CONSTRUCTION INDUSTRY COUNCIL
建造業議會

CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Assessment Standard

Pavement Block

CIC GREEN
PRODUCT CERTIFICATION

(Version 2.0)

Pavement Block

Summary of Assessment Criteria

CORE CRITERIA

Criteria	Requirements	Verification	Points		Index
			Basic	+Bonus	
Product Information	Provide following information with delivered products or made accessible to public: • 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 catalogue, technical datasheet, webpages	**5**	-	4.1.1
RESOURCE					
Material Optimization	Raw Material: **Option A** Adopt a combination of recycled materials as stated in Table 7, and meet the following: • 10 Basic Points for ≥ 50% • 10 Bonus Points for ≥ 80% *OR* **Option B** The density shall meet the following level: • 10 Basic Points for < 700 kg/m³ • 10 Bonus Points for < 400 kg/m³	Documentation including but not limited to product catalogue, MSDS, test reports and written declaration	**10**	+10	4.3.1.1

<table>
<tr><th rowspan="2">Criteria</th><th rowspan="2">Requirements</th><th rowspan="2">Verification</th><th colspan="2">Points</th><th rowspan="2">Index</th></tr>
<tr><th>Basic</th><th>+Bonus</th></tr>
<tr><td colspan="6">ENVIRONMENT</td></tr>
<tr><td rowspan="2">Human Toxicity and Ecosystem Impact</td><td>Hazardous Substances:
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>Tetrachloroethylene</td><td><0.1</td></tr><tr><td>Phenolic Compounds</td><td><0.2</td></tr></table>
AND
For Carcinogenic Substances, the product shall be listed in IARC Group 1, 2A and 2B shall be < 0.1% by weight of the product.

AND
The product shall also not contain any substances or chemicals that are classified as Fatal, Toxic, Harmful in accordance with Regulation (EC) No 1272/2008.</td><td>Laboratory test report(s) and self-declaration letter</td><td>10</td><td>-</td><td>4.4.3.1</td></tr>
<tr><td>Heavy Metals:
Product shall not contain the following heavy metals that exceed below limits:

<table><tr><th>Heavy Metal</th><th>Limit (mg/L)</th></tr><tr><td>Arsenic</td><td><5</td></tr><tr><td>Barium</td><td><100</td></tr><tr><td>Cadmium</td><td><1</td></tr><tr><td>Chromium VI</td><td><5</td></tr><tr><td>Lead</td><td><5</td></tr><tr><td>Mercury</td><td><0.2</td></tr></table></td><td>Laboratory test report(s)</td><td>15</td><td>-</td><td>4.4.3.2</td></tr>
</table>

Criteria	Requirements	Verification	Points		Index
			Basic	+Bonus	
PERFORMANCE					
Product Life	Serviceability: 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 • Resistance to disintegration • Chemical resistance • Resistance to polishing / abrasion / wear / attrition • Compaction/ Loadbearing capacity • Drying shrinkage	Laboratory test report(s) and any production documentation for all relevant quality and performance tests	**10**	-	4.5.2.1
		Subtotal:	**50**	+10	

NON-CORE CRITERIA

Criteria	Requirements	Verification	Points +Bonus	Index
CARBON				
CFP quantification	Provide a life cycle assessment report with the carbon footprint of products (CFP), covering at least A1 to A3 endorsed by a third-party critical review *OR* provide an Environmental Product Declaration (EPD).	CFP quantification report **OR** Environmental Product Declaration (EPD)	+5/+10	4.2.1
RESOURCE				
Circularity	Recyclability: Developed a recycling plan for the product and declared options for reuse, recycling, recovery and disposal. The plan shall include the following and made available to public.	Recycling Plan	+5	4.3.2.1
	Packaging Requirement: The packaging materials shall not contain halogenated plastics; *OR* Shall be comprised of 100% recycled materials, readily recyclable materials or decomposable materials; *OR* shall not be impregnated, labelled, coated or otherwise treated in a manner, which would prevent or significantly limit recycling.	Documentation on the packaging materials used	+5	4.3.2.2
Waste Management	Waste Management Plan: Implementing effective Waste Management Plan detailing the policies, procedures and/or a waste management program covering manufacturing operations.	Waste management programme	+5	4.3.3.1
Water Management	Option A: Water Consumption Reporting: Report both potable and non-potable water usage in the production process of the past year.	Water consumption report	+5/ +10	4.3.4.1
	Water Recycling Program: Develop and implement water recycling program during the manufacturing process.	Documentation on water recycling		4.3.4.2
	Option B: Water Management System: Process valid certificate under ISO 14046: Water Footprint Assessment	ISO 14046 Certificate issued by accredited certification body		4.3.4.3

