% of the peak luminance at the default picture setting determined by the test results submitted to the Director by the specified person.

(d) The tested visible screen size diagonal dimension shall not exceed the rated visible screen size by ± 1cm.

(e) The tested energy efficiency grade meeting either one of the followings:-

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director, the tested energy efficiency index calculated in the compliance monitoring testing being not greater than 110% of the measured energy efficiency index calculated by the test results submitted to the Director.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

13. Energy Efficiency Labelling for Storage Type Electric Water Heaters

13.1. Scope

13.1.1. Clause 13 of the Code, unless the Director provides otherwise, applies to a storage type electric water heater defined in the Ordinance, that is, the products specified in clauses 13.1.2 and 13.1.3.

13.1.2. "Storage type electric water heater", subject to clause 13.1.3 of the Code, means a product—

(a) that is a household appliance –

(i) designed for heating water in a thermally well-insulated container and for the storage of heated water; and

(ii) having a device to control the water temperature; and

(b) that –

(i) uses mains electricity as the only power source; and

(ii) has a rated water storage capacity not exceeding 50 litres.

13.1.3. "Storage type electric water heater" does not include a product that —

(a) is designed for making hot drinks or food only; or

(b) has more than one heated volume.

13.2. Definitions

This clause provides definitions of terms used in clause 13 of the Code. Unless otherwise specified, the definitions adopted in the clause 13 follow those stipulated in the Ordinance, if any.

fixed loss ($E_{st,fix}$)	means average energy consumption due to heat loss of a storage type electric water heater per 24 hours (kWh/24h) caused by heat bridges such as water and pipe connections.

local factor ($E_{st,loc}$)	means additional energy consumption due to heat loss of a storage type electric water heaters per 24 hours (kWh/24h) caused by the requirements for the installation of safety valves at the water heater.
IEC	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).
mains electricity	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50 Hz.
mean water temperature (θ_M)	means the average of the mean water temperature after a thermostat cut-out (θ_A) and the mean water temperature after a thermostat cut-in (θ_E).
mean water temperature after a thermostat cut-in (θ_E)	means average value of n number of temperatures recorded after each cut-in of the thermostat of a storage type electric water heater.
mean water temperature after a thermostat cut-out (θ_A)	means average value of n number of temperatures recorded after each cut-out of the thermostat of a storage type electric water heater.
measured standing loss ($E_{st,meas}$)	means the standing loss per 24 hours of a storage type electric water heater measured in accordance to IEC 60379 standard.
open outlet or vented water heater	means a storage type electric water heater in which the pressure due to the expanded water can be released through the overflow or vent pipe and the flow of water is generally controlled by a valve in the inlet pipe.
rated standing loss	means the standing loss per 24 hours of a storage type electric water heater as determined and declared by the manufacturer or importer of the storage type electric water heater in accordance with the standard and requirements specified in the Code.

rated water storage capacity (V)	means the water storage capacity as determined and declared by the manufacturer or importer of the storage type electric water heater in accordance with the standard and requirements specified in the Code.
standing loss	means the electrical energy consumption of a filled storage type electric water-heater, after steady-state conditions have been reached, when connected to the electrical supply, during any 24 hours when no water is withdrawn.
unvented water heater	means a storage type electric water heater designed to work under the pressure of the water supply mains and the flow of water being controlled by one or more valves in the outlet system.
variable standing loss ($E_{st,var}$)	means the result of fixed loss and local factor subtracted from the standing loss.

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13.3. Classification of Storage Type Electric Water Heaters

All storage type electric water heaters regulated under the Ordinance are classified in accordance with Table 13.1 into the following two categories: -

Table 13.1 – Classification of storage type electric water heaters

Category	Description
1	Unvented storage type electric water heaters
2	Open outlet or vented storage type electric water heaters

13.4. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with IEC 60379, or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a storage type electric water heater. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Water storage capacity test;

(b) Energy consumption test for the measurement of standing loss per 24 hours;

(c) Hot water output test; and

(d) Reheating time test.

13.5. Test Methodology and Energy Efficiency Grading

13.5.1. Test Conditions

(a) In carrying out the tests as specified in clause 13.4 of the Code, the storage type electric water heater shall be tested at a voltage and frequency of mains electricity in Hong Kong i.e. at a voltage of 380/220 V and a frequency of 50 Hz. Measurements shall not be carried out if, in warm conditions, the voltage needed to provide the rated input deviates more than 5% from the rated voltage. Moreover, unless the Director approves otherwise, the requirements of IEC 60379 standard test conditions shall be followed:

(i) The measurements shall be carried out in a substantially draught-free room.

(ii) The ambient room temperature shall be 20±2ºC.

(iii) The relative humidity in the test room shall not exceed 85%.

(iv) The water supplied to the water heater shall be maintained at a cold water temperature (θ_c) of 15±2ºC and provided from a source having a substantially steady pressure.

(v) The tested storage type electric water heater shall be installed according to the manufacturer's instruction.

(b) The thermostat of storage type electric water heaters where adjustment is provided shall be set so that the mean water temperature (θ_M), as measured in accordance with IEC60379, is 65±3 ºC. The thermostat setting shall remain unchanged throughout the test measurements. For storage type electric water heaters where regulation of the water heater thermostat is not provided for the user, no adjustment to the thermostat setting shall be made.

13.5.2. Measurement of Water Storage Capacity

The water storage capacity of a storage type electric water heater shall be determined by using the test results of the test as measured in accordance with the relevant clause of IEC 60379.

13.5.3. Measurement of Stored Water Temperature

(a) Measurements of water temperature without withdrawal of water shall be made with a thermocouple placed inside the upper section of the container. However, for metal containers the thermocouple may be placed on the outer surface of the container.

(i) The mean water temperature after a thermostat cut-out (θ_A) shall be the average value of n number of temperatures (θ_{Ai}) recorded after each cut-out of the thermostat and is given by:

$$\theta_A = (\sum_{i=1}^{i=n} \theta_{Ai})/n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.\ 1)$$

(ii) The mean water temperature after a thermostat cut-in (θ_E) shall be the average value of n number of temperatures (θ_{Ei}) recorded after each cut-in of the thermostat and is given by:

$$\theta_E = (\sum_{i=1}^{i=n} \theta_{Ei})/n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.\ 2)$$

(b) Measurements of temperature of withdrawn water shall be measured by using the test results of the test as measured in accordance with the relevant clause of IEC 60379. It shall be made in the outflow which is to be continuous. The temperature shall be measured to an accuracy of ±0.5K and, if a thermometer is used, it shall be a type that records quickly and accurately in any position.

13.5.4. Measurement of Standing Loss and Calculation of Annual Standby Loss Energy Consumption

(a) The methodology for measuring standing loss expressed in kilowatt-hour per 24 hours (kWh/24h) shall be based on IEC 60379 or other equivalent international standards approved by the Director.

(b) The storage type electric water heater shall first be filled with cold water at the temperature θ_c for the measurement. The electrical supply shall then be switched on for a few cycles of operation of the thermostat until steady conditions have been reached. Starting and ending at a cut-out of the thermostat, the energy (E_1) consumed during time (t_1) in hours shall be measured over a period of not less than 48 hours. The water temperatures (θ_{Ei}) at each thermostat cut-in and (θ_{Ai}) at each thermostat cut-out shall be measured by means of a thermocouple

positioned as described in clause 13.5.3(a) of the Code.

The energy consumption (E) per 24 hours shall be calculated according to the following formula:

$$\mathrm{E} = (E_1 \times 24)/t_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.3)$$

The mean water temperature θ_M shall be calculated by the formula:

$$\theta_M = (\theta_A + \theta_E)/2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.4)$$

where θ_A and θ_E being calculated as indicated in clause 13.5.3(a) of the Code.

(c) Measured standing loss ($\mathrm{E_{st,meas}}$) that is related to a temperature rise of 45K and expressed in kilowatt-hours per 24 hours shall be calculated according to the formula:

$$\mathrm{E_{st,meas}} = \left[\frac{45}{\theta_M - \theta_{amb}}\right] \times E \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.5)$$

where θ_{amb} is the ambient temperature during the test.

The measured standing loss ($\mathrm{E_{st,meas}}$) of a storage type electric water heater shall be shown on the energy label after it is calculated to annual standby loss energy consumption by multiplying the kWh figure over the 24-hour period by 75, assuming an annual standby hours of 1,800 hours.

13.5.5. Calculation of Variable Standing Loss

The measured standing loss of a storage type electric water heater is composed of two components: the variable standing loss ($\mathrm{E_{st,var}}$) which varies with a series of physical parameters of the storage type electric water heater itself, and the fixed loss ($\mathrm{E_{st,fix}}$) caused by heat bridges such as water and pipe connections. While the variable standing loss differs from heater to heater, the fixed loss is more or less the same for all heaters of the same category. To better compare the energy efficiency of the water heater, it is necessary to eliminate the fixed loss, and compare just the variable standing loss. The value of the fixed loss refers to given in Table 13.2.

Table 13.2 – Fixed loss per 24 hours

Category	Fixed Loss per 24 hours $\mathrm{E_{st,fix}}$ (kWh/24h)
1 (unvented) and 2 (open outlet or vented)	$\mathrm{E_{st,fix}} = 0.072$

To reflect the effect of the requirements for installing safety valves and local conditions at the water heater, a local factor ($E_{st,loc}$) as shown in Table 13.3 is to be subtracted from the measured standing loss with respect to the different categories.

Table 13.3 – Local factor to be subtracted from the measured standing loss

Category	Local factor per 24 hours $E_{st,loc}$ (kWh/24h)
1 (unvented)	0.2
2 (open outlet or vented)	0.1

The variable standing loss of a storage type electric water heater is thus calculated by the following equation:

$$E_{st,var} = E_{st,meas} - E_{st,fix} - E_{st,loc} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.\,6)$$

where

- $E_{st,var}$ = variable standing loss per 24 hours (kWh/24h).
- $E_{st,meas}$ = measured standing loss per 24 hours (kWh/24h).
- $E_{st,fix}$ = fixed loss per 24 hours (kWh/24h), as given in Table 13.2.
- $E_{st,loc}$ = local factor per 24 hours (kWh/24h), as given in Table 13.3.

13.5.6. Average Appliance Energy Consumption

The average energy consumption of a storage type electric water heater due to standing loss and fixed loss shall be determined in accordance with Table 13.4.

Table 13.4 – Average energy consumption due to standing loss and fixed loss

Category	Average Energy Consumption due to Standing Loss per 24 hours $E_{st,av}$ (kWh/24h)	Average Energy Consumption of Fixed Loss per 24 hours $E_{st,fix}$ (kWh/24h)
1 (unvented) and 2 (open outlet or vented)	$E_{st,av} = 0.13 + 0.0553V^{2/3}$	$E_{st,fix} = 0.072$

*V is the rated water storage capacity in litres

The average appliance energy consumption is given by:

$$E_{st,av,var} = E_{st,av} - E_{st,fix} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.7)$$

where

- $E_{st,av,var}$ = average appliance energy consumption per 24 hours (kWh/24h).

- $E_{st,av}$ = average energy consumption due to standing loss per 24 hours (kWh/24h), as given in table 13.4.

- $E_{st,fix}$ = fixed loss per 24 hours (kWh/24h), as given in table 13.4.

13.5.7. Energy Efficiency Grading

(a) Energy Consumption Index (I_ε)

(i) The energy consumption index (I_ε) of a storage type electric water heater is defined as the ratio of the variable standing loss of the storage type electric water heater to the average appliance energy consumption of a storage type electric water heater with similar category and same rated water storage capacity as found from the associated average appliance energy consumption equations in clause 13.5.6 of the Code.

(ii) The index is expressed in percentages, and calculated as follows:

$$\text{Energy Consumption Index } (I_\varepsilon) = \frac{E_{st,var}}{E_{st,av,var}} \times 100\% \ldots\ldots (eq.8)$$

where

- $E_{st,var}$ = variable standing loss per 24 hours (kWh/24h), as given by clause 13.5.5.

- $E_{st,av,var}$ = average appliance energy consumption per 24 hours (kWh/24h), as given by clause 13.5.6.

Thus, within a category, a storage type electric water heater with a lower energy consumption index (i.e. a lower percentage) consumes less energy than a storage type electric water heater with a higher energy consumption index (i.e. a higher percentage).

(b) Storage Type Electric Water Heater Energy Efficiency Grading

The energy efficiency grading of a storage type electric water heater shall be determined from Energy Consumption Index as shown in Table 13.5, with Grade 1 being the most energy efficient and Grade 5 the least.

Table 13.5 – Derivation of energy efficiency grades

Energy Consumption Index : I_ε (%)	Energy Efficiency Grade
$I_\varepsilon \leq 75$	1
$75 < I_\varepsilon \leq 90$	2
$90 < I_\varepsilon \leq 105$	3
$105 < I_\varepsilon \leq 120$	4
$120 < I_\varepsilon$	5

An example illustrating the method on how to determine the energy efficiency grade of a storage type electric water heater is shown in Appendix 7A.

13.5.8. Measurement of Hot Water Output

Immediately following the measurement of the standing loss according to clause 13.5.4 of the Code, the water heater shall be switched off after a cut-out of the thermostat. Then, a quantity of water equal to the rated water storage capacity shall be withdrawn through the outlet at a constant rate of flow by supplying cold water at the temperature θ_c; the flow of water from open outlet water or vented heaters shall be controlled by the inlet valve if applicable. The flow in other type of water heater shall be kept constant by means of a valve fitted in the outlet if applicable. The rate of flow shall be adjusted:

- to 2 litre/min. for water heaters with a rated water storage capacity less than 10 litre;

- to 5 litre/min. for water heaters with a rated water storage capacity of 10 litre up to 50 litre;

The temperature of the withdrawn water shall be measured in the manner described in clause 13.5.3(b) of the Code and the average temperature of withdrawn water (θ'_p) established. The mean water temperature (θ_p) shall be calculated from the following formula:

$$\theta_p = 50 \times \frac{\theta'_p - \theta_c}{\theta_A - \theta_c} + 15 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.9)$$

where

- $\theta_c =$ temperature of cold water within 15±2ºC.

- $\theta_A =$ mean water temperature after a thermostat cut-out

The hot water output shall be recorded as the rated water storage capacity at θ_p (…litres at …℃).

13.5.9. Measurement of Reheating Time

Immediately following determination of θ_p according to the precedent clause:

- the electrical supply shall be switched on;

- the heating time (t_R) from switch-on until the first cut-out of the thermostat when the temperature of the water (θ_R) as measured according to clause 13.5.3 of the Code shall be within 10K of (θ_A).

The reheating time required for heating up the water from 15℃ to 65℃ shall be calculated from the following formula and expressed in hours and minutes:

$$t_{R,50} = t_R \times \frac{50}{\theta_R - \theta_c} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (eq.10)$$

where

$\theta_R =$ water temperature after reheating;

$\theta_c =$ temperature of cold water within 15±2ºC.

13.6. Performance Requirements

13.6.1. In the test report submitted to the Director under section 6 of the Ordinance, the results of the test carried out in accordance with the relevant clauses of IEC 60379, or other equivalent international standards approved by the Director shall show that the concerned model of the storage type electric water heater conforms with the following performance requirements—

(a) The measured standing loss shall not be greater than 105% of the rated standing loss.

(b) The measured water storage capacity shall not be lower than 98% of the rated water storage capacity.

(c) The measured hot water output shall not be lower than 90% of the rated hot water output.

(d) The measured reheating time shall not be longer than 110% of the rated reheating time.

13.6.2. The rated standing loss, rated water storage capacity, rated hot water output and rated reheating time as declared by the manufacturer or importer shall meet the requirements specified in clause 13.6.1 of the Code.

13.7. Safety Requirements

In addition to the energy efficiency performance requirements, all storage type electric water heaters shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the storage type electric water heater.

13.8. Number of Samples to be Tested

For submission of product information of a model under section 6 of the Ordinance, a test report on one sample of the model shall be submitted.

13.9. Energy Label

13.9.1. The specification of the energy label for storage type electric water heater is shown in Appendix 7B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in strict accordance with the requirements in Appendix 7B.

13.9.2. (a) Subject to clause 13.9.2(c), the energy label is to be attached or affixed to a prominent position of the storage type electric water heater and is to be clearly visible.

(b) For the avoidance of doubt, if only part of the storage type electric water heater is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the storage type electric water heater or its packaging in a manner specified by the Director where the Director has approved its being so attached.

13.9.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 7B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

13.9.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

13.10. Compliance

13.10.1. During the compliance monitoring testing carried out by the Director, a listed model of storage type electric water heater will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested standing loss shall not be greater than 105% of the rated standing loss.

