CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

ELECTRONIC BALLAST

(Version 1.0a)

Assessment Standard

Last updated: 11 June 2020

ELECTRONIC BALLAST

Summary of Assessment Criteria

CORE CRITERIA

Criteria	***Requirements***	***Verification***	***Points***		***Index***
			Basic	***+Bonus***	
Product Life	○ At the maximum permissible measuring-point temperature (tc) and under standard network conditions, guaranteed product service life shall be: ▪ ≥ 30,000 lighting hour [5 basic] ▪ ≥ 40,000 lighting hour (+5 bonus) ○ The failure rate shall not exceed 0.2% /1,000 hours (or 10% of failure rate)	Laboratory test report(s) on product life and guarantee certificate(s)	**5**	*+5*	*4.1.2 (page 4)*
Technical Performance	○ Ballast-lumen-factor*: 0.95 - 1.00 ○ Ballast safety shall be tested and comply with International IEC -61347-2-3 ○ Ballast shall be tested and comply with IEC-60929:2006 ○ Guaranteed constant luminous flux generated by the fluorescent lighting system ○ Lamp-operating frequency: > 25 kHz (but not in range of 30 to 40 kHz) *The type, number and size of reference lamp(s) shall be indicated.	Laboratory test report(s) for all relevant tests	**10**		*4.1.3 (page 4)*
Energy Efficiency	○ The maximum power loss of the electronic ballast shall not be higher than those tabulated in Table 2 of Section 4.2.2	Laboratory test report(s) and production documentation	**20**		*4.2.2 (page 5)*
Total Power Factor	○ Total power factor: ≥ 0.85 [5 basic] ○ Total power factor: ≥ 0.9 (+5 bonus) ○ Total power factor: ≥ 0.95 (+15 bonus)	Laboratory test report(s) on power factor	**5**	*+5 / +15*	*4.2.3 (page 7)*
Hazardous Substances	○ Product shall comply with the following requirements: ▪ Concentration of cadmium: < 100 ppm ▪ Concentration of lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ether: < 1,000 ppm ▪ The plastic parts used in the case weighing 25g or more shall not contain short-chain chlorinated paraffins (C=10~13) (with chlorine concentration over 50%)	Laboratory test report(s), MSDS and production documentation	**10**		*4.3.2 (page 7)*
		Subtotal:	**50**	**+20**	

NON-CORE CRITERIA

Criteria	***Requirements***	***Verification***	***Points*** ***+Bonus***	***Index***
Environmental Management System	Valid ISO14001 or the EU Eco-Management and Audit Scheme (EMAS) certification	ISO14001 or EMAS certificate issued by accredited certification body	+5	*4.1.1 (page 3)*
Recyclability	○ The components of the product shall be designed to be diverted from the waste stream for reprocessing and reuse.	Detailed report(s) of the recyclability of the product with relevant production documentation	+5	*4.2.1 (page 4)*
Carcinogenic Substances	○ Substances listed in IARC Group 1, 2A and 2B shall be < 0.1% by weight of the product	Laboratory test report(s), MSDS, self-declaration letter and production documentation	+10	*4.3.1 (page 7)*
Operating Noise	○ Noise level: ≤ 24 dBA (i.e. Class A sound rating when installed)	Detailed report(s) of the operating noise	+10	*4.3.3 (page 8)*
		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 electronic ballasts 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

Ballast is a device used to provide the necessary starting and operating electrical conditions of fluorescent lighting systems. While fluorescent lighting systems are commonly used in all types of buildings and artificial lighting consumes approximately 15 to 30% of the total energy consumption in a building, the energy efficiency of electronic ballasts have been promoted worldwide, including U.S., Canada, Australia and China. According to the Natural Resources Canada, an energy saving of 3 PJ and a reduction in greenhouse gases emissions of 0.4 Mt can be achieved by 2020 in Canada under Canada's Energy Efficiency Regulations (EER) for electronic ballasts.

In addition to energy efficiency, the disposal of used ballasts shall be handled with great care as they contain hazardous substances such as polychlorinated biphenyl (PCB), di-2-ethylhexyl phthalate (DEHP) and other toxic components. Programme for proper collection, disposal and recycling is equally important to reduce the damage to the environment and human health. The purposes of the evaluation criteria developed for electronic ballasts are thus to conserve energy consumption, to minimise the impacts to both the environment and human health through stringent assessment criteria on the production process, use of materials and energy efficiency.