Criteria	Requirements	Verification	Points +Bonus	Index
Energy Management	Option A: Energy Management Plan: Implement effective energy management policies and procedures and/or an energy management programme.	Energy Management Plan	+5/ +10	4.3.5.1
	Option B: Energy Management System: Possess valid certificate under ISO 50001: Energy management systems – Requirements with guidance for use.	ISO 50001 Certificate issued by accredited certification body		4.3.5.2
	Clean Energy: Procure or produce renewable electricity or carbon offsets to compensate 5% of total electricity used and greenhouse gas emissions from other energy sources	Calculation report	+5	4.3.5.3
ENVIRONMENT				
Environmental Management	Environmental Management System: Possess valid certificate under ISO 14001: Environmental management systems or EU Eco-Management and Audit Scheme (EMAS).	ISO 14001 or EMAS Certificate issued by accredited certification body	+5	4.4.1.1
	Particulate Matters: Manufacturer shall implement effective dust management policies and procedures and/ or a dust management programme for the manufacturing plant.	Detailed policies, procedures, programs and/or plans of dust management	+5	4.4.1.2
Regional Product	Regional Product: Products that are manufactured within 800km radius of HKSAR by road transportation; within a 1,600km radius by rail transportation; or within a 4,000km radius by sea transportation.	Location map	+5	4.4.2.1
Human Toxicity and Ecosystem Impact	Radioactivity: External Hazard Index, $H_{ex} \leq 1.2$ Internal Hazard Index, $H_{in} \leq 0.9$	Laboratory test report(s)	+5	4.4.3.3
	Plasticisers: Concentration of phthalate in the product 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)	Laboratory test report(s)	+5	4.4.3.4

Criteria	Requirements	Verification	Points +Bonus	Index
PERFORMANCE				
Performance Property	Permeability: **<u>Option A</u>** Product shall obtain a permeability rate of at least 0.01cm/s; *OR* **<u>Option B</u>** Product shall obtain the sustainable features that could be integrated to the open-grid pavement system.	**<u>Option A</u>** Product catalogue and testing reports; *OR* **<u>Option B</u>** Documentation including but not limited to product catalogue.	+5	4.5.1.1
	Solar Reflectance Index: All products shall obtain a solar reflectance index (SRI) of at least 29 in accordance with relevant testing methods.	Documentation such as test reports and product catalogue.	+5	4.5.1.2
INNOSMART				
Innovation & Additions	Adopt new practice, technology and strategy; *OR* Achieve exemplary performance	Narrative with supporting	+5	4.6.1
		Subtotal:	+90	

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1. INTRODUCTION

1.1 PURPOSE

The CIC Green Product Certification Scheme (the "Scheme") is a green product labelling scheme, owned by the Construction Industry Council (CIC) and implemented by the Hong Kong Green Building Council (HKGBC). The primary goal of the scheme is to support Hong Kong's transition to a low-carbon economy by encouraging the adoption of environmentally friendly construction practices.

With the Green Product Certification, various stakeholders, including consumers, building professionals, construction practitioners and policymakers, can easily and unequivocally identify environmentally preferable construction materials and building products. This certification serves as a reliable indicator of a product's sustainability, helping to drive market demand for greener options.