(b) The tested water storage capacity shall not be lower than 98% of the rated water storage capacity.

(c) The tested hot water output shall not be lower than 90% of the rated hot water output.

(d) The tested reheating time shall not be longer than 110% of the rated reheating time.

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director by the specified person, the tested energy consumption index calculated in the compliance monitoring testing being not greater than 105% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.

13.10.2. The Director may remove from the record the reference number of a listed model of storage type electric water heater, if he has reasonable grounds to believe that the storage type electric water heater does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 13.10.1 above and apply for further testing of the concerned model for the Director's consideration.

13.10.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of storage type electric water

heater will be accepted as conformance if the results of further testing meet the following criteria:

(a) The average of the tested standing loss of all the samples shall not be greater than 105% of the rated standing loss.

(b) The average of the tested water storage capacity of all the samples shall not be lower than 98% of the rated water storage capacity.

(c) The average of the tested hot water output of all the samples shall not be lower than 90% of the rated hot water output.

(d) The average of the tested reheating time of all the samples shall not be longer than 110% of the rated reheating time.

(e) The tested energy efficiency grade meeting either one of the following:

(i) The energy efficiency grade determined by the average of the tested energy consumption index of all the samples calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or

(ii) If the energy efficiency grade determined by the average of the tested energy consumption index of all the samples calculated in the further testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director by the specified person, the average of the tested energy consumption index of all the sample calculated in the further testing being not greater than 105% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

14. Energy Efficiency Labelling for Induction Cookers

14.1. Scope

14.1.1. Clause 14 of the Code, unless the Director provides otherwise, applies to an induction cooker defined in the Ordinance, that is, the products specified in clauses 14.1.2 and 14.1.3.

14.1.2. "Induction cooker", subject to clause 14.1.3 of the Code, means a product —

(a) that is an encased assembly using electromagnetic induction heating as the heat source for household cooking; and

(b) that—

(i) uses mains electricity as the only power source;

(ii) has a rated power not less than 700 watts but not exceeding 3 500 watts for each heating unit; and

(iii) has a total rated power not exceeding 7 000 Watts.

14.1.3. "Induction cooker" does not include a product that —

(a) contains electric heating unit not using electromagnetic induction heating as the heat source or

(b) is a concave stove.

14.2. Definitions

This clause provides definitions of terms used in clause 14 of the Code. Unless otherwise specified, the definitions adopted in the clause 14 follow those stipulated in the Ordinance, if any.

GB	means Guobiao standards (the latest edition of the standard shall be followed for test methodology).
heating unit	means a part of the induction cooker with independent heating function on which a countertop container can be placed.
mains electricity	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50Hz.

rated power per heating unit	means the power of a heating unit when operating independently, as determined and declared by the manufacturer or importer of the induction cooker in accordance with the standard and requirements specified in this Code.
thermal efficiency	means the ratio of the heat received in a heating unit of an induction cooker at a given time to the power input to a heating unit of an induction cooker.
total rated power	means the power of an induction cooker as determined and declared by the manufacturer or importer of the induction cooker in accordance with the standard and requirements specified in this Code.

14.3. Tests Required to be Carried Out

The tests specified in this clause are required to be carried out, in accordance with GB 21456 or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of an induction cooker. A test report required to be submitted to the Director under section 6 of the Ordinance shall contain the results of these tests:

(a) Power input test;

(b) Thermal efficiency test; and

(c) Standby power consumption test.

14.4. Test Methodology and Energy Efficiency Grading

14.4.1. Test Conditions

In carrying out the tests as specified in clause 14.3 of the Code, the induction cooker shall be tested at a voltage and frequency of mains electricity in Hong Kong with tolerances as specified the relevant standard. Moreover, unless the Director approves otherwise, the following test conditions shall be followed:

(a) Relative humidity: 45% ~ 85%;

(b) Atmospheric pressure: 86kPa ~ 106kPa; and

(c) Ambient temperature: 20 ºC±2 ºC and without influence of air flow and heat radiation in the test venue.

14.4.2 Measurement of Thermal Efficiency and Power Input

(a) The thermal efficiency test shall be conducted in accordance with Annex B of GB 21456 and the corresponding standard pot used for the test shall satisfy the requirements and the size specification in Annex A of GB 21456, or other equivalent international standards approved by the Director.

(b) The thermal efficiency test shall be conducted three times and the average value of the three thermal efficiency measurements shall be taken as the thermal efficiency of an induction cooker. For an induction cooker with two or more heating units, test should be conducted on each of the heating units.

(c) The power input and the energy consumption of each heating unit at the maximum heating mode shall be measured during the thermal efficiency test.

(d) The total power input of the induction cooker at the maximum heating mode shall be measured.

(e) The annual energy consumption of the induction cooker shall be calculated by multiplying the measured power input by an average of 220 hours per year.

14.4.3 Measurement of Standby Power Consumption

The standby power consumption test at the test condition shall be conducted in accordance with Annex C of GB 21456 or other equivalent international standards approved by the Director. The power consumption of an induction cooker at the maximum standby power mode shall be measured during the standby power consumption test and is calculated as follows:-

$$P = E / t$$

where P *is the average power consumption (W).*

E *is the measured energy consumption (Wh).*

t *is the duration of measurement (hour).*

14.4.4. Calculation of Thermal Efficiency

The thermal efficiency (η) is used to measure the energy efficiency of an induction cooker at the test condition and is calculated as follows:-

$$\eta = (c1 \times m1 + c2 \times m2) \times \Delta t \times 100\% / (3.6 \times 10^3 \times E)$$

where *η is the thermal efficiency (%).*

c1 is the specific heat capacity of water, 4.18 (kJ/(kg · K)).

m1 is the mass of water (kg).

c2 is the specific heat capacity of pot body and lid, 0.46 (kJ/(kg · K));

m2 is the total mass of pot body and lid (kg);

E is the energy consumption (kWh);

Δt is the temperature rise, Δt=t2 – t1 (K).

14.4.5. Energy Efficiency Grading

The energy efficiency grading of an induction cooker shall be determined as shown in Table 14.1, with Grade 1 having the best performance and Grade 5 having the worst performance.

Table 14.1 – Derivation of energy efficiency grades

Rated and Measured Thermal Efficiency, η(%)		**Energy Efficiency Grade** *(Notes)*
Rated Power of Heating Unit > 1200W	Rated Power of Heating Unit ≤ 1200W	
η ≥ 90	η ≥ 88	1
90 > η ≥ 88	88 > η ≥ 86	2
88 > η ≥ 86	86 > η ≥ 84	3
86 > η ≥ 84	84 > η ≥ 82	4
η < 84	η < 82	5

Notes:

Any induction cooker with the rated or measured standby power consumption more than 1W for one heating unit, or more than 2W for two or more heating units, can only obtain a Grade 5 level.

For an induction cooker with two or more heating units, the lowest energy efficiency grade among heating units is used to determine the overall energy efficiency grade.

An example illustrating the method on how to determine the energy efficiency grade of an induction cooker is shown in Appendix 8A.

14.5. Performance Requirements

14.5.1 In the test report submitted to the Director under section 6 of the Ordinance, the results of the tests carried out in accordance with GB 21456 or other equivalent international standards approved by the Director shall show that the concerned model conforms with the following performance requirements—

(a) The measured power inputs of each heating unit and whole induction cooker shall be neither less than 95% nor greater than 105% of the rated power inputs of each heating unit and whole induction cooker.

(b) The thermal efficiency calculated shall meet the requirements as stipulated in clause 14.4.5 of the Code.

(c) The measured standby power consumption shall not exceed 1W for one heating unit or 2W for two or more heating units. Any induction cooker failing to meet this requirement can only obtain Grade 5.

(d) The rated power input, rated thermal efficiency and rated standby power consumption as declared by the manufacturer or importer shall meet the requirements specified in clause 14.5.1 of the Code.

14.6. Safety Requirements

In addition to the energy efficiency performance requirements, all induction cookers shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislations concerning the safety of the induction cookers.

14.7. Number of Samples to be Tested

14.7.1. For submission of product information of a model under section 6 of the Ordinance, a test report on one sample of the model shall be submitted.

14.8. Energy Label

14.8.1. The specification of the energy label for induction cooker is shown in Appendix 8B. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products of the listed model showing the energy efficiency grade and associated information in accordance with the requirements in Appendix 8B.

14.8.2. (a) Subject to clause 14.8.2(c), the energy label is to be attached or affixed to a prominent position of the induction cooker and is to be clearly visible.

(b) To avoid doubt, if only part of the induction cooker is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.

(c) The energy label may be attached to the induction cooker or its packaging in a manner specified by the Director where the Director has approved its being so attached.

14.8.3. The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Appendix 8B or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.

14.8.4. The paper used for the energy label shall be durable with good wear and tear characteristics.

14.9. Compliance

14.9.1. During the compliance monitoring testing carried out by the Director, a listed model of induction cooker will be accepted as conformance if the test results of a single sample of the listed model meet the following criteria:

(a) The tested power inputs of each heating unit and whole induction cooker shall be neither less than 95% nor greater than 105% of the rated power inputs of each heating unit and whole induction cooker.

(b) The thermal efficiency calculated in the compliance monitoring testing being equal to or better than the requirements of thermal efficiency as stipulated in Clause 14.4.5 for the respective grade determined by the specified person.

(c) The tested standby power consumption shall not exceed 1W for one heating unit or 2W for two or more heating units for Grade 1 to 4.

14.9.2. The Director may remove from the record the reference number of a listed model of induction cooker, if he has reasonable grounds to believe that the induction cooker does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 14.9.1 above and apply for further testing of the concerned model for the Director's consideration.

14.9.3. If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A listed model of induction cooker will be accepted as conformance if the results of further testing meet the following criteria:

(a) The tested power inputs of each heating unit and whole induction cooker shall be neither less than 95% nor greater than 105% of the rated power inputs of each heating unit and whole induction cooker.

(b) The thermal efficiency calculated in the compliance monitoring testing being equal to or better than the requirements of thermal efficiency as stipulated in Clause 14.4.5 for the respective grade determined by the specified person.

(c) The tested standby power consumption shall not exceed 1W for one heating unit or 2W for two or more heating units for Grade 1 to 4.

(Remark: The specified person can choose to accept the results of further testing undertaken on fewer than three samples if the results of each sample subsequently tested also do not meet the acceptance criteria as stated above.)

Appendix 1A

Example for Calculating the Energy Efficiency Grade for Room Air Conditioner

(Cooling - Fixed Capacity Single Package Type)

Step (1)

Rated cooling capacity	6.000 kW
Rated power input	1.850 kW

Measured cooling capacity at 35℃, $\Phi_{ful}\ (\mathbf{35})$	5.899 kW
Measured power input at 35℃, $\boldsymbol{P_{ful}}\ (\mathbf{35})$	1.855 kW

Step (2)

Calculated cooling capacity at 29℃, $\Phi_{ful}\ (\mathbf{29})$ $=1.077 \times \Phi_{ful}\ (35)$	6.353 kW
Calculated cooling power input at 29℃, $\boldsymbol{P_{ful}}\ (\mathbf{29})$ $=0.914 \times P_{ful}\ (35)$	1.695 kW

The defined cooling load is assumed linearly changing depending on the change in outdoor temperature as shown below:

Parameter	Load zero (0)	Load 100%
Cooling load (W)	0	6000
Outdoor Temperature (°C)	23	35

Degradation Coefficient, C_D = 0.25

Step (3)

A	B	C	D	E	F	G	H	I	J
Bin no. j	Out-door temp	Ref. bin hours	$\Phi_{ful}(t_j)$	$P_{ful}(t_j)$	$L_c(t_j)$	$X(t_j)$	$F_{PL}(t_j)$	$L_{CST}(t_j)$	$C_{STE}(t_j)$
1	24	67	6.7317422	1.56253	0.5	0.0743	0.768568744	33.5	10.117
2	25	117	6.6560383	1.58912	1	0.1502	0.78755988	117	35.468
3	26	147	6.5803345	1.61571	1.5	0.228	0.806987984	220.5	67.09
4	27	177	6.5046307	1.64229	2	0.3075	0.826868315	354	108.09
5	28	210	6.4289268	1.66888	2.5	0.3889	0.847216848	525	160.86
6	29	183	6.353223	1.69547	3	0.4722	0.868050319	549	168.78
7	30	114	6.2775192	1.72206	3.5	0.5575	0.889386273	399	123.07
8	31	75	6.2018153	1.74865	4	0.645	0.911243111	300	92.826
9	32	56	6.1261115	1.77524	4.5	0.7346	0.933640144	252	78.215
10	33	33	6.0504077	1.80182	5	0.8264	0.956597649	165	51.367
11	34	15	5.9747038	1.82841	5.5	0.9205	0.98013693	82.5	25.759
12	35	5	5.8990000	1.855	6	1	1	29.495	9.275
13	36	1	5.8232962	1.88159	6.5	1	1	5.8233	1.8816
		1200					Σ	3032.8	932.8
							CSPF	3.2513	

For details of the abbreviations and formulae, please refer to ISO 16358-1.

Step (4)

The cooling seasonal performance factor (CSPF), F_{CSP}, of the room air conditioner is 3.2513.

According to Table 7.8 in clause 7 of the Code, the single package type room air conditioner is rated as a **Grade 3** room air conditioner for cooling.

Example for Calculating the Energy Efficiency Grade for Room Air Conditioner

(Cooling - Variable Capacity Split Type)

Step (1)

Rated cooling full capacity	6.000 kW
Rated cooling full power input	1.850 kW
Rated cooling half capacity	3.000 kW
Rated cooling half power input	0.650 kW

Measured cooling full capacity at 35℃, Φ_{ful} (35)	5.899 kW
Measured cooling full power input at 35℃, P_{ful} (35)	1.855 kW
Measured cooling half capacity at 35℃, Φ_{haf} (35)	3.086 kW
Measured cooling half power input at 35℃, P_{haf} (35)	0.663 kW

Step (2)

Calculated cooling full capacity at 29℃, Φ_{ful} (29) $=1.077 \times \Phi_{ful}$ (35)	6.353 kW
Calculated cooling full power input at 29℃, P_{ful} (29) $=0.914 \times P_{ful}$ (35)	1.695 kW
Calculated cooling half capacity at 29℃, Φ_{haf} (29) $=1.077 \times \Phi_{haf}(35)$	3.324 kW
Calculated cooling half power input at 29℃, P_{haf} (29) $=0.914 \times P_{haf}$ (35)	0.606 kW

The defined cooling load is assumed linearly changing depending on the change in outdoor temperature as shown below:

Parameter	Load zero (0)	Load 100%
Cooling load (W)	0	6000
Outdoor Temperature (°C)	23	35

Degradation Coefficient, C_D = 0.25

Calculated outdoor temperature when cooling load is equal to cooling half capacity, t_c $=\frac{6\Phi_{ful}\ (35)\times 23+6\Phi_{haf}(35)\times(35-23)+0.077\times 35\Phi_{haf}(35)\times(35-23)}{6\Phi_{ful}\ (35)+0.077\Phi_{haf}(35)\times(35-23)}$	29.7℃
Outdoor temperature when cooling load is equal to cooling full capacity, t_b	*35℃

*In the calculation, t_b would be set as 35℃

Step (3)

Bin no. j	Outdoor temp. (℃)	*Ref. Bin hours, n_j	$\Phi_{ful}\ (t_j)$ (kW)	$P_{ful}\ (t_j)$ (kW)	$L_c\ (t_j)$ (kW)	Cooling load at t_j (kWh)	Energy consumption at t_j (kWh)
1	24	67	6.7317	1.5625	0.5	33.5000	6.7632
2	25	117	6.6560	1.5891	1	117.0000	23.2227
3	26	147	6.5803	1.6157	1.5	220.5000	43.0640
4	27	177	6.5046	1.6423	2	354.0000	68.0803
5	28	210	6.4289	1.6689	2.5	525.0000	99.4947
6	29	183	6.3532	1.6955	3	549.0000	102.5943
7	30	114	6.2775	1.7221	3.5	399.0000	75.9067
8	31	75	6.2018	1.7486	4	300.0000	61.9685
9	32	56	6.1261	1.7752	4.5	252.0000	56.9377
10	33	33	6.0504	1.8018	5	165.0000	41.1408
11	34	15	5.9747	1.8284	5.5	82.5000	22.9464
12	35	5	5.8990	1.8550	6	29.4950	9.2750
13	36	1	5.8233	1.8816	6.5	5.8233	1.8816
					Σ	L_{CST} =3032.8183	C_{CSE} =613.2760
					CSPF	4.9453	

For details of the abbreviations and formulae, please refer to ISO 16358-1.

