

# **Code of Practice on Energy Labelling of Products 2014**

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### History of Revision

<u>Version</u>	<u>Effective Date</u>	<u>Details of Revision</u>
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

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## **1. Introduction**

- 1.1. This Code of Practice on Energy Labelling of Products 2014 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 and dehumidifiers under the Ordinance.
- 1.3. This version of Code contains new calculation methods of the energy efficiency grading of room air conditioners, refrigerating appliances and washing machines which takes effect on 31 October 2014. The energy labels of these three products supplied on or after 25 November 2015 shall conform with this version of Code.
- 1.4. For avoidance of doubt, the last version of code (Revision 1 in 2010) still applies to room air conditioners, refrigerating appliances and washing machines that have been manufactured in or imported into Hong Kong before 31 October 2014.
- 1.5. 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 5151:2010 and ISO 16358-1:2013. The text taken from ISO 5151:2010, Non-ducted air conditioners and heat pumps – Testing and rating for performance and ISO 16358-1:2013 Air-cooled air conditioners and air-to-air heat pumps – Testing and calculating methods for seasonal performance factors – Part 1: Cooling seasonal performance factor, is reproduced with the permission of the International Organisation for Standardization, ISO. These standards can be obtained from any ISO member and from the Web site of the ISO Central Secretariat at the following address: [www.iso.org](http://www.iso.org). Copyright remains with ISO.
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- (f) the Canadian Standards Association (CSA) as CAN/CSA-C749 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.

<i>Director</i>	means the Director of Electrical and Mechanical Services.
<i>disposition</i>	in relation to any specified premises, includes a sale of, a lease of, and a licence and permission to occupy the specified premises.
<i>family of models</i>	means a range of models of a prescribed product where in each model— <ul style="list-style-type: none"> <li>(a) the physical characteristics that affect the energy efficiency are the same; and</li> <li>(b) the output, energy consumption, energy efficiency and performance characteristics are the same.</li> </ul>
<i>listed model</i>	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.
<i>mains electricity</i>	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50 Hz.

<i>prescribed product</i>	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 and 11.1 of the Code).
<i>reference number</i>	means a number assigned to a product model by the Director under section 8 of the Ordinance.
<i>second-hand product</i>	means a prescribed product that has previously been used by a consumer.
<i>specified document</i>	means a document within the meaning of section 6 of the Ordinance.
<i>specified information</i>	means the information within the meaning of section 6 of the Ordinance.
<i>specified person</i>	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.
<i>specified premises</i>	means newly completed premises, whether domestic or not— <ul style="list-style-type: none"> <li>(a) subject to paragraph (b), the first disposition of which has not been made; or</li> <li>(b) if the first occupation of which is made before the first disposition, the first occupation of which has not been made.</li> </ul>
<i>supply</i>	in relation to the supply of a prescribed product, means— <ul style="list-style-type: none"> <li>(a) to sell or hire out the prescribed product;</li> <li>(b) to offer, keep or exhibit the prescribed product or any part of the product for sale or for hiring out;</li> <li>(c) to exchange or dispose of the prescribed product for consideration;</li> <li>(d) to transmit, convey or deliver the prescribed product in pursuance of— <ul style="list-style-type: none"> <li>(i) a sale;</li> </ul> </li> </ul>

- (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 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 section 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 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.
- 6.2. 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 section 11(2) and (3) are complied with.

- 6.3. 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.
- 6.4. 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 6.3 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—

- (a) means 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) includes single package type and split type room air conditioners that—
  - (i) use mains electricity as the primary power source;
  - (ii) operate by using the vapour compression cycle;
  - (iii) are non-ducted;
  - (iv) are air-cooled;
  - (v) are of either cooling only type or reverse cycle type; and
  - (vi) have 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;
- (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 the clause 7 follow those stipulated in the Ordinance, if any.

<i>air-cooled</i>	in relation to a room air conditioner, means the employment of air-cooled condensers in the room air conditioner.
<i>ceiling-mounted type air conditioner</i>	<p>means a split type room air conditioner whose indoor unit—</p> <ul style="list-style-type: none"><li>(a) is equipped with mounting brackets or hooks on its body at appropriate locations;</li><li>(b) is intended to be installed with mounting rods or mounting bolts fastened on the ceiling in accordance with the manufacturer's installation procedures;</li><li>(c) is intended to be installed directly under the ceiling; and</li><li>(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).</li></ul>
<i>cooling capacity</i>	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.
<i>cooling only type</i>	means a room air conditioner which is used for cooling, but not for heating.
<i>cooling seasonal total load (CSTL)</i>	means the total annual amount of heat that is removed from the indoor air when the equipment is operated for cooling in active mode.
<i>cooling seasonal energy consumption (CSEC)</i>	means the total annual amount of energy consumed by the equipment when it is operated for cooling in active mode.



<i>cooling seasonal performance factor (CSPF)</i>	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.
<i>effective power input (<math>P_E</math>)</i>	means the average electrical power input to the room air conditioner obtained from— <ul style="list-style-type: none"> <li>(a) the power input from the compressor(s)</li> <li>(b) the power input to electric heating devices used only for defrosting,</li> <li>(c) the power input to all control and safety devices of the room air conditioner, and</li> <li>(d) the power input for operation of all fans</li> </ul> <p>Note: This is expressed in units of watts.</p>
<i>fan-coil air-conditioning unit</i>	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.
<i>fixed capacity type room air conditioner</i>	means a room air conditioner which does not have possibility to change its capacity.
<i>floor standing type air conditioner</i>	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.
<i>heat pump</i>	means an encased assembly or assemblies designed as a unit to provide delivery of heat, which includes an electrically operated refrigeration system for heating.
<i>ISO</i>	means International Organization for Standardization (the latest edition of the standard shall be followed for test methodology).

<i>multiple split-system</i>	means a split system that— <ul style="list-style-type: none"> <li>(a) incorporates a single or multiple refrigerant circuits;</li> <li>(b) has one or more compressors;</li> <li>(c) has multiple indoor units;</li> <li>(d) has one or more outdoor units; and</li> <li>(e) is capable of operating either as an air conditioner or a heat pump.</li> </ul>
<i>multi-stage capacity type room air conditioner</i>	means a room air conditioner where the capacity is varied by three or four steps.
<i>non-ducted</i>	means not having any additional ductings or pipes required for air intake and exhaust.
<i>Non-fixed capacity type room air conditioner</i>	means a room air conditioner which has possibility to change its capacity.
<i>rated cooling capacity</i>	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.
<i>rated power consumption</i>	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.
<i>refrigeration circuit</i>	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.
<i>reverse cycle type</i>	means a room air conditioner which can operate in normal or reverse vapour compression cycle, used for both cooling and heating.

<i>single package type</i>	means a room air conditioner which consists of components of a refrigeration system fixed on a common mounting to form a discrete unit.
<i>split type</i>	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.
<i>two-stage capacity type room air conditioner</i>	means a room air conditioner where the capacity is varied by two steps.
<i>variable capacity type room air conditioner</i>	means a room air conditioner where the capacity is varied by five or more steps to represent continuously variable capacity.
<i>water-cooled</i>	in relation to a room air conditioner, means the employment of water-cooled condensers in the room air conditioner.
<i>vapour compression cycle</i>	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 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) Maximum cooling performance test.

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 – Test required to be carried out, test conditions and default values**

Test	Characteristics	Fixed	Two-stage	Multi-stage	Variable
Standard cooling capacity	Full capacity $\phi_{\text{ful}}(35)$ (W)	Test Required	Test Required	Test Required	Test Required
	Full power input $P_{\text{ful}}(35)$ (W)				
Indoor DB 27°C WB 19°C	Half capacity $\phi_{\text{haf}}(35)$ (W)	---	---	Note 1	Test Required
	Half power input $P_{\text{haf}}(35)$ (W)				
Outdoor DB 35°C WB 24°C	Minimum capacity $\phi_{\text{min}}(35)$ (W)	---	Note 1	---	---
	Minimum power input $P_{\text{min}}(35)$ (W)				
Low temp. cooling capacity	Full capacity $\phi_{\text{ful}}(29)$ (W)	Note 1	Note 1	Note 1	Note 1
	Full power input $P_{\text{ful}}(29)$ (W)				
Indoor DB 27°C WB 19°C	Half capacity $\phi_{\text{haf}}(29)$ (W)	---	---	Test Required	Note 1
	Half power input $P_{\text{haf}}(29)$ (W)				
Outdoor DB 29°C WB 24°C	Minimum capacity $\phi_{\text{min}}(29)$ (W)	---	Test Required	---	---
	Minimum power input $P_{\text{min}}(29)$ (W)				
Note 1: Default values shall be used: $\phi_{\text{ful}}(35) = \phi_{\text{ful}}(29)/1.077$ , $P_{\text{ful}}(35) = P_{\text{ful}}(29)/0.914$ $\phi_{\text{haf}}(35) = \phi_{\text{haf}}(29)/1.077$ , $P_{\text{haf}}(35) = P_{\text{haf}}(29)/0.914$ $\phi_{\text{min}}(35) = \phi_{\text{min}}(29)/1.077$ , $P_{\text{min}}(35) = P_{\text{min}}(29)/0.914$					
Note 2: Default value of degradation coefficient: $C_D = 0.25$					

## 7.5. Test Methodology

### 7.5.1. Standard Cooling Capacity Tests

The standard cooling capacity tests shall be conducted in accordance with Annex A of ISO 5151. The cooling capacity and effective power input shall be measured during the standard cooling capacity tests.