2. SCOPE

There are two common types of ballast, namely the magnetic type and electronic type. Between the two, electronic ballasts operate at a much higher frequency, resulting in 10% higher energy efficiency than the magnetic ballasts generally. Hence, this Standard covers the electronic ballasts used on standard fluorescent lamps (i.e. linear, circular and compact type), high-intensity discharge (HID) lamps, powered from either a 220V 50Hz AC supply or an appropriate DC power source. Ballasts that serve as the integrated parts of fluorescent lamps are excluded from this Standard. Besides, ballasts used in T8 lamps are excluded.

Note:
Each application shall specify the product code / serial number.

3. DEFINITIONS

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

Ballast efficacy factor / ballast efficiency factor (BEF): Ratio of the ballast lumen factor, specified as a percentage, to the ballast input power in watts. The factor is used to compare the ballasts operating under the same type and number of lamps.

Ballast lumen factor (BLF): Luminous flux of a fluorescent or high-intensity discharge (HID) lamp (or lamps) operated on the ballast divided by the luminous flux of the same lamp when operated on the reference ballast specified for rating lamp lumens

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

Maximum allowable power consumption: The maximum ballast-lamp circuit power for each lamp power and ballast type

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

Recyclable: A characteristic of a product, packaging or associated component that can be diverted from the waste stream through available processes and programmes and can be collected, processed and returned to use in the form of raw materials or products (ISO 14021:1999)

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 power factor: The power factor of the combination of a ballast and the lamp (or lamps) for which the ballast is designed. It ranges from 0 to 1

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 "Green", "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 or the EU Eco-Management and Audit Scheme (EMAS) certificates. 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

5 Basic + 5 Bonus Points (Core Criterion)
The minimum expected service life of electronic ballast is 30,000 lighting hours, at the maximum permissible measuring-point temperature and under standard network conditions. Bonus points will be awarded for longer expected lifetime according to Table 1.

The failure rate shall also not exceed 0.2% per 1,000 hours, corresponding to a 10% of failure rate based on laboratory testing conditions.

Table 1: Expected ballast service time and associated points

Expected service life (lighting hours)	***Points***
≥ 30,000	5 [basic]
≥ 40,000	+5 (bonus)

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

4.1.3 Technical Performance

15 Points (Core Criterion)
The electronic ballasts shall comply with all the technical requirements stated below.

- Ballast-lumen-factor* (BLF) from 0.95 to 1.00;
- Ballast safety shall be tested and comply with International Electrotechnical Commission (IEC) 61347-2-3;
- Ballast shall be tested and comply with IEC-60929:2006;
- Constant luminous flux generated by the fluorescent lighting system shall be guaranteed; and
- Lamp-operating frequency shall be higher than 25 kHz but not in the range of 30 to 40 kHz.

* The type, number and size of reference lamp(s) shall be clearly indicated.

Verification
Laboratory test report(s) for all relevant tests.

4.2 RESOURCE CONSUMPTION

4.2.1 Recyclability

5 Points (Non-Core Criterion)

The product shall be designed in a way so that its components can be diverted from the waste stream for reprocessing and reuse, where collect or drop-off facilities are available.

Verification

Detailed report(s) of the recyclability of the product with relevant production documentation.

4.2.2 Energy Efficiency

20 Points (Core Criterion)

The energy efficiency of a ballast-lamp circuit is measured by the total power input in the circuit. This is a function of lamp power and the type of ballast. The maximum allowable power consumption of a given ballast type is defined as the maximum lamp-circuit power for each lamp power and the ballast type, as defined in the Voluntary Energy Efficiency Labelling Scheme for Electronic Ballasts administered by the Electrical and Mechanical Services Department of the HKSAR Government (EMSD, 2012).

The maximum power loss of the electronic ballast shall not be higher than those tabulated in Table 2. Whenever a lamp power of ballast falls between two values as indicated in Table 2, the maximum power input power of ballast-lamp circuit shall be calculated by linear interpolation between the two values of the maximum input power for the two closest lamps power an indicated in Table 2.