Step (4)

The cooling seasonal performance factor (CSPF), F_{CSP}, of the room air conditioner is 4.9453.

According to Table 7.8 in clause 7 of the Code, the split type room air conditioner is rated as a **Grade 1** room air conditioner for cooling.

Example for Calculating the Energy Efficiency Grade for Room Air Conditioner

(Heating - Fixed Capacity Single Package Type)

Step (1)

Rated heating capacity at 7℃, ϕ_{ful} (7)	6.000 kW
Rated power input at 7℃, P_{ful} (7)	1.500 kW
Measured heating capacity at 7℃, ϕ_{ful} (7)	6.200 kW
Measured power input at 7℃, P_{ful} (7)	1.400 kW

Step (2)

Calculated heating capacity at 0℃, ϕ_{ful} (0) =0.82 x ϕ_{ful} (7)	5.084 kW
Calculated heating power input at 0℃, P_{ful} (0) = 0.91 x P_{ful} (7)	1.274 kW

The defined heating load is assumed linearly changing depending on the change in outdoor temperature as shown below:

Parameter	Load zero (0)	Load 100%
Heating load (kW)	0	5.084
Outdoor Temperature (°C)	17	0

Degradation Coefficient, C_D = 0.25

Step (3)

A	B	C	D	E	F	G	H	I	J	K
Bin no. j	Out-door temp	Ref. bin hours	$\Phi_{ful}(t_j)$	$P_{ful}(t_j)$	$L_h(t_j)$	$X(t_j)$	$F_{PL}(t_j)$	$P_{RH}(t_j)$	$L_{HST}(t_j)$	$C_{HSE}(t_j)$
1	0	0	5.0840000	1.274	4.920	0.968	0.99193548	0.000	0.000	0.000
2	1	0	5.2434286	1.292	4.631	0.883	0.97078055	0.000	0.000	0.000
3	2	0	5.4028571	1.310	4.341	0.803	0.95087411	0.000	0.000	0.000
4	3	0	5.5622857	1.328	4.052	0.728	0.93210880	0.000	0.000	0.000
5	4	0	5.7217143	1.346	3.762	0.658	0.91438924	0.000	0.000	0.000
6	5	0	5.8811429	1.364	3.473	0.591	0.89763037	0.000	0.000	0.000
7	6	1	6.0405714	1.382	3.184	0.527	0.88175614	0.000	3.184	0.826
8	7	4	6.2000000	1.400	2.894	0.467	0.86669829	0.000	11.576	3.016
9	8	6	6.3594286	1.418	2.605	0.410	0.85239544	0.000	15.628	4.088
10	9	11	6.5188571	1.436	2.315	0.355	0.83879218	0.000	25.468	6.688
11	10	15	6.6782857	1.454	2.026	0.303	0.82583841	0.000	30.388	8.011
12	11	19	6.8377143	1.472	1.736	0.254	0.81348871	0.000	32.993	8.731
13	12	24	6.9971429	1.490	1.447	0.207	0.80170178	0.000	34.729	9.225
14	13	29	7.1565714	1.508	1.158	0.162	0.79044000	0.000	33.572	8.950
15	14	38	7.3160000	1.526	0.868	0.119	0.77966906	0.000	32.993	8.827
16	15	44	7.4754286	1.544	0.579	0.077	0.76935754	0.000	25.468	6.837
17	16	49	7.6348571	1.562	0.289	0.038	0.75947666	0.000	14.181	3.820
		240						Σ	260.181	69.019
								HSPF	3.7697	

For details of the abbreviations and formulae, please refer to ISO 16358-2.

Step (4)

The heating seasonal performance factor (HSPF), F_{HSP}, of the reverse cycle type room air conditioner is 3.7697

According to Table 7.9 in clause 7 of the Code, the single package type room air conditioner is rated as a **Grade 1** room air conditioner for heating.

Example for Calculating the Energy Efficiency Grade for Room Air Conditioner

(Heating - Variable Capacity Split Type)

Step (1)

Rated heating full capacity at 7℃, ϕ_{ful} (7)	6.400kW
Rated heating full power input at 7℃, P_{ful} (7)	1.600 kW
Rated heating half capacity at 7℃, ϕ_{haf} (7)	3.100 kW
Rated heating half power input at 7℃, P_{haf} (7)	0.600kW
Measured heating full capacity at 7℃, ϕ_{ful} (7)	6.200kW
Measured heating full power input at 7℃, P_{ful} (7)	1.500 kW
Measured heating half capacity at 7℃, ϕ_{haf} (7)	3.086 kW
Measured heating half power input at 7℃, P_{haf} (7)	0.590 kW

Step (2)

Calculated heating full capacity at 0℃ =0.82 x ϕ_{ful} (7)	5.084kW
Calculated heating full power input at 0℃ =0.91 x P_{ful} (7)	1.365 kW

The defined heating load is assumed linearly changing depending on the change in outdoor temperature as shown below:

Parameter	Load zero (0)	Load 100%
Heating load (kW)	0	5.084
Outdoor Temperature (ºC)	17	0

Degradation Coefficient, C_D = 0.25

Step (3)

A	B	C	D	E	F	G	H	I	J	K
Bin no. j	Outdoor temp	Ref. bin hours	$\Phi_{ful}(t_j)$	$P_{ful}(t_j)$	$L_h(t_j)$	$X(t_j)$	$F_{PL}(t_j)$	$P_{RH}(t_j)$	$L_{HST}(t_j)$	$C_{HSE}(t_j)$
1	0	0	5.0840000	1.365	5.248	1.000	1.000000	0.614	0.000	0.000
2	1	0	5.2434286	1.384	4.939	1.000	1.000000	0.210	0.000	0.000
3	2	0	5.4028571	1.404	4.631	1.000	1.000000	0.000	0.000	0.000
4	3	0	5.5622857	1.423	4.322	1.000	1.000000	0.000	0.000	0.000
5	4	0	5.7217143	1.442	4.013	1.000	1.000000	0.000	0.000	0.000
6	5	0	5.8811429	1.461	3.704	1.000	1.000000	0.000	0.000	0.000
7	6	1	6.0405714	1.481	3.396	1.000	1.000000	0.000	3.396	0.673
8	7	4	6.2000000	1.500	3.087	1.000	1.000000	0.000	12.348	2.344
9	8	6	6.3594286	1.519	2.778	0.878	0.969435	0.000	16.670	3.246
10	9	11	6.5188571	1.539	2.470	0.761	0.940283	0.000	27.166	5.389
11	10	15	6.6782857	1.558	2.161	0.650	0.912523	0.000	32.414	6.548
12	11	19	6.8377143	1.577	1.852	0.544	0.886057	0.000	35.192	7.239
13	12	24	6.9971429	1.596	1.544	0.443	0.860797	0.000	37.045	7.759
14	13	29	7.1565714	1.616	1.235	0.347	0.836663	0.000	35.810	7.636
15	14	38	7.3160000	1.635	0.926	0.254	0.813581	0.000	35.192	7.639
16	15	44	7.4754286	1.654	0.617	0.166	0.791483	0.000	27.166	6.002
17	16	49	7.6348571	1.674	0.309	0.081	0.770309	0.000	15.127	3.402
		240						Σ	277.527	57.877
								HSPF	4.7951	

For details of the abbreviations and formulae, please refer to ISO 16358-2.

Step (4)

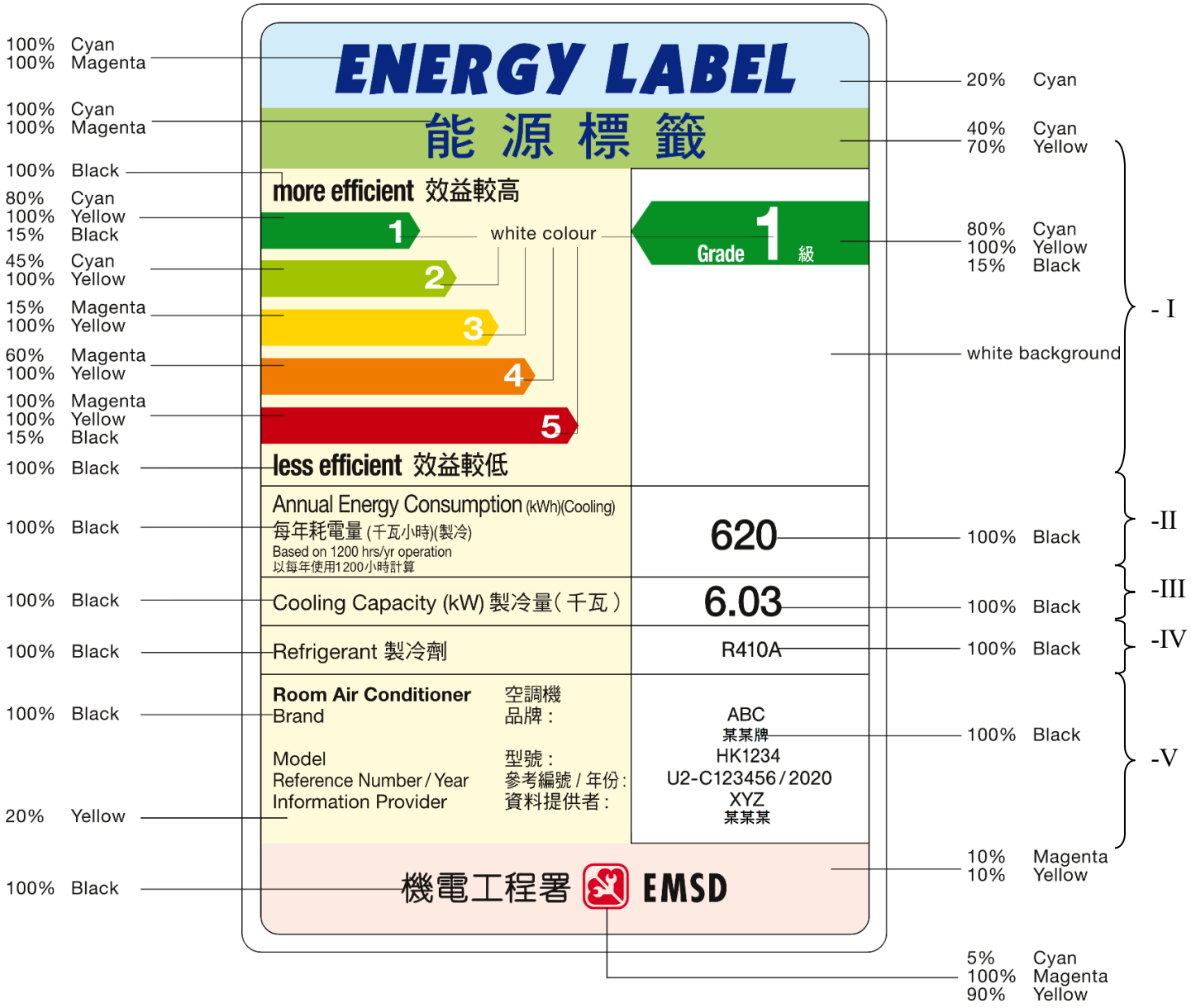
The heating seasonal performance factor (HSPF), F_{HSP}, of the reverse cycle type room air conditioner is 4.7951.

According to Table 7.9 in clause 7 of the Code, the split type room air conditioner is rated as a **Grade 1** room air conditioner for heating.

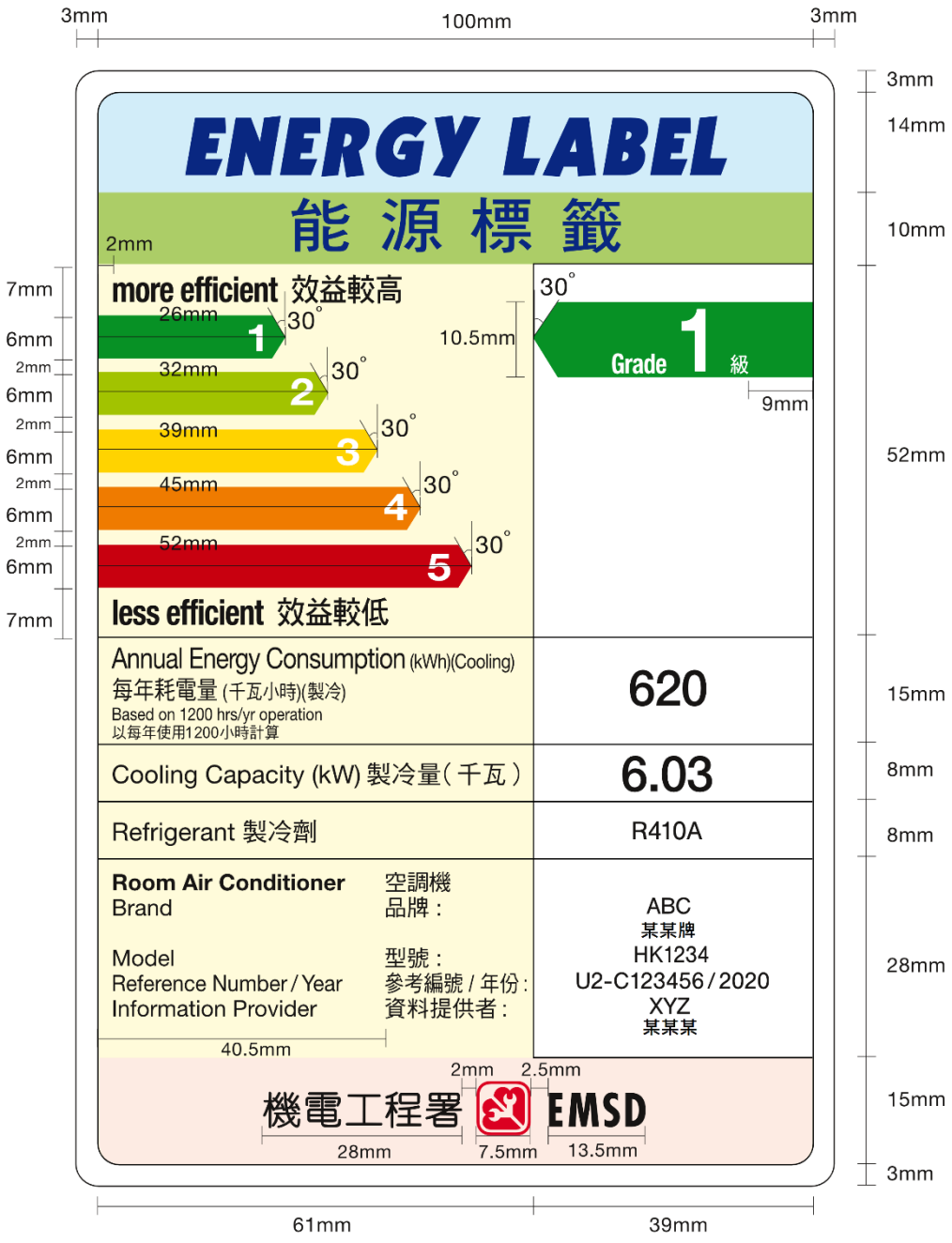
Appendix 1B

Specification of Energy Label

(1) The colour and design of the energy label for a room air conditioner of cooling only must be as specified in the diagrams below—



(2) The dimensions of the energy label for a room air conditioner of cooling only type must be as specified in the diagram below—