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

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

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 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 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 and Power Consumption

The test conditions and the testing methodology for measurement of cooling capacity and power consumption shall follow ISO 5151, ISO16358-1 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.

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 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 capacity test 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, in watts (W), or in kilowatts (kW).

#### 7.5.4. Maximum Cooling 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.

## 7.6. Determination of Energy Efficiency Grading

### 7.6.1. Cooling Seasonal Performance Factor (CSPF)

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

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

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 7.3 and Table 7.4 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 7.3 and Table 7.4 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.

### 7.6.2. Cooling Load

The defined cooling load is assumed linearly changing depending on the change in outdoor temperature as shown in Table 7.3.

**Table 7.3 – Defined cooling load**

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

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.

### 7.6.3. Outdoor Temperature Bin Distribution for Cooling

The cooling seasonal performance factor (CSPF) shall be calculated at outdoor temperature bin distribution shown in Table 7.4.

**Table 7.4 – Outdoor temperature bin distribution**

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

#### 7.6.4. Energy Efficiency Grading

The energy efficiency grade of the room air conditioner shall be determined as shown in Table 7.5, with Grade 1 having the best performance and Grade 5 having the worst performance.

**Table 7.5 – Derivation of energy efficiency grades**

Cooling Seasonal Performance Factor (CSPF), $F_{CSP}$		Energy Efficiency Grade <sup>(Note)</sup>
Single Package Type Categories 1 - 2	Split Type Categories 3 - 4	
$3.00 \leq F_{CSP}$	$4.50 \leq F_{CSP}$	1
$2.80 \leq F_{CSP} < 3.00$	$3.50 \leq F_{CSP} < 4.50$	2
$2.60 \leq F_{CSP} < 2.80$	$3.15 \leq F_{CSP} < 3.50$	3
$2.40 \leq F_{CSP} < 2.60$	$2.80 \leq F_{CSP} < 3.15$	4
$F_{CSP} < 2.40$	$F_{CSP} < 2.80$	5

**Note:**

*In order to obtain Grade 1 to 4, 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  $F_{CSP} < 2.40$  for single package type room air conditioner or the  $F_{CSP} < 2.80$  for split type room air conditioner.*

Example illustrating the method on how to determine the energy efficiency grade of room air conditioner is 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 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  $\phi_{\text{ful}}(35)$  from 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.
- (b) The measured power consumption  $P_{\text{ful}}(35)$  from full capacity test at standard cooling condition (T1 climate) shall not be greater than 110% of the rated power consumption of the room air conditioner.
- (c) The calculated cooling seasonal performance factor shall not be less than 90% of the rated cooling seasonal performance factor.
- (d) The room air conditioner 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.

7.7.2. The rated cooling capacity, rated power consumption and rated cooling seasonal performance factor 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  $\phi_{\text{ful}}(35)$  from full capacity test at standard cooling condition (T1 climate) is equal to or greater than 95%, and is less than 97.5% of the rated cooling 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 tested sample with a lower cooling seasonal performance factor ( $F_{\text{CSP}}$ ).

#### 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  $\phi_{\text{ful}}(35)$  from full capacity test at standard cooling condition (T1 climate) being not less than 90% of the rated cooling capacity;
- (b) The tested power consumption  $P_{\text{ful}}(35)$  from full capacity test at standard cooling condition (T1 climate) being not greater than 110% of the rated power consumption;
- (c) The calculated cooling seasonal performance factor being not less than 90% of the rated cooling seasonal performance factor;
- (d) The room air conditioner (with a Grade 1, 2, 3 or 4 energy label) passing the maximum cooling performance test; 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 cooling seasonal performance factor calculated in the compliance monitoring testing being not less than 90% 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.

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  $\phi_{\text{ful}}(35)$  from full capacity tests at

standard cooling condition (T1 climate) of all the samples being not less than 90% of the rated cooling capacity;

- (b) The average of the tested power consumptions  $P_{\text{ful}}(35)$  from full capacity tests at standard cooling condition (T1 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 90% of the rated cooling seasonal performance factor;
- (d) Each sample passing the maximum cooling performance test for Grade 1 to 4; and
- (e) The tested energy efficiency grade meeting either one of the following:
  - (i) The 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 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 calculated cooling seasonal performance 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, the average of the cooling seasonal performance factors of all the samples calculated in the further testing being not less than 90% 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.

(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—

- (a) means a factory-assembled insulated cabinet with one or more compartments and of suitable volume and equipment for household use, cooled by internal natural convection or a frost-free system where the cooling is obtained by one or more energy-consuming means;
- (b) includes a refrigerator, frozen food storage cabinet, food freezer, and their combinations; and
- (c) includes refrigerating appliances that—
  - (i) use mains electricity as the primary power source;
  - (ii) operate by using the vapour compression cycle; and
  - (iii) have a rated total storage volume not exceeding 500 litres.

8.1.3. “Refrigerating appliance” does not include refrigerating appliances which—

- (a) may also use other energy sources; or
- (b) 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* means a system—

*refrigerating 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.

<i>adjusted volume</i>	means the volume for the storage of foodstuff corrected for the relative contribution to the total energy consumption according to the different temperatures of the storage compartments.
<i>cellar compartment</i>	means a compartment intended for the storage of particular foods or beverages at a temperature warmer than that of the fresh food storage compartment.
<i>chill compartment</i>	means a compartment intended specifically for the storage of highly perishable foodstuffs whose volume is capable of containing at least 2 “M” packages.
<i>food freezer</i>	means a refrigerating appliance having 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.
<i>food freezer compartment</i>	means a compartment suitable for freezing foodstuffs from ambient temperature down to –18 °C, and which is also suitable for the storage of frozen food under three-star storage conditions.
<i>fresh food storage compartment</i>	means a compartment intended for the storage of unfrozen food, which may itself be divided into sub-compartments.
<i>frozen food storage cabinet</i>	means a refrigerating appliance having one or more compartments suitable for the storage of frozen food.
<i>frozen food storage compartment</i>	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.
<i>ice-making compartment</i>	means a compartment intended specifically for the freezing and storage of water ice-cubes.
<i>IEC</i>	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).

<i>low temperature compartment</i>	means a compartment which may be either an ice-making compartment or a frozen food storage compartment.
<i>rated energy consumption</i>	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.
<i>rated freezing capacity</i>	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.
<i>rated storage volume</i>	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.
<i>rated total storage volume</i>	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.
<i>refrigerator</i>	means a refrigerating appliance intended for the preservation of food, one of whose compartments is suitable for the storage of fresh food.
<i>refrigerator / freezer</i>	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.
<i>storage volume</i>	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.