Table 2: Maximum allowable power loss of electronic ballasts

Ballast Category	***Rated Lamp Power***		***Maximum Allowable Power Consumption***
	50 Hz	*High Frequency (HF)*	
(for linear fluorescent lamps)	4 W	3.4 W	6 W
	6 W	5.1 W	8 W
	8 W	6.7 W	11 W
	13 W	11.8 W	15 W
	15 W	13.5 W	16 W

	18 W	16 W	19 W
	30 W	24 W	31 W
	36 W	32 W	36 W
	38 W	32 W	38 W
	58 W	50 W	55 W
	70 W	60 W	68 W
	--	14 W	17 W
	--	21 W	24 W
	--	24 W	27 W
	--	28 W	32 W
	--	35 W	39 W
	--	39 W	43 W
	--	49 W	55 W
	--	54 W	60 W
	--	80 W	88 W
(for compact 2 tubes fluorescent lamps)	5 W	4.5 W	7 W
	7 W	6.5 W	9 W
	9 W	8 W	11 W
	11 W	10 W	14 W
	13 W	12 W	16 W
	18 W	16 W	19 W
	24 W	22 W	25 W
	36 W	32 W	36 W
	--	40 W	45 W
	--	55 W	61 W
(for compact 4 tubes flat fluorescent lamps)	18 W	16 W	19 W
	24 W	22 W	25 W
	36 W	32 W	36 W
(for compact 4 tubes fluorescent lamps)	10 W	9.5 W	11 W
	13 W	12.5 W	14 W
	18 W	16.5 W	19 W
	26 W	24 W	27 W
(for compact 6 tubes fluorescent lamps)	18 W	16.5 W	19 W
	26 W	24 W	27 W
	--	32 W	36 W
	--	42 W	47 W
(for compact 2 D fluorescent lamps)	10 W	9 W	11 W
	16 W	14 W	17 W
	21 W	19 W	22 W
	28 W	25 W	29 W
	38 W	34 W	38 W
	--	55 W	61 W
(for circular fluorescent lamps)	22 W	19 W	22 W
	32 W	30 W	35 W
	40 W	32 W	37 W
	--	22 W	26 W
	--	40 W	45 W
	--	55 W	61 W
(for HID lamps)	35 W	--	43 W
	70 W	--	80 W
	150W	--	165 W
	250W	--	270 W
	400W	--	430 W

Verification
Relevant laboratory test report(s) and production documentation. Tests shall be conducted in accordance with EN 50294.

4.2.3 Total Power Factor

5 Basic + 5 / 15 Bonus Points (Core Criterion)

The total power factor of an electronic ballast-lamp circuit shall not be less than 0.85. Bonus points will be awarded for a higher power factor according to Table 3.

Table 3: Limits of power factor of ballast-lamp circuit and associated points

Ballast-lamp circuit total power factor	***Points***
≥ 0.85	5 [basic]
≥ 0.9	+5 (bonus)
≥ 0.95	+15 (bonus)

Verification
Relevant laboratory test report(s) on the above energy performance indicator.

4.3 HUMAN TOXICITY

4.3.1 Carcinogenic Substances

10 Points (Non-Core Criterion)
Hazardous substances listed in the International Agency for Research on Cancer's (IARC) Groups 1, 2A and 2B Classifications (details can be found in website: http://monographs.iarc.fr/ENG/Classification/) shall be avoided during the production process or present in the final product. Any such carcinogens which are known to be present as contaminants shall be less than 0.1% by weight of the product.

Verification
Laboratory test report(s), MSDS, self-declaration letter and production documentation shall be provided.

4.3.2 Hazardous Substances

10 Points (Core Criterion)

The use of lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr(VI)), polybrominated biphenyls (PBB) and polybrominated diphenyl ether (PBDE) shall comply with the requirements stated in the Directive of the European Commission on the restriction of the use of certain hazardous substances in electrical and electronic equipment (2011/65/EU), i.e. concentration not higher than 100 ppm for cadmium and 1,000 ppm for the other five substances stated above. In addition, the plastic parts used in the case weighing 25g or more shall not contain short-chain chlorinated paraffins (C=10~13) (with chlorine concentration over 50%).

Verification

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

4.3.3 Operating Noise

10 Points (Non-Core Criterion)

The Applicants shall report the operating noise characteristic of electronic ballast, measured using a sound meter at 12 inches from the ballast in any directions. The noise level shall not exceed 24 dBA.

Verification

Detailed report(s) of the operating noise of the electronic ballast.

5. SCORING AND GRADING

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

Table 4: 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
4.1.3 Technical Performance [CORE]	**10**	
4.2.1 Recyclability		+5
4.2.2 Energy Efficiency [CORE]	**20**	
4.2.3 Total Power Factor [CORE]	**5**	+5 / +15
4.3.1 Carcinogenic Substances		+10
4.3.2 Hazardous Substances [CORE]	**10**	
4.3.3 Operating Noise		+10
	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 5: Benchmarks for grading electronic ballast

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