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# **The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Light Emitting Diode (LED) Lamp**

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## **Preface**

With the continual improvement in Light Emitting Diode (LED) technology and performance, LED has become one of the lighting sources of choice for general lighting applications. However, the use of LED in general lighting applications has only appeared in the past few years and the international testing standard for LED lamps on energy performance is still under development at present. In view of this, the Hong Kong Voluntary Energy Efficiency Labelling Scheme for LED lamps (the scheme) is developed with reference to currently available, relevant international pre-standards, regional/national standards and performance requirements in the labelling schemes of other countries. It is noted that the testing of the claimed life of LED lamps will take years to complete. As there is still no available international testing method to accelerate the life test, this scheme will only assess the energy performance and life up to 6 000 hours.

It is expected that, with the technology development and publication of more and more of the international testing standards of LED lamps, the performance requirements of this scheme will be updated and revised from time to time. We will keep track of the development and make necessary updating/amendment at appropriate time.

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## 1. Purpose

This set of document is intended to give a general description on the Hong Kong Voluntary Energy Efficiency Labelling Scheme for LED Lamp.

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## 2. Background

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

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

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

2.3 Hong Kong also aims at achieving the above objectives and the EELS now covers nineteen types of household appliances and office equipment. Eleven types of which are electrical appliances and seven types of office equipment. There is also one type of gas appliance for domestic gas instantaneous water heaters. The scope of EELS has also been extended to cover petrol passenger cars.

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### **3. Scope**

3.1 The scheme will only apply to the manufacturers and importers (local agents, retailers and the related parties) who have participated in this voluntary scheme.

3.2 The scheme commenced from 14 June 2011, and will expire on 31 December 2013 when re-registration is necessary.

3.3 The scope of application covers all new registered appliances under the scope of the Scheme to be sold in Hong Kong with effect from the date that is declared by the participant but does not cover second-hand products, products already in use, under trans-shipment or export, etc.

3.4 The scheme will be operated as a 'Recognition Type' labelling system. All participating appliances will be registered under this scheme provided that they have met the performance requirement specified in the scheme.

3.5 The provision of this scheme shall apply to directional and non-directional LED lamps, and is intended for general lighting purposes having the following characteristics:

- (a) those with a rated voltage up to 240 volts AC or DC;
- (b) those with a rated frequency of 50 Hz for AC;
- (c) those with a rated lamp wattage up to 60 Watts; and
- (d) those with a rated CCT value from 2700K to 6500K.

3.6 The scheme shall apply to LED lamps designed with dimming or non-dimming operations.

3.7 The scheme does not cover (i) LED tubes, and (ii) LED lamps that intentionally produce tinted or coloured light neither does it cover organic LED (OLED) lamps.

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## 4. Definitions

Unless otherwise specified, the following definitions shall apply throughout this document:

Authority	means the Electrical & Mechanical Services Department, the Government of the Hong Kong Special Administrative Region (HKSAR).
beam angle	means the angle between two imaginary lines in a plane through the optical beam axis, such that these lines pass through the centre of the front face of the lamp and through points at which the luminous intensity is 50% of the centre beam intensity.
center beam intensity	means the value of the luminous intensity measured on the optical beam axis.
CIE	means International Commission on Illumination.
CISPR	means Comité International Spécial des Perturbations Radioélectriques.
Colour Rendering Index (CRI)	means an index, which is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and standard illumination according to the recommendations of CIE publication No. 13.3-1995.
Correlated Colour Temperature (CCT)	means the temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions.
directional lamp	means a lamp having at least 80% of light output within a solid angle of $\pi$ sr (corresponding to a cone with angle of 120 degree).
Director	means the Director of Electrical & Mechanical Services Department, the Government of the Hong Kong Special Administrative Region.
Duv	means the closest distance from the Planckian locus on the ( $u'$ , $2/3 v'$ ) diagram, with + sign for above and – sign for below the Planckian locus.
General CRI (Ra)	means the arithmetical mean of the eight special CRIs for the

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CIE-1974 test-colour samples Nos 1 to 8.

Government	means the Government of the Hong Kong Special Administrative Region.
IEC	means International Electrotechnical Commission.
initial value	means a photometric and electrical characteristics at the end of the stabilization time.
inspecting officer	means the officer authorized by the Director to carry out inspection on appliances.
label	means the energy label as described in Section 7 of this document.
LED driver	means a power source with integral Light Emitting Diode (LED) control circuitry designed to meet the specific requirements of a LED lamp or a LED array.
LED lamp	means a lamp, incorporating a Light Emitting Diode (LED) light source and any additional elements necessary for stable operation of the light source, provided with a lamp cap conforming IEC 60061-1, which cannot be dismantled without permanent damages.
LED lamp, integral	means a Light Emitting Diode (LED) lamp intended to operate directly on mains voltage.
LED lamp, non-integral	means a Light Emitting Diode (LED) lamp intended for connection to an LED driver and cannot be operated directly on mains voltage.
IES	means Illuminating Engineering Society of North America.
lumen maintenance	means a luminous flux at a given time in the life of a LED-lamp divided by the initial value of the luminous flux of the lamp and expressed as a percentage of the initial luminous flux.
luminous efficacy (lm/W)	means a ratio of luminous flux emitted by a lamp to the electrical power consumed by the lamp.

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luminous flux (lm)	means a quantitative measure of light emitted by a light source. The quantity is derived from radiant flux (power in Watt) by evaluating the radiation in accordance with the spectral sensitivity of the standard eye as described by the CIE Standard Photometric Observer.
luminous intensity (cd)	means the quotient of the luminous flux $d\Phi_v$ leaving the source and propagated in the element of solid angle $d\Omega$ containing the given direction, by the element of solid angle
non-directional lamp	means a lamp that is not a “directional lamp”.
optical beam axis	means the axis about which the luminous intensity distribution is substantially symmetrical.
participant	means the manufacturers, importers or the retailers of appliance participating in the scheme.
power factor	means a ratio of the measured active input power to the product of the supply voltage (r.m.s.) and the supply current (r.m.s.).
rated beam angle	means the beam angle declared by participant.
rated CCT	means the CCT declared by participant.
rated center beam intensity	means the center beam intensity declared by participant.
rated frequency	means the frequency marked on the lamp or declared by participant.
rated General CRI (Ra)	means the General CRI (Ra) declared by participant.
rated lamp life	means a length of time during which a complete LED lamp provides more than 70% of the rated luminous flux, published in combination with the failure rate, as declared by participant.
rated lamp voltage	means the voltage marked on the LED lamp or declared by participant.

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rated lamp wattage	means the wattage marked on the LED lamp or declared by participant.
recognized laboratory	means a laboratory that complies with the requirements as stated in Section 8 of this document and is acceptable to the Authority for carrying out tests and issuing test reports on LED lamps.
scheme	means the Hong Kong Voluntary Energy Efficiency Labelling Scheme for LED Lamp.
stabilisation time	means the time which the LED lamp requires to obtain stable thermal conditions
target lamp	means the lamp such as incandescent lamp, directional lamp, etc. to be compared with LED lamp.

## 5. Energy Efficiency Standards

### Non-directional LED Lamps with Integrated Driver - Specific Performance Requirements

5.1 The LED lamps are needed to meet the following performance requirements:

(a) The measured initial General CRI (Ra) values shall be equal to or greater than 80, and shall not have decreased by more than 3 points from the rated General CRI (Ra) value.

(b) The LED lamp must have one of the rated Correlated Colour Temperatures (CCTs) including 2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700K, 6500K and flexible CCT consistent with the 7-step chromaticity quadrangles and Duv tolerances as indicated in Table 1. The measured initial CCT and initial Duv shall be within the tolerances of target CCT and target Duv of the selected rated CCT.

Table 1: Rated CCT Categories

Rated CCT	Target CCT and tolerance (K)	Target Duv and tolerance
2700 K	2725 ± 145	0.000 ± 0.006
3000 K	3045 ± 175	0.000 ± 0.006
3500 K	3465 ± 245	0.000 ± 0.006
4000 K	3985 ± 275	0.001 ± 0.006
4500 K	4503 ± 243	0.001 ± 0.006
5000 K	5028 ± 283	0.002 ± 0.006
5700 K	5665 ± 355	0.002 ± 0.006
6500 K	6530 ± 510	0.003 ± 0.006
Flexible CCT (2700-6500 K)	$T^1 \pm \Delta T^2$	$Duv^3 \pm 0.006$

i) T is chosen to be at 100 K steps (2800, 2900, ..., 6400 K) excluding those eight nominal CCTs listed in Table 1.

ii)  $\Delta T$  is given by  $\Delta T = 0.0000108 \times T^2 + 0.0262 \times T + 8$ .

iii) Duv is given by  $Duv = 57700 \times (1/T)^2 - 44.6 \times (1/T) + 0.0085$ .

