CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

LED LIGHTING
(Version 1.0a)

Assessment Standard

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LED LIGHTING

Summary of Assessment Criteria

CORE CRITERIA

Criteria	***Requirements***	***Verification***	***Points***		***Index***
			Basic	***+Bonus***	
Product Life	○ Self-ballasted LED lamp shall deliver at least 70% of initial lumens for ▪ ≥ 15,000 hours [10 basic] ▪ ≥ 25,000 hours (+5 bonus) ▪ ≥ 35,000 hours (+10 bonus) ○ Non Self-Ballasted LED Lamp ▪ ⩾ 20,000 hours [10 basic] ▪ ⩾ 35,000 hours (+5 bonus) ▪ ⩾ 50,000 hours (+10 bonus) ○ LED luminaire shall deliver at least 70% of initial lumens for ▪ ≥ 35,000 hours [10 basic] ▪ ≥ 45,000 hours (+5 bonus) ▪ ≥ 60,000 hours (+10 bonus)	Laboratory test report(s) and guarantee certificate(s) supplied with the product or made available to the public	**10**	*+5 / +10*	*4.1.2 (page 4)*
Luminous Efficacy	○ Directional LED ▪ ≥ 40 lm/W [10 basic] ▪ ≥ 65 lm/W (+5 bonus) ▪ ≥ 80 lm/W (+10 bonus) ▪ ≥ 100 lm/W (+15 bonus) ○ Non-directional LED ▪ ≥ 50 lm/W [10 basic] ▪ ≥ 80 lm/W (+5 bonus) ▪ ≥ 90 lm/W (+10 bonus) ▪ ≥ 105 lm/W (+15 bonus)	Laboratory test report(s) on Luminous Efficacy	**10**	*+5 / +10 / +15*	*4.2.1 (page 5)*
Colour Rendering Index	○ Colour rendering index: ▪ ≥ 80 [10 basic] ▪ ≥ 90 (+5 bonus)	Laboratory test report(s) on Colour Rendering Index	**10**	*+5*	*4.2.2 (page 6)*
Power Factor	The power factor of the LED lamp / luminaire shall meet the following: ***Rated lamp wattage*** / ***Minimum allowable power factor*** ≤ 5 W / 0.45 > 5 W to ≤ 25W / 0.65 > 25 W / 0.9	Laboratory test report(s) on Power Factor	**10**		*4.2.3 (page 6)*

Correlated Colour Temperature	Product shall fulfil the correlated colour temperature as shown in Section 4.2.4	Laboratory test report(s) on Correlated Colour Temperature	**10**		*4.2.4 (page 6)*
		Subtotal:	**50**	**+30**	

NON-CORE CRITERIA

Criteria	***Requirements***	***Verification***	***Points*** ***+Bonus***	***Index***
Environmental Management System	○ Valid certification of ISO14001 or the EU Eco-Management and Audit Scheme (EMAS)	ISO14001 or EMAS certificate issued by accredited certification body	+5	*4.1.1 (page 4)*
Packaging Requirements	○ Product packaging shall not contain halogenated plastics ○ All packaging materials shall be either comprised of 100% recycled material or readily recyclable	Documentation that describes the packaging and the materials used	+5	*4.1.3 (page 5)*
Hazardous Substances	○ The maximum concentration values of the restricted substances of product components (e.g. circuit boards, electrical, electronic and plastic components) shall be: ▪ Lead, mercury and hexavalent chromium: < 0.1% by weight each ▪ Cadmium: < 0.01% by weight ▪ PBBs and PBDEs: < 0.1% by weight each	Laboratory test report(s), MSDS, self-declaration letter and production documentation	+5	*4.3.1 (page 7)*
Recycling Programme	○ A recycling programme shall be developed to encourage and facilitate the recycling of used LED lightings	Documentation related to the recycling programme and relevant information as stated above	+5	*4.4.1 (page 8)*
		Subtotal:	**+20**	

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1. INTRODUCTION

1.1 PURPOSE

The CIC Green Product Certification *(formerly known as HKGBC Green Product Accreditation and Standards [HK G-PASS])* (herein after referred as the "Scheme") is an environmental labelling scheme owned by the Construction Industry Council (CIC) and implemented by the Hong Kong Green Building Council (HKGBC) which aims to help consumers, building professionals and policy makers identify environmentally preferable building materials and products. This Assessment Standard (hereafter referred as the "Standard") sets out the assessment criteria and their benchmarks for light emitting diodes (LED) lighting to govern the application and award of a label under the Scheme. The Standard also defines the verification methods to determine which labelling grade should be awarded to the product according to the assessment criteria.

