CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Pavement Block

Assessment Standard

(Version 1.1)

Last updated: 1 April 2019

Pavement Block

Summary of Assessment Criteria

CORE CRITERIA

Criteria	*Requirements*	*Verification*	*Points*		*Index*
			Basic	*+Bonus*	
Product Information	Applicant shall provide the following product information on the product packaging, catalogue and/or company website for compliance: • Basic product specifications • The intended use of the product • Instructions for correct use and storage to maximise the lifetime of the product • Recommended maintenance instructions for the product • Installation method • Instructions for consumer product disposal • Country of origin	Documentation including, but not limited to, product label, product catalogue, MSDS, and written declaration	**5**		*4.1.2 (page 3)*
Heavy Metals	Product shall not contain the following heavy metals that exceed below limits: **Heavy Metal** / **Limit (mg/L)** Arsenic <5 Barium <100 Cadmium <1 Chromium VI <5 Lead <5 Mercury <0.2	Laboratory test report(s), and any production documentation	**20**		*4.2.1 (page 5)*

<table>
<tr>
<td>Harmful Substances</td>
<td>Product shall not contain the following organic compounds of environmental concern that exceed below limits:
<table>
<tr><th>Organic Compounds</th><th>Limit (mg/L)</th></tr>
<tr><td>Cyanide</td><td><10</td></tr>
<tr><td>Organic phosphorus</td><td><1</td></tr>
<tr><td>Trichloroethylene</td><td><0.3</td></tr>
<tr><td>Tetrachlorothylene</td><td><0.1</td></tr>
<tr><td>Phenolic compounds</td><td><0.2</td></tr>
</table>
The following requirements are applicable to products using rubber as raw materials:

Concentration of the following phthalates in the product shall below 0.1% by weight of the product:

Bis(2-ethylhexyl)phthalate (DEHP)
Dibutyl phthalate (DBP)
benzylbutylphthalate (BBP)
Diisononylphthalate (DINP)
Diisodecylphthalate (DIDP)
Di-n-octylphthalate (DNOP)

</td>
<td>Laboratory test report(s), and any production documentation</td>
<td>10</td>
<td></td>
<td>4.2.2 (page 6)</td>
</tr>
<tr>
<td>Serviceability</td>
<td>Quality, durability and performance properties of the product shall be demonstrated through at least FIVE testing items including, but not limited to, the followings:

Weathering/ Freeze–thaw resistance
Thermal properties/ conductivity/ prestress
Water absorption capacity
Crushing/ Fragmentation resistance
Tensile splitting / Bending/ Flexural strength
Resistance/ Reaction to fire
Abrasion resistance
Slip/skid resistance
Resistacne to disintegration

</td>
<td>Laboratory test report(s) and any production documentation for all relevant quality and performance tests</td>
<td>5</td>
<td></td>
<td>4.1.3 (page 4)</td>
</tr>
</table>

	• Chemical resistance • Resistance to polishing / abrasion / wear / attrition • Compaction/ Loadbearing capacity • Drying shrinkage				
Raw Materials	**<u>Option A</u>** For concrete blocks including but not limited to dense concrete, lightweight aggregate concrete and autoclaved aerated concrete, raw materials or components of product (by weight) are made from combinations of recycled materials, waste materials as stated in Appendix Table 4, the combination shall exceed the below value for awarding point: • ≥ 65% (10 basic points) • ≥ 80% (+10 bonus points) OR **<u>Option B</u>** For concrete blocks including but not limited to dense concrete, lightweight aggregate concrete and autoclaved aerated concrete, the density shall be less than the following level: • 700 kg/m³ (10 basic points) • 400 kg/m³ (+10 bonus points)	Documentation including, but not limited to, product catalogue, MSDS, test reports and written declaration	**10**	+10	*4.3.3 (page 8)*
		Subtotal:	**50**	**+10**	