<i>total storage volume</i>	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).
<i>vapour compression cycle</i>	means a mechanism employed by a refrigerating appliance throughout which the refrigerant undergoes alternate compression and expansion to achieve the cooling function.
<i>“1-star” compartment</i>	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.
<i>“2-star” compartment</i>	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.
<i>“3-star” compartment</i>	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.
<i>“4-star” freezer</i>	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 (°C) <sup>Note</sup>
		IEC 62552 <sup>Note</sup>
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 °C

	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	$0 < t_{1m}, t_{2m}, t_{3m} \leq +8$	$\leq +4$	$\leq -6$	$\leq -12$	$\leq -18$	$+8 \leq t_{cm} \leq +14$	$-2 \leq t_{cc} \leq +3$
Permitted deviations during defrost cycle	$0 < t_{1m}, t_{2m}, t_{3m} \leq +8$	$\leq +4$	$\leq -6$	$\leq -9$	$\leq -15$	$+8 \leq t_{cm} \leq +14$	$-2 \leq t_{cc} \leq +3$

(IEC 62552 “Copyright © 2007 IEC Geneva, Switzerland.[www.iec.ch](http://www.iec.ch)”)

*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 °C	Frozen food compartment temp. in °C	Description
Refrigerator	Category 1	+5	Nil	A refrigerator without a frozen food compartment
	Category 2	+5	$\leq -6$	A refrigerator with a 1-star frozen food compartment
	Category 3	+5	$\leq -12$	A refrigerator with a 2-star frozen food compartment
	Category 4	+5	$\leq -18$	A refrigerator with a 3-star frozen food compartment
Refrigerator -freezer	Category 5	+5	$\leq -18$	A refrigerator with a 4-star frozen food compartment
	Category 6	+5	$\leq -18$	A Category 5 refrigerator incorporating means to prevent the formation of frost on contents
Freezer	Category 7	Nil	$\leq -18$	A refrigerating appliance in which the entire storage volume is intended for freezing food.
	Category 8	Nil	$\leq -18$	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 8.5.1 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—

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

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

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

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

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

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

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

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. <sup>(Note)</sup>
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:  $V_{adj} = \sum V_i \times \Omega$

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:

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

Since temperature of a 3-Star compartment is  $T_i = T_{ffc} = -18^\circ\text{C}$ , and temperature of a fresh food compartment is  $T_r = 5^\circ\text{C}$ ,

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

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

### 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  $5^\circ\text{C}$  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 =

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

(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	$V_{adj} \times 0.233 + 245$	13
Category 2	$V_{adj} \times 0.643 + 191$	14
Category 3	$V_{adj} \times 0.450 + 245$	15
Category 4	$V_{adj} \times 0.657 + 235$	16
Category 5	$V_{adj} \times 0.777 + 303$	17
Category 6	$1.35 \times (V_{adj} \times 0.777 + 303)^{(Note)}$	18
Category 7	Chest freezer: $V_{adj} \times 0.446 + 181$	19
	Upright freezer: $V_{adj} \times 0.472 + 286$	20
Category 8	Chest freezer: $1.35 \times (V_{adj} \times 0.446 + 181)^{(Note)}$	21
	Upright freezer: $1.35 \times (V_{adj} \times 0.472 + 286)^{(Note)}$	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 ( $I_e$ )

The energy consumption index ( $I_e$ ) 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—

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

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**

<b>Energy Consumption Index : <math>I_e</math> (%)</b>	<b>Energy Efficiency Grade</b>
$I_e \leq 35$	1
$35 < I_e \leq 44$	2
$44 < I_e \leq 55$	3
$55 < I_e \leq 69$	4
$69 < I_e$	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  $-18^{\circ}\text{C}$  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  $-18^{\circ}\text{C}$  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  $-18^{\circ}\text{C}$  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—

- (a) means a type of fluorescent lamp which has a single lamp cap; and
- (b) includes integrated type compact fluorescent lamps that—
  - (i) use mains electricity as the primary power source;
  - (ii) have a rated lamp wattage up to 60 watts; and
  - (iii) have 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.

<i>ageing period</i>	means the time required for the initial burn-in of the lamp.
<i>ballast</i>	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.
<i>bayonet cap</i>	means the bayonet cap as defined in IEC 60061 or other equivalent international standards approved by the Director.
<i>CIE</i>	means International Commission on Illumination (the latest edition of the standard shall be followed for test methodology).

<i>cold cathode fluorescent lamp</i>	means a lamp of a type whose principle of illumination is the same as that of a conventional fluorescent lamp except that it— <ul style="list-style-type: none"> <li>(a) does not require heating of electrodes during starting and operating; and</li> <li>(b) operates at a much higher voltage and lower current to start and maintain the discharge.</li> </ul>
<i>full test report</i>	in relation to a compact fluorescent lamp, means a test report that presents the results of a test carried out— <ul style="list-style-type: none"> <li>(a) to find out all aspects of the lamp's energy efficiency and performance characteristics specified in the Code; and</li> <li>(b) to a standard specified in the Code.</li> </ul>
<i>IEC</i>	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).
<i>integrated type CFL</i>	means a compact fluorescent lamp of a type that— <ul style="list-style-type: none"> <li>(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</li> <li>(b) cannot be dismantled without being permanently damaged.</li> </ul>
<i>interim test report</i>	in relation to a compact fluorescent lamp, means a test report that presents the results of a test carried out— <ul style="list-style-type: none"> <li>(a) to find out certain aspects of the lamp's energy efficiency and performance characteristics specified in the Code; and</li> <li>(b) to a standard specified in the Code.</li> </ul>
<i>life to 50% failures (average life)</i>	means the length of time during which 50% of the compact fluorescent lamps reach the end of their individual lives.

<i>lumen maintenance</i>	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.
<i>luminous efficacy (lm/W)</i>	means a ratio of luminous flux emitted by a lamp to the electrical power consumed by the lamp.
<i>luminous flux (lm)</i>	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.
<i>non-integrated type CFL</i>	means a compact fluorescent lamp of a type that is electrically connected to an external ballast for operation.
<i>progress test report</i>	in relation to a compact fluorescent lamp, means a test report— <ul style="list-style-type: none"> <li>(a) that is submitted together with or after the submission of an interim test report; and</li> <li>(b) that presents the results of a test carried out— <ul style="list-style-type: none"> <li>(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</li> <li>(ii) to a standard specified in the Code.</li> </ul> </li> </ul>
<i>rated lamp wattage</i>	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.)
<i>rated life to 50% failures (rated average life)</i>	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 .

<i>rated lumen maintenance</i>	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.
<i>rated luminous flux</i>	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.
<i>rated power consumption</i>	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.
<i>reflector CFL</i>	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.
<i>screw cap</i>	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**

Rated Lamp Wattage ( $L_w$ ) (Watt)	$X$ <sup>Note (1)</sup> (Lumen/W)				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
	Note (2)		Note (3)		Note (4)
$\leq 10$	$X \geq 49.5$	$49.5 > X \geq 45$	$45 > X \geq 40.5$	$X < 40.5$	N/A
$10 < L_w \leq 20$	$X \geq 55$	$55 > X \geq 50$	$50 > X \geq 45$	$X < 45$	N/A
$20 < L_w \leq 30$	$X \geq 60.5$	$60.5 > X \geq 55$	$55 > X \geq 49.5$	$X < 49.5$	N/A
$30 < L_w$	$X \geq 66$	$66 > X \geq 60$	$60 > X \geq 54$	$X < 54$	N/A

*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 a 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**

<b>Tests Required</b>	<b>Minimum Number of Samples</b>
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**

<b>Tests Required</b>	<b>Test Results</b>
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) $\geq$ 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—

- (a) means 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) includes washing machines that—
  - (i) use mains electricity as the primary power source; and
  - (ii) have a rated washing capacity not exceeding 7 kilograms, whether or not they have built-in dryers for drying textiles by means of heating.

10.1.3. “Washing machine” does not include washing machines that —

- (a) may also use other energy sources; or
- (b) 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.

<i>IEC</i>	means International Electrotechnical Commission (the latest edition of the standard shall be followed for test methodology).
<i>JIS</i>	means Japanese Industrial Standard (the latest edition of the standard shall be followed for test methodology).
<i>rated washing capacity</i>	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.
<i>spin extraction</i>	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.
<i>spin extractor</i>	means separate water-extracting appliance in which water is removed from textiles by centrifugal action.
<i>vertical axis washing machine</i>	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**

<b>Category</b>	<b>Description</b>
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 °C 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  $30 \pm 2$  °C.

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:

$$\text{Specific Energy Consumption (E}_{sp}) = \frac{E}{W_r} \dots\dots\dots(\text{eq. 1})$$

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:

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

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 °C to 60 °C and shall be calculated as follows:

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

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 °C, i.e. 60 °C

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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 <sup>(Note)</sup>
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
<b>Performance Requirements<sup>Note (1)</sup></b>		
Test Standard	IEC 60456 <sup>Note (4)</sup>	JIS C 9606
Washing Performance <sup>Note (2)</sup>	$q \geq 0.7$	$C \geq 0.55$
Water Extraction Performance <sup>Note (3)</sup>	$RM \leq 1.1$	Water extracting efficiency $\geq 0.47$

**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):

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

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):*

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

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

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  $E_{sp} > 0.195$  for horizontal axis washing machine or  $E_{sp} > 0.0232$  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—

- (a) means an encased assembly for removing moisture from its surrounding atmosphere; and
- (b) includes self-contained, electrically operated and mechanically-refrigerated dehumidifiers that—
  - (i) use mains electricity as the primary power source;
  - (ii) operate by using the vapour compression cycle;
  - (iii) consist of a refrigerated surface (“evaporator”) that condenses moisture from the atmosphere; a refrigerating system, including an electric motor; an air circulating fan; and a drain system for collecting or disposing of the condensate; and
  - (iv) have 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.