(c) The change of chromaticity (at initial and 6 000 hours) shall be within 0.007 on the CIE 1976 (u', v') diagram.

(d) For the LED lamp with integral LED driver, the measured initial power factor shall be equal to or greater than the corresponding minimum allowable values as indicated in Table 2.

Table 2: Minimum Allowable Power Factor for Non-Directional LED Lamp with Integrated Driver

Rated Lamp Wattage (Lw)	Minimum Allowable Power Factor
$L_w \leq 5 \text{ W}$	0.5
$5\text{W} < L_w \leq 25 \text{ W}$	0.7
$L_w > 25 \text{ W}$	0.9

(e) The measured initial power consumption by the LED lamp shall be neither less than 90% nor greater than 110% of the rated lamp wattage.

(f) The LED lamp shall be subjected to supply voltage switching test as follow:

At test voltage the lamp (inclusive of the LED driver) shall be switched on and off for 30 seconds. The cycling shall be repeated for 10 000 times or a number equal to half of the rated lamp life (hours), whichever is greater;

At the end of the above test, the LED lamp shall operate and remain alight for 15 minutes.

(g) The measured average lumen maintenance at 6 000 hours shall be equal to or greater than 90%. For LED lamp power  $<10\text{W}$ , it must operate at minimum  $25^\circ\text{C}$  between measurements. For LED lamp power  $\geq 10\text{W}$ , it must operate at minimum  $45^\circ\text{C}$  between measurements.

(h) The measured luminous efficacy shall be equal to or greater than the corresponding minimum allowable value as indicated in Table 3.

Table 3: Minimum Allowable Luminous Efficacy for Non-Directional LED Lamps with Integrated Driver

Rated Lamp Wattage (Lw)	Minimum Allowable Luminous Efficacy (lm/W)
$L_w < 10 \text{ W}$	50
$L_w \geq 10 \text{ W}$	55

**Non-Directional LED Lamps with Integrated Driver - Additional Performance Requirements for LED Lamp without claiming equivalence with Target Lamp**

(i) In addition to the specific performance requirements, the measured initial luminous flux of non-directional LED lamp shall be equal to or greater than 90% of the rated luminous flux.

**Non-Directional LED Lamps with Integrated Driver - Additional Performance Requirements for the LED Lamp claiming equivalence with Target Lamp**

(j) In addition to the specific performance requirements, the measured initial luminous flux of non-directional LED lamp shall be equal to or greater than 90% of the rated luminous flux; and the luminous flux of the LED lamp shall exceed the value (lm) as stated in the table in Annex 8.

## Directional LED Lamps with Integrated Driver - Specific Performance Requirements

5.2 The LED lamps are needed to meet the following performance requirements:

- (a) The measured initial General CRI (Ra) values shall be equal to or greater than 80, and shall not have decreased by more than 3 points from the rated General CRI (Ra) value.
- (b) The LED lamp must have one of the rated Correlated Colour Temperatures (CCTs) including 2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700K, 6500K and flexible CCT consistent with the 7-step chromaticity quadrangles and Duv tolerances as indicated in Table 4. The measured initial CCT and initial Duv shall be within the tolerances of target CCT and target Duv of the selected rated CCT.

Table 4: Rated CCT Categories

Rated CCT	Target CCT and tolerance (K)	Target Duv and tolerance
2700 K	2725 ± 145	0.000 ± 0.006
3000 K	3045 ± 175	0.000 ± 0.006
3500 K	3465 ± 245	0.000 ± 0.006
4000 K	3985 ± 275	0.001 ± 0.006
4500 K	4503 ± 243	0.001 ± 0.006
5000 K	5028 ± 283	0.002 ± 0.006
5700 K	5665 ± 355	0.002 ± 0.006
6500 K	6530 ± 510	0.003 ± 0.006
Flexible CCT (2700-6500 K)	$T^{(1)} \pm \Delta T^{(2)}$	$Duv^{(3)} \pm 0.006$

- i) T is chosen to be at 100 K steps (2800, 2900, ..., 6400 K) excluding those eight nominal CCTs listed in Table 4.
- ii)  $\Delta T$  is given by  $\Delta T = 0.0000108 \times T^2 + 0.0262 \times T + 8$ .
- iii) Duv is given by  $Duv = 57700 \times (1/T)^2 - 44.6 \times (1/T) + 0.0085$ .
- (c) The change of chromaticity (at initial and 6 000 hours) shall be within 0.007 on the CIE 1976 (u', v') diagram.
- (d) For the LED lamp with integral LED driver, the measured initial power factor shall be equal to or greater than the corresponding minimum allowable values as indicated in Table 5.

Table 5: Minimum Allowable Power Factor for Directional LED Lamp with Integrated Driver

Rated Lamp Wattage (Lw)	Minimum Allowable Power Factor
$Lw \leq 5 \text{ W}$	0.5
$5\text{W} < Lw \leq 25 \text{ W}$	0.7
$Lw > 25 \text{ W}$	0.9

(e) The measured initial power consumption by the LED lamp shall be neither less than 90% nor greater than 110% of the rated lamp wattage.

(f) The LED lamp shall be subjected to supply voltage switching test as follow:

At test voltage the lamp (inclusive of the LED driver) shall be switched on and off for 30 seconds. The cycling shall be repeated for 10 000 times or a number equal to half of the rated lamp life (hours), whichever is greater;

At the end of the above test, the LED lamp shall operate and remain alight for 15 minutes.

(g) The measured average lumen maintenance at 6 000 hours shall be equal to or greater than 90%. For LED lamp power  $<10\text{W}$ , it must operate at minimum  $25^{\circ}\text{C}$  between measurements. For LED lamp power  $\geq 10\text{W}$ , it must operate at minimum  $45^{\circ}\text{C}$  between measurements.

(h) For directional LED lamp, luminous intensity distribution shall be measured to demonstrate that the lamp having at least 80% of light output within a solid angle of  $\pi\text{sr}$  (corresponding to a cone with angle of 120 degree).

**Directional LED Lamps with Integrated Driver - Additional Performance Requirements for LED Lamp without claiming equivalence with Target Lamp**

(i) The measured luminous efficacy shall be equal to or greater than the corresponding minimum allowable value as indicated in Table 6.

Table 6: Minimum Allowable Luminous Efficacy for Directional LED Lamps with Integrated Driver (Without Claiming Equivalence with Target Lamp)

Lamp Diameter (Ld)	Minimum Allowable Luminous Efficacy (lm/W)
$Ld \leq 63.5 \text{ mm}$	40
$Ld > 63.5 \text{ mm}$	45

(j) The measured beam angle of the LED lamp shall be within  $\pm 25\%$  of the rated beam angle of the LED lamp.

(k) The measured initial luminous flux shall be equal to or greater than 90% of the rated luminous flux.

## **Directional LED lamps with Integrated Driver - Additional Performance Requirements for LED Lamp claiming equivalence with Target Lamp**

- (l) The directional LED lamp shall have a rated lamp wattage not greater than 25% of the Target Lamp.
- (m) The measured luminous efficacy shall be equal to or greater than the corresponding minimum allowable value as indicated in Table 7.

Table 7: Minimum Allowable Luminous Efficacy for Directional LED Lamps with Integrated Driver (Claiming Equivalence with Target Lamp)

Lamp Diameter (Ld)	Minimum Allowable Luminous Efficacy (lm/W)
Ld ≤ 63.5 mm	40
Ld > 63.5 mm	45

- (n) The measured beam angle of the LED lamp shall be within  $\pm 25\%$  of the rated beam angle of the LED lamp; and the rated beam angle of the LED lamp shall be equal to the rated beam angle of the target lamp.
- (o) For directional LED lamp excluding PAR, the measured initial luminous flux shall be equal to or greater than 90% of the rated luminous flux; and the luminous flux of the LED lamp shall be at least equal to the rated wattage of the target lamp multiplied by 10.
- (p) For PAR (i.e. PAR16, PAR20, PAR30 and PAR38), the measured initial minimum center beam intensity shall exceed the value (cd) for a given wattage of target lamp and beam angle of the target lamp as stated in the corresponding tables in Annex 9.