NON-CORE CRITERIA

Criteria	***Requirements***	***Verification***	***Points*** / ***+Bonus***	***Index***
Environmental Management System	Manufacturer shall possess valid certification of ISO 14001, EU Eco-Management and Audit Scheme (EMAS) or Cradle-to-Cradle.	A valid certificate issued by accredited certification body	+10	*4.1.1 (page 3)*
Dust Management	Manufacturer shall implement effective dust management policies and procedures and / or a dust management programme for the manufacturing plant including but not limited to the following items: • Initiatives taken for dust management covering all areas of the operation and associated activities • Monitoring plan for controlling the particulate matters (PM 2.5 & PM 10)	Detailed policies, procedures, programs and/ or plans of dust management	+5	*4.3.1 (page7)*
Reuse and Recycling	Applicant shall provide information on reuse and recycling of products including but not limited to the following items for compliance: • Product shall not be impregnated, labelled or coated or treated in a manner preventing post-consumer recycling; • Information related to the reuse and recycling of products e.g. reassembly of products	Documentation of reuse, recycling and waste management of products including, but not limited to, product catalogue, MSDS and written declaration	+5	*4.4.3 (page 9)*
Energy Management	Manufacturer shall implement effective energy management policies and procedures and / or an energy management programme, including but not limited to the following items: • Initiatives taken to reduce energy use and improve energy efficiency • Initiatives or requirements for suppliers or contract manufacturers	Detailed policies, procedures, programs and/ or plans of energy management	+5	*4.3.2 (page 7)*

Environmental Features	**Option A** Product shall obtain a permeability rate of at least 0.01cm/s. or **Option B** Product shall obtain the sustainable features that could be integrated to the open-grid pavement system.	**Option A** Documentation including, but not limited to, test reports, MSDS and product catalogue or **Option B** Documentation including, but not limited to product catalogue and written declaration	+10	*4.4.1 (page 8)*
Solar Reflectance Index	Product shall obtain a solar reflectance index (SRI) of at least 29.	Laboratory test report(s) and any production documentation	+10	*4.4.2 (page 8)*
		Subtotal:	**+40**	

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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 pavement block 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

Pavement block can place a significant burden on the environment, from raw material extraction to potential health hazards in the use phase. With increasing environmental claims of pavement block in the market, a more comprehensive and systematic approach to assess the environmental impacts of the furniture products shall be developed. The aim of this Standard is to help designers and end-users choosing greener products by conserving resources, reducing the amount of waste disposal in landfills and reducing the impact to human health throughout the life cycle of the pavement block. The development of the assessment criteria in this Standard has made references to worldwide relevant eco-labelling schemes and some existing life cycle assessment (LCA) studies.

2. SCOPE

The scope of this Standard is applicable to pavement blocks including basic pavement block (block with recycled materials, permeable block, block for vegetation, tactile block, etc.) and interlocking pavement block (interlocking block with recycled materials, permeable interlocking block, interlocking block for vegetation, tactile interlocking block, etc.).

The types and ratio (formulation) of raw materials shall be specified clearly in each application. ONE application is only for ONE product series with same raw materials and ratio (formulation). Products under the same series with different sizes, thickness, colour and shapes could be included in ONE application.

Subsequent application is available for products under the same product series and manufactured with the same type of raw materials, but with different ratio (formulation). The deviation of ratio (formulation) of products in each subsequent application shall be ± 5 % and the information of the ratio (formulation) is required to be provided for the application. Maximum 5 (FIVE) subsequent applications shall be available and the subsequent application is only eligible for applying within the validity period of the label.

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

CIC or an appointed third party would conduct a random check of the labelled product during the validity period of the label. Any one of the testing items listed in the Assessment Standard would be selected and performed testing to verify the compliance of the product with the criteria stated in the Assessment Standard. Applicant shall be responsible for the cost of the laboratory test.