This Standard neither modifies nor supersedes laws and regulations. Compliance with this Standard is not a substitute for, and does not assure, compliance with any applicable laws or regulations. Compliance with all applicable laws and regulations is a prerequisite for the manufacturing and marketing of the product.

1.2 BACKGROUND

With the dramatic improvement in the performance and significant cost reduction of light emitting diodes (LEDs), they are increasingly accepted by users as an alternative to traditional light sources in a variety of lighting applications. LEDs are energy efficient and mercury-free lighting, but like other electronic products, they could have some negative environmental impacts.

The purposes of the assessment criteria developed for LED lighting are, therefore, to minimise the use and subsequent release of environmentally harmful substances to the environmental throughout the product's life cycle, to conserve energy consumption, and to encourage recycling and responsible disposal.

2. SCOPE

The scope of this Standard is applicable to both directional and non-directional LEDs used for general illumination purposes in all types of buildings (see the definition in Section 3). However, LED lamps producing tinted or coloured light as well as organic LED (OLED) lamps are excluded from this Standard.

For application of LED lamp, the lamp type and lamp base shall be specified clearly in each application. **ONE** application is only for **ONE** product series with same lamp type and lamp base. E.g. Bulb – classic – E27 is regarded as one application.

- Lamp type: Reflector, Flood, Spot, Bulb – classic / oval / T-shaped, LED tubes - T8 / T5
- Lamp base: E14, E27, GU4, GU5.3, GU10, GX53, MR16, etc.

For application of LED luminaire, the product serial number and function shall be specified clearly in each application. **ONE** application is only for **ONE** product series with same function. E.g. ABC Series – Downlight is regarded as one application.

- Function: Downlight, Track light, Floodlight, Troffer, Commercial, Surface fittings, Bathroom, Kitchen, Outdoor, and other specific function.

Subsequent application is available for the similar products with the same product serial number of a labelled product series, but different lamp bases or updated models, which is only eligible for applying within the validity period of the label. Maximum **10 (TEN)** subsequent application shall be applicable for each first application.[1]

3. DEFINITIONS

Applicant: Organisations which apply for the label of the CIC Green Product Certification of the Construction Industry Council

ANSI: American National Standards Institute

CIC: Construction Industry Council

CNAS: China National Accreditation Service for Conformity Assessment

Colour rendering index (CRI): 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

Directional lamp: A lamp having at least 80% of light output within a solid angle of π sr (corresponding to a cone with angle of 120 degree)

Non-directional lamp: A lamp having less than 80% of light output within a solid angle of π sr (corresponding to a cone with angle of 120 degree)

[1] The number of maximum subsequent application is subject to change based on the market demand.

HKAS: Hong Kong Accreditation Service

HKGBC: The Hong Kong Green Building Council Limited

HOKLAS: The Hong Kong Laboratory Accreditation Scheme

ISO: International Organisation for Standardisation

LED: A P-N junction semiconductor device that emits incoherent optical radiation when biased in the forward direction. The output is a function of its physical construction, materials used, and exciting current and may be in the ultraviolet, visible or infrared regions of the spectrum

Non self-ballasted LED Lamp: LED lamp which needs a separate controlgear (ballast) to operate

Self-ballasted LED Lamp: LED lamp, incorporating controlgear (ballast), and any additional elements necessary for stable operation of the light source, designed for direct connection to the supply voltage

LED Luminaire: Luminaire designed to incorporate one or more LED light source(s) and any additional elements necessary for starting and stable operation of the light source

Lumen maintenance: Luminous flux at a given time in the life of the LED expressed as a percentage of the initial luminous flux

Luminous efficacy: A ratio of luminous flux emitted by a lamp to the electrical power consumed by the lamp (in watts, W)

MEELS: Mandatory Energy Efficiency Labelling Scheme. Energy labels are required to be shown on the prescribed products for supply in Hong Kong to inform consumers of their energy efficiency performance