<i>ANSI / AHAM</i>	means American National Standards Institute / Association of Home Appliance Manufacturers (the latest edition of the standard shall be followed for test methodology).
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<i>CAN/CSA</i>	means Canada / Canadian Standards Association (the latest edition of the standard shall be followed for test methodology).
<i>dehumidifying capacity</i>	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.
<i>energy factor</i>	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.
<i>rated dehumidifying capacity</i>	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.
<i>vapour compression cycle</i>	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	26.7°C
Wet-bulb temperature	20.9°C
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.

#### 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—

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

*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
$< 10$	$1.6 \leq EF$	$1.35 \leq EF < 1.6$	$1.15 \leq EF < 1.35$	$1 \leq EF < 1.15$	$EF < 1$
$10 \leq D_R < 15$	$1.85 \leq EF$	$1.55 \leq EF < 1.85$	$1.35 \leq EF < 1.55$	$1.20 \leq EF < 1.35$	$EF < 1.2$
$15 \leq D_R < 20$	$2 \leq EF$	$1.65 \leq EF < 2$	$1.45 \leq EF < 1.65$	$1.25 \leq EF < 1.45$	$EF < 1.25$
$20 \leq D_R < 25$	$2.1 \leq EF$	$1.75 \leq EF < 2.1$	$1.55 \leq EF < 1.75$	$1.35 \leq EF < 1.55$	$EF < 1.35$
$25 \leq D_R \leq 35$	$2.35 \leq EF$	$2 \leq EF < 2.35$	$1.7 \leq EF < 2$	$1.5 \leq EF < 1.7$	$EF < 1.5$

**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.)

**Example for Calculating the Energy Efficiency Grade for Room Air Conditioner**

(Fixed Capacity Single Package Type)

Step (1)

Rated cooling capacity	6.000 kW
Rated power input	1.850 kW

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

Step (2)

Calculated cooling capacity at 29°C, $\Phi_{ful}(29)$ = $1.077 \times \Phi_{ful}(35)$	6.353 kW
Calculated cooling power input at 29°C, $P_{ful}(29)$ = $0.914 \times P_{ful}(35)$	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	$\Phi_{\text{ful}}(t_j)$	$P_{\text{ful}}(t_j)$	$L_c(t_j)$	$X(t_j)$	$F_{\text{PL}}(t_j)$	$L_{\text{CST}}(t_j)$	$C_{\text{STE}}(t_j)$
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					$\Sigma$	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),  $F_{\text{CSP}}$ , of the room air conditioner is 3.25.

According to Table 7.5 in clause 7 of the Code, the single package type room air conditioner is rated as a **Grade 1** room air conditioner.

### **Example for Calculating the Energy Efficiency Grade for Room Air Conditioner**

(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°C, $\Phi_{ful}(35)$	5.899 kW
Measured cooling full power input at 35°C, $P_{ful}(35)$	1.855 kW
Measured cooling half capacity at 35°C, $\Phi_{haf}(35)$	3.086 kW
Measured cooling half power input at 35°C, $P_{haf}(35)$	0.663 kW

#### Step (2)

Calculated cooling full capacity at 29°C, $\Phi_{ful}(29)$ $=1.077 \times \Phi_{ful}(35)$	6.353 kW
Calculated cooling full power input at 29°C, $P_{ful}(29)$ $=0.914 \times P_{ful}(35)$	1.695 kW
Calculated cooling half capacity at 29°C, $\Phi_{haf}(29)$ $=1.077 \times \Phi_{haf}(35)$	3.324 kW
Calculated cooling half power input at 29°C, $P_{haf}(29)$ $=0.914 \times P_{haf}(35)$	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°C
Outdoor temperature when cooling load is equal to cooling full capacity, $t_b$	*35°C

\*In the calculation,  $t_b$  would be set as 35°C

### Step (3)

Bin no. j	Outdoor temp. (°C)	*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
$\Sigma$						$L_{CST}$ =3032.8183	$C_{CSE}$ =613.2760
CSPF						4.9453	

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

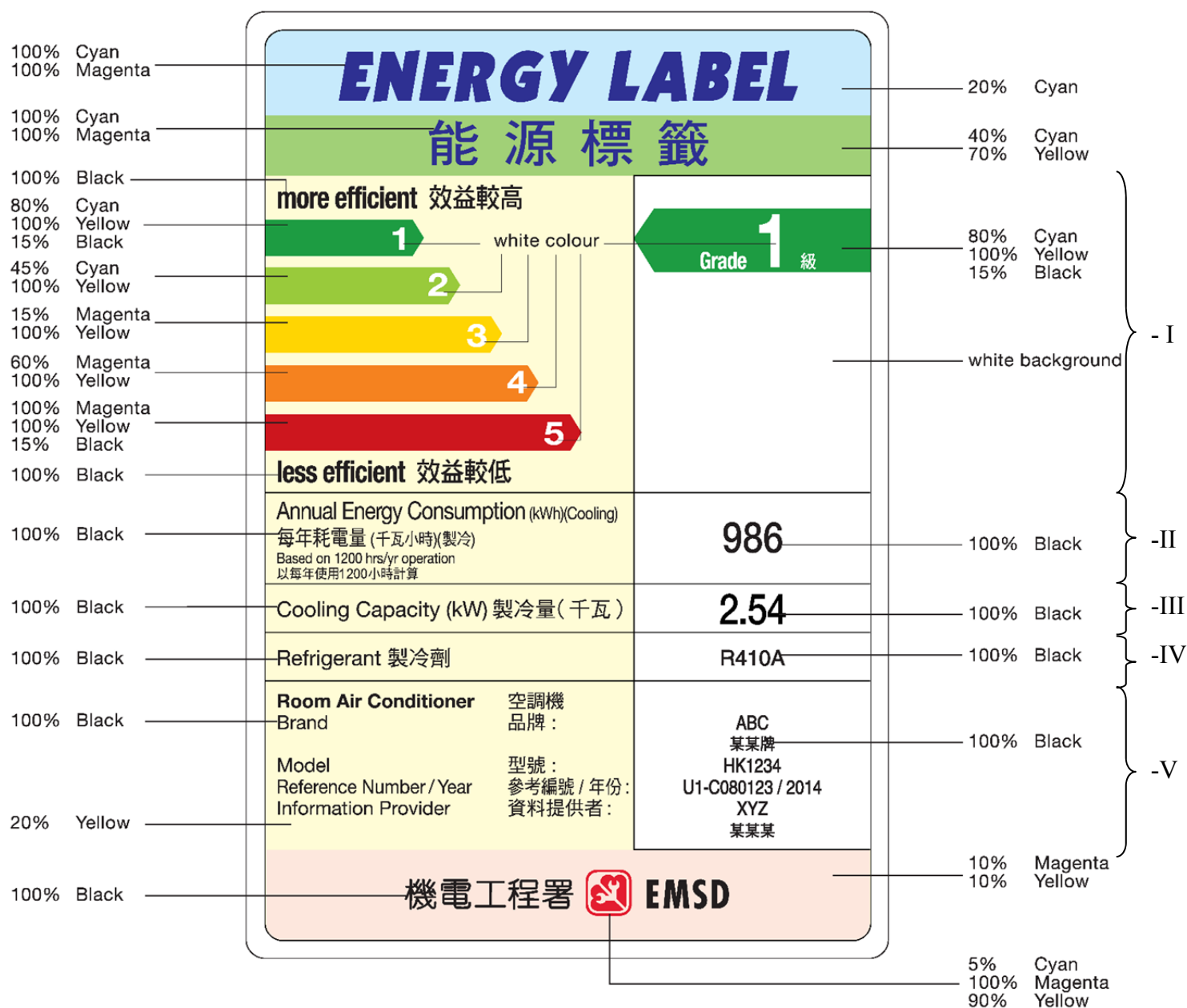
### Step (4)

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

According to Table 7.5 in clause 7 of the Code, the split type room air conditioner is rated as a **Grade 1** room air conditioner.