3. DEFINITIONS

Applicant:	Organisation which apply for the label under the CIC Green Product Certification of the Construction Industry Council
ASTM:	American Society for Testing and Materials
BS:	British Standards
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
MSDS:	Material safety data sheet. To qualify as suitable, MSDS and information therein must not be more than 5-years old
US EPA:	United States Environmental Protection Agency

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 documentation shall be endorsed by the Chief Executive Officer or other authorised persons of the Applicant to demonstrate conformance to the assessment criteria. All certifications, laboratory reports and documentations must be valid during the assessment process and labelling period. All laboratory reports and documentation shall be within 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. CIC or an appointed third party would conduct a random check of the labelled product during the period of validity of the label, through laboratory test to verify the compliance with the criteria as stated in the Standard. Manufacturer shall bear the cost of the laboratory test.

4.1 GENERAL REQUIREMENTS

4.1.1 Environmental Management System

10 Points (Non-core Criterion)

Manufacturer shall possess valid certification of ISO 14001, EU Eco-Management and Audit Scheme (EMAS) or Cradle-to-Cradle.

Note:
BS EN ISO 14001 is the international standard which provides an outline of how to meet the environmental policy and objectives for the business of the applicant.

Eco-Management and Audit Scheme (EMAS) is an environmental management tool which enables organisations to assess, manage and continuously improve their environmental performance

Cradle-to-Cradle design is a biomimetic approach to the design of products and systems. It models human industry on nature's processes viewing materials as nutrients circulating in healthy and safe metabolisms.

Verification
A valid certificate issued by local or oversea accredited certification body.

4.1.2 Product Information

5 Points (Core Criterion)

Applicant shall provide the following product information on the product packaging, catalogue and/or company website for compliance:

- Basic product specifications
- The intended use of the product
- Instructions for correct use and storage to maximise the lifetime of the product
- Recommended maintenance instructions for the product
- Installation method
- Instructions for consumer product disposal
- Country of origin

Verification

Documentation including, but not limited to, product label, product catalogue, MSDS, and written declaration.

4.1.3 Serviceability

5 Points (Core Criterion)

Quality, durability and performance properties of the product shall be demonstrated through at least FIVE testing items (as applicable to material type) including, but not limited to, the following, in accordance with relevant testing methods (or later version); other related testing methods are also acceptable with justification provided by the applicant:

Testing items	Testing Methods/ Requirements
• Weathering/ Freeze–thaw resistance	BS EN 1338: 2003, BS EN 1339: 2003, BS EN 12620:2002 (08) , BS EN 13055-1:2002, BS EN 13055-2:2004
• Thermal properties/ conductivity/ prestress	BS EN 1338: 2003, BS EN 1339: 2003, BS EN 13055-2:2004
• Water absorption capacity	BS EN 12620:2002 (08) , BS EN 13055-1:2002, BS EN 13055-2:2004
• Crushing/ Fragmentation resistance	BS EN 12620:2002 (08) , BS EN 13055-1:2002, BS EN 13055-2:2004
• Tensile splitting / Bending/ Flexural strength	BS EN 1338: 2003, BS EN 1339: 2003
• Resistance/ Reaction to fire	BS EN 1338: 2003, BS EN 1339: 2003
• Abrasion resistance	BS EN 1338: 2003, BS EN 1339: 2003
• Slip/skid resistance	BS EN 1338: 2003, BS EN 1339: 2003

• Resistacne to disintegration	BS EN 13055-1:2002, BS EN 13055-2:2004
• Chemical resistance	BS EN 12620:2002 (08), BS EN 13055-2:2004
• Resistance to polishing / abrasion / wear / attrition	BS EN 12620:2002 (08), BS EN 13055-2:2004
• Compaction/ Loadbearing capacity	BS EN 13055-2:2004
• Drying shrinkage	BS EN 12620:2002 (08)

Requirement of concrete paving blocks/ flags (if applicable)

- BS EN 1338:2003
- BS EN 1339:2003

Requirement of aggregates (if applicable)

- BS EN 13055-1:2002
- BS EN 13055-2:2004
- BS EN 12620:2002+A1: 2008

Verification

Laboratory test report(s) and any production documentation for all relevant quality and performance tests.