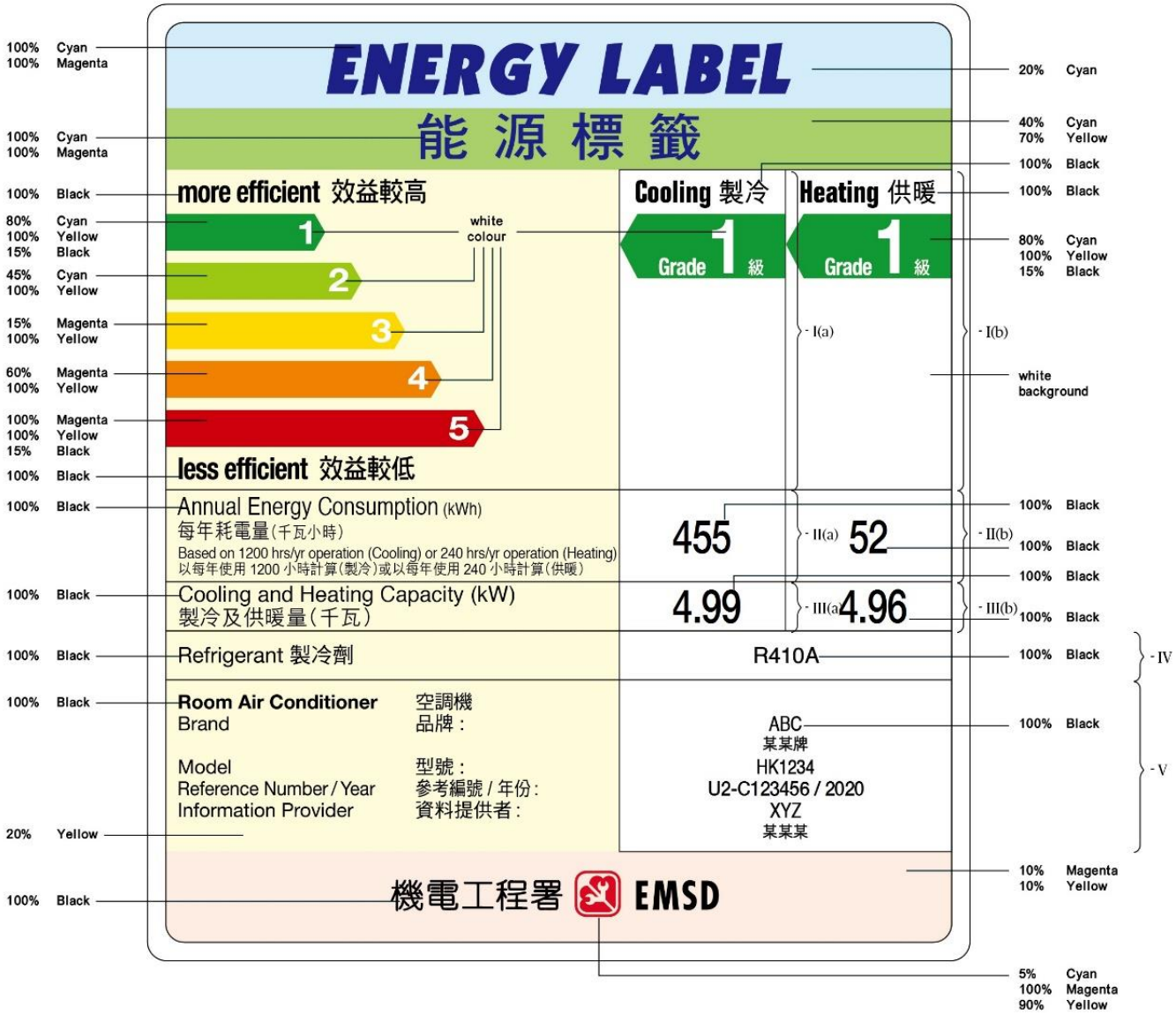


Actual Size : 106mm(W) X 156mm(H)

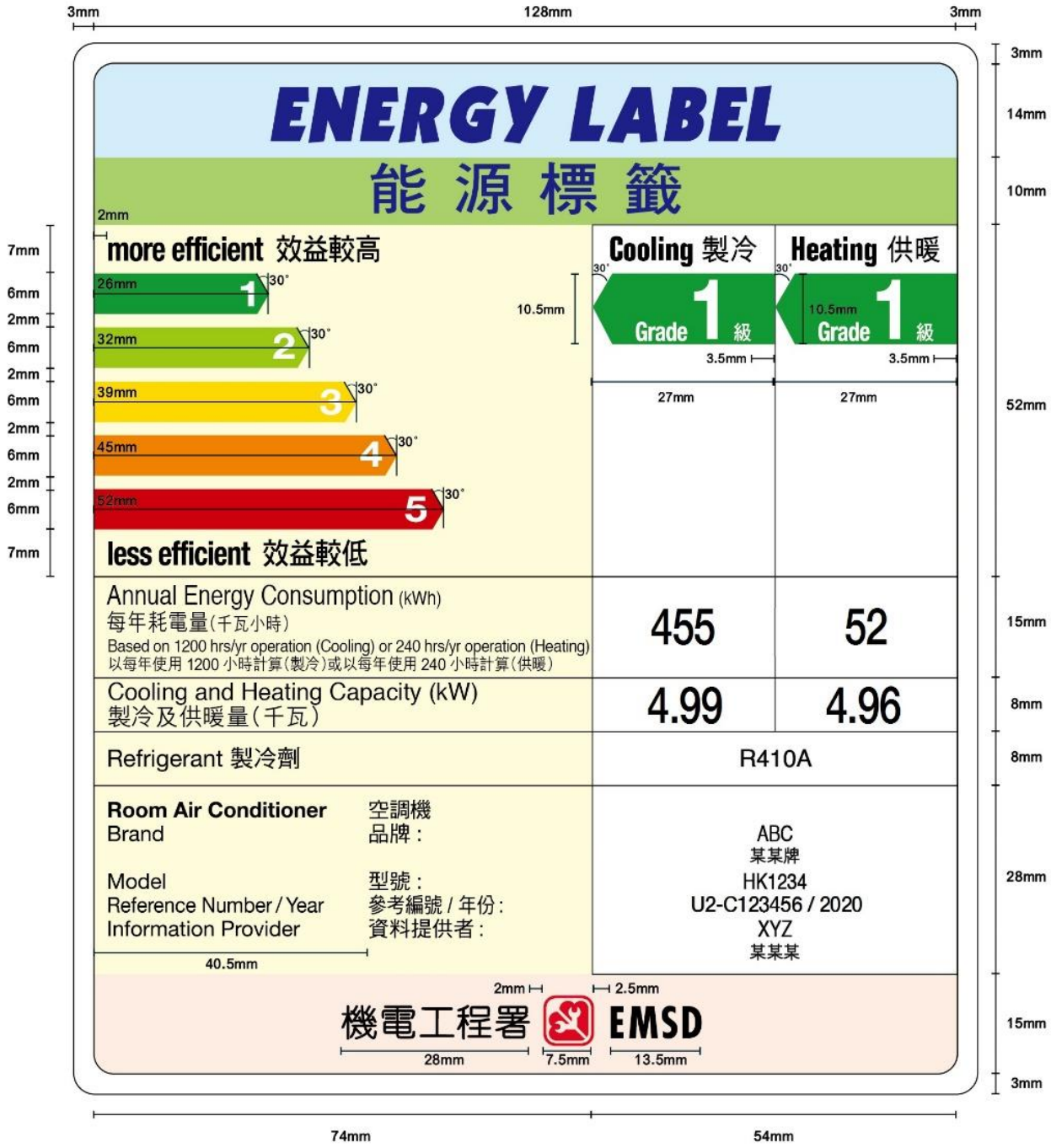
(3) The energy label under clause 1 of Appendix 1B is divided into 5 rectangular areas (marked I, II, III, IV and V by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading for cooling of the model calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual energy consumption for cooling based on operation for an average of 1200 hours per year, calculated in accordance with the Code.
III	The cooling capacity, which is the measured cooling capacity in kW of the model in cooling mode at full load, determined in accordance with the Code.
IV	The type of refrigerant used for the model.
V	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(3A) The colour and design of the energy label for a room air conditioner of reverse cycle type must be as specified in the diagrams below—



(3B) The dimenisons of the energy label for a room air conditioner of reverse cycle type must be as specified in the diagram below—



Actual Size : 134mm(W) x 156mm(H)

(3C) The energy label under clause 3A of Appendix 1B is divided into 8 rectangular areas (marked I(a), I(b), II(a), II(b), III(a), III(b), IV and V on or by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I(a)	The energy efficiency grading for cooling of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
I(b)	The energy efficiency grading for heating of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II(a)	The annual energy consumption for cooling based on operation for an average of 1200 hours per year, calculated in accordance with the Code.
II(b)	The annual energy consumption for heating based on operation for an average of 240 hours per year, calculated in accordance with the Code.
III(a)	The cooling capacity, which is the measured cooling capacity in kW of the model in cooling mode at full load, determined in accordance with the Code.
III(b)	The heating capacity, which is the measured heating capacity in kW of the model in heating mode at full load, determined in accordance with the Code.
VI	The type of refrigerant used for the model.
VII	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency gradings for cooling and heating (or for either of them) are calculated in accordance with the new calculation methods under section 12 of this Ordinance, the year in which the new calculation methods take effect (or, if the new calculation methods take effect in 2 different years, the later of them) and the name of the

information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	14 point DFHeiBold (Chinese)
Cooling 製冷	14 point Helvetica Neue Bold (English)
Heating 供暖	14 point DFHeiBold (Chinese)
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right –	
The word "Grade"	11 point Helvetica Neue Bold Condensed (English)
The figure "1"	35.5 point Helvetica Neue Bold (English)
The word "級"	9.5 point DFHeiBold (Chinese)
Annual Energy Consumption (kWh)(Cooling)	11.5 (8) point Helvetica Roman (English)
每年耗電量（千瓦小時）（製冷）	10 (8) point DFHeiMedium (Chinese)
Annual Energy Consumption (kWh)	11.5 (8) point Helvetica Roman (English)
每年耗電量（千瓦小時）	10 (8) point DFHeiMedium (Chinese)
Based on 1 200 hrs/yr operation	7 point Helvetica Roman (English)
以每年使用 1 200 小時計算	7 point DFHeiMedium (Chinese)

Description on the Energy Label	Font and font size
Based on 1200 hrs/yr operation (Cooling) or 240 hrs/yr operation (Heating)	7 point Helvetica Roman (English)
以每年使用 1200 小時計算(製冷)或以每年使用 240 小時計算(供暖)	7 point DFHeiMedium (Chinese)
Cooling Capacity (kW)	10 point Helvetica Roman (English)
製冷量（千瓦）	10 point DFHeiMedium (Chinese)
Cooling and Heating Capacity (kW)	10 point Helvetica Roman (English)
製冷及供暖量（千瓦）	10 point DFHeiMedium (Chinese)
Figure or figures of annual energy consumption on the right	20 point Helvetica Medium
Figure of cooling capacity on the right	20 point Helvetica Medium
Figure of heating capacity on the right	20 point Helvetica Medium
Refrigerant	10 point Helvetica Roman (English)
製冷劑	10 point DFHeiMedium (Chinese)
Character of refrigerant on the right	10 point Helvetica Roman (English)
Room Air Conditioner	9 point Helvetica Bold (English)
空調機	9 point DFHeiMedium (Chinese)
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)

Description on the Energy Label	Font and font size
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署	16 point Monotype Yuen (Chinese)
EMSD and its logo	17.9 point Futura Bold Condensed (English)

Appendix 2A

Example for Calculating the Energy Efficiency Grade for Refrigerating Appliance

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

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

Annual Energy Consumption: 280 kWh/year

The adjusted volume for the refrigerating appliance is calculated according to the equations 1, 2 and 11 in clause 8.5.2 of the Code.

$$V_{adj} = \Sigma V \times \Omega = V_r \times \Omega_r + V_{ffc} \times \Omega_{ffc} + V_c \times \Omega_c$$
$$= 174 + 215 + 83.75$$
$$= 472.75 \text{ litres}$$

From the Table 8.5, the Average Appliance Energy Consumption for Category 6 refrigerating appliance is:

$$= V_{adj} \times 0.777 + 303$$
$$= 472.75 \times 0.777 + 303$$
$$= 670.3 \text{ kWh/year}$$

Considering it is a no-frost model, the Average Appliance Energy Consumption is multiplied by a factor of 1.35.

Therefore, it is 1.35 x 670.3 = 905 kWh/year

$$\text{Energy Consumption Index } I_\varepsilon = \frac{\text{Annual Energy Consumption}}{\text{Average Appliance Energy Consumption}}$$

$$I_\varepsilon = \frac{280}{905}$$

$$I_\varepsilon = 30.9\%$$

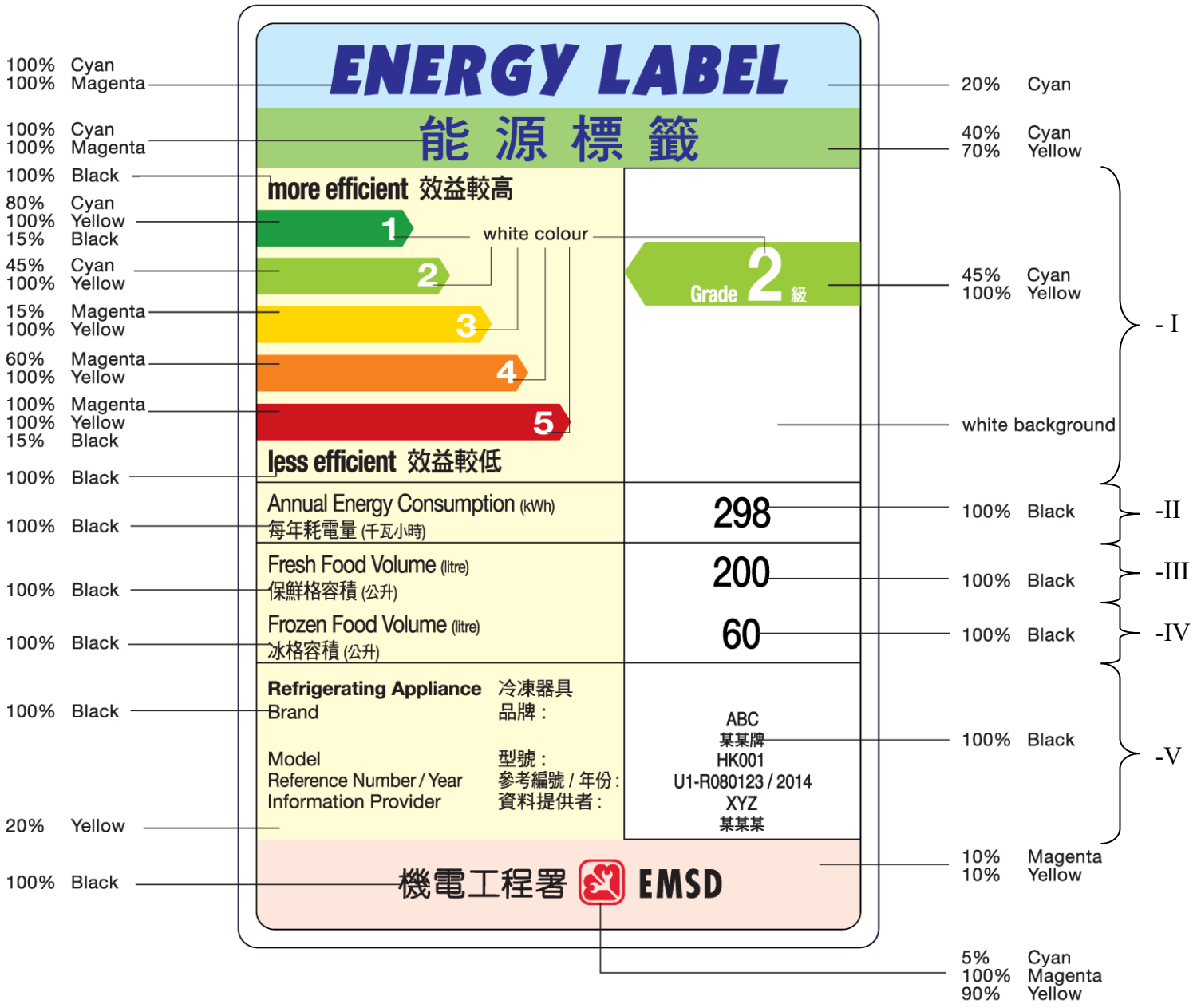
$$\mathbf{I_\varepsilon < 35\ \%}$$

According to Table 8.6 in clause 8 of the Code, the refrigerating appliance is rated as a **Grade 1** refrigerating appliance.