To ensure the credibility and effectiveness of the certification, the CIC and the HKGBC has jointly developed this Technical Assessment Standards (the "Standard"), which sets out the assessment criteria and their benchmarks to govern the application and award of a label under the Scheme. The comprehensive assessment evaluates the overall sustainability of construction materials and building products across multiple dimensions. These dimensions include environmental impact, resource efficiency, technical performance, and the use of smart manufacturing technologies.

The Standard is divided into two main parts:

- General Requirements (Refer to General Requirements provided in separate document). This part introduces Scheme's framework, outlines the application procedure, and details the grades.

- Technical Requirements (This document refers). This part defines the principles, requirements and guides for quantifying and reporting the products' carbon footprint (CFP), along with other sustainability assessment criteria and scoring standards.

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.).

Note:

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

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
EMAS:	Eco-Management and Audit Scheme (EMAS) is an environmental management tool which enables organisations to assess, manage and continuously improve their environmental performance.
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
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
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". "Bronze", "Silver", "Gold" or "Platinum" Label will be awarded according to the total points accumulated, as shown in Table 1.

Table 1: Benchmarks for grading

Points achieved	Grade to be awarded
90 or above	Platinum
80 – 89	Gold
70 – 79	Silver
60 – 69	Bronze
50 – 59	Green
Below 50	No label

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 within 5 years from the date of issue. The chemical tests should be conducted by either a third party or the manufacturer, providing that they have obtained ISO 17025 certification or relevant national accreditations, such as HOKLAS or CNAS.

4.1 BASIC INFORMATION

4.1.1 Product Information – Core Criteria

The Applicant is required to achieve 5 Basic Points under this section.

Requirements

5 Basic Points for providing following information with delivered products or made accessible to public:

- 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 related to the product labels, instructions and other information provided with the product, material safety data sheets (MSDS), web pages and any other information shall be freely available to customers or the public.

4.2 CARBON

4.2.1 CFP quantification – Non-core Criteria

The Applicant can achieve maximum 10 Bonus Points under this section.

Requirements

5 Bonus Points for providing life cycle assessment report for quantifying and reporting the carbon footprint of products (CFP), covering at least A1 (raw material supply), A2 (transport) and A3 (manufacturing process).

OR

10 Bonus Points for providing the product's CFP value from a product level EPD issued in accordance ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024 or BS EN 15804:2012.

Verification

Either of the following documents shall be provided for verification.

CFP quantification report endorsed by a third-party critical review, in accordance with ISO 14067:2018 or equivalent

OR

Environmental Product Declaration fulfilling the above requirements

4.3 RESOURCE

4.3.1 Material Optimization

The Applicant is required to achieve 10 Basic Points under this section. Additionally, the Applicant can achieve maximum 10 Bonus Points under this section.

4.3.1.1 Raw Material – Core Criteria

Requirements

Points are awarded for meeting the requirement on raw materials through one of the following options:

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 7, the combination shall exceed the below value for awarding point:

- 10 Basic Points for ≥ 50%
- 10 Bonus Points for ≥ 80%

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:

- 10 Basic Points for < 700 kg/m³
- 10 Bonus Points for < 400 kg/m³

Verification

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

4.3.2 Circularity

The Applicant can achieve maximum 10 Bonus Points under this section.

4.3.2.1 Recyclability – Non-core Criteria

Requirements

5 Bonus Points for demonstrating that the manufacturer has developed a recycling plan for the product and declared options for reuse, recycling, recovery and disposal. The plan shall include the following and made available to public.

- Designate all homogeneous materials in the product as being intended for technical and/or biological cycles and define the intended cycling pathway(s) for each material.
- Identify potential partners for product reuse, recycling, recovery in accordance with the intended cycling pathway(s).
- For products and materials intended for municipal recycling, the product and/or material must be compatible for municipal cycling systems (e.g., painted plastics and plastic laminated paper are not currently compatible for municipal recycling).
- Instructions for how to cycle the product shall be made publicly available.

Verification

Documentation of recycling plan, including, but not limited to product catalogue, MSDS and written declaration.