## **Directional LED Lamps with Non-Integrated Driver - Specific Performance Requirements**

5.3 The LED lamps are needed to meet the following performance requirements:

- (a) The measured initial General CRI (Ra) values shall be equal to or greater than 80, and shall not have decreased by more than 3 points from the rated General CRI (Ra) value.
- (b) The LED lamp must have one of the rated Correlated Colour Temperatures (CCTs) including 2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700K, 6500K and flexible CCT consistent with the 7-step chromaticity quadrangles and Duv tolerances as indicated in Table 8. The measured initial CCT and initial Duv shall be within the tolerances of target CCT and target Duv of the selected rated CCT.

Table 8: Rated CCT Categories

Rated CCT	Target CCT and tolerance (K)	Target Duv and tolerance
2700 K	2725 ± 145	0.000 ± 0.006
3000 K	3045 ± 175	0.000 ± 0.006

3500 K	3465 ± 245	0.000 ± 0.006
4000 K	3985 ± 275	0.001 ± 0.006
4500 K	4503 ± 243	0.001 ± 0.006
5000 K	5028 ± 283	0.002 ± 0.006
5700 K	5665 ± 355	0.002 ± 0.006
6500 K	6530 ± 510	0.003 ± 0.006
Flexible CCT (2700-6500 K)	$T^{(1)} \pm \Delta T^{(2)}$	$Duv^{(3)} \pm 0.006$

i)  $T$  is chosen to be at 100 K steps (2800, 2900, ..., 6400 K) excluding those eight nominal CCTs listed in Table 7.

ii)  $\Delta T$  is given by  $\Delta T = 0.0000108 \times T^2 + 0.0262 \times T + 8$ .

iii)  $Duv$  is given by  $Duv = 57700 \times (1/T)^2 - 44.6 \times (1/T) + 0.0085$ .

(c) The change of chromaticity (at initial and 6 000 hours) shall be within 0.007 on the CIE 1976 ( $u'$ ,  $v'$ ) diagram.

(d) For the LED lamp with non-integral LED driver, the measured initial power factor shall be equal to or greater than 0.9.

(e) The measured initial power consumption by the LED lamp shall be neither less than 90% nor greater than 110% of the rated lamp wattage.

(f) The LED lamp shall be subjected to supply voltage switching test as follows:

At test voltage the lamp (inclusive of the LED driver) shall be switched on and off for 30 seconds. The cycling shall be repeated for 10 000 times or a number equal to half of the rated lamp life (hours), whichever is greater;

At the end of the above test, the LED lamp shall operate and remain alight for 15 minutes.

(g) The measured average lumen maintenance at 6 000 hours shall be equal to or greater than 90%. For LED lamp power <10W, it must operate at minimum 25°C between measurements. For LED lamp power ≥10W, it must operate at minimum 45°C between measurements.

(h) For directional LED lamp, luminous intensity distribution shall be measured to demonstrate that the lamp having at least 80% of light output within a solid angle of  $\pi sr$  (corresponding to a cone with angle of 120 degree).

### **Directional LED lamps with Non-Integrated Driver - Additional Performance Requirements for the LED Lamp without claiming equivalence with Target Lamp**

(i) The measured luminous efficacy shall be equal to or greater than the corresponding minimum allowable value as indicated in Table 9. The luminous efficacy for directional LED lamps with non-Integrated Driver excludes the driver loss.

Table 9: Minimum Allowable Luminous Efficacy for Directional LED Lamps with Non-Integrated Driver (Without Claiming Equivalent with Target Lamp)

Lamp Diameter (Ld)	Minimum Allowable Luminous Efficacy (lm/W)
Ld ≤ 63.5 mm	40
Ld > 63.5 mm	45

(j) The measured beam angle of the LED lamp shall be within ±25% of the rated beam angle of the LED lamp.

(k) The measured initial luminous flux shall be equal to or greater than 90% of the rated luminous flux.

**Directional LED lamps with Non-Integrated Driver - Additional Performance Requirements for the LED Lamp claiming equivalence with Target Lamp**

(l) The directional LED lamp shall have a rated lamp wattage not greater than 25% of the target lamp.

(m) The measured luminous efficacy shall be equal to or greater than the corresponding minimum allowable value as indicated in Table 10. The luminous efficacy for directional LED lamps with non-Integrated Driver excludes the driver loss.

Table 10: Minimum Allowable Luminous Efficacy for Directional LED Lamps (Claiming Equivalence with Target Lamp)

Lamp Diameter (Ld)	Minimum Allowable Luminous Efficacy (lm/W)
Ld ≤ 63.5 mm	40
Ld > 63.5 mm	45

(n) The measured beam angle of the LED lamp shall be within ±25% of the rated beam angle of the LED lamp; and the rated beam angle of the LED lamp shall be equal to the rated beam angle of the target lamp.

(o) For directional LED lamp excluding MR16, the measured initial luminous flux shall be equal to or greater than 90% of the rated luminous flux; and the luminous flux of the LED lamp shall be at least equal to the rated wattage of the target lamp multiplied by 10.

(p) For MR16 directional LED lamps, the measured initial minimum center beam intensity shall exceed the value (cd) for a given wattage of the target lamp and beam angle of the target lamp as stated in the corresponding tables in Annex 9.

**Safety Requirements**

5.4 In addition to the performance requirements, all LED lamps shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety

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standards specified under the Regulation, and all other legislations concerning the safety of LED lamps.

## **Control of Interference Requirements**

5.5 In addition to the performance requirements, all LED lamps shall comply with the requirements specified in the Telecommunications (Control of Interference) Regulations (Chapter 106B) of the Law of Hong Kong, and international standards such as CISPR 15 or its equivalence.

## **Number of Samples to be Tested**

5.6 For submission of product information of a model, a test report on samples of the model shall be submitted. The minimum numbers of samples for the tests are indicated in Table 11.

Table 11: Minimum Number of Samples for Tests

Test Parameters	Samples
CCT, General CRI (Ra), change of chromaticity, lumen maintenance, luminous efficacy, luminous flux, power factor and lamp wattage	10
Supply voltage switching test	10
Center beam intensity, luminous intensity distribution and beam angle	1

5.7 The test results of the samples shall be determined in accordance with the requirements in Table 12.

Table 12: Determination of Test Results

Test Parameters	Test Results
Luminous efficacy	90% of the tested samples of a total batch shall meet the applicable requirements as stated in Clauses 5.1(h), 5.2(i), 5.2(m), 5.3(i) and 5.3(m).
General CRI (Ra)	The average of measured values of all test samples shall meet the applicable requirement as stated in Clauses 5.1(a), 5.2(a) and 5.3(a) with none lower than 77.
CCT	90% of the tested samples of a total batch shall meet the applicable requirement as stated in Clauses 5.1(b), 5.2(b) and 5.3(b).
Change of chromaticity (at initial and 6 000 hours)	90% of the tested samples of a total batch shall meet the applicable requirement as stated in Clauses 5.1(c), 5.2(c) and 5.3(c).
Power factor	The average of measured values of all test samples

	shall meet the applicable requirement as stated in Clauses 5.1(d), 5.2(d) and 5.3(d).
Lamp wattage	90% of the tested samples of a total batch shall meet the applicable requirement as stated in Clauses 5.1(e), 5.2(e), 5.2(l), 5.3(e) and 5.3(l).
Supply voltage switching test	90% of the tested samples of a total batch shall meet the applicable requirement as stated in Clauses 5.1(f), 5.2(f) and 5.3(f).
Lumen maintenance	The average of measured values of all test samples shall meet the applicable requirement as stated in Clauses 5.1(g), 5.2(g) and 5.3(g).
Luminous flux	90% of the tested samples of a total batch shall meet the applicable requirements as stated in Clauses 5.1(i), 5.1(j), 5.2(k), 5.2(o), 5.3(k) and 5.3(o).
Luminous intensity distribution (for directional LED lamp only)	The measured values of the sample shall meet the applicable requirements as stated in Clauses 5.2(h) and 5.3(h).
Beam angle (for directional LED lamp only)	The measured values of the sample shall meet the applicable requirements as stated in Clauses 5.2(j), 5.2(n), 5.3(j) and 5.3(n).
Center beam intensity (for directional LED lamp only)	The measured values of the sample shall meet the applicable requirements as stated in Clauses 5.2(p) and 5.3(p).

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## 6. Test Standards

### General

6.1 All test standards specified in this document are related to the energy efficiency and general performance requirements. It is not the intention of this document to detail out the test standards and requirements for the Electrical Products (Safety) Regulation of the HKSAR. The participant should conduct appropriate tests, where necessary, in addition to those specified in this document in order to obtain Certificates of Safety Compliance for the appliances.

