# CONSTRUCTION INDUSTRY COUNCIL

## CIC GREEN PRODUCT CERTIFICATION

# COMPACT FLUORESCENT LAMP
(Version 1.0a)

## *Assessment Standard*



Last updated: 11 June 2020

# COMPACT FLUORESCENT LAMP

## *Summary of Assessment Criteria*

**CORE CRITERIA**

| ***Criteria*** | ***Requirements*** | ***Verification*** | ***Points*** | | ***Index*** |
|---|---|---|---|---|---|
| | | | ***Basic*** | ***+Bonus*** | |
| Product Life | ○ Product life: ≥ 6,000 hours [5 basic]<br>○ Product life: ≥ 8,000 hours (+5 bonus)<br>○ Product life: ≥ 10,000 hours (+10 bonus) | Laboratory test report(s) on product life and guarantee certificate | **5** | *+5 / +10* | *4.1.2 (page 4)* |
| Energy Efficiency | ○ Integrated CFL lamps: shall have obtained Mandatory Energy Efficiency Labelling Scheme – Grade I Energy Label<br>○ Non-integrated CFL lamps: shall have obtained Voluntary Energy Efficiency Labelling Scheme – Recognition Type Energy Label | Laboratory test report(s) and any relevant documentation | **25** | | *4.2.1 (page 5)* |
| Power Factor | ○ Power factor: ≥ 0.8 [5 basic]<br>○ Power factor: ≥ 0.85 (+10 bonus) | Laboratory test report(s) on PF | **5** | *+10* | *4.2.2 (page 5)* |
| Total Harmonic Distortion | ○ Total harmonic distortion: < 30% | Laboratory test report(s) on THD | **10** | | *4.2.3 (page 5)* |
| Maximum Allowable Power Loss | ○ Integrated CFL lamps shall fulfil the maximum allowable power loss requirements shown in Section 4.2.4; Non-integrated CFL lamps are exempted from this requirement | Laboratory test report(s) on MAPL | **5** | | *4.2.4 (page 6)* |
| | | **Subtotal:** | **50** | **+20** | |

**NON-CORE CRITERIA**

| ***Criteria*** | ***Requirements*** | ***Verification*** | ***Points*** <br> ***+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 3)* |
| Packaging Requirements | ○ Product packaging shall not contain halogenated plastics<br>○ All packaging materials shall be either comprised of 100% recycled material or readily recyclable | Documentation on the packaging materials used | +5 | *4.1.3 (page 4)* |
| Mercury Content | ○ Mercury content: ≤ 4 mg<br>○ Employ encapsulated dosing methods during the production process | Laboratory test report(s), MSDS and production documentation | +10 | *4.3.1 (page 6)* |
| Hazardous Substances | ○ Product shall not contain radioisotopes<br>○ The maximum concentration values of the restricted substances of product components (e.g. circuit boards, electrical, electronic and plastic components) shall be:<br>▪ Lead, mercury and hexavalent chromium: < 0.1% by weight each<br>▪ Cadmium: < 0.01% by weight<br>▪ PBBs and PBDEs: < 0.1% by weight each | Laboratory test report(s), MSDS, self-declaration letter and production documentation | +5 | *4.3.2 (page 7)* |
| Recycling Programme | ○ A recycling programme shall be developed to encourage and facilitate the recycling of used CFL lamps | Documentation related to the recycling programme | +5 | *4.4.1 (page 7)* |
| | | **Subtotal:** | **+30** | |

# TABLE OF CONTENTS

# 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 compact fluorescent lamps 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

Compact fluorescent lamps (CFLs) consume about 80% less electrical power than incandescent lamps for the same light output. In addition, the life expectancy of CFLs is generally about 8 to 10 times that of incandescent lamps. However, CFLs usually contain mercury or its compound in the tube gases, which is hazardous to human health. Other environmental concerns of using CFLs include their poor power factor, high harmonic current demand, and the potential electromagnetic interference effects of the current-switching nature of the associated electronic ballasts.

The purposes of the assessment criteria developed for CFLs are to conserve energy consumption, and to minimise the impacts to both the environment and human health through stringent control on the production process, use of materials and energy efficiency. The criteria in this Standard are based on relevant worldwide eco-labelling schemes and some existing life cycle assessment (LCA) studies.

# 2. SCOPE

There are two types of CFLs, i.e.: (i) integrated lamps; and (ii) non-integrated lamps. Integrated lamps combine the tube and ballast in a single unit. In contrast, non-integrated CFLs have the ballast permanently installed in the luminaire, and only the lamp bulb has to be changed at its

end of life. This Standard applies to CFLs with and without the integrated ballasts and controllers for general illumination purposes.

For application of CFL, 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. integrated bulb – classic – E27 is regarded as one application.

- Lamp type: integrated lamps / non-integrated; Bulb – classic, oval, T-shaped, etc.
- Lamp base: E14, E27, etc.

## 3. DEFINITIONS

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

*Ballast adapter:* A unit containing all elements that are necessary for starting and maintaining a stable operation of the lamp, with an integral socket for a lamp

*Compact fluorescent lamp (CFL):* A fluorescent lamp which is small and compact that may be self-ballasted or function with a ballast adapter

*CIC:* Construction Industry Council

*CNAS:* China National Accreditation Service for Conformity Assessment

*HKAS:* Hong Kong Accreditation Service

*HKGBC:* The Hong Kong Green Building Council Limited

*HOKLAS:* The Hong Kong Laboratory Accreditation Scheme

*IARC:* International Agency for Research on Cancer

*ISO:* International Organisation for Standardisation

*IEC:* International Electrotechnical Commission

*Luminous efficacy:* A ratio of luminous flux emitted by a lamp to the electrical power consumed by the lamp

*MEELS:* Mandatory Energy Efficiency Labelling Scheme. Under this scheme, energy labels are required to be displayed 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, the MSDS and information therein must not be more than 5-years old

*Power factor:* The ratio of real power versus apparent power in the circuit

*Self-ballasted lamp:* A unit that incorporates, permanently enclosed, all elements that are necessary for starting and maintaining a stable operation of the lamp, but any replaceable or interchangeable parts are excluded. The unit including all elements is discarded at the end of the lamp's life

*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

*Total harmonic distortion:* The ratio of the sum of the powers of all harmonic components to the power of the fundamental frequency

# 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 submission and documentation 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 ISO14001 certificates or any other equivalent schemes recognised by CIC (e.g. 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 Certificate or any other equivalent certifications recognised by CIC (e.g. the EU Eco-Management and Audit Scheme (EMAS)).