4.3.2.2 Packaging Requirement – Non-core Criteria

Requirements

5 Bonus Points for minimizing the wastage from all primary packaging materials. The packaging materials shall achieve either of the followings.

The packaging materials shall not contain halogenated plastics

OR

The packaging materials shall be comprised of 100% recycled materials, readily recyclable materials or decomposable materials

OR

The packaging shall not be impregnated, labelled, coated or otherwise treated in a manner, which would prevent or significantly limit recycling.

Verification

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

4.3.3 Waste Management

The Applicant can achieve maximum 5 Bonus Points under this section

4.3.3.1 Waste Management Plan – Non-core Criteria

Requirements

5 Bonus Points for implementing effective Waste Management Plan detailing the policies, procedures and/or a waste management program covering manufacturing operations. The waste management plan should include but not limited to the following information:

- Initiatives taken to reduce waste generation and improve recovery/recycling of waste
- Initiatives implemented for recovery of post-consumer and/or pre-consumer waste that can be re-introduced into the manufacturing process and
- Other environmental benefits or constraints associated with waste minimisation objectives and processes.

Verification

Documentation of waste management programme.

4.3.4 Water Management

The Applicant can achieve maximum 10 Bonus Points under this section.

The Applicants can select one of the options below and comply with any or all the requirements under that option to achieve associated points. Each option is eligible for a maximum 10 Bonus Points.

Option A:

4.3.4.1 Water Consumption Reporting – Non-core Criteria

Requirements

5 Bonus Points for reporting both potable and non-potable water usage in the production process of the past year.

Verification

Water consumption report, support by water usage data acquired from water meter, water sub-meter, water bill or other equivalent documents.

4.3.4.2 Water Recycling Program – Non-core Criteria

Requirements

5 Bonus Points for developing and implementing water recycling program during the manufacturing process.

Verification

Documentation demonstrating the implementation of water recycling program, support by drawings, water usage data acquired from water sub-meter or other equivalent documents.

Option B:

4.3.4.3 Water Management System – Non-core Criteria

Requirements

10 Bonus Points for possessing valid certificate under ISO 14046: Environmental management – Water footprint – Principles, requirements and guidelines.

ISO 14046 is a framework for assessing the water footprint of products, processes, and organizations. It provides principles, requirements, and guidelines for conducting and reporting water footprint assessments. It helps organizations evaluate and improve their water management practices.

Verification

A valid ISO 14046 certificate issued by accredited certification body.

4.3.5 Energy Management

The Applicant can achieve maximum 15 Bonus Points under this section.

The Applicants can select one of the options below and comply with any or all the requirements under that option to achieve associated points.

Option A:

4.3.5.1 Energy Management Plan – Non-core Criteria

Requirements

5 Bonus Points for implementing effective energy management policies and procedures and/or an energy management programme, including but not limited to the following items:

- Energy efficiency initiatives: Manufacturer should undertake specific initiatives to reduce energy use and improve energy efficiency throughout their operations. This could include upgrading to more efficient equipment, optimizing production processes, or implementing energy-saving technologies
- Supplier requirements: Manufacturers should extend their energy management efforts to their supply chain by establishing requirements or initiatives for suppliers and contract manufacturers to improve their energy performance where possible

Verification

Documentation of energy management plan detailing the above, supported by organizational policy or other equivalent documents.

Option B:

4.3.5.2 Energy Management System – Non-core Criteria

Requirements

10 Bonus Points for possessing valid certificate under ISO 50001: Energy management systems — Requirements with guidance for use.

ISO 50001 provides a framework for organizations to establish, implement, maintain, and improve an Energy Management System. The goal is to help organizations improve their energy performance, increase energy efficiency, and reduce energy costs and greenhouse gas emissions. By achieving ISO 50001 certification, manufacturers can demonstrate their commitment to energy efficiency and sustainability

Verification

A valid ISO 50001 certificate issued by accredited certification body.