### Test Standards – Energy Efficiency Performances

6.2 The luminous efficacy value (lm/W) is the major criterion that determines whether a lamp can meet the specific energy efficiency requirement. Therefore, it is important that a common base is used to validate the information submitted by manufacturers from different countries for their appliances.

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6.3 The testing standards for measurement of electrical and photometric performances are based on the following international standards. For detailed requirements and procedural descriptions one should refer to the respective standards.

- (a) IES LM-79, Approved Method: Electrical and Photometric Measurements of Solid State Lighting Products; and
- (b) IEC/PAS 62612, Self-ballasted LED-lamps for general lighting services – Performance Requirements.

6.4 To the extent that definitions in the IEC and IES standards do not conflict with the definitions of this document, the definitions in the aforesaid standards shall be included.

## **Test Conditions**

6.5 The test conditions for LED lamps shall be as follows:

- (a) The general test conditions make reference to IEC/PAS 62612:2009 and IES LM-79, and are detailed as follow:

All tests measurements shall be made in a draught-free room at an ambient temperature of  $(25 \pm 1)^\circ\text{C}$  and a relative humidity of 65% maximum. For lumen maintenance test, the required minimum ambient temperature between measurement should be  $25^\circ\text{C}$  for LED lamp power  $<10\text{W}$  and  $45^\circ\text{C}$  for LED lamp power  $\geq 10\text{W}$ .

The test voltage shall be stable within  $\pm 0.5\%$ , during stabilization periods,  $\pm 0.2\%$  at the moment of measurements. For ageing and lumen maintenance testing, the tolerance is 2%. The total harmonic content of the supply voltage shall not exceed 3%. The harmonic content is defined as the RMS summation of the individual harmonic components using fundamental as 100%.

LED lamps shall be operated in free air in a vertical base-up position for all tests including lumen maintenance test.

The LED lamp under test shall be operated long enough to reach stabilization and temperature equilibrium. It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%. The stabilization time used for each LED lamp shall be reported.

- (b) The test voltage and frequency for the LED lamps shall be 220 volts AC with tolerance meeting the requirements as stated in clause 6.5(a) and  $50\text{ Hz} \pm 2\%$ , respectively; **and**
- (c) For dimmable LED lamps, all performance requirements shall be tested with the lamp operated at full power; **and**
- (d) For LED lamps requiring specific non-integral LED driver(s), all performance requirements shall be tested with the lamp operated with all the specific non-integral LED driver(s). Individual test reports for each type of drivers in accordance with the requirements in this document shall be provided. If the non-integral LED driver(s) and the LED lamp are come from different manufacturers, a letter of consent is required from the manufacturer of the LED driver(s) for using their driver to test with the applicant's LED lamp; **and**
- (e) For retrofit MR16 LED lamps that compatible with existing non-integral 12V low voltage driver(s), all performance requirements shall be tested with the lamp operated with all the compatible non-integral 12V driver(s). Individual test reports for each type of driver in accordance with the requirements in this document shall be provided. If the non-integral LED

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driver(s) and the LED lamp are come from different manufacturers, a letter of consent is required from the manufacturer of the LED driver(s) for using their driver to test with the applicant's LED lamp.

### **Measurement of CCT, Center Beam Intensity, General CRI (Ra), Change of Chromaticity, Light Intensity Distribution, Luminous Flux and Lamp Wattage of Test Lamp**

6.6 The results at the test conditions mentioned in Clause 6.5 shall be measured in accordance with the requirements of IES LM-79.

### **Measurement of Lumen Maintenance of Test Lamp**

6.7 The lumen maintenance at the test conditions mentioned in Clause 6.5 shall be measured in accordance with the requirements of IES LM-79.

### **Determination of Power Factor**

6.8 Power factor shall be determined by computing the ratio of measured active input power to the product of measured supply voltage and current in r.m.s.

### **Determination of Lamp Luminous Efficacy**

6.9 Lamp luminous efficacy shall be determined by computing the ratio of the measured initial lamp luminous flux output and measured initial lamp electrical power input at the test conditions. The resulting quotient shall be rounded off to the nearest unit of a lumen per watt.

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## **7. Energy Label**

### **Label Location**

7.1 The labels should be self-adhesive or otherwise approved by the Director and affixed to the appliance packaging at a prominent location. The participant should ensure that the energy label appears on every registered appliance on display or sale and should be easily visible.

### **Colour Scheme & Dimensions**

7.2 The energy labels should be printed on white-coloured self-adhesive sheet material and should have colour schemes and dimensions as shown in Annex 1. It should be printed in English and in Chinese. If the dimensions of the energy label as shown in Annex 1 cannot fit into the product packaging, then the second largest energy label (in the descending order of 90%, 80% and 70% (by length) of the largest energy label) is to be chosen.

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## **Label Quality**

7.3 The paper or the material that is approved by the Director for the label should be durable and possess good wear and tear characteristics. It should stick tightly on the appliance packaging.

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## **8. Testing Facilities, Laboratories and Accreditation Bodies**

8.1 The Authority will accept the results and certificates issued by the test laboratory, which fulfills one of the following criteria as specified in Clause 8.2 or 8.3.

8.2 The laboratory is accredited by the Hong Kong Accreditation Service (HKAS) for IES LM-79, IEC 60969 or their equivalence under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or a scheme for which HOKLAS has concluded a mutual recognition agreement (see Note). For measurements of light intensity distribution, beam angle and center beam intensity of directional LED lamps, the laboratory shall have a Type-C goniophotometer as prescribed in IES LM-79 and accredited by HKAS for IES LM-79, IEC 61341, CIE 121 or their equivalence under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or a scheme for which HOKLAS has concluded a mutual recognition agreement (see Note).

8.3 The Authority will also consider the following arrangements:

- (a) Self-certification by original manufacturers that the operations of their in-house laboratories satisfy the requirements of ISO/IEC 17025;
- (b) The manufacturers are currently operating according to a recognized international quality system (such as ISO 9001); and
- (c) The manufacturer's in-house laboratories have been successful in carrying out the relevant tests in IES LM-79, IEC 60969 or their equivalence and where these tests have been evaluated and certified by recognized independent certification body. For measurements of light intensity distribution, beam angle and center beam intensity of directional LED lamps, the in-house laboratory shall have a Type-C goniophotometer as prescribed in IES LM-79 and the manufacturer's in-house laboratories have been successful in carrying out the relevant tests in IES LM-79, IEC 61341, CIE 121 or their equivalence and where these tests have been evaluated and certified by recognized independent certification body.

8.4 The recognized independent certification body mentioned in Clause 8.3(c) 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

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

## **Laboratory Accreditation**

8.5 The Government takes cognizance of the need to ensure acceptable and compatible quality standards of testing laboratories, and considers that they need to be accredited by some independent bodies.

8.6 The criteria of accreditation should be based on ISO/IEC 17025 and accreditation bodies should operate in accordance with ISO/IEC 17011.

8.7 The Authority will recognize accreditation granted by the HKAS and by overseas accreditation bodies which have concluded mutual recognition arrangements with HKAS for accreditation of testing laboratories. The Authority will consider accreditation by other bodies on a case-by-case basis.

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*Note* HKAS has concluded mutual recognition arrangements with overseas accreditation bodies for testing laboratory accreditation. The list of mutual recognition arrangement partners may change from time to time and the up-to-date list is available from the HKAS website of [www.info.gov.hk/itc/hkas](http://www.info.gov.hk/itc/hkas). Partners to these arrangements recognise the accreditations granted by one another as equivalent.

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## **9. Registration and Participation**

### **Registration Procedures**

9.1 All manufacturers, importers and the other parties involved in the appliance distribution network are welcomed and encouraged to participate in the scheme. For some known manufacturers and importers, invitation letters will be issued to them. However, any party may submit their applications for registration no matter whether they are invited or not.

9.2 The proforma letter of invitation is shown in Annex 2.

9.3 Applicant should submit his formal application to  
Chief Engineer /Energy Efficiency A  
Energy Efficiency Office  
Electrical & Mechanical Services Department  
3 Kai Shing Street, Kowloon  
Hong Kong

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by means of an application letter through mail, facsimile or electronic mail. In order to ensure effective implementation of the scheme, the applicant must commit himself to fully comply with the duties, responsibilities and obligations set out in this scheme. The proforma letter of application as shown in Annex 3 details the aforesaid obligations and should be used for application. To facilitate the application process, the application form can be downloaded from EMSD website.