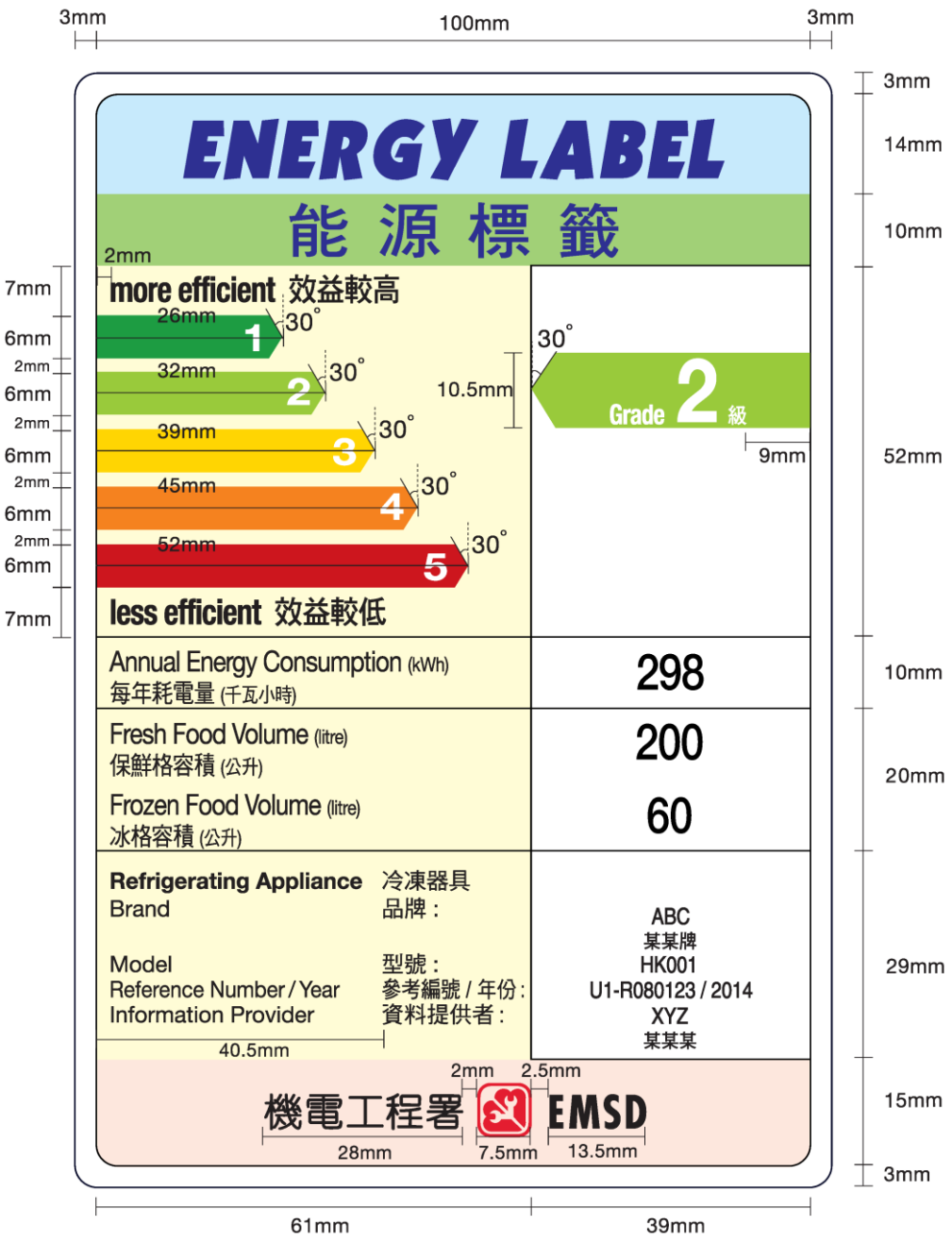
Appendix 2B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below—



(2) The dimensions of the energy label must be as specified in the diagram below—



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

(3) The energy label under clause 1 of Appendix 2B is divided into 5 rectangular areas (marked I, II, III, IV and V by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual energy consumption, calculated by multiplying the measured energy consumption by 365 days, determined in accordance with the Code.
III	The fresh food volume, which is the sum of the measured net storage volume of all compartments whose operating temperature exceeds –6ºC, determined in accordance with the Code. (Note: the net storage volume refers to the storage volume in clause 8.2 of the Code.)
IV	The frozen food volume, which is the sum of the measured net storage volume of all frozen food storage compartments whose operating temperature is equal to or below –6ºC, determined in accordance with the Code. (Note: the net storage volume refers to the storage volume in clause 8.2 of the Code.)
V	The brand name, product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)
more efficient 效益較高 less efficient 效益較低	14 point Helvetica Neue Bold (English) 14 point DFHeiBold (Chinese)
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right – The word "Grade" The figure "2" The word "級"	 11 point Helvetica Neue Bold Condensed (English) 35.5 point Helvetica Neue Bold (English) 9.5 point DFHeiBold (Chinese)
Annual Energy Consumption (kWh) 每年耗電量（千瓦小時）	11.5 (8) point Helvetica Roman (English) 10 (8) point DFHeiMedium (Chinese)
Fresh Food Volume (litre) 保鮮格容積（公升）	11.5 (8) point Helvetica Roman (English) 10 (8) point DFHeiMedium (Chinese)
Frozen Food Volume (litre) 冰格容積（公升）	11.5 (8) point Helvetica Roman (English) 10 (8) point DFHeiMedium (Chinese)
Figures of annual energy consumption and volumes on the right	20 point Helvetica Medium
Refrigerating Appliance 冷凍器具	9 point Helvetica Bold (English) 9 point DFHeiMedium (Chinese)

Description on the Energy Label	Font and font size
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署	16 point Monotype Yuen (Chinese)
EMSD and its logo	17.9 point Futura Bold Condensed (English)

Appendix 3A

Example for Calculating the Energy Efficiency Grade for Compact Fluorescent Lamp

Rated power input……. 11W
Rated luminous flux……..…… 600 lm
Rated lumen maintenance..……85% (not less than 80% for Grade 1 and 2)
Rated average life……..…8000 hours (not less than 8000 hours for Grade 1 and 2)

Measured luminous flux and power input at the end of 100-hour ageing period:
Average power input…….10.7 W
Average luminous flux..……609.6 lm

Measured average life……8100 hours (not less than 8000 hours for Grade 1 and 2)

Average Measured lumen maintenance at 2000 hours = 88% (not less than 80% for Grade 1 and 2)

Measured Luminous Efficacy (E_m)

$$= \frac{\text{Measured luminous flux}}{\text{Measured power input}}$$

$$= 609.6 / 10.7$$

$$= 57 \text{ lm/W}$$

Rated luminous Efficacy (E_r)

$$= \frac{\text{Rated luminous flux}}{\text{Rated power input}}$$

$$= 600 / 11$$

$$= 54.5 \text{ lm/W}$$

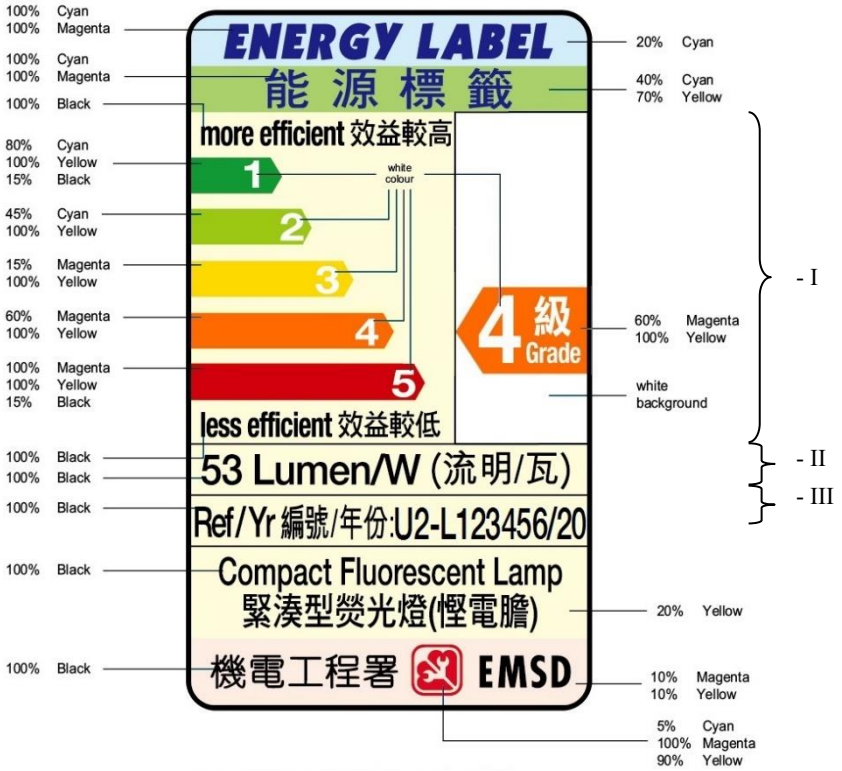
Since the $E_m \geq E_r$, the E_r (54.5 lm/W) is used to determine the energy efficiency grade

According to Table 9.1 in clause 9 of the Code, the CFL is rated as a **Grade 4** CFL**.**

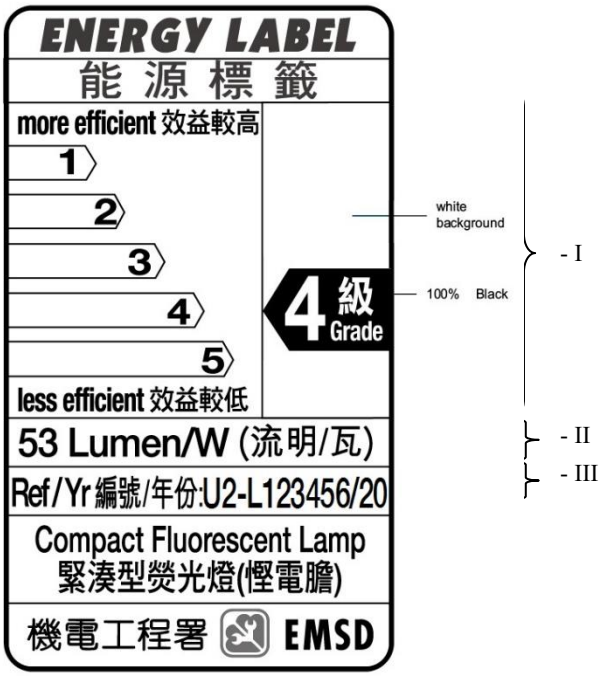
Appendix 3B

Specification of Energy Label

(1) The colour and design of the largest energy label must be as specified in the diagram below. There are two versions of the energy labels, namely the colour version and black-on-white version. The supplier is to choose either one of the two versions.

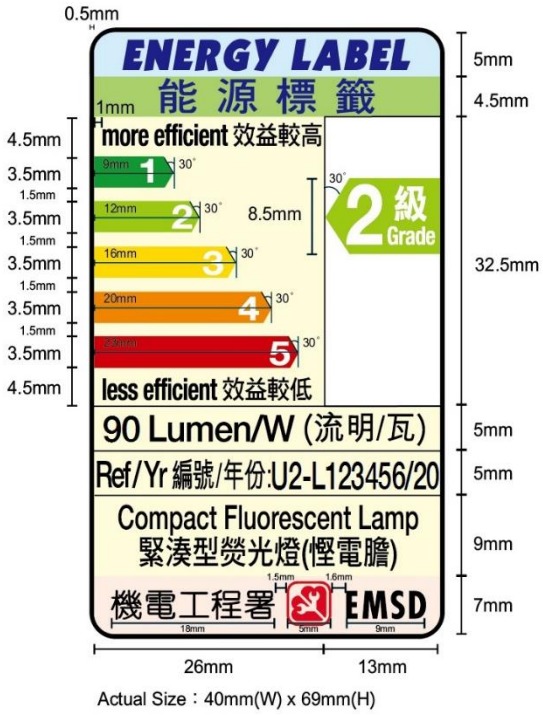


Colour Version



Black-on-white Version

(2) The dimensions of the largest energy label must be as specified in the diagram below—



(3) The energy label under clause 1 of Appendix 3B is divided into 3 rectangular areas (marked I, II and III by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. If a coloured label is chosen, the head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left. If a black-on-white label is chosen, the head of the arrow containing the energy efficiency grade number is to be placed at the same level as the head of the relevant arrow on the left and is in black.
II	The lumen per watt, which is the lamp lumen efficacy calculated by computing the ratio of the measured lamp luminous flux and the lamp electrical power input, determined in accordance with the Code. (Note: the lumen efficacy refers to the luminous efficacy in clause 9.2 of the Code.)

III The reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect.

(4) The specifications for the font size of the words printed on the largest energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	13 point Italic Kabel Ult BT (English)
能源標籤	12.5 point DFHeibold (Chinese)
more efficient 效益較高	9.6 point Helvetica Neue Bold (English)
less efficient 效益較低	9.1 point DFHeiBold (Chinese)
Grade on the left (1, 2, 3, 4, 5)	10.6 point Helvetica Neue Bold (English)
Grade on the right –	
The word "Grade"	8 point Helvetica Neue Bold Condensed (English)
The figure "2"	27 point Helvetica Neue Bold (English)
The word "級"	14 point DFHeiBold (Chinese)
Lumen/W	11.8 point Helvetica Neue Medium (English)
（流明/瓦）	10.8 point DFHeiBold (Chinese)
Figure of lumen/W	11.8 point Helvetica Neue Medium (English)
Ref / Yr	11.8 point Helvetica Neue Medium (English)
編號 / 年份：	10.8 point DFHeiBold (Chinese)
Characters of reference number and year	11.8 point Helvetica Neue Medium (English)
Compact Fluorescent Lamp	10.65 point Helvetica Neue Medium (English)
緊湊型熒光燈(慳電膽)	10.65 point DFHeiBold (Chinese)
機電工程署	10.4 point Monotype Yuen (Chinese)
EMSD and its logo	11.6 point Futura Bold Condensed (English)

Appendix 4A

Example of Calculating the Energy Efficiency Grade for Washing Machine

The given washing machine is of Category 1 (i.e. horizontal axis washing machine) with built-in water heating device.

Rated washing capacity (W_r) …… 5 kg

Measured energy consumption (E) ……... 0.6 kWh/cycle

Measured water consumption …….. 72 litres

Measured washing performance (q) ……. 1.1

Measured spin extraction performance (RM) …….. 0.8

Annual energy consumption = E x 260 …… 156 kWh

Specific energy consumption (E_{sp}) = E / W_r ……...…….. 0.12 kWh/kg/cycle

Also the washing performance and spin extraction performance meet the requirements in Table 10.3 in clause 10.6.1(c) of the Code.

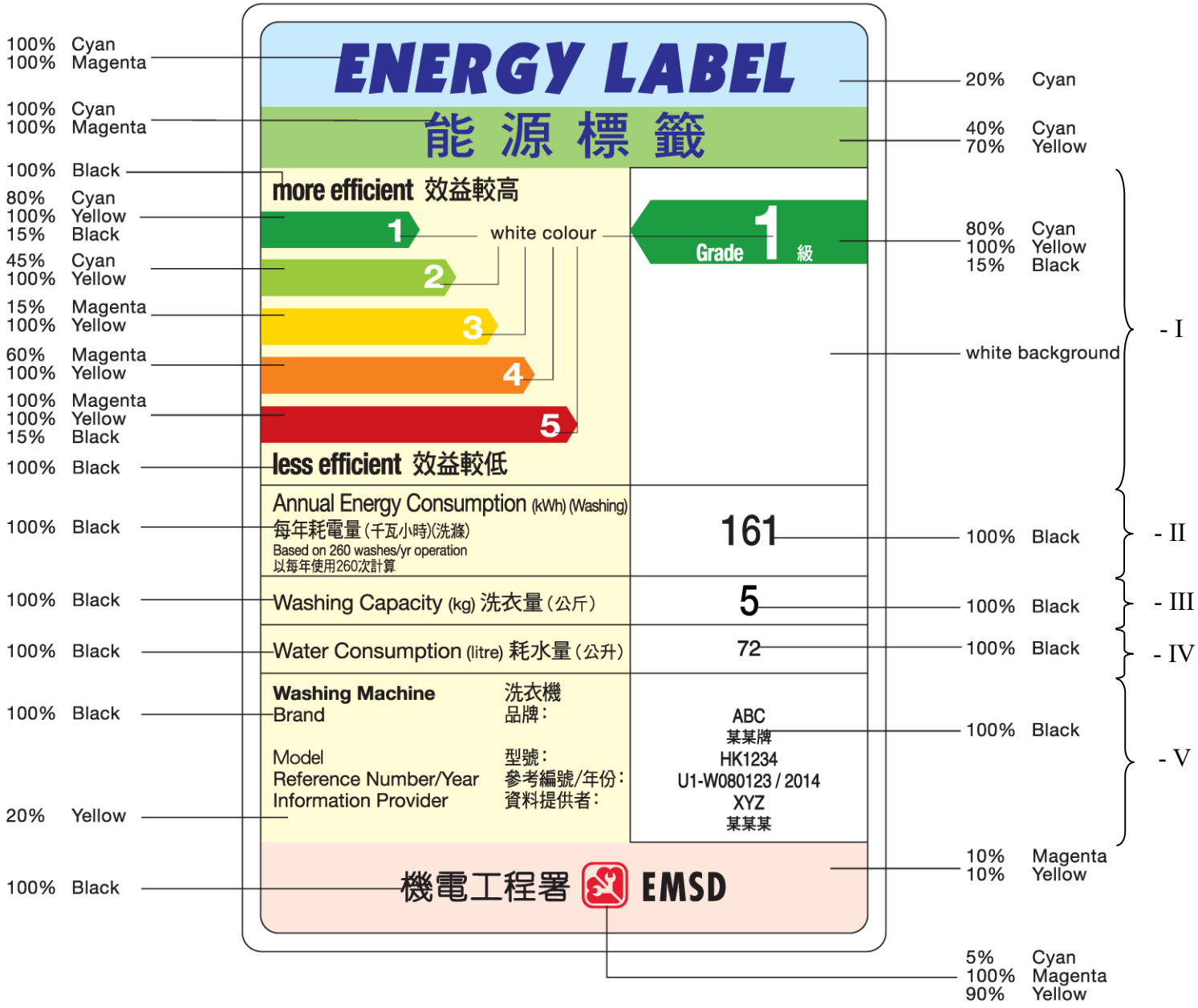
$$\mathbf{E_{sp} \leqq 0.130}$$

According to Table 10.2 in clause 10 of the Code, the washing machine is rated as a **Grade 1** washing machine.