4.3.5.3 Clean Energy – Non-core Criteria

Requirements

5 Bonus Points for procure or produce renewable electricity or carbon offsets to compensate 5% of total electricity used and greenhouse gas emissions from other energy sources.

The targets can be met via a variety of methods. One or more of the methods listed below may be applied toward achieving the targets.

i) For electricity

- Procure or produce renewable electricity to match 5% of the electricity used
- Purchase carbon offsets to compensate for 5% of the resulting greenhouse gas emissions (using grid average emissions factors)

ii) For greenhouse gas emissions from other energy sources

- Purchase carbon offsets to compensate for 5% of the resulting greenhouse gas emissions

Verification

Calculation report include at least the following information:

- Quantity of electricity consumed with the associated carbon emission factor, supported by electricity bill and grid emission factor
- Quantify of other energy source consumed with the associated carbon emission factor, support by purchase order, declaration letter or other equivalent documents
- Quantity of renewable electricity produced onsite, supported by drawings, submeter reading or other equivalent documents

- Quantity of renewable electricity or carbon offset purchased, support by purchase agreement, carbon offset program certification or other equivalent documents

4.4 ENVIRONMENT

4.4.1 Environmental Management

The Applicant can achieve maximum 10 Bonus Points under this section.

4.4.1.1 Environmental Management System – Non-core Criteria

Requirements

5 Bonus Points for possessing valid certificate under ISO 14001: Environmental management systems — Requirements with guidance for use or EU Eco-Management and Audit Scheme (EMAS).

The target of the environmental management system 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.

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.

Verification

A valid ISO14001 or EMAS certificate issued by accredited certification body

4.4.1.2 Particulate Matters – Non-core Criteria

Requirements

5 Bonus Points for implementing 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

4.4.2 Regional Product

The Applicant can achieve maximum 5 Bonus Points under this section.

4.4.2.1 Regional Product – Non-core Criteria

Requirements

5 Bonus Points for products that are manufactured within 800km radius of HKSAR by road transportation; within a 1,600km radius by rail transportation; or within a 4,000km radius by sea transportation. The distance is measured by the direct distance, not by actual travel distance.

Verification

Documents demonstrating the location of the manufacturer and a map showing the distance between the manufacturer and HKSAR.

4.4.3 Human Toxicity and Ecosystem Impact

The Applicant is required to achieve 25 Basic Points under this section. Additionally, the Applicant can achieve maximum 10 Bonus Points under this section.

4.4.3.1 Hazardous Substances – Core Criteria

Requirements

10 Basic Points for demonstrating that the product shall not contain the following organic compounds of environmental concern that exceed below limits:

Table 2: Limit of Organic Compounds

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

AND

The product shall not contain any carcinogenic substances or chemicals that are classified as Group 1, 2A or 2B according to International Agency for Research on Cancer (IARC)[1]. Any such carcinogens which are known to be present as contaminants shall be less than 0.1% by weight of the product.

AND

The product shall also not contain any substances or chemicals that are classified as H300 - Fatal if swallowed, H301 - Toxic if swallowed, H302 - Harmful if swallowed, H310 - Fatal in contact with skin, H311 - Toxic in contact with skin, H312 - Harmful in contact with skin, H330 - Fatal if inhaled, H331 - Toxic if inhaled ,H332 - Harmful

[1] Agents Classified by the IARC Monographs, Volumes 1–137 – IARC Monographs on the Identification of Carcinogenic Hazards to Humans

if inhaled, in accordance with Regulation (EC) No. 1272/2008 of the European Parliament and of the Council[2].

Verification:

Laboratory test report(s) shall be provided for organic compounds requirements listed in Table 2. Laboratory test report(s) or self-declaration letter shall be provided for carcinogenic substances and concerned substances classified under EC No. 1272/2008 mentioned above.

4.4.3.2 Heavy Metals – Core Criteria

Requirement

15 Basic Points for product not containing the following heavy metals that exceed below limits:

Table 3: Limit of heavy metal

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.