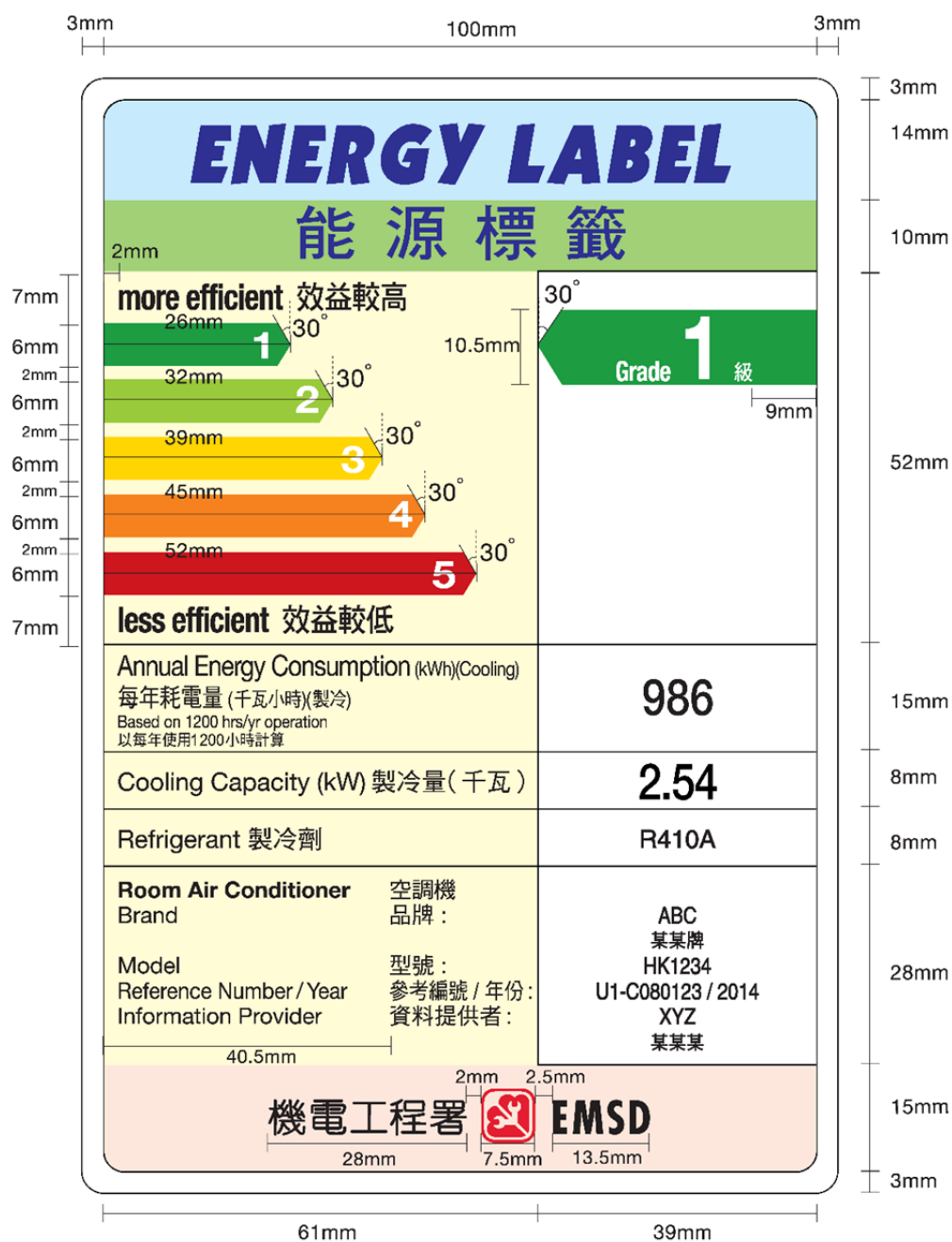
### Specification of Energy Label

- (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 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.

<u>Area</u>	<u>Information to be contained</u>
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 in cooling mode at full load by an average of 1,200 hours per year, determined 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.

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

<u>Description on the Energy Label</u>	<u>Font and font size</u>
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)

<u>Description on the Energy Label</u>	<u>Font and font size</u>
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	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)
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)
Cooling Capacity (kW)	10 point Helvetica Roman (English)
製冷量（千瓦）	10 point DFHeiMedium (Chinese)
Figures of annual energy consumption and cooling 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	} 9 point Helvetica Roman (English)
Model	
Reference Number / Year	
Information Provider	

<u>Description on the Energy Label</u>	<u>Font and font size</u>
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)

**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.

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

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.

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

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

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

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

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

$$\begin{aligned}
 \text{Energy Consumption Index } I_e &= \frac{\text{Annual Energy Consumption}}{\text{Average Appliance Energy Consumption}} \\
 I_e &= \frac{280}{905} \\
 I_e &= 30.9\% \\
 \mathbf{I_e < 35 \%}
 \end{aligned}$$

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

**ENERGY LABEL**  
**能源標籤**

**more efficient 效益較高**

**1** white colour

**2**

**3**

**4**

**5**

**less efficient 效益較低**

**Grade 2 級**

**white background**

**Annual Energy Consumption (kWh)**  
每年耗電量 (千瓦小時)

**298**

**Fresh Food Volume (litre)**  
保鮮格容積 (公升)

**200**

**Frozen Food Volume (litre)**  
冰格容積 (公升)

**60**

**Refrigerating Appliance 冷凍器具**  
Brand 品牌:

ABC  
某某牌  
HK001

Model 型號:  
Reference Number / Year 參考編號 / 年份:  
Information Provider 資料提供者:

U1-R080123 / 2014  
XYZ  
某某某

**機電工程署 EMSD**

100% Cyan  
100% Magenta

100% Cyan  
100% Magenta

100% Black

80% Cyan  
100% Yellow  
15% Black

45% Cyan  
100% Yellow

15% Magenta  
100% Yellow

60% Magenta  
100% Yellow

100% Magenta  
100% Yellow  
15% Black

100% Black

100% Black

100% Black

100% Black

100% Black

20% Yellow

100% Black

20% Cyan

40% Cyan  
70% Yellow

45% Cyan  
100% Yellow

100% Black

100% Black

100% Black

100% Black

10% Magenta  
10% Yellow

5% Cyan  
100% Magenta  
90% Yellow

- I

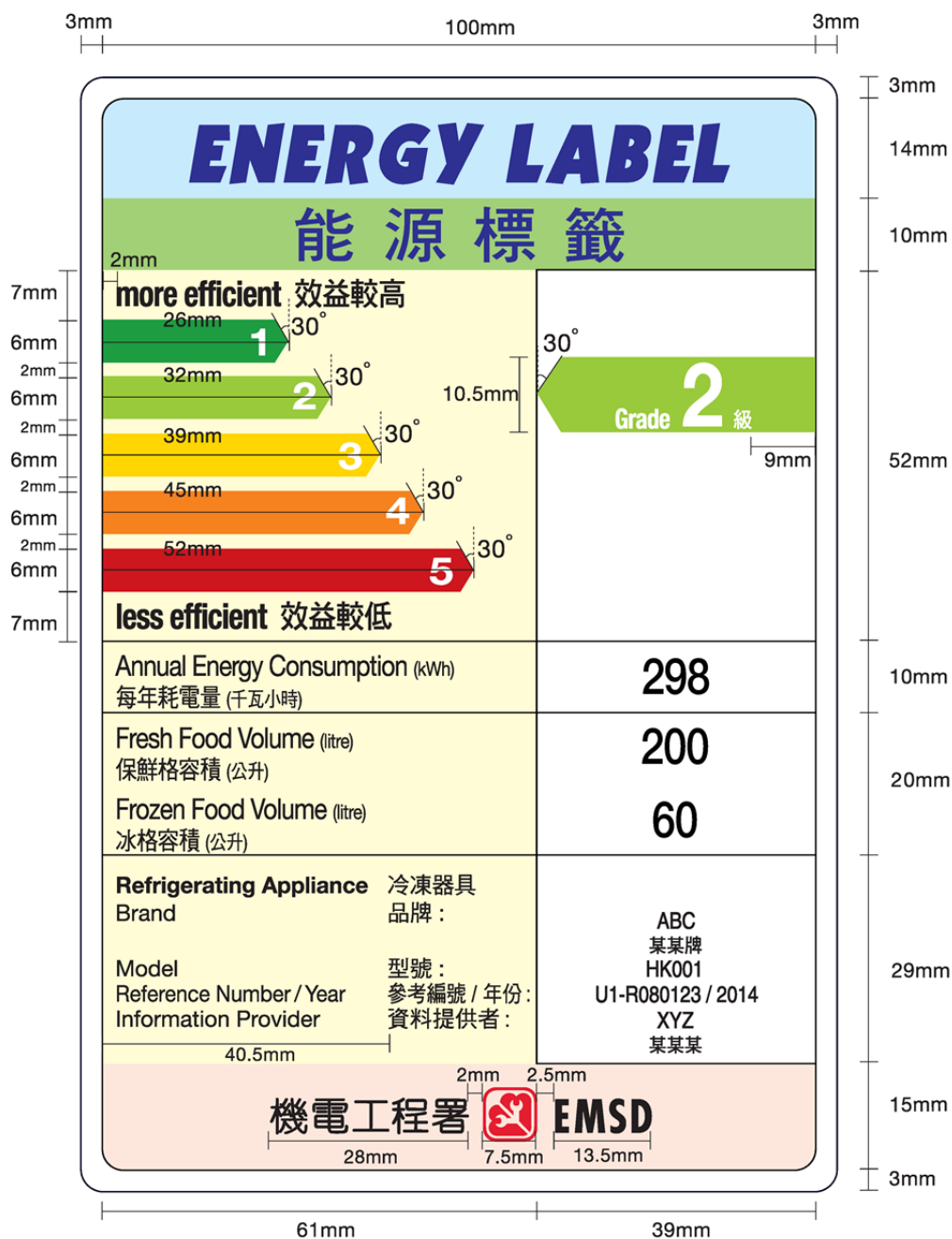
- II

- III

- IV

- V

(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.

<u>Area</u>	<u>Information to be contained</u>
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 $-6^{\circ}\text{C}$ , 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 $-6^{\circ}\text{C}$ , 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—



<u>Description on the Energy Label</u>	<u>Font and font size</u>
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)
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 “2”	35.5 point Helvetica Neue Bold (English)
The word “級”	9.5 point DFHeiBold (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)
Fresh Food Volume (litre)	11.5 (8) point Helvetica Roman (English)
保鮮格容積（公升）	10 (8) point DFHeiMedium (Chinese)
Frozen Food Volume (litre)	11.5 (8) point Helvetica Roman (English)
冰格容積（公升）	10 (8) point DFHeiMedium (Chinese)
Figures of annual energy consumption and volumes on the right	20 point Helvetica Medium
Refrigerating Appliance	9 point Helvetica Bold (English)
冷凍器具	9 point DFHeiMedium (Chinese)
Brand	} 9 point Helvetica Roman (English)
Model	
Reference Number / Year	
Information Provider	

<u>Description on the Energy Label</u>	<u>Font and font size</u>
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)

**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  
 ( $E_r$ )

$$= \frac{\text{Rated luminous flux}}{\text{Rated power input}}$$

$$= 600 / 11$$

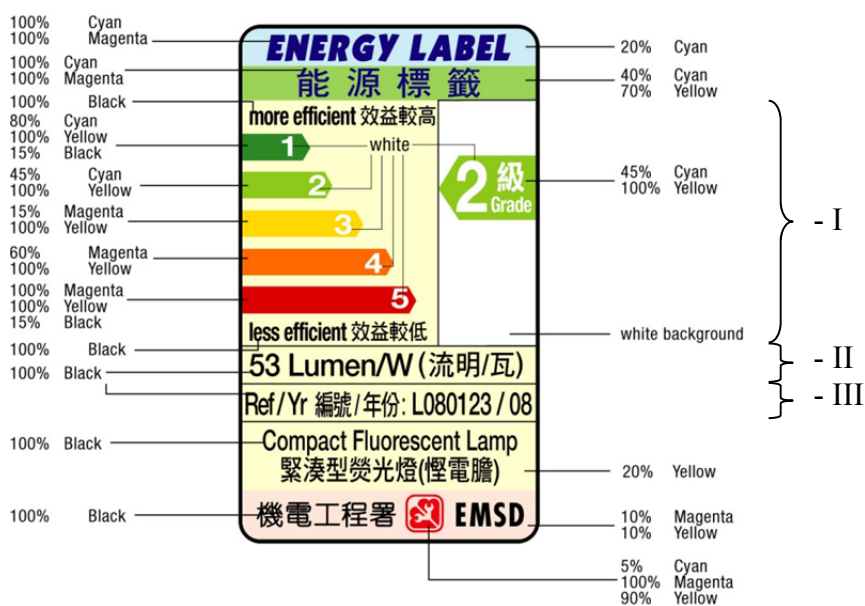
$$= 54.5 \text{ lm/W}$$

Since the  $E_m \geq E_r$ , the  $E_r$  (54.5 lm/W) is used to determine the energy efficiency grade

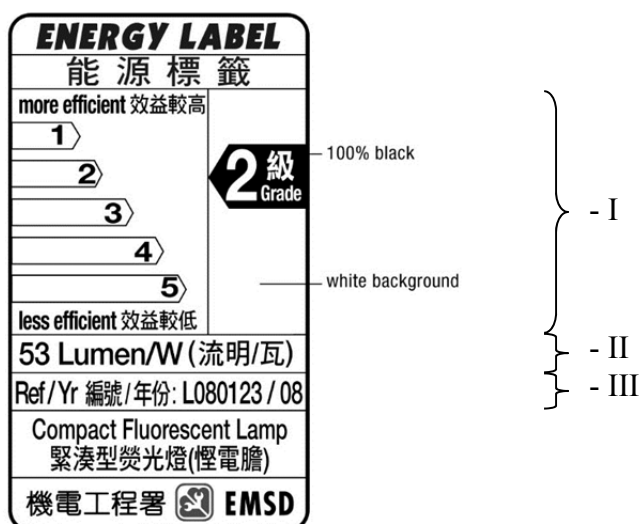
According to Table 9.1 in clause 9 of the Code, the CFL is rated as a **Grade 2 CFL**.

### 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.

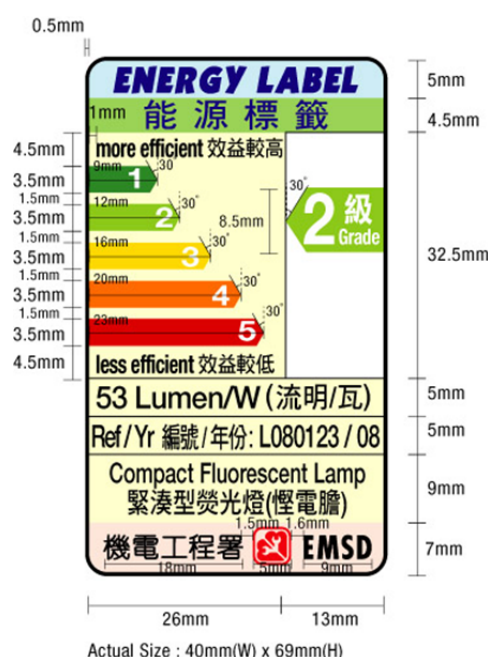


### Colour Version



### 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.

<u>Area</u>	<u>Information to be contained</u>
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—

<u>Description on the Energy Label</u>	<u>Font and font size</u>
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)

**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 = $E \times 260$ .....	156 kWh
Specific energy consumption ( $E_{sp}$ ) = $E / W_r$ .....	0.12 kWh/kg/cycle