### *4.1.2 Product Life*

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

The life span of CFL products shall not less than 6,000 hours as measured in accordance with IEC 60901 and IEC 60969 for modular CFLs (with separate ballast and adaptor) and integrated CFLs respectively. Bonus points will be awarded if the average lamp life exceeds 8,000 or 10,000 hours.

*Table 1: Requirements on product life of compact fluorescent lamps*

| ***Product life (hours)*** | ***Points*** |
|---|---|
| ≥ 6,000 | 5 [basic] |
| ≥ 8,000 | +5 (bonus) |
| ≥ 10,000 | +10 (bonus) |

Verification

Guarantee certificate supplied with the product or made available to the public, e.g. through manufacturer's website; relevant laboratory test report(s) in accordance with IEC 60901 and IEC 60969 for modular CFLs (with separate ballast and adaptor) and integrated CFLs, or other relevant international standards.

### *4.1.3 Packaging Requirements*

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 describing the packaging materials used as well as their chemical composition (if any and where applicable), treatment process and recyclability shall be submitted.

## 4.2 RESOURCE CONSUMPTION

### *4.2.1 Energy Efficiency*

25 Points (Core Criterion)

The integrated CFL products shall have obtained a Grading Type Energy Label under the Mandatory Energy Efficiency Labelling Scheme (MEELS) of the Electrical and Mechanical Services Department (EMSD) of the HKSAR Government Grade 1 label.

The non-integrated CFL products shall have obtained a Recognition Type Energy Label under the Voluntary Energy Efficiency Labelling Scheme (VEELS) of the EMSD of the HKSAR Government.

Verification

Relevant test report(s) in accordance to the methodologies stated in MEELS or VEELS; and other production documentation.

### *4.2.2 Power Factor*

5 Basic + 10 Bonus Points (Core Criterion)

The CFL products shall have a power factor (PF) of equal to or greater than 0.8. Bonus points will be awarded for product with a higher PF according to Table 2.

*Table 2: Limits of power factor and associated points*

| ***Power factor*** | ***Points*** |
|---|---|
| ≥ 0.8 | 5 [basic] |
| ≥ 0.85 | +10 (bonus) |

### *4.2.3 Total Harmonic Distortion*

10 Points (Core Criterion)

The total harmonic distortion (THD) of CFL products shall be below 30%.

THD can be calculated using the equation below:

$$THD = \frac{\sqrt{(V_2^2 + V_3^2 + V_4^2 + \ldots + V_n^2}}{V_1} \times 100\%$$

where $V_i$ is the RMS voltage of $i_{th}$ harmonic; $i = 1$ is the fundamental frequency.

### 4.2.4 *Maximum Allowable Power Loss*

5 Points (Core Criterion)

The Maximum Allowable Power Loss (MAPL) of electronic ballast in the integrated CFL products shall fulfil the requirements as stated in Table C7.8.3: Maximum Allowable Power Loss of Electronic Ballast, in General Specification for Electrical Installation in Government Buildings, published by Hong Kong Architectural Services Department. Non-integrated CFL products are exempted from this requirement.

Verification (for 4.2.2, 4.2.3 and 4.2.4)
Relevant laboratory test report(s) on the above energy performance indicators.

## 4.3 HUMAN TOXICITY

### *4.3.1 Mercury Content*

10 Points (Non-Core Criterion)
The mercury content of each CFL shall not exceed 4 mg.

CFL manufacturer shall use the encapsulated dosing methods to minimise mercury exposure to workers during the product manufacturing stage. Other methods of closed, accurate, and precise dosing would be acceptable if proven, with documentation, to have similar or better dose efficiency and protection against worker exposure.

Verification
Laboratory test report(s) on mercury content, and documentation showing that encapsulated dosing methods or other equivalent methods have been used.

### *4.3.2 Hazardous Substances*

5 Points (Non-Core Criterion)

i) The products shall not contain radioisotopes; and

ii) The product components (i.e. the circuit boards, electrical, electronic, plastic components, etc.) 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)

In order to encourage and facilitate recycling of CFLs, manufacturers shall have a recycling programme which includes:

- Convenient CFL collection options free of cost to the users. This may include options beyond municipal programmes, such as but not limited to a third-party provider or retailer partnership; and
- Information on the company website regarding the recycling programme particularly on the CFL collection options.

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 3.

*Table 3: 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] | **5** | +5 / +10 |
| 4.1.3 Packaging Requirements | | +5 |
| 4.2.1 Energy Efficiency [CORE] | **25** | |
| 4.2.2 Power Factor (PF) [CORE] | **5** | +10 |
| 4.2.3 Total Harmonic Distortion (THD) [CORE] | **10** | |
| 4.2.4 Maximum Allowable Power Loss (MAPL) [CORE] | **5** | |
| 4.3.1 Mercury Content | | +10 |
| 4.3.2 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 4: Benchmarks for grading compact fluorescent lamp*

| ***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 |