4.2 HUMAN TOXICITY

4.2.1 Heavy Metals

20 Points (Core Criterion)

Product shall not contain the following heavy metals that exceed below limits:

Table 2

Heavy Metal	**Limit (mg/L)**
Arsenic	<5
Barium	<100
Cadmium	<1
Chromium VI	<5
Lead	<5
Mercury	<0.2

Product shall undergo a standard leaching test according to US EPA 1311 Test Toxicity Characteristic Leaching Procedure; other related testing methods are also acceptable with justification provided by the applicant.

Note:
US EPA 1311 Test Toxicity Characteristic Leaching Test is designed to determine the mobility of both organic and inorganic compounds present in liquid, solid as well as multiphasic samples.

Verification
Laboratory test report(s) and any production documentation.

4.2.2 Harmful Substances

10 Points (Core Criterion)
Product shall not contain the following organic compounds of environmental concern that exceed below limits:

Table 3

Organic Compounds	**Limit (mg/L)**
Cyanide	<10
Organic phosphorus	<1
Trichloroethylene	<0.3
Tetrachlorothylene	<0.1
Phenolic compounds	<0.2

Product shall undergo a standard leaching test according to US EPA 1311 Test Toxicity Characteristic Leaching Procedure; other related testing methods are also acceptable with justification provided by the applicant.

The following requirements are applicable to products using rubber as raw materials:
Concentration of phthalate in the product shall below 0.1% by weight of the product. The limited phthalates including the following types:

- Bis(2-ethylhexyl)phthalate (DEHP)
- Dibutyl phthalate (DBP)
- benzylbutylphthalate (BBP)
- Diisononylphthalate (DINP)
- Diisodecylphthalate (DIDP)
- Di-n-octylphthalate (DNOP)

Product shall be tested in accordance with CPSC-CH-C1001-09.2 (or later version); other related testing methods are also acceptable with justification provided by the applicant.

Note:
US EPA 1311 Test Toxicity Characteristic Leaching Test is designed to determine the mobility of both organic and inorganic compounds present in liquid, solid as well as multiphasic samples.

CPSC-CH-C1001-09.2 is a document which provide detailed information on test methods that will be used by the U.S. Consumer Product Safety Commission's (CPSC) testing laboratory (LSC) for the analysis of phthalate content in children's toys and child care articles covered by the standard set forth in the Consumer Product Safety Improvement Act Section 108.

Verification
Laboratory test report(s) and any production documentation.

4.3 RESOURCE CONSUMPTION

4.3.1 Dust Management

5 Points (Non-core Criterion)
Manufacture shall implement effective dust management policies and procedures and / or a dust management programme for the manufacturing plant including but not limited to the following items:

- Initiatives taken for dust management covering all areas of the operation and associated activities;
- Monitoring plan for controlling the particulate matters (PM 2.5 & PM 10)

Verification
Detailed policies, procedures, programs and/ or plans of dust management issued by the Manufacturer.

4.3.2 Energy Management

5 Points (Non-core Criterion)
Manufacture shall implement effective energy management policies and procedures and / or an energy management programme, including but not limited to the following items:

- Initiatives taken to reduce energy use and improve energy efficiency;
- Initiatives or requirements for suppliers or contract manufacturers.

Verification
Detailed policies, procedures, programs and/ or plans of energy management issued

by the Manufacturer.

4.3.3 Raw Materials

10 Basic Points + 10 Bonus Points (Core Criterion)

Option A

For concrete blocks including but not limited to dense concrete, lightweight aggregate concrete and autoclaved aerated concrete, raw materials or components of product (by weight) are made from combinations of recycled materials, waste materials as stated in Appendix: Table 4, the combination shall exceed the below value for awarding point:

- ≥ 65% (10 basic points)
- ≥ 80% (+10 bonus points)

or

Option B

For concrete blocks including but not limited to dense concrete, lightweight aggregate concrete and autoclaved aerated concrete, the density shall be less than the following level:

- 700 kg/m³ (10 basic points)
- 400 kg/m³ (+10 bonus points)

Verification

Documentation including, but not limited to, product catalogue, MSDS, test reports and written declaration.