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

9.4 Each brand and model of an appliance participating in the scheme should be provided with a test report issued by a recognized laboratory. The test report should contain energy efficiency test and performance test results. Details of the technical information to be submitted together with the application are listed as follows:

(a) Information of the company:

Name, Address, Telephone number, Fax, E-mail address, Contact person, Importer, Distributor, etc.

(b) Products to apply for participating in the scheme:

i) Name of LED lamp, types, directional or non-directional, dimmable or non-dimmable, integral or non-integral LED driver, brand, model references, country of origin.

ii) Name of non-integral LED driver, types, brand, model references, country of origin, if applicable.

iii) Target lamp type, wattage and beam angle for those products stating equivalence with target lamps, if applicable.

(c) Parties that will be responsible for making and fixing the Energy Labels

(d) Commencement date to affix energy labels on appliance packaging

Year \_\_\_\_\_, Month \_\_\_\_\_

(e) Certificates of Safety Compliance prescribed by the Electrical Products (Safety) Regulation of the HKSAR (Chapter 406G) and safety requirements at Clause 5.4.

(f) Technical data of LED lamps:

Rated General CRI (Ra);

Rated Correlated Colour Temperature (CCT);

Rated lamp wattage;

Rated lamp voltage;

Rated frequency;

Rated lamp life;

Rated luminous flux, if applicable; and

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Rated beam angle

(g) Detailed reports with test data, graphics and results showing the following LED lamp performances:

General CRI (Ra);

Correlated Colour Temperature (CCT) and Duv;

Change of chromaticity (at initial and 6 000 hours);

Power Factor;

Lamp wattage;

Supply voltage switching test;

Averaged lumen maintenance (at 6 000 hours);

Luminous efficacy;

Luminous flux, if applicable; (Remark: Calculation of minimum luminous flux for LED lamp to claim equivalence with incandescent lamp shall be provided)

Center beam intensity, if applicable; (Remark: Calculation of minimum center beam intensity for PAR and MR16 LED lamps to claim equivalence with directional lamps shall be provided)

Luminous intensity distribution and beam angle (only applicable to directional LED lamps); and

Brand and model of Type-C goniophotometer which is used in the test (only applicable to directional LED lamps).

(Remark: Test data for the above LED lamp performances should be accurate to 1 decimal place, whenever applicable, excluding that the CCT should be accurate to the nearest unit, the power factor should be accurate to 2 decimal places and the change of chromaticity should be accurate to 4 decimal places.)

(h) Since it may take long time to complete the 6 000 hours test for LED lamp, the Authority may also consider the following in lieu of Clause (g) above:

i) Detailed reports with test data, graphics and results showing the following LED lamp performances:

General CRI (Ra);

Correlated Colour Temperature (CCT) and Duv;

Change of chromaticity (at initial and 3 000 hours);

Power Factor;

Lamp wattage;

Supply voltage switching test;

Averaged lumen maintenance (at 3 000 hours);

Luminous efficacy;

Luminous flux, if applicable; (Remark: Calculation of minimum luminous flux for LED lamp to claim equivalence with incandescent lamp shall be provided)

Center beam intensity, if applicable; (Remark: Calculation of minimum center beam intensity for PAR and MR16 LED lamps to claim equivalence with directional lamps shall be provided)

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Luminous intensity distribution and beam angle (only applicable to directional LED lamps); and  
Brand and model of Type-C goniophotometer which is used in the test (only applicable to directional LED lamps).

(Remark: Test data for the above LED lamp performances should be accurate to 1 decimal place, whenever applicable, excluding that the CCT should be accurate to the nearest unit, the power factor should be accurate to 2 decimal places and the change of chromaticity should be accurate to 4 decimal places.)

ii) The results in the detailed reports as mentioned in clause i) above shall not be lower than the applicable requirements as stipulated in Section 5, excepting that the measured averaged lumen maintenance at 3 000 hours shall be equal or greater than 95%; and

iii) Additional detailed report of the LED lamp (i.e. operate at test voltage other than 220 volts AC) with test data, graphics and results showing that the applicable requirements stipulated in Section 5 can be met. The detailed report shall include test data at 6 000 hours for those performance parameters requiring test results at 6 000 hours. The detailed report shall be issued by a testing laboratory meeting the requirements as stipulated in Section 8.

(i) Self-declaration issued by original manufacturer that the product is or is not claiming equivalence with target lamp. Sample of declaration of conformity is shown in Annex 10.

(j) Letter of consent from the manufacturer of the non-integral LED driver for using their driver to test with the applicant's LED lamp. (only applicable if the non-integral LED driver and the LED lamp are manufactured by different manufacturers)

Notes: Company's name and chop should be stamped on all the documents provided. The above information can also be found in Annex 4, information to be submitted to Energy Efficiency Office.

## **Acceptance of Registration**

9.5 On receipt of the application, the Authority will process the application and verify whether the appliance meets the energy efficiency and performance requirements based on the submitted data.

9.6 If the application is accepted, the participants will be notified of the result in writing within 17 working days. The participants will then be allowed to affix the energy label onto the 'registered' appliances packaging. Both manufacturers and importers of the registered appliances should ensure that the energy labels are correctly printed and affixed on the appliances packaging in accordance with Section 7. The proforma letter of acceptance is shown in Annex 5.

9.7 If the application is rejected, the notification letter as shown in Annex 6 will also be given within 17 working days upon receipt of all necessary information requested.

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9.8 The flow chart for registration is shown in Annex 7.

### **Participant's Obligations**

9.9 The participant is obliged to:

- (a) submit application and information including test results in accordance with format and procedures set out in Clauses 9.3 & 9.4;
- (b) conduct tests via recognized laboratories and to comply with the specified test methodology;
- (c) produce and affix energy labels at his own costs;
- (d) fully inform other sales agents in his distribution network once the particular brand and model of an appliance is registered;
- (e) allow random/ad-hoc inspection to be conducted by persons authorized by the Authority on registered appliance at his premises;
- (f) conduct re-test(s) at his own costs at some recognized laboratories, if non-compliance is found on the appliance. The result of re-test(s) shall reach the Authority within the prescribed period of time specified by the Authority;
- (g) inform the Authority of any change in the technical information and data that were submitted to the Authority together with the application letter;
- (h) accept the fact that if appliance fails to perform in accordance with the requirements as given in Sections 4, 5, 6 and 7 and this cannot be readily rectified, the Authority may order it be de-registered from the scheme;
- (i) remove all energy labels from appliances which had been de-registered from the scheme immediately; and
- (j) provide correct information of target lamp type, wattage and beam angle (i.e. equivalent to those stated in manufacturer's self-declaration letter required in Clause 9.4 (i)) on product packaging, supporting documents and marketing material for LED lamp claiming equivalence with the target lamp.

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

### **Termination**

9.11 Under circumstances of poor performance such as:

- (a) (repeated) failure to fulfill obligations set out under Clause 9.9; or
- (b) in any other case where the Director is of the opinion that registration of an appliance is contrary to the public interest.

The Authority may de-register an appliance from the scheme with immediate effect by giving the participant notice in writing. Once an appliance is de-registered, no one is allowed to fix an energy label on it.

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

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## **10. Legal Provisions**

10.1 This is a voluntary scheme. However, a participant who abuses the scheme by giving false information may contravene provisions of the Trade Description Ordinance (Chapter 362).

10.2 No one could take advantage of the scheme by using the label on the appliances without authorization of the Authority as that may constitute an infringement of copyright under the Copyright Ordinance (Chapter 528).

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## **11. Compliance Monitoring and Inspection**

### **Purpose**

11.1 To uphold credibility of the scheme and to maintain continuous confidence of the consumers, compliance check on energy labels on those appliances participating in the scheme are needed. Also, to avoid the unsatisfactory situation that the non-participating parties taking advantage of the scheme by using unauthorized labels, suitable form of inspection on those unregistered appliances will also be required.

### **Scope**

11.2 The scope of inspection includes sample checking and testing of the following items:

- (a) whether energy label is in fact placed on the registered appliance packaging;
- (b) whether energy label on the registered appliance packaging is in a prominent position;
- (c) whether energy label being displayed is of correct format in accordance with Section 7;
- (d) whether unregistered appliances display unauthorized energy labels;
- (e) whether the registered appliance complies with the energy efficiency and performance requirements; and
- (f) whether the data submitted by the participants are correct by random re-testing.

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11.3 The participants will be requested to take immediate remedial action and report the follow-up action taken if non-compliance is found on their appliances.