MSDS: Material safety data sheet. To qualify as suitable, MSDS and information therein must not be more than 5-years old

Power factor (PF): A ratio between the real power and apparent power

PAS: Publicly Available Specifications

VEELS: The Hong Kong Voluntary Energy Efficiency Labelling Scheme

Third-party: An entity without any financial interest or stake in the sales of the product or service being evaluated or other conflict of interest

4. EVALUATION CRITERIA

A product to be assessed shall meet all the minimum requirements of the "Core Criteria" in order to be awarded a "Green" (i.e. a "pass" grade) Label under the Scheme. Bonus points may be awarded if the product meets the "Non-core Criteria" and a "Bronze", "Silver", "Gold" or "Platinum" Label will be awarded according to the total points accumulated (see Section 5 for details). All submissions and documentations shall be endorsed by the Chief Executive Officer or other authorised persons of the Applicant to demonstrate conformance to the assessment criteria. All certification, laboratory report and documentation must be valid during the assessment process and labelling period. The validity of all laboratory report and documentation shall be 5 years from the date of issue. The chemical tests should be conducted by either a third party or the manufacturer who has received the ISO17025 certification or relevant national accreditation systems, e.g. HOKLAS, CNAS, etc.

4.1 GENERAL REQUIREMENTS

4.1.1 Environmental Management System

5 Points (Non-Core Criterion)

Manufacturer of the products shall possess valid certificate of ISO14001 or the EU Eco-Management and Audit Scheme (EMAS). Targets shall be set to reduce the environmental impacts during the manufacturing process which include but not limited to the reduction of hazardous substance emissions, energy consumption, CO_2 emissions, secondary environmental load, waste management, water management, etc.

Verification

A valid ISO14001 or EMAS Certificate issued by local or overseas accredited certification bodies.

4.1.2 Product Life

10 Basic + 5 / 10 Bonus Points (Core Criterion)

LEDs shall deliver at least 70% of initial lumens for at least 15,000 hours, 20,000 hours and 35,000 hours for self-ballasted LED lamp, non self-ballasted LED lamp and LED luminaire respectively. Bonus points will be awarded with reference to Table 1.

Table 1: Requirements on product life and associated points

Lamp type	***Product life (hours)***	***Points***
Self-ballasted LED lamp	≥ 15,000	10 [basic]

	≥ 25,000	+5 (bonus)
	≥ 35,000	+10 (bonus)
Non self-ballasted LED lamp	≥ 20,000	10 [basic]
	≥ 35,000	+5 (bonus)
	≥ 50,000	+10 (bonus)
LED luminaire	≥ 35,000	10 [basic]
	≥ 45,000	+5 (bonus)
	≥ 60,000	+10 (bonus)

Verification
Laboratory test report(s) and guarantee certificate(s) supplied with the product or made available to the public, e.g. through manufacturer's website.

4.1.3 Packaging Requirement

The packaging requirements are relevant to all primary packaging materials, i.e. those being used to envelop the product and hold it. The primary packaging materials are usually in direct contact with the contents and shall be in the minimal amount of distribution and/or use as they may eventually be disposed by the consumers.

5 Points (Non-Core Criterion)
The packaging materials shall:

- Not contain halogenated plastics; and
- Be comprised of 100% recycled material or be readily recyclable, decomposable, or contain no coatings, impregnated chemicals or other materials that would prevent recycling or decomposition.

Verification
Documentation that describes the packaging and the materials used.

4.2 RESOURCE CONSUMPTION

4.2.1 Luminous Efficacy

10 Basic + 5 / 10 / 15 Bonus Points (Core Criterion)
The luminous efficacy of both the directional and non-directional LEDs shall not be less than 40 and 50 lm/W respectively, as stated in Table 2. Bonus points will be awarded to LEDs with higher luminous efficacy according to Table 2.

Table 2: Requirements of luminous efficacy and associated points

Lamp type	***Luminous efficacy (lm/W)***	***Points***
Directional LED	≥ 40	10 [basic]
	≥ 65	+5 (bonus)
	≥ 80	+10 (bonus)
	≥ 100	+15 (bonus)
Non-directional LED	≥ 50	10 [basic]
	≥ 80	+5 (bonus)
	≥ 90	+10 (bonus)
	≥ 105	+15 (bonus)

4.2.2 Colour Rendering Index

10 Basic + 5 Bonus Points (Core Criterion)

The measured initial general colour rendering index (CRI) values of the product shall be equal to or greater than 80, and shall not have decreased by more than 3 points from the rated general CRI value (i.e. the General CRI declared by the Applicant). Bonus points will be awarded to LEDs with CRI equal to or greater than 90.