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)

4.4.3.3 Radioactivity – Non-core Criteria

Requirements

5 Bonus Points for for demonstrating the following:

The effective concentration of potassium isotope K_{40} (C_K), radium isotope Ra_{226} (C_{Ra}) and thorium isotope Th_{232} (C_{Th}) shall satisfy the following requirements:

External Hazard Index, H_{ex}:

[2] Regulation - 1272/2008 - EN - clp regulation - EUR-Lex

$$H_{ex} = \frac{C_K}{4200} + \frac{C_{Ra}}{370} + \frac{C_{Th}}{260}$$

Internal Hazard Index, H_{in}:

$$H_{in} = \frac{C_{Ra}}{200}$$

where H_{ex} shall be $\leqslant$ 1.2 and H_{in} shall be $\leqslant$ 0.9

Products shall be tested based on the requirement as stated in GB 6566-2010 (or latest version); other related testing methods are also acceptable with justification provided by the applicant.

GB 6566-2010 specifies the limits and natural radionuclides in building materials radionuclide radium-226, thorium-232, potassium-40 Test Method for radioactivity.

Verification

A detailed laboratory report(s) shall be provided.

4.4.3.4 Plasticisers – Non-core Criteria

Requirements

5 Bonus Points for demonstrating the concentration of phthalate in the product is below 0.1% by weight of the product with plastic content. 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)

Verification

Laboratory test report(s). Test report(s) shall be compiled according to the National and International test methods.

4.5 PERFORMANCE

4.5.1 Performance Property

The Applicant can achieve maximum 10 Bonus Points under this section.

4.5.1.1 Permeability – Non-core Criteria

Requirements

5 Bonus Points for meeting the requirement on permeability through one of the following options:

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-17a and ASTM C1781 / C1781M-21; other related testing methods are also acceptable with justification provided by the applicant.

ASTM C1701/C1701M-17a specifies the determination of the field water infiltration rate of in place pervious concrete.

ASTM C1781/C1781M-21 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 and testing reports.

OR

Option B
Documentation including but not limited to product catalogue.

4.5.1.2 Solar Reflectance Index – Non-core Criteria

Requirements

5 Bonus Points for products obtaining 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.

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 and product catalogue.

4.5.2 Product Life

The Applicant is required to achieve 10 Basic Points under this section

4.5.2.1 Serviceability – Core Criteria

Requirements

10 Basic Points for demonstrating the product quality, durability and performance properties through at least **FIVE** (as applicable to material type) testing items which may include 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
- Resistance to disintegration
- Chemical resistance
- Resistance to polishing / abrasion / wear / attrition
- Compaction/ Loadbearing capacity
- Drying shrinkage

Table 4: Testing requirements for pavement block

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, GB/T 25993-2023
• Thermal properties/ Conductivity/ Prestress	BS EN 1338: 2003, BS EN 1339: 2003, BS EN 13055-2:2004, GB/T 25993-2023
• Water absorption capacity	BS EN 12620:2002 (08), BS EN 13055-1:2002, BS EN 13055-2:2004, GB/T 25993-2023
• Crushing/ Fragmentation resistance	BS EN 12620:2002 (08), BS EN 13055-1:2002, BS EN 13055-2:2004, GB/T 25993-2023
• Tensile splitting / Bending/ Flexural strength	BS EN 1338: 2003, BS EN 1339: 2003, GB/T 25993-2023
• Resistance/ Reaction to fire	BS EN 1338: 2003, BS EN 1339: 2003, GB/T 25993-2023
• Abrasion resistance	BS EN 1338: 2003, BS EN 1339: 2003, GB/T 25993-2023

Testing items	Testing Methods/ Requirements
• Slip/skid resistance	BS EN 1338: 2003, BS EN 1339: 2003, GB/T 25993-2023
• Resistance to disintegration	BS EN 13055-1:2002, BS EN 13055-2:2004, GB/T 25993-2023
• Chemical resistance	BS EN 12620:2002 (08), BS EN 13055-2:2004, GB/T 25993-2023
• Resistance to polishing / abrasion / wear / attrition	BS EN 12620:2002 (08), BS EN 13055-2:2004, GB/T 25993-2023
• Compaction/ Loadbearing capacity	BS EN 13055-2:2004, GB/T 25993-2023
• Drying shrinkage	BS EN 12620:2002 (08), GB/T 25993-2023

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.