11.4 If a registered appliance carrying energy label but found not meeting the requirements (as specified in Section 5) in accordance with the test standards stipulated in Section 6, the participant will also be requested to repeat performance tests stipulated in Section 5 by an agreed testing laboratory. The initial results of relevant performance tests shall be submitted to the Authority for initial review within one week. The 3 000 hours interim results of the relevant performance tests shall be submitted to the Authority for interim review on or before 130 days after commencement of repeat performance tests. The final results (in a form of test report) of the relevant performance tests shall be submitted to the Authority for confirmation of the compliance on or before 260 days after commencement of repeat performance tests.

11.5 If non-compliance is confirmed in the repeat performance tests initial, interim or final test results, the Authority may de-register an appliance from the scheme with immediate effect by giving the participant notice in writing. Failure to remove energy labels from the de-registered appliances after the Director has withheld his authorization for using such labels may contravene the relevant ordinances.

### **Inspecting Officers**

11.6 The Authority will authorize inspecting officers to carry out appliances compliance monitoring and inspection. The officers will carry proper identification cards that will be produced on request during their inspection operations. However, the officer will not inform the participants in advance of their intended inspection operation.

11.7 It is the participants' duty to allow the inspecting officers to gain access to their premises to carry out inspection.

### **Mode of Inspection**

11.8 Inspections will be carried out on registered appliances under the scheme on random basis. Based on the record of the registration, random inspection programmes will be developed.

11.9 In addition to the random inspections, the inspecting officers will carry out ad-hoc inspections in response to complaints. The items to be inspected in such a case will depend upon the nature of complaint and may include all types of inspection as stated in Clause 11.2.

11.10 Inspections will normally be carried out at the retail outlets and appliances showrooms. Where necessary, inspection will also be done at warehouses.

11.11 The inspection results will be properly recorded for future analysis as well as on evaluation of the effectiveness of the scheme.

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## **12. Complaints and Appeal**

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

### **Complaints Handling Procedure**

12.2 The Director shall ensure that complaints are properly recorded and handled without undue delay.

12.3 The Authority shall carry out preliminary investigation on complaints and reply to the complainants within a reasonable time. For complaints that require site inspection and laboratory test, the complainant shall be notified through an interim reply.

12.4 The Authority shall inform the complainant of the results or decisions made on the complaint.

### **Appeal Procedure**

12.5 A participant who is aggrieved by a decision or action taken by the Authority may appeal to the Director in writing stating the reason for the appeal.

12.6 The Director may decide to suspend the decision or action given by the Authority from the day on which the appeal is made until such appeal is disposed of, withdrawn or abandoned unless such suspension would, in the opinion of the Director, be contrary to public interest.

12.7 The Director may by notice to the appellant require that appellant to attend meeting with him or his representative and provide documents and give evidence relevant to the appeal.

12.8 The Director shall notify the appellant of his decision and reasons for it. The decision will be final and binding.

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## **13. Maintenance of Scheme**

13.1 To ensure that the scheme can continue to operate effectively and efficiently after its introduction, a proper system of maintenance is needed.

13.2 The maintenance system consists essentially of:

(a) Continuous updating of the lists of participants in the scheme as follows:

i) Registered appliances with details such as registration number, date of registration or de-registration if it occurs, energy efficiency data, performance data, brand, model and other related information ; and

ii) Registered importers, manufacturers, local agents etc. in the distribution network with details such as address, date of registration or de-registration if it occurs, etc.

(b) Periodic review of the test methodology, and procedures for application registration and compliance monitoring, etc. to bring them in line with the latest needs of the manufacturers, importers and retailers, etc.

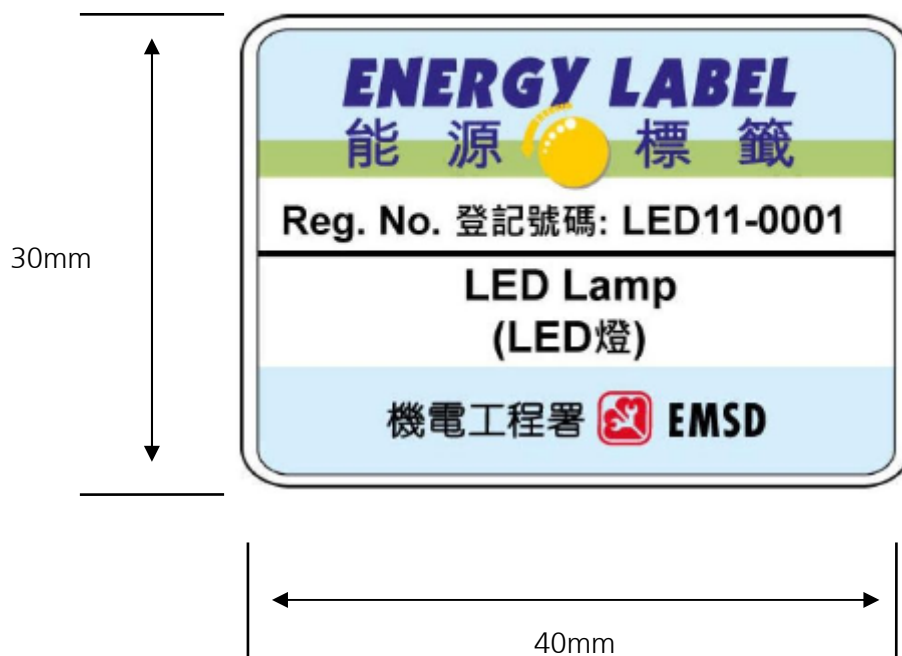
(c) Continuous evaluation of the effectiveness of the scheme and assessment of what changes are necessary.

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## **14. Future Development**

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

## **Energy Label Format**



(Not to Scale)

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

## **Proforma Letter of Invitation**

Our ref. EEO/LB/35

Your ref.

Tel.

Fax.

Date

[Name and Address of  
Manufacturers/Importers/Agents]

Dear Sir/Madam,

### **Invitation of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for LED Lamp**

Having gone through the necessary consultations and duly considered the views from various concerned parties, the government has decided to introduce a voluntary energy efficiency labelling scheme for LED lamp to Hong Kong with effect from (\_\_\_\_\_). The details of the scheme ❶ have been finalized and the revised scheme document can be downloaded from EMSD web-site: <http://www.emsd.gov.hk>.

Being one of the major LED lamps manufacturers / importers / agents ❷ in Hong Kong, you are invited to participate in the scheme so as to take part in promoting public awareness in energy conservation and environmental improvement to Hong Kong. If you are interested to participate in the scheme, please apply in accordance with the proforma letter of application (scheme document - Annex 3) and submit details including technical information in accordance with the scheme to the 'Chief Engineer / Energy Efficiency A' at the following address.

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

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

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

Yours faithfully,

for Director of Electrical & Mechanical Services

(Note : ❶ 'scheme' means 'The Voluntary Energy Efficiency Labelling Scheme for LED Lamp '  
❷ delete as appropriate)

## **Proforma Letter of Application**

Your ref. EEO/LB/35

Our ref.

Tel.

Fax

Date

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

Dear Sir/Madam,

### **Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for LED Lamp**

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

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

- i) conduct tests via recognized laboratories and to comply with the specified test standards;
- ii) produce and affix specified labels at my own costs;
- iii) allow random/ad-hoc inspection to be conducted by persons authorized by the issuing Authority on registered appliance at my premises;
- iv) conduct re-test(s) at my own costs at some recognized laboratories, if the results of inspection suggest inaccurate energy label information being displayed. The result of re-test(s) shall reach the Authority within the prescribed period of time specified by the Authority;
- v) inform the Authority of any change in the technical information and data that were submitted to the Authority together with the application letter; and
- vi) accept the fact that if appliance fails to perform in accordance with the required energy efficiency standards and performance as given in Section 5 and this cannot be readily rectified, the Authority may order it be de-registered from the scheme.

The details of information of those appliances which we intend to register with the Authority are shown in the attached document, (Annex 4) and are submitted herewith for your vetting.

Yours faithfully,

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

\_\_\_\_\_  
\* *delete as appropriate*

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

1. Information of the company:  
  
Name, Address, Telephone number, Fax, E-mail, Contact person, Importer, Distributor, etc.
  
2. Product to apply for participating in the scheme:
  - i) Name of LED lamp, type, directional or non-directional, dimmable or non-dimmable, integral or non-integral LED driver, brand, model references, country of origin.
  
  - ii) Name of non-integral LED driver, type, brand, model references, country of origin, if applicable.
  
  - iii) Target lamp type, wattage and beam angle for those products claiming equivalence with target lamps, if applicable.
  