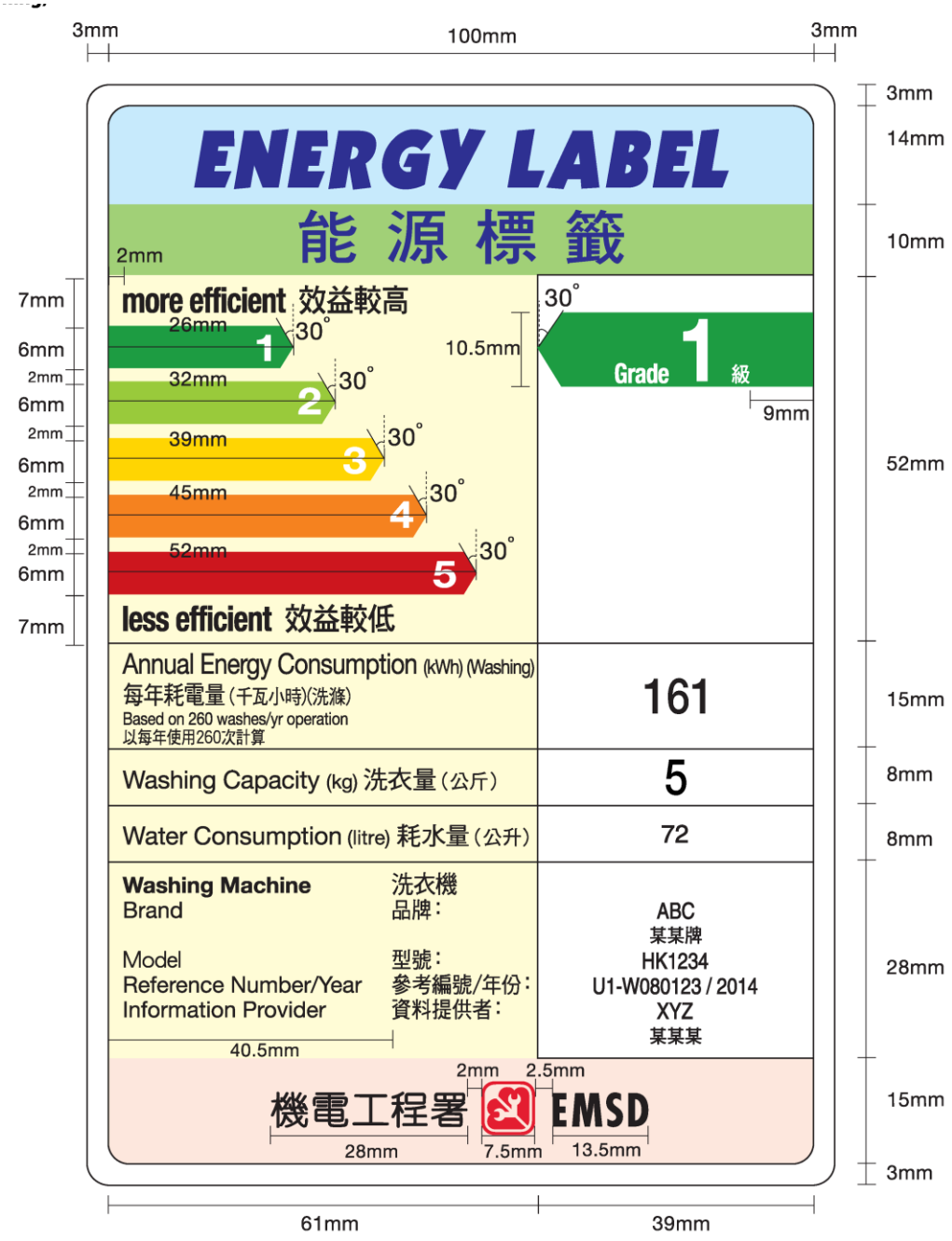
Appendix 4B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below—



(2) The dimensions of the energy label must be as specified in the diagram below—



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

(3) The energy label under section 1 of Appendix 4B is divided into 5 rectangular areas (marked I, II, III, IV and V by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual energy consumption, calculated by multiplying the measured energy consumption per cycle by an average of 260 washes per year, determined in accordance with the Code.
III	The washing capacity, which is the rated washing capacity of the model, determined in accordance with the Code.
IV	The water consumption, which is the measured water consumption per cycle, determined in accordance with the Code.
V	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	14 point DFHeiBold (Chinese)

Description on the Energy Label	Font and font size
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right –	
The word “Grade”	11 point Helvetica Neue Bold Condensed (English)
The figure “1”	35.5 point Helvetica Neue Bold (English)
The word “級”	9.5 point DFHeiBold (Chinese)
Annual Energy Consumption (kWh)(Washing)	11.5 (8) point Helvetica Roman (English)
每年耗電量（千瓦小時）（洗滌）	10 (8) point DFHeiMedium (Chinese)
Based on 260 washes/yr operation	7 point Helvetica Roman (English)
以每年使用 260 次計算	7 point DFHeiMedium (Chinese)
Washing Capacity (kg)	10 point Helvetica Roman (English)
洗衣量（公斤）	10 point DFHeiMedium (Chinese)
Figures of annual energy consumption and washing capacity on the right	20 point Helvetica Medium
Water Consumption (litre)	10 point Helvetica Roman (English)
耗水量（公升）	10 point DFHeiMedium (Chinese)
Figure of water consumption on the right	10 point Helvetica Roman (English)
Washing Machine	9 point Helvetica Bold (English)
洗衣機	9 point DFHeiMedium (Chinese)
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)

Description on the Energy Label	Font and font size
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署 EMSD and its logo	16 point Monotype Yuen (Chinese) 17.9 point Futura Bold Condensed (English)

Appendix 5A

Example for Calculating the Energy Efficiency Grade for Dehumidifier

The given dehumidifier is of standard capacity dehumidifier.

Rated dehumidifying capacity …… 9 litres / day

Measured dehumidifying capacity (V) ……... 8.75 litres / day

Measured energy consumption (E) ……. 5.12 kWh / day

Annual energy consumption = E x 450 / 24 hours ……. 96 kWh

$$\text{Energy Factor (EF)} = \frac{V}{E}$$

$$EF = \frac{8.75}{5.12}$$

$$EF = 1.71 \text{ litres / kWh}$$

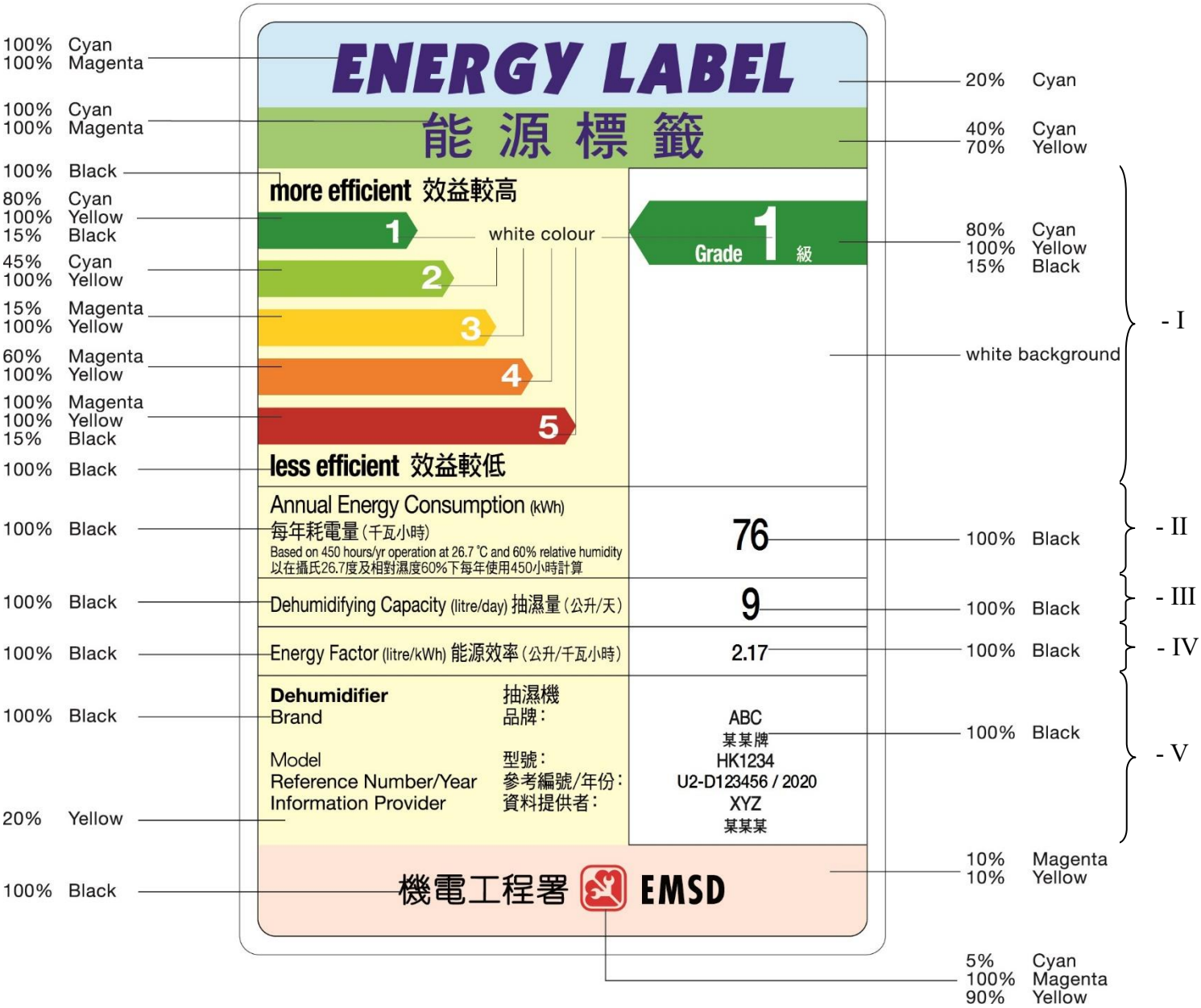
$1.70 \leq EF < 2.00$

According to Table 11.2 in clause 11 of the Code, the dehumidifier is rated as a **Grade 2** dehumidifier.

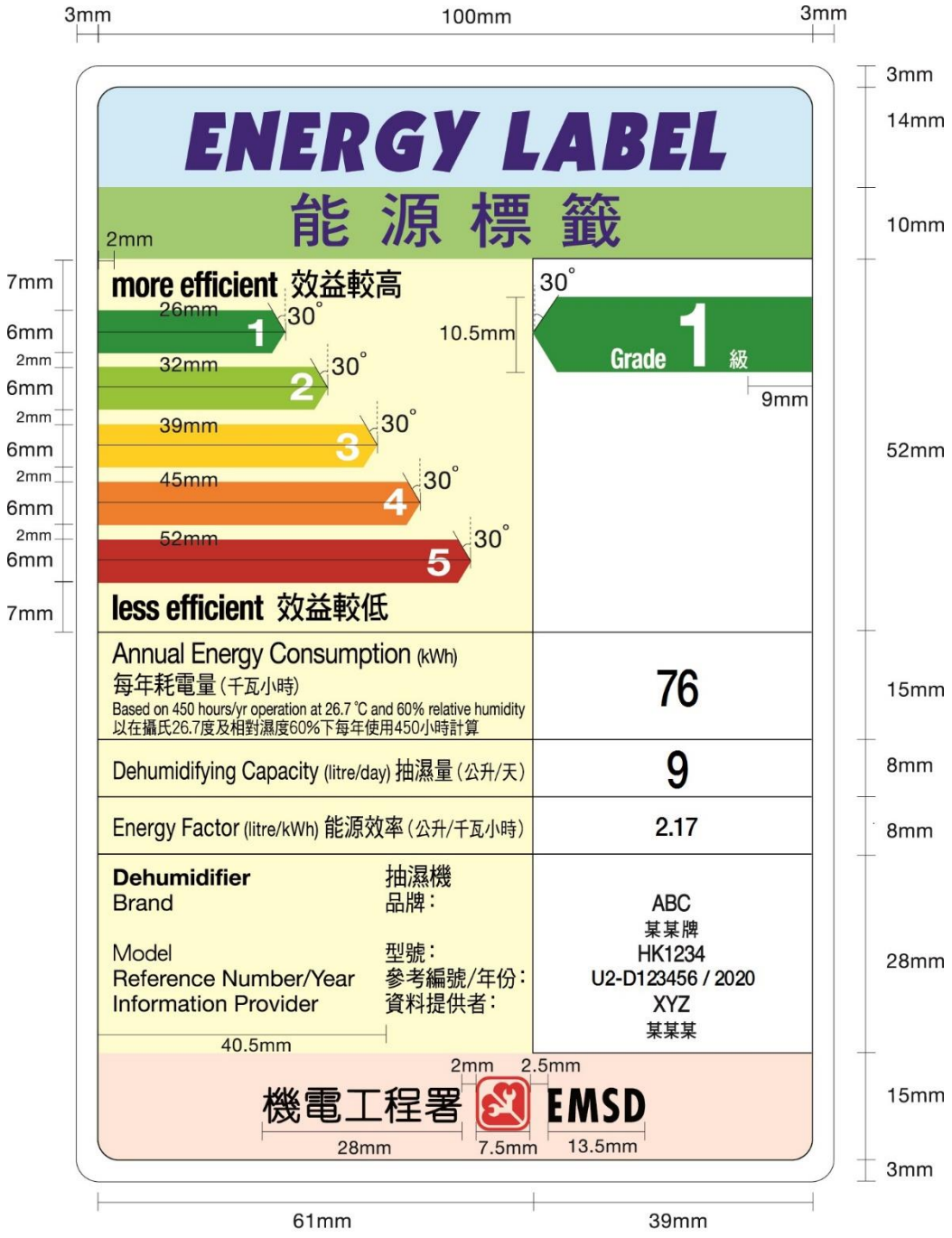
Appendix 5B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below—



(2) The dimensions of the energy label must be as specified in the diagram below—



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

(3) The energy label under clause 1 of Appendix 5B is divided into 5 rectangular areas (marked I, II, III, IV and V by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual energy consumption, calculated by multiplying the measured power consumption at 26.7°C and 60% relative humidity by an average of 450 hours per year, determined in accordance with the Code.
III	The dehumidifying capacity, which is the measured amount of water removed in 24 hours, determined in accordance with the Code.
IV	The energy factor, which is the measured amount of water removed per kilowatt-hour, determined in accordance with the Code.
V	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)

Description on the Energy Label	Font and font size
more efficient 效益較高 less efficient 效益較低	14 point Helvetica Neue Bold (English) 14 point DFHeiBold (Chinese)
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right – The word “Grade” The figure “1” The word “級”	 11 point Helvetica Neue Bold Condensed (English) 35.5 point Helvetica Neue Bold (English) 9.5 point DFHeiBold (Chinese)
Annual Energy Consumption (kWh) 每年耗電量（千瓦小時）	11.5 (8) point Helvetica Roman (English) 10 (8) point DFHeiMedium (Chinese)
Based on 450 hours/yr operation at 26.7ºC and 60% relative humidity 以在攝氏 26.7 度及相對濕度 60%下每年使用 450 小時計算	7 point Helvetica Roman (English) 7 point DFHeiMedium (Chinese)
Dehumidifying Capacity (litre/day) 抽濕量（公升/天）	10 point Helvetica Roman (English) 10 point DFHeiMedium (Chinese)
Figures of annual energy consumption and dehumidifying capacity on the right	20 point Helvetica Medium
Energy Factor (litre/kWh) 能源效率（公升/千瓦小時）	10 point Helvetica Roman (English) 10 point DFHeiMedium (Chinese)
Figure of energy factor on the right	10 point Helvetica Roman (English)
Dehumidifier 抽濕機	9 point Helvetica Bold (English) 9 point DFHeiMedium (Chinese)

Description on the Energy Label	Font and font size
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署	16 point Monotype Yuen (Chinese)
EMSD and its logo	17.9 point Futura Bold Condensed (English)

Appendix 6A

Example for Calculating the Energy Efficiency Grade for Television (1)

The given television is a standard television of one tuner.