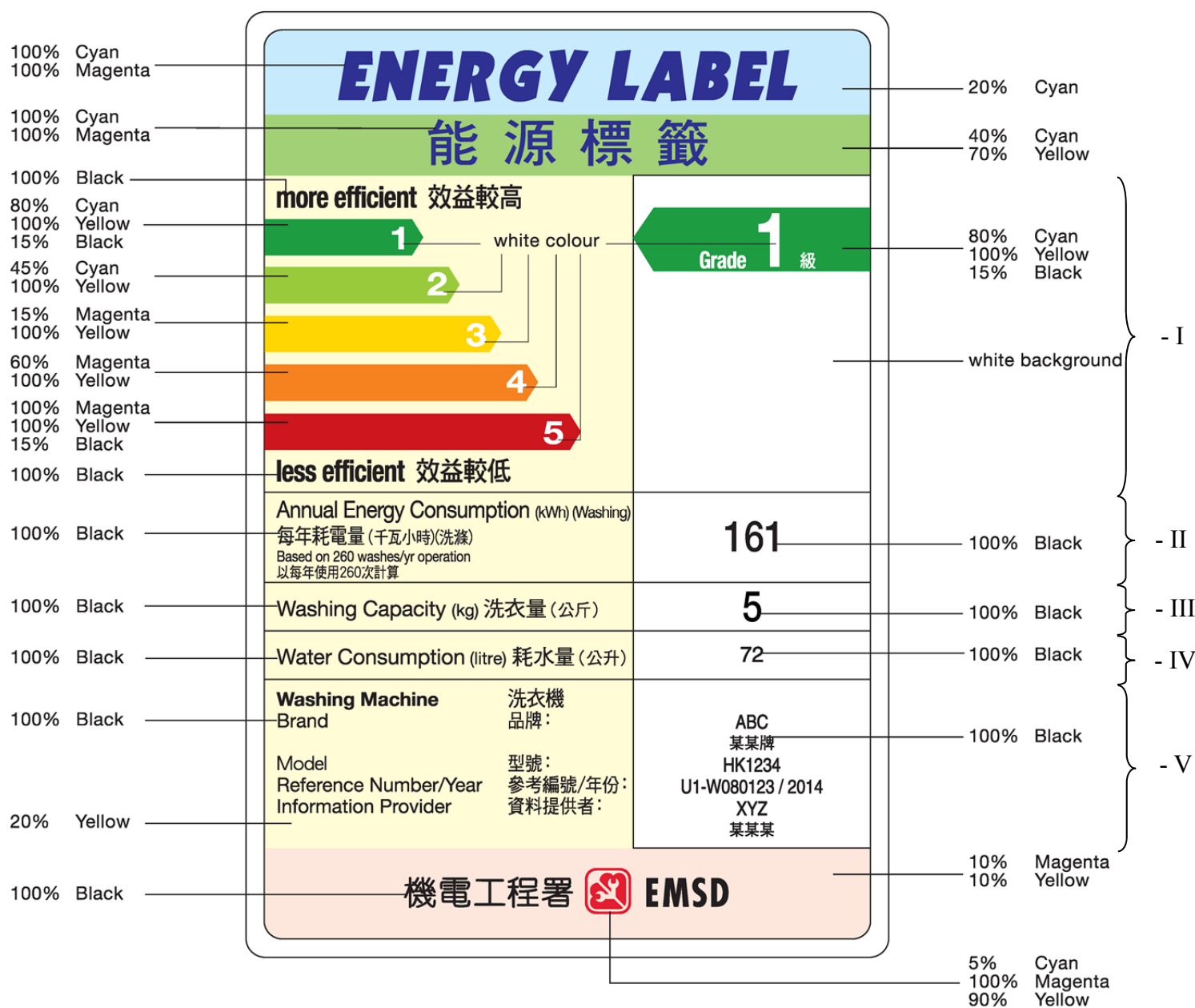
Also the washing performance and spin extraction performance meet the requirements in Table 10.3 in clause 10.6.1(c) of the Code.

$$E_{sp} \leq 0.130$$

According to Table 10.2 in clause 10 of the Code, the washing machine is rated as a **Grade 1** washing machine.

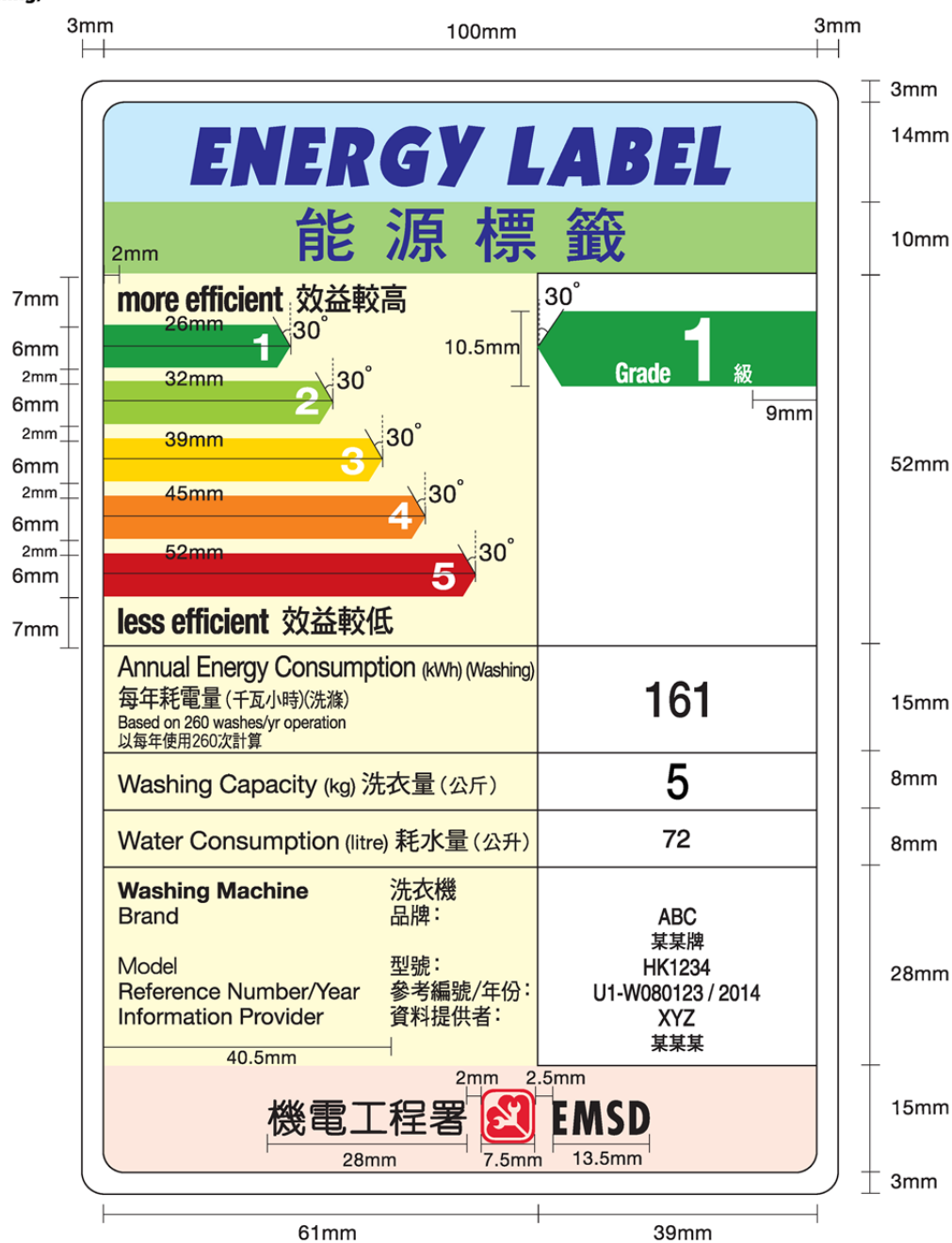
### Specification of Energy Label

(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.

<u>Area</u>	<u>Information to be contained</u>
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—

<u>Description on the Energy Label</u>	<u>Font and font size</u>
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)

<u>Description on the Energy Label</u>	<u>Font and font size</u>
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	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)(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	} 9 point Helvetica Roman (English)
Model	
Reference Number / Year	
Information Provider	

<u>Description on the Energy Label</u>	<u>Font and font size</u>
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)