3. Parties that will be responsible for making and fixing the Energy Label
  
4. Commencement date to affix Energy Labels on appliance packaging  
  
Year \_\_\_\_\_, Month \_\_\_\_\_
  
5. Technical data of LED lamps:
  - (a) Rated General CRI (Ra);
  - (b) Rated Correlated Colour Temperature (CCT);
  - (c) Rated lamp wattage;
  - (d) Rated lamp voltage;
  - (e) Rated frequency;
  - (f) Rated lamp life;
  - (g) Rated luminous flux, if applicable; and
  - (h) Rated beam angle.
  
6. Detailed reports with test data and results showing the following LED lamp performances:
  - (a) General CRI (Ra);
  - (b) Correlated Colour Temperature (CCT);
  - (c) Change of chromaticity (at initial and 6 000 hours);
  - (d) Power factor;
  - (e) Lamp wattage;
  - (f) Supply voltage switching test;

- (g) Averaged lumen maintenance (at 6 000 hours);
- (h) Luminous efficacy;
- (i) Luminous flux, if applicable;  
(Remark: Calculation of minimum luminous flux for LED lamp to claim equivalence with incandescent lamp shall be provided)
- (j) Center beam intensity, if applicable;  
(Remark: Calculation of minimum center beam intensity for PAR and MR16 LED lamps to claim equivalence with directional lamps shall be provided)
- (k) Luminous intensity distribution and beam angle (only applicable to directional LED lamps); and
- (l) Brand and model of Type-C goniophotometer which is used in the test (only applicable to directional LED lamps).

(Remark: Test data for the above LED lamp performances should be accurate to 1 decimal place, whenever applicable, excluding that the CCT should be accurate to the nearest unit, the power factor should be accurate to 2 decimal places and the change of chromaticity should be accurate to 4 decimal places.)

7. Since it may take long time to complete the 6 000 hours test for LED lamp, the Authority may also consider the following in lieu of clause 6 above:
- i) Detailed reports with test data, graphics and results showing that the following LED lamp performances; and
    - (a) General CRI (Ra);
    - (b) Correlated Colour Temperature (CCT) and Duv;
    - (c) Change of chromaticity (at initial and 3 000 hours);
    - (d) Power Factor;
    - (e) Lamp wattage;
    - (f) Supply voltage switching test;
    - (g) Averaged lumen maintenance (at 3 000 hours);
    - (h) Luminous efficacy;
    - (i) Luminous flux, if applicable;  
(Remark: Calculation of minimum luminous flux for LED lamp to claim equivalence with incandescent lamp shall be provided)
    - (j) Center beam intensity, if applicable;  
(Remark: Calculation of minimum center beam intensity for PAR and MR16 LED lamps to claim equivalence with directional lamps shall be provided)
    - (k) Luminous intensity distribution and beam angle (only applicable to directional LED lamps); and
    - (l) Brand and model of Type-C goniophotometer which is used in the test (only applicable to directional LED lamps).

(Remark: Test data for the above LED lamp performances should be accurate to 1 decimal place, whenever applicable, excluding that the CCT should be accurate to the nearest unit, the power factor should be accurate to 2 decimal places and the change of chromaticity should be accurate to 4 decimal places.)

- ii) The results in the detailed reports as mentioned in clause i) above shall not be lower than the applicable requirements as stipulated in Section 5, excepting that the measured averaged lumen maintenance at 3 000 hours shall be equal or greater than 95%; and
  - iii) Additional detailed report of the LED lamp (i.e. operate at test voltage other than 220 volts AC) with test data, graphics and results showing that the applicable requirements stipulated in Section 5 can be met. The detailed report shall include test data at 6 000 hours for those performance parameters requiring test results at 6 000 hours. The detailed report shall be issued by a testing laboratory meeting the requirements as stipulated in Section 8.
8. Documentary proof that the applied appliance(s) comply with the Electrical Products (Safety) Regulation of the Hong Kong Special Administrative Region (Chapter 406G) and safety requirements at Clause 5.4 of the scheme document.
  9. Self-declaration issued by original manufacturer that the product is or is not equivalence with target lamp. Sample of declaration of conformity is shown in Annex 10.
  10. Letter of consent from the manufacturer of the non-integral LED driver for using their driver to test with the applicant's LED lamp. (only applicable if the non-integral LED driver and the LED lamp are manufactured by different manufacturers)

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

## **Proforma Letter of Acceptance**

Your ref.

Our ref. EEO/LB/35

Tel:

Fax:

Date

[Manufacturers/Importers/Agents]

Dear Sir/Madam,

### **Acceptance of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for LED Lamp**

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

I enclose herewith the registration certificates of LED lamps registered. The registered LED Lamps are as follows:

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

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

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

Yours faithfully,

for Director of Electrical & Mechanical Services

## **Proforma Letter of Rejection**

Our ref. EEO/LB/35

Your ref.

Tel.

Fax.

Date

[Manufacturers/Importers/Agents]

Dear Sir/Madam,

### **Rejection of Application for Registration to Participate in Voluntary Energy Efficiency Labelling Scheme for LED Lamp**

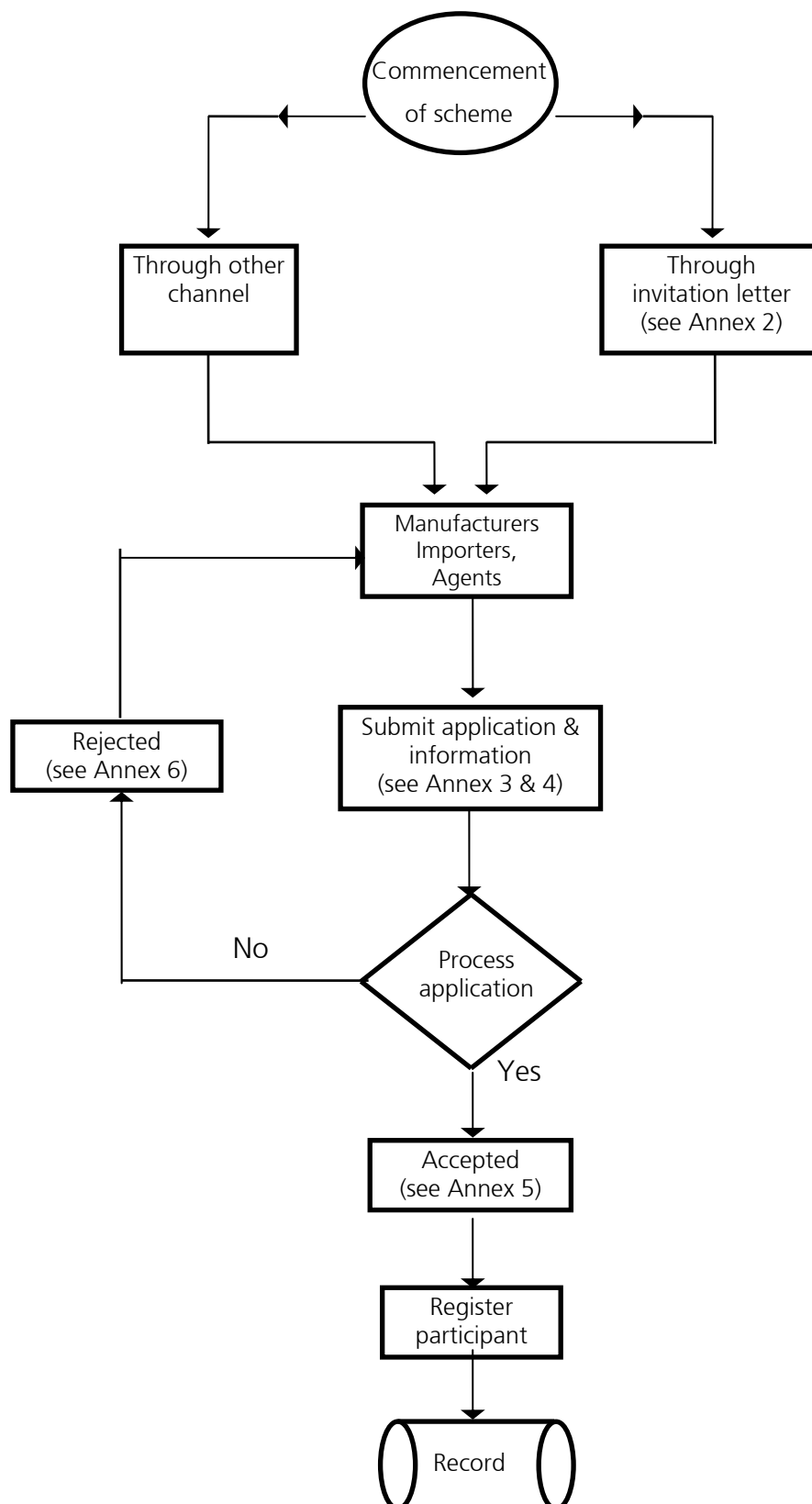
With reference to your letter of application ref. \_\_\_\_\_ dated \_\_\_\_\_, I regret to inform you that your application for registration to participate in the scheme has not been accepted for the following reasons:-

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

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

Yours faithfully,

for Director of Electrical & Mechanical Services

**Flow Chart for Registration**

**Minimum Luminous Flux for LED Lamp to Claim Equivalence with Incandescent Lamp**

<b>Claimed equivalent wattage of incandescent lamp (W)</b>	<b>Minimum luminous flux of LED lamps (lm)</b>
15	117
25	214
40	404
60	693
75	907
100	1308
150	2108
200	2968

Remarks: The intermediate values of both the luminous flux and claimed equivalent wattage of incandescent lamp at 220 volts (rounded up to 1 Watt) shall be calculated by linear interpolation between two adjacent values.