Measured on-mode power consumption at the default picture setting ……..120W
Measured visible screen area ……..……..……..……11000cm^2
Measured peak luminance ratio……..……..…70%

Standby power consumption

1st measurement (P_{s1})…….……..…….…….....0.30W
2nd measurement (P_{s2}) …….…….…….……..0.32W
3rd measurement (P_{s3}) …….…….…….……...0.31W
4th measurement (P_{s4}) …….…….…….……...0.29W
5th measurement (P_{s5}) …….…….…….……...0.30W

Energy Efficiency Index (EEI)

$P_{ref}A$ = P_{basic} + (A/100) x 4.3224
= 20 + (11000/100) x 4.3224
= 495.4640 Watts/cm^2

Energy Efficiency Index (EEI)
= 120/495.4640 = 0.2422 < 0.265

Standby Power Consumption

Average standby power consumption
= (P_{s1} + P_{s2} + P_{s3} + P_{s4} + P_{s5})/5
= (0.30 + 0.32 + 0.31 + 0.29 + 0.30)/5
= 0.304W < 0.5W

The peak luminance ratio at the default picture setting is more than 65% of the peak luminance of the brightest on-mode condition provided by the television, and the average standby power consumption is less than 0.5W. According to Table 12.1 in clause 12 of the Code, the television is rated as a **Grade 3** television.

Example for Calculating the Energy Efficiency Grade for Television (2)

The given television is a standard television of two tuners. *(Note 1)*

For televisions with automatic brightness control (ABC) feature enabled by default in the default picture setting, the on-mode power consumption shall be determined with ABC feature enabled. *(Note 2)*

Measured on-mode power consumption at the default picture setting over different illuminance conditions (0 lx, 12 lx, 35 lx and 300 lx):

P_{ABC_0} ……..70W
P_{ABC_12} ……70W
P_{ABC_35} ……85W
P_{ABC_300} ……120W

On-mode power consumption at the default picture setting:

$P = P_{ABC\_0} \times 24\% + P_{ABC\_12} \times 42\% + P_{ABC\_35} \times 28\% + P_{ABC\_300} \times 6\%$
$= 70 \times 24\% + 70 \times 42\% + 85 \times 28\% + 120 \times 6\%$
$= 77.2W$

Measured visible screen area ……11000cm^2
Measured peak luminance ratio ……70%

Standby power consumption

1st measurement (P_{s1})…….0.30W
2nd measurement (P_{s2}) …….0.32W
3rd measurement (P_{s3}) …….0.31W
4th measurement (P_{s4}) …….0.29W
5th measurement (P_{s5}) …….0.30W

Energy Efficiency Index (EEI)

$P_{ref}A = P_{basic} + (A/100) \times 4.3224$
$= 24 + (11000/100) \times 4.3224$
$= 499.4640$ Watts/cm^2

Energy Efficiency Index (EEI)
= 77.2/499.4640 = 0.1546 < 0.195

Standby Power Consumption

Average standby power consumption
= $(P_{s1} + P_{s2} + P_{s3} + P_{s4} + P_{s5})/5$
= (0.30 + 0.32 +0.31 +0.29+ 0.30)/5
= 0.304W < 0.5W

The peak luminance ratio at the default picture setting is more than 65% of the peak luminance of the brightest on-mode condition provided by the television, and the average standby power consumption is less than 0.5W. According to Table 12.1 in clause 12 of the Code, the television is rated as a **Grade 2** television.

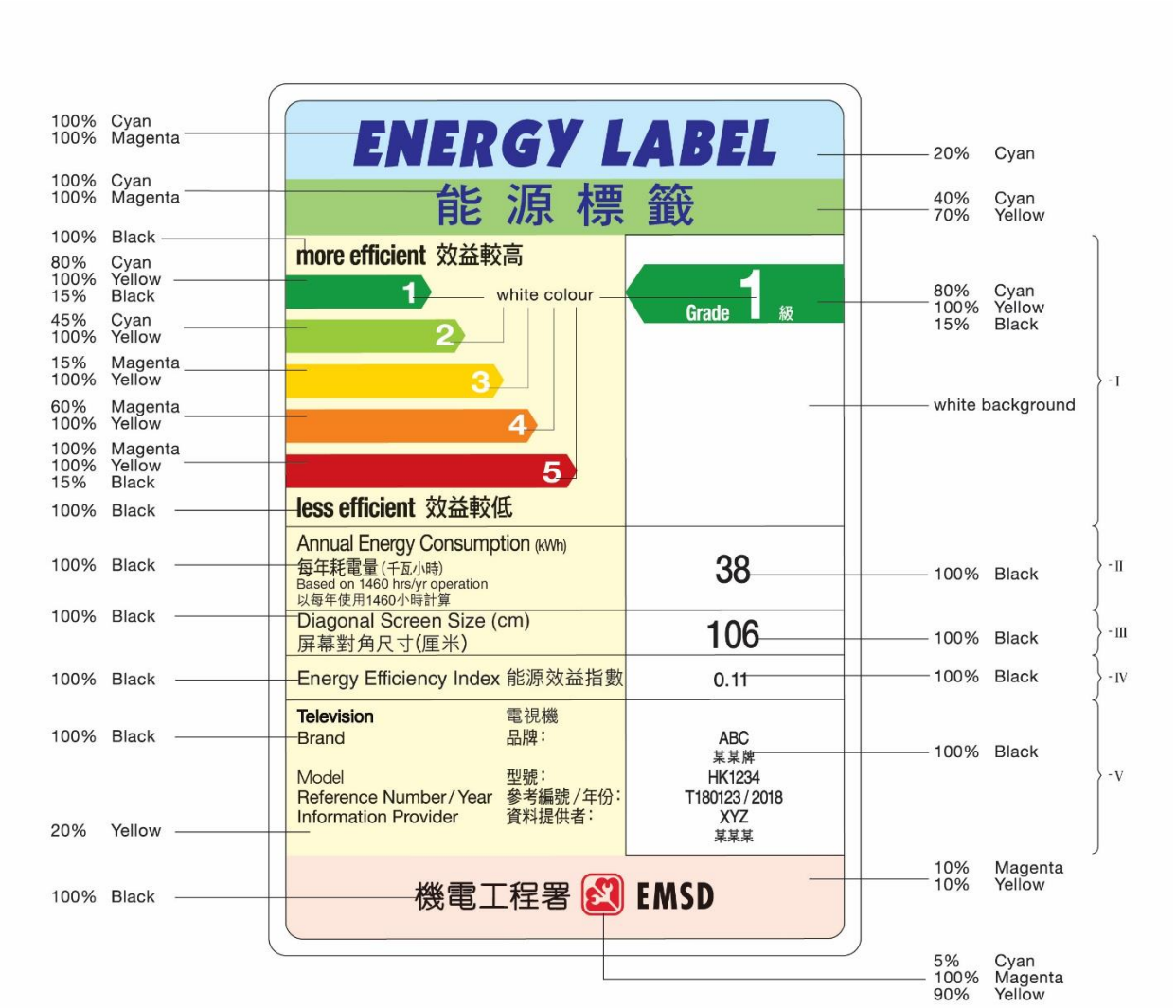
Note 1: Because of their functionality, double tuners should qualify for a higher basic power consumption of 24 watts.

Note 2: According to IEC 62087-3, for television sets with the ABC feature enabled by default in the default picture setting, the on-mode power consumption shall be determined with ABC feature enabled or manually disabled.

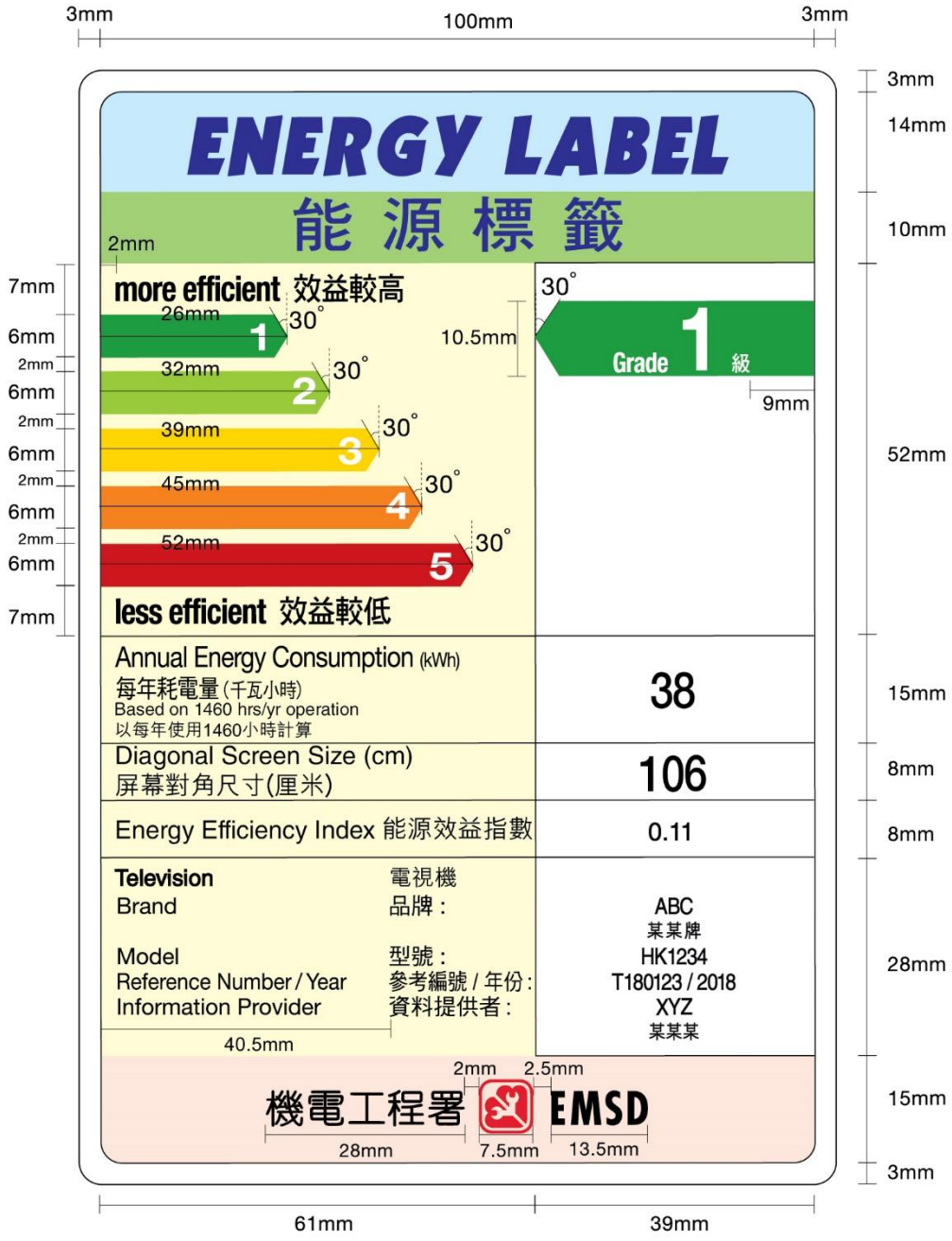
Appendix 6B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below—



(2) The dimensions of the energy label must be as specified in the diagram below—



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

(3) The energy label under clause 1 of Appendix 6B is divided into 5 rectangular areas (marked I, II, III, IV and V by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual energy consumption, calculated by multiplying the measured power consumption by an average of 1 460 hours per year, determined in accordance with the Code.
III	The diagonal screen size, which is the measured diagonal length of the model's visible screen, determined in accordance with the Code.
IV	The energy efficiency index determined in accordance with the Code.
V	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of the Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	14 point DFHeiBold (Chinese)

Description on the Energy Label	Font and font size
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right –	
The word “Grade”	11 point Helvetica Neue Bold Condensed (English)
The figure “1”	35.5 point Helvetica Neue Bold (English)
The word “級”	9.5 point DFHeiBold (Chinese)
Annual Energy Consumption (kWh) 每年耗電量（千瓦小時）	11.5 (8) point Helvetica Roman (English) 10 (8) point DFHeiMedium (Chinese)
Based on 1460 hrs/yr operation 以每年使用 1460 小時計算	7 point Helvetica Roman (English) 7 point DFHeiMedium (Chinese)
Diagonal Screen Size (cm) 屏幕對角尺寸(厘米)	10 point Helvetica Roman (English) 10 point DFHeiMedium (Chinese)
Figures of annual energy consumption and power on the right	20 point Helvetica Medium
Energy Efficiency Index 能源效益指數	10 point Helvetica Roman (English) 10 point DFHeiMedium (Chinese)
Figure of energy efficiency index on the right	10 point Helvetica Roman (English)
Television 電視機	9 point Helvetica Bold (English) 9 point DFHeiMedium (Chinese)
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)

Description on the Energy Label	Font and font size
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署	16 point Monotype Yuen (Chinese)
EMSD and its logo	17.9 point Futura Bold Condensed (English)

Appendix 7A

Example for Calculating the Energy Efficiency Grade for Storage Type Electric Water Heater

The given appliance is of Category 1 (i.e. unvented storage type electric water heaters).
The following data are measured according to the required standard:
Rated water storage capacity (V) ……40 litres
Measured standing loss per 24 hours ($E_{st,meas}$) ……1.050 kWh/24h

According to Table 13.4 in clause 13.5.6, for Category 1 appliance, average energy consumption per 24 hours due to standing loss,

$$E_{st,av} = 0.13 + 0.0553V^{2/3} = 0.77679272 \ \ kWh/24h$$

Fixed Loss per 24 hour, for category 1 heater,

$$E_{st,fix} = 0.072 \ \ kWh/24h$$

According to Table 13.3 in clause 13.5.5, local factor per 24 hour for category 1 heater,

$$E_{st,loc} = 0.2 \ \ kWh/24h$$

According to equations 6 in clause 13.5.5, equation 7 in clause 13.5.6 and equation 8 in clause 13.5.7, Energy Consumption Index of the appliance,

$$I_\varepsilon = \frac{E_{st,var}}{E_{st,av,var}} \times 100\%$$

$$= \frac{E_{st,meas} - E_{st,fix} - E_{st,loc}}{E_{st,av} - E_{st,fix}} \times 100\%$$

$$= \frac{1.050 - 0.072 - 0.2}{0.77679272 - 0.072} \times 100\%$$

$$= 110.3871\%$$

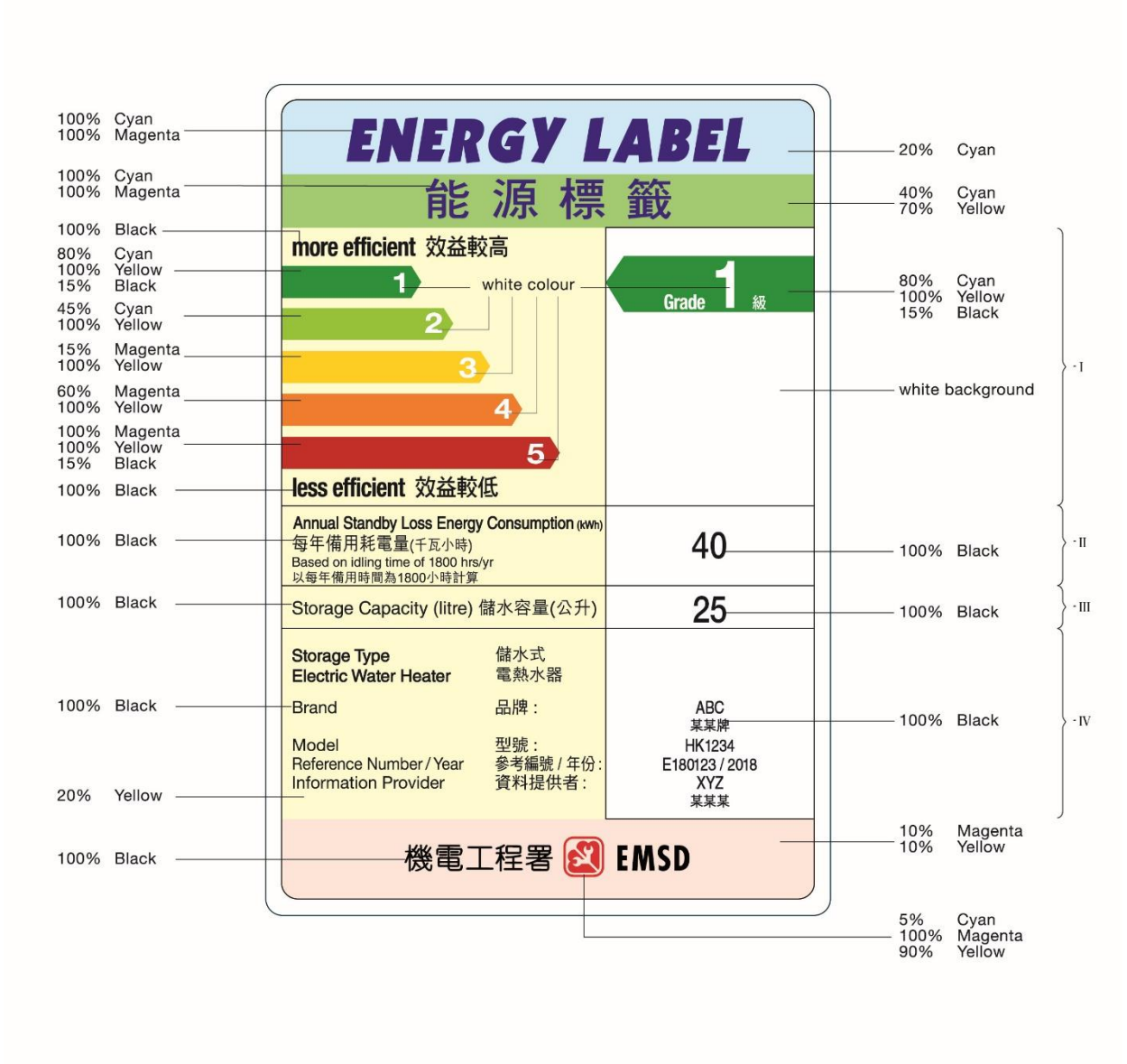
$$105\% < I_\varepsilon \leq 120\%$$

The value of Energy Consumption Index of the appliance is 110.3871% which is between 105% and 120%.
According to Table 13.5 in clause 13.5.7, the appliance shall be rated as Grade 4 storage type electric water heater.