4.2.3 Power Factor

10 Points (Core Criterion)

The power factor of the LED lamp / luminaire shall meet the minimum values as shown in Table 3.

Table 3: Minimum allowable power factor for LED lighting

Rated lamp wattage	***Minimum allowable power factor***
≤ 5 W	0.45
> 5 W to ≤ 25W	0.65
> 25 W	0.9

4.2.4 Correlated Colour Temperature

10 Points (Core Criterion)

The product shall have one of the rated correlated colour temperatures (CCTs) including 2,700K, 3,000K, 3,500K, 4,000K, 4,500K, 5,000K, 5,700K, 6,500K and a 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 the target CCT and the target Duv of the selected rated CCT.

Table 4: Rated CCT categories

Rated CCT	***Target CCT and tolerance (K)***	***Target Duv and tolerance***
2,700 K	2,725 ± 145	0.000 ± 0.006
3,000 K	3,045 ± 175	0.000 ± 0.006
3,500 K	3,465 ± 245	0.000 ± 0.006
4,000 K	3,985 ± 275	0.001 ± 0.006
4,500 K	4,503 ± 243	0.001 ± 0.006
5,000 K	5,028 ± 283	0.002 ± 0.006
5,700 K	5,665 ± 355	0.002 ± 0.006
6,500 K	6,530 ± 510	0.003 ± 0.006
Flexible CCT (2700 – 6500 K)	T [1)] ± ΔT [2)]	Duv [3)]± 0.006

1) T is chosen to be at 100 K steps (2,800, 2,900, ... , 6,400 K)

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

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

Verification (4.2.1 to 4.2.4)

Laboratory test report(s) for all relevant energy efficiency and performance tests.

4.3 HUMAN TOXICITY

4.3.1 Hazardous Substances

5 Points (Non-Core Criterion)

The product shall be manufactured in accordance with the EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2011/65/EU (commonly referred to as the Restriction of Hazardous Substances Directive or RoHS). The maximum concentration values of the RoHS restricted substances are:

- Lead, mercury and hexavalent chromium: < 0.1% by weight respectively;
- Cadmium: < 0.01% by weight; and
- Polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE): < 0.1% by weight respectively

Verification

Laboratory test report(s), MSDS, self-declaration letter and production documentation. Test report(s) shall be compiled according to the National and International test methods including but not limited to IEC 62321.

4.4 ECOSYSTEM IMPACT

4.4.1 Recycling Programme

5 Points (Non-Core Criterion)

LED manufacturers shall have a recycling programme in place to encourage and facilitate the recycling of lamp / luminaire. This shall include information on the package, website, through customer service, and be able to take-back lamp / luminaire and send them to a lighting recycling programme.

Verification

Documentation related to the recycling programme and relevant information as stated above.

5. SCORING AND GRADING

The points for meeting each criterion stated in Section 4 are summarised in Table 5.

Table 5: Points to be awarded under the assessment criteria of this Standard

Evaluation criteria	***Points***	
	Basic	***+Bonus***
4.1.1 Environmental Management System		+5
4.1.2 Product Life [CORE]	**10**	+5 / +10
4.1.3 Packaging Requirements		+5
4.2.1 Luminous Efficacy [CORE]	**10**	+5 / +10 / +15
4.2.2 Colour Rendering Index [CORE]	**10**	+5
4.2.3 Power Factor [CORE]	**10**	
4.2.4 Correlated Colour Temperature [CORE]	**10**	
4.3.1 Hazardous Substances		+5
4.4.1 Recycling Programme		+5
	50	**+50**
Total:	**100**	

The minimum requirement to be awarded a "Green" Label under this product category is to obtain 50 points by meeting all minimum requirements laid down in the "Core Criteria".

Table 6: Benchmarks for grading LED lighting

Grade to be awarded	***Points required***
Platinum	90 or above
Gold	80 - 89
Silver	70 - 79
Bronze	60 - 69
Green	50 - 59
No Label	Below 50