## **Minimum Center Beam Intensity for PAR and MR16 LED Lamps to Claim Equivalence with Directional Lamps**

Table 9-1 Minimum Center Beam Intensity Requirement (cd) for PAR16

		Rated Wattage of Target Lamp (W)											
		5	10	15	20	25	30	35	40	45	50	55	60
Beam Angle of Target Lamp (degree)	5	933	1115	1329	1579	1870	2208	2599	3051	3571	4166	4847	5622
	10	605	723	861	1023	1211	1430	1684	1977	2313	2699	3140	3642
	15	409	489	583	692	820	968	1140	1338	1566	1827	2126	2465
	20	290	346	412	490	580	685	806	947	1108	1292	1504	1744
	25	214	256	305	362	429	506	596	700	819	955	1111	1289
	30	165	197	235	280	331	391	460	540	632	738	858	995
	35	133	159	190	226	267	316	371	436	510	595	693	803
	40	112	134	160	190	225	266	313	368	430	502	584	677
	45	99	118	141	168	199	234	276	324	379	442	515	597
	50	91	109	130	154	183	216	254	298	349	407	474	550
	55	88	105	125	148	176	208	244	287	336	392	456	529
	60	88	105	126	149	177	209	246	288	338	394	458	531
	65	93	111	132	157	186	219	258	303	355	414	481	558

Table 9-2 Minimum Center Beam Intensity Requirement (cd) for PAR 20

		Rated Wattage of Target Lamp (W)											
		5	10	15	20	25	30	35	40	45	50	55	60
Beam Angle of Target Lamp (degree)	5	1340	1585	1869	2197	2575	3009	3506	4073	4717	5447	6270	7197
	10	856	1012	1193	1403	1644	1922	2239	2601	3012	3478	4004	4596
	15	571	675	796	936	1097	1282	1494	1735	2010	2321	2672	3067
	20	398	471	555	653	765	894	1042	1210	1401	1618	1863	2139
	25	290	343	405	476	557	651	759	882	1021	1179	1357	1558
	30	221	261	308	362	424	496	578	671	777	898	1033	1186
	35	176	208	245	288	338	394	460	534	618	714	822	944
	40	146	173	204	239	281	328	382	444	514	593	683	784
	45	127	150	177	208	244	285	332	385	446	515	593	681
	50	115	136	160	189	221	258	301	350	405	468	539	618
	55	109	129	152	179	210	245	286	332	384	444	511	586
	60	108	128	151	177	208	243	283	329	381	440	506	581
	65	112	132	156	184	215	251	293	340	394	455	524	601

Table 9-3 Minimum Center Beam Intensity Requirement (cd) for PAR 30

		Rated Wattage of Target Lamp (W)														
		15	20	25	30	35	40	45	50	55	60	65	75	90	100	125
Beam Angle of Target Lamp (degree)	5	3708	4247	4850	5523	6269	7095	8006	9007	10103	11298	12597	15520	20754	24817	36825
	10	2285	2617	2988	3402	3862	4371	4932	5549	6224	6960	7760	9561	12786	15289	22686
	15	1471	1684	1924	2190	2486	2814	3175	3572	4006	4480	4996	6155	8230	9842	14603
	20	989	1133	1294	1476	1672	1893	2136	2403	2695	3014	3360	4140	5536	6620	9823
	25	695	796	909	1035	1175	1330	1501	1689	1894	2118	2362	2910	3891	4653	6904
	30	511	585	668	760	863	977	1102	1240	1391	1556	1734	2137	2858	3417	5070
	35	392	449	512	583	662	750	846	952	1067	1194	1331	1640	2193	2622	3891
	40	314	360	411	468	531	601	678	763	856	957	1067	1315	1758	2103	3120
	45	263	301	344	392	445	504	568	639	717	802	894	1102	1473	1762	2614
	50	230	264	301	343	390	441	498	560	628	702	783	964	1290	1542	2288
	55	211	241	276	314	356	403	455	512	574	642	716	882	1180	1411	2093
	60	202	231	264	300	341	386	435	489	549	614	685	843	1128	1349	2001
	65	201	231	263	300	340	385	435	489	548	613	684	842	1126	1347	1999

Table 9-4 Minimum Center Beam Intensity Requirement (cd) for PAR 38

		Rated Wattage of Target Lamp (W)											
		40	45	50	55	60	65	75	90	100	125	150	180
Beam Angle of Target Lamp (degree)	5	9317	10296	11345	12462	13649	14905	17614	22127	25378	33931	42098	49408
	10	5577	6163	6791	7460	8170	8922	10544	13245	15191	20311	25199	29575
	15	3488	3855	4247	4666	5110	5580	6595	8284	9502	12704	15761	18498
	20	2280	2519	2776	3049	3340	3647	4310	5414	6210	8303	10301	12090
	25	1557	1721	1896	2083	2281	2491	2943	3697	4241	5670	7035	8256
	30	1111	1228	1353	1486	1628	1777	2100	2638	3026	4046	5020	5891
	35	828	915	1009	1108	1214	1325	1566	1967	2256	3017	3743	4393
	40	645	713	786	863	946	1032	1220	1533	1758	2350	2916	3423
	45	525	581	640	703	770	841	993	1248	1431	1913	2374	2786
	50	447	494	544	598	655	715	845	1061	1217	1628	2020	2370
	55	397	439	484	531	582	636	751	943	1082	1447	1795	2107
	60	369	408	449	494	541	590	698	876	1005	1334	1667	1957
	65	358	396	436	479	525	573	677	850	975	1304	1618	1899

Table 9-5 Minimum Center Beam Intensity Requirement (cd) for MR16

		Rated Wattage of Target Lamp (W)											
		5	10	15	20	25	30	35	40	45	50	55	60
Beam Angle of Target Lamp (degree)	5	2002	2713	3583	4612	5787	7076	8434	9796	11090	12236	13158	13791
	10	1238	1677	2215	2852	3578	4375	5214	6056	6856	7565	8135	8526
	15	799	1083	1431	1842	2310	2825	3367	3911	4428	4885	5253	5506
	20	539	731	965	1242	1559	1906	2272	2639	2987	3296	3544	3715
	25	380	515	680	876	1099	1343	1601	1860	2105	2323	2498	2618
	30	280	379	501	645	809	989	1179	1369	1550	1710	1839	1927
	35	215	292	385	496	622	761	906	1053	1192	1315	1414	1482
	40	173	234	309	398	500	611	728	846	958	1057	1136	1191
	45	145	197	260	334	419	513	611	710	804	887	954	999
	50	127	172	228	293	368	450	536	622	705	777	836	876

Remarks: The intermediate values of the center beam intensity and the beam angle of target lamp and the rated wattage of target lamp shall be calculated by linear interpolation between two adjacent values.

## **Sample of Declaration Letter from Manufacturer**

Your ref. \_\_\_\_\_

We \_\_\_\_\_  
(name of manufacturer)

of \_\_\_\_\_  
(address)

declare under our sole responsibility that product

\_\_\_\_\_  
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)

to which this declaration relates is:

\* equivalence to \_\_\_\_\_  
(Target Lamp type)

\_\_\_\_\_  
(Target Lamp wattage)

\_\_\_\_\_  
(Target Lamp beam angle, when applicable)

\* not equivalence with any target lamp such as incandescent lamp, PAR lamp and MR16 lamp, etc.

\*Please tick the appropriated check box

\_\_\_\_\_  
(name of authorized officer)

\_\_\_\_\_  
(title of authorized officer)

\_\_\_\_\_  
(date of issue)

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(company seal)