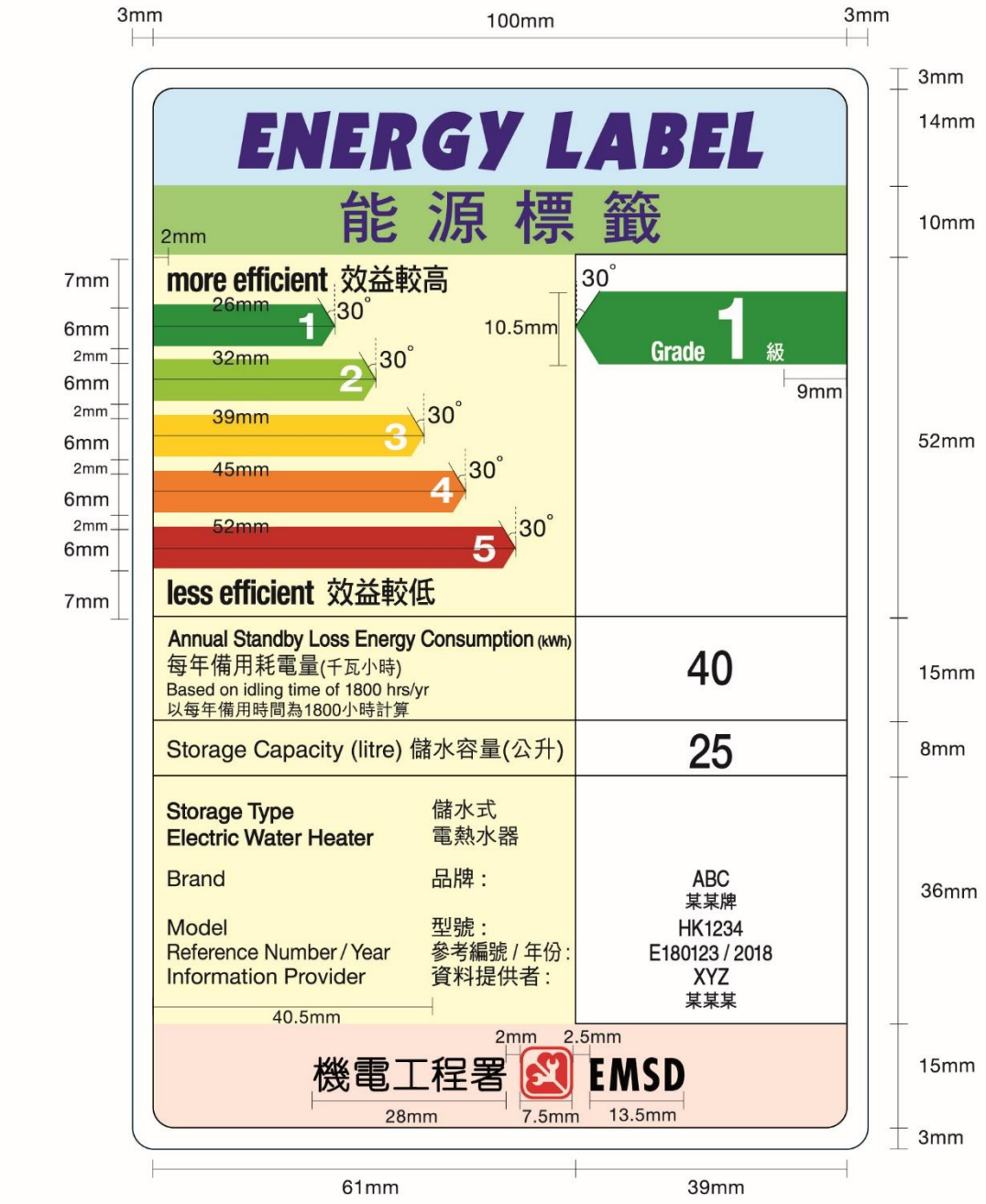
Appendix 7B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below –



(2) The dimensions of the energy label must be as specified in the diagram below–



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

(3) The energy label under clause 1 of Appendix 7B is divided into 4 rectangular areas (marked I, II, III and IV by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The annual standby loss energy consumption, calculated by multiplying the measured power consumption due to standby loss in idling time by an average of 1800 hours per year, determined in accordance with the Code.
III	The storage capacity, which is the measured water storage capacity, determined in accordance with the Code.
IV	The brand name, the product model, the reference number assigned by the Director, the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under section 12 of this Ordinance, the year in which the new calculation method takes effect and the name of the information provider. The information provider is the specified person who submitted the specified information to the Director.

(4) The specifications for the font size of the words printed on the energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	14 point DFHeiBold (Chinese)

Description on the Energy Label	Font and font size
Grade on the left (1, 2, 3, 4, 5)	15 point Helvetica Neue Bold (English)
Grade on the right –	
The word “Grade”	11 point Helvetica Neue Bold Condensed (English)
The figure “1”	35.5 point Helvetica Neue Bold (English)
The word “級”	9.5 point DFHeiBold (Chinese)
Annual Standby Loss Energy Consumption (kWh)	11.5 (8) point Helvetica Roman (English)
每年備用耗電量（千瓦小時）	10 (8) point DFHeiMedium (Chinese)
Based on idling time of 1800 hrs/yr	7 point Helvetica Roman (English)
以每年備用時間為 1800 小時計算	7 point DFHeiMedium (Chinese)
Storage Capacity (litre)	10 point Helvetica Roman (English)
儲水容量(公升)	10 point DFHeiMedium (Chinese)
Figures of annual standby loss energy consumption and storage capacity on the right	20 point Helvetica Medium
Storage Type Electric Water Heater	9 point Helvetica Bold (English)
儲水式電熱水器	9 point DFHeiMedium (Chinese)
Brand Model Reference Number / Year Information Provider	9 point Helvetica Roman (English)
品牌： 型號： 參考編號 / 年份： 資料提供者：	9 point DFHeiMedium (Chinese)

Description on the Energy Label	Font and font size
Characters of brand, model, reference number, year and information provider on the right	9 point Helvetica Roman (English) 7.5 point DFHeiMedium (Chinese)
機電工程署 EMSD and its logo	16 point Monotype Yuen (Chinese) 17.9 point Futura Bold Condensed (English)

Appendix 8A

Example for Calculating the Energy Efficiency Grade for Induction Cooker

The given induction cooker is of two heating units (left and right side).

Rated power input of an induction cooker…….……...…….…….2400W

Rated standby power consumption of an induction cooker…..……..1.5W

Rated power of left side heating unit (heating unit 1)..…….1400W

Rated power of right side heating unit (heating unit 2) ...…….1000W

Rated thermal efficiency of heating unit 1 ……....……87%

Rated thermal efficiency of heating unit 2 ……....……87%

According to Table 14.1 in clause 14 of the Code, the rated thermal efficiency of heating unit 1 is rated as Grade 3 whereas the rated thermal efficiency of heating unit 2 is rated as Grade 2. Besides, the rated standby power consumption for two heating units is less than 2W. From the rated information as declared by the manufacturer or importer, the induction cooker is rated as a **Grade 3** induction cooker.

Measured power input of an induction cooker…....……..2460W

Measured standby power consumption …….……1.6W

Measured power input and thermal efficiency of heating unit 1

Measured power input (1st test) (P_{11}) …….……..1420W

Measured power input (2nd test) (P_{12})…….……...1430W

Measured power input (3rd test) (P_{13}) ……...1440W

Average of three power input measurements

= (P_{11} + P_{12} + P_{13})/3 = (1420+1430+1440)/3 = 1430W

Measured thermal efficiency (1st test) (TE_{11}) ……..…..88.0%

Measured thermal efficiency (2nd test) (TE_{12})……...88.2%

Measured thermal efficiency (3rd test) (TE_{13}) ……...88.4%

Average of three thermal efficiency measurements

= (TE_{11} + TE_{12} + TE_{13})/3 = (88.0+88.2+88.4)/3 = 88.2%

Measured power input and thermal efficiency of heating unit 2

Measured power input (1st test) (P_{21}) …….……..…..1020W

Measured power input (2nd test) (P_{22})…….……...1030W

Measured power input (3rd test) (P_{23}) ……...1040W

Average of three power input measurements

= (P_{11} + P_{12} + P_{13})/3 = (1020+1030+1040)/3 = 1030W

Measured thermal efficiency (1st test) (TE_{21}) ……....…..…86.0%

Measured thermal efficiency (2nd test) (TE_{22})……...86.6%

Measured thermal efficiency (3rd test) (TE_{23}) ……...86.3%

Average of three thermal efficiency measurements

= (TE_{21} + TE_{22} + TE_{23})/3 = (86.0+86.6+86.3)/3 = 86.3%

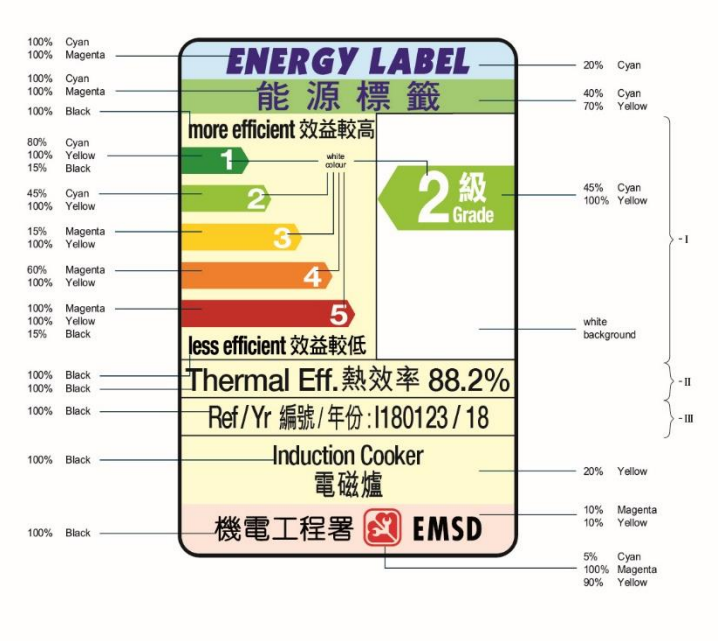
The measured power input of the induction cooker at the maximum heating mode does not exceed 5% of the rated power input of the induction cooker. Besides, for the induction cooker with two heating units, the lowest energy efficiency grade among heating units is used to determine overall grade, and standby power consumption for induction cooker of two heating units is less than 2W. From the test, the induction cooker is rated as Grade 2.

Overall, considering the lowest energy efficiency grade among the induction cooker from the rated and measured information, the induction cooker is rated as **Grade 3**.

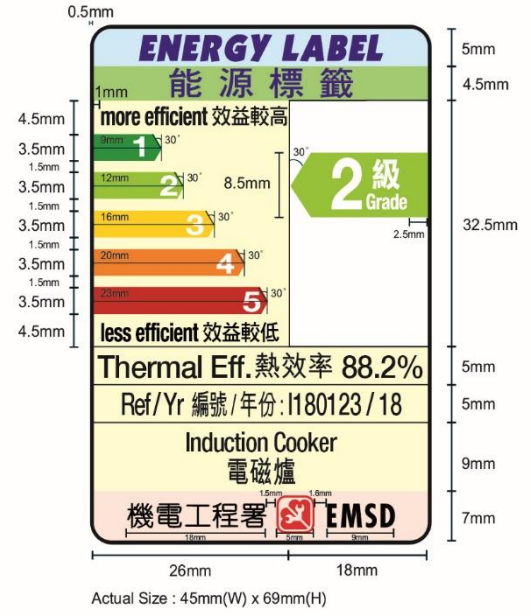
Appendix 8B

Specification of Energy Label

(1) The colour and design of the energy label must be as specified in the diagram below—



(2) The dimensions of the energy label must be as specified in the diagram below—



(3) The energy label under clause 1 of Appendix 8B is divided into 3 rectangular areas (marked I, II and III by the side of the label). The information to be contained in each area of the energy label is specified in column 2 of the following Table in relation to the area specified opposite to that information in column 1 of the Table.

Area	Information to be contained
I	The energy efficiency grading of the model, calculated in accordance with the Code. The head of the arrow containing the energy efficiency grade number is to be placed at the same level and has the same colour as the head of the relevant arrow on the left.
II	The thermal efficiency, calculated by computing the ratio of the heat generated at a given time to the measured power input, determined in accordance with the Code.
III	The reference number assigned by the Director and the year in which the reference number is assigned or, where the energy efficiency grading is calculated in accordance with the new calculation method under Section 12 of the Ordinance, the year in which the new calculation method takes effect.

(4) The specifications for the font size of the words printed on the largest energy label are as follows—

Description on the Energy Label	Font and font size
ENERGY LABEL	13 point Italic Kabel Ult BT (English)
能源標籤	12.5 point DFHeibold (Chinese)
more efficient 效益較高 less efficient 效益較低	9.6 point Helvetica Neue Bold (English) 9.1 point DFHeiBold (Chinese)
Grade on the left (1, 2, 3, 4, 5)	10.6 point Helvetica Neue Bold (English)

Description on the Energy Label	Font and font size
Grade on the right –	
The word “Grade”	8 point Helvetica Neue Bold Condensed (English)
The figure “2”	27 point Helvetica Neue Bold (English)
The word “級”	14 point DFHeiBold (Chinese)
Thermal Eff.	11.8 point Helvetica Neue Medium (English)
熱效率	10.8 point DFHeiBold (Chinese)
Figure of thermal efficiency and the sign “%”	11.8 point Helvetica Neue Medium (English)
Ref / Yr	11.8 point Helvetica Neue Medium (English)
編號 / 年份：	10.8 point DFHeiBold (Chinese)
Characters of reference number and year	11.8 point Helvetica Neue Medium (English)
Induction Cooker	10.65 point Helvetica Neue Medium (English)
電磁爐	10.65 point DFHeiBold (Chinese)
機電工程署	10.4 point Monotype Yuen (Chinese)
EMSD and its logo	11.6 point Futura Bold Condensed (English)

Electrical and Mechanical Services Department
3 Kai Shing Street, Kowloon, Hong Kong
Tel: (852) 2808 3465 Fax: (852) 2890 6081
Homepage: http://www.emsd.gov.hk/energylabel
Email: eepublic@emsd.gov.hk