**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

$$\text{Energy Factor (EF)} = \frac{V}{E}$$

$$\text{EF} = \frac{8.75}{5.12}$$

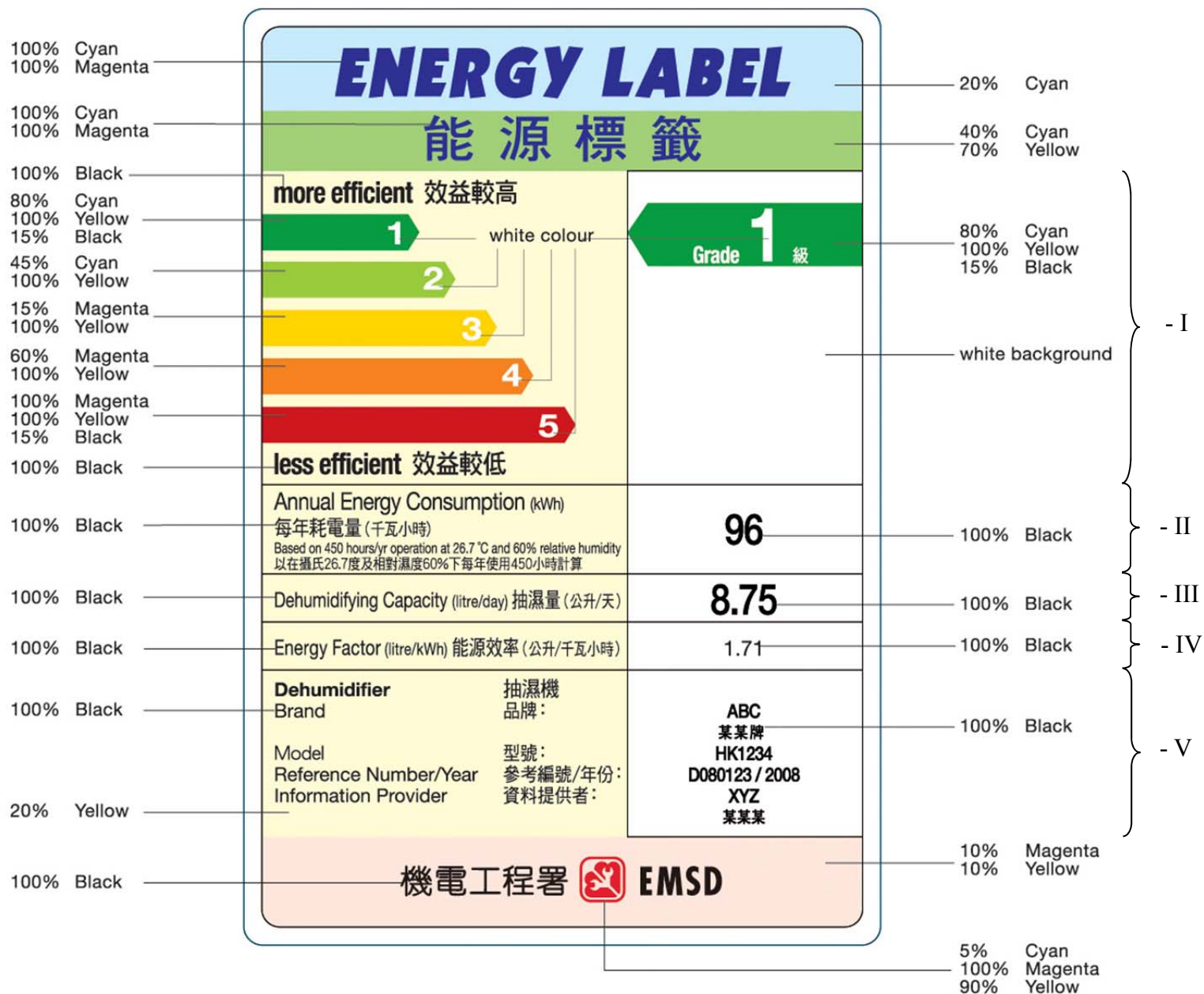
$$\text{EF} = 1.71 \text{ litres / kWh}$$

$$1.60 < \text{EF}$$

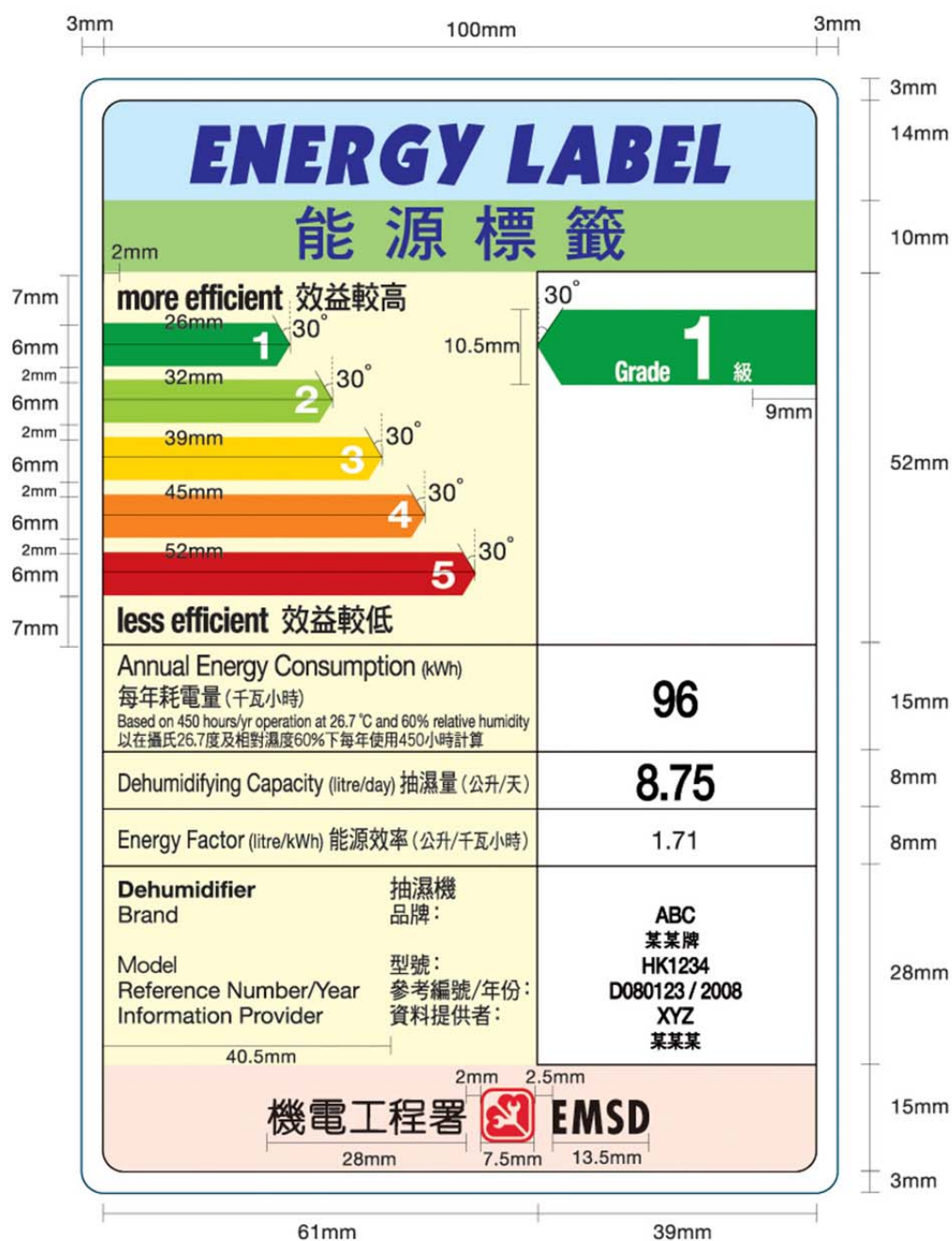
According to Table 11.2 in clause 11 of the Code, the dehumidifier is rated as a **Grade 1** dehumidifier.

### 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.

<u>Area</u>	<u>Information to be contained</u>
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—

<u>Description on the Energy Label</u>	<u>Font and font size</u>
ENERGY LABEL	31 point Italic Kabel Ult BT (English)
能源標籤	24 point DFHeibold (Chinese)



<u>Description on the Energy Label</u>	<u>Font and font size</u>
more efficient 效益較高	14 point Helvetica Neue Bold (English)
less efficient 效益較低	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)	11.5 (8) point Helvetica Roman (English)
每年耗電量（千瓦小時）	10 (8) point DFHeiMedium (Chinese)
Based on 450 hours/yr operation at 26.7°C and 60% relative humidity	7 point Helvetica Roman (English)
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 DFHeiMedium (Chinese)
Dehumidifying Capacity (litre/day)	10 point Helvetica Roman (English)
抽濕量（公升/天）	10 point DFHeiMedium (Chinese)
Figures of annual energy consumption and dehumidifying capacity on the right	20 point Helvetica Medium
Energy Factor (litre/kWh)	10 point Helvetica Roman (English)
能源效率（公升/千瓦小時）	10 point DFHeiMedium (Chinese)
Figure of energy factor on the right	10 point Helvetica Roman (English)
Dehumidifier	9 point Helvetica Bold (English)
抽濕機	9 point DFHeiMedium (Chinese)

<u>Description on the Energy Label</u>	<u>Font and font size</u>
Brand	} 9 point Helvetica Roman (English)
Model	
Reference Number / Year	
Information Provider	
品牌：	} 9 point DFHeiMedium (Chinese)
型號：	
參考編號 / 年份：	
資料提供者：	
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)



Electrical and Mechanical Services Department  
3 Kai Shing Street, Kowloon, Hong Kong  
Tel: (852) 2808 3465 Fax: (852) 2890 6081  
Homepage: <http://www.energylabel.emsd.gov.hk>  
Email: [eepublic@emsd.gov.hk](mailto:eepublic@emsd.gov.hk)