4.6 INNOSMART

4.6.1 Innovations & Additions-Non-core Criteria

The Applicant can achieve maximum 5 Bonus Points under this section.

Requirements:

5 Bonus Points for achieving significant, measurable environmental performance using new practices, technology and strategy not addressed in this Standard.

OR

Demonstrating exemplary performance in any of the existing assessment criteria.

The benefits of environmental performance can be achieved throughout the lifecycle of the products, covering the product, construction process, use and end of life stage. Examples of innovative and smart technologies are shown below.

- Implementing technologies that significantly reduce resource consumption across various aspects.

- Adopting intelligent production methods that leverage automation, data analytics, and innovative design techniques.

Table 5: Examples for Innovative and Smart technologies

Permeable Pavement Blocks	• Designed to allow rainwater to pass through, reducing surface runoff and promoting groundwater recharge. • Helps prevent flooding and reduces the burden on drainage systems by managing stormwater naturally. • Often made from recycled materials, contributing to eco-friendly urban development.
Solar-Powered Pavement Blocks	• Integrated solar cells harness sunlight to generate renewable energy for street lighting or nearby facilities. • Can power LED lights embedded in the pavement, enhancing safety and visibility at night. • Reduces reliance on non-renewable energy sources, promoting sustainable urban infrastructure.
Smart Pavement Blocks with Sensors	• Equipped with sensors to monitor traffic patterns, temperature, and environmental conditions. • Provides data on wear and tear, allowing for proactive maintenance and reducing long-term repair costs. • Can be integrated with smart city applications to provide information on traffic, weather, or local events to pedestrians.

Verification

Report with a maximum length of 1,000 words, outline the objectives, solution and evaluation of the performance achieved by proposed Smart and Innovative Technologies.

AND

Include attachments that provide evidence of implementation, along with relevant technical specification that support the claims made in the report.

5. SCORING

The points for meeting each criterion stated in this Standard are summarized below.

Table 6: Points to be awarded under the assessment criteria of this Standard

Label	Evaluation Criteria		Points		Related BEAM Plus Credits
			Basic	+Bonus	
	Product Information [CORE]		5	-	
Carbon	CFP quantification		-	+5/+10	MW 10
Resource	Material Optimization	Raw Material [CORE]	10	+10	MW 6
	Circularity	Recyclability	-	+5	
		Packaging Requirement	-	+5	
	Waste Management	Waste Management Plan	-	+5	
	Water Management	Water Consumption Reporting	-	+5/+10	
		Water Recycling Program			
		Water Management System			
	Energy Management	Energy Management Plan	-	+5/+10	
		Energy Management System			
		Clean Energy	-	+5	
Environment	Environmental Management	Environmental Management System	-	+5	
		Particulate Matters	-	+5	
	Regional Product	Regional Product	-	+5	MW 8
	Human Toxicity and Ecosystem Impact	Hazardous Substances [CORE]	10	-	
		Heavy Metals [CORE]	15	-	
		Radioactivity	-	+5	
		Plasticisers	-	+5	
Performance	Performance Property	Permeability	-	+5	
		Solar Reflectance Index	-	+5	
	Product Life	Serviceability [CORE]	10	-	MW 4
InnoSmart	Innovations & Additions		-	+5	IA
		Total:	**50**	**+100**	

Related BEAM Plus Credits refer to these relevant credits under BEAM Plus New Buildings Version 2.0, as listed below.

- MW 4: Design for Durability and Resilience
- MW 6: Recycled Materials
- MW 8: Regional Materials
- MW 10: Life Cycle Assessment
- MW 9: Use of Green Products
- Innovations & Additions

Appendix

Table 7: 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