4.4 ECOSYSTEM IMPACT

4.4.1 Environmental Features

10 Bonus Points (Non-core Criterion)

Option A

Products shall obtain a permeability rate of at least 0.01cm/s in accordance with relevant national and international test methods (if applicable) including but not limited to the ASTM C1701/ C1701M-09 and ASTM C1781 / C1781M-14a; other related testing methods are also acceptable with justification provided by the applicant.

Note:

ASTM C1701/C1701M-09 specifies the determination of the field water infiltration rate of in place pervious concrete.

ASTM C1781/C1781M-14a specifies the determination of the field surface infiltration rate of in place permeable unit pavement systems surfaced with solid interlocking concrete paving units, concrete grid paving units, or clay paving brick.

or

Option B

Products shall obtain the sustainable features that could be integrated to the open-grid pavement system.

Verification

Option A

Documentation including but not limited to product catalogue, MSDS and testing reports.

or

Option B

Documentation including but not limited to product catalogue, MSDS.

4.4.2 Solar Reflectance Index

10 Bonus Points (Non-core Criterion)

All products shall obtain a solar reflectance index (SRI) of at least 29 in accordance with relevant ASTM testing method (if applicable) including but not limited to the ASTM E1980; other related testing methods are also acceptable with justification provided by the applicant.

Note:

ASTM E1980 specifies covers the calculation of the solar reflectance index (SRI) of horizontal and low-sloped opaque surfaces at standard conditions. The method is intended to calculate SRI for surfaces with emissivity greater than 0.1.

Verification

Documentation including, but not limited to, test reports, MSDS and product catalogue.

4.4.3 Reuse and Recycling

5 Bonus Points (Non-core Criterion)

Applicant shall provide information on reuse and recycling of products including, but not limited to, the following items for compliance:

- Product shall not be impregnated, labelled or coated or treated in a manner preventing post-consumer recycling;
- Information related to the reuse and recycling of products e.g. reassembly of products.

Verification

Documentation of reuse, recycling and waste management of products including, but not limited to, product catalogue, MSDS and written declaration.

5. SCORING AND GRADING

The points for meeting each criterion stated in Section 4 are summarised in Table 1.

Table 1: 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 Information [CORE]	5	
4.1.3 Serviceability [CORE]	5	
4.2.1 Heavy Metals [CORE]	20	
4.2.2 Harmful Substances [CORE]	10	
4.3.1 Dust Management		+5
4.3.2 Energy Management		+5
4.3.3 Raw Materials [CORE]	10	+10
4.4.1 Environmental Features		+10
4.4.2 Solar Reflectance Index		+10
4.4.3 Reuse and Recycling		+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 5: Benchmarks for grading

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

Appendix

Table 4

Category of recycled materials/wastes for raw materials of concrete products	
Category	**Recycled Materials**
Incinerated ashes	Incinerated ashes
Waste from metal industry	Copper slag
	Steel slag
	Ceramic material
	Electric furnace slag
	Ferronickel slag
	Casting sand
	Lime/plaster
	Moulding sand
	Lime powder
Inorganic sludge	Sewer sludge
	Waterworks sludge
	Sludge at bottom of lake
Sludge generated industrially	Paper manufacturing sludge
	Aluminium sludge
	Plating sludge
	Polishing sand sludge
Other industrial waste	Coal ash
	Disposed plastics
	Shells
	Disposed lumber from buildings
	Glass cullet
	Disposed rubber
Construction & Demolition Waste	Concrete
	Glass
	Disposed lumber from buildings
	Asphalt
	Metals
	Gypsum
Waste from mines and quarries	Waste sand from quarries and ceramics
	Micro silica sand generated at separation of silica by water