CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Assessment Standard

Technical Requirements

Cooling Tower

(Version 2)

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Cooling Tower

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: • Country of origin • Basic product specifications • Installation method • Instructions for consumer product disposal • Operation & Maintenance Manual	Documentation including, but not limited to, product catalogue, technical datasheet, webpages	**5**	-	4.1.1
ENVIRONMENT					
Human Toxicity and Ecosystem Impact	Noise Level: Product should not exceed the limits as stated in Table 2 and Table 3.	Documentation including, but not limited to, product catalogue and test report(s).	**10**	-	4.4.3.2
PERFORMANCE					
Efficiency Metrics	Energy Efficiency: Cooling towers shall fulfil the requirement as stated in Table 4 and Table 5	Documentation including, but not limited to, product catalogue and test report(s).	**15**	+5/ +10	4.5.1.1
	Water Efficiency: Evaporation loss and drift loss shall not exceed 1% and 0.005% of water circulation rate respectively, under maximum air flow and maximum water flow.	Documentation including, but not limited to, product catalogue and test report(s).	**10**	-	4.5.1.2
	Thermal Performance: The thermal performance ratio (i.e. percentage of the measured cooling capacity and the designed cooling capacity) shall meet following requirements: • ≥ 90% (10 Basic Points) • ≥ 95% (10 Basic +5 Bonus Points) under specific operating conditions as stated in Table 7.	Documentation including, but not limited to, product catalogue and test report(s).	**10**	+5	4.5.1.4
		Subtotal:	**50**	+15	

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NON-CORE CRITERIA

Criteria	Requirements	Verification	Points +Bonus	Index
CARBON				
CFP Quantification	Provide a 3rd party endorsed life cycle assessment report with the carbon footprint of products (CFP), covering at least A1 to A3 OR a product level Environmental Product Declaration (EPD).	CFP quantification report **OR** Environmental Product Declaration (EPD)	+10	4.2.1
RESOURCE				
Circularity	Recyclability: Developed a recycling plan for the product and declared options for reuse, recycling, recovery, and disposal.	Documentation on recycling plan	+5	4.3.1.1
	Packaging Requirement: 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.	Documentation on packaging materials used	+5	4.3.1.2
	Design for Disassembly: • The fans and motors shall be demountable from enclosure for cleaning, repair, replacement, or maintenance purpose; and • Fan impeller scroll casing shall be removable for fan blades cleaning.	Documentation including, but not limited to, product label, product catalogue, and written declaration	+5	4.3.1.3
Waste Management	Waste Management Plan: Implement effective waste management plan detailing the policies, procedures, and/or a waste management program covering manufacturing operations.	Waste management plan	+5	4.3.2.1
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	4.3.3.1
	Water Recycling Program: Develop and implement a water recycling program during the manufacturing process.	Documentation on water recycling		4.3.3.2
	Option B: Water Management System:	ISO 14046 Certificate issued by		4.3.3.3

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Criteria	Requirements	Verification	Points +Bonus	Index
	Process valid certificate under ISO 14046: Water Footprint Assessment.	accredited certification body		
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	4.3.4.1
	Option B: Energy Management System: Possess valid certificate under ISO 50001: Energy management systems.	ISO 50001 Certificate issued by accredited certification body		4.3.4.2
ENVIRONMENT				
Environmental Management	Environmental Management System: Manufacturer shall possess valid certification of ISO 14001: Environmental management systems or EU Eco-Management and Audit Scheme (EMAS).	ISO 14001 or EMAS Certificate	+5	4.4.1.1
Regional Products	Regional Manufactured Equipment: 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 with distance between manufacturer and HKSAR	+5	4.4.2.1
Human Toxicity and Ecosystem Impact	Hazardous Substances: Product shall meet the requirements for both paints used and flame retardant Paints Used • Limit the concentration of Lead, Cadmium, Chromium (VI), Mercury, or their compounds in paint below 0.01% by weight. • Limit the VOC content in paint below 250g/L. Flame Retardant Concentration of the flame-retardants in the product shall be below 0.1% by weight of the product. The restricted fire retardants including the following types: • Polybrominated diphenyl ether • Polybrominated biphenyls • Short-chained chlorinated paraffin • Halogenated organic compound • Hexabromocyclododecane	Laboratory test report(s) or self-declaration letter	+5	4.4.3.1
PERFORMANCE				
Efficiency Metrics	Variable Speed Drives: Variable Speed Drives shall be added to the cooling tower fans.	Documentation including, but not limited to, product label and product catalogue.	+5	4.5.1.3

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Criteria	Requirements	Verification	Points +Bonus	Index
INNOSMART				
Innovations & Additions	Achieving significant, measurable environmental performance using new practices, technology, and strategy not addressed in this Standard. OR Incorporating various smart technologies to improve efficiency, reduce energy consumption, and optimize performance.	Narrative with supporting documents	+5	4.6.1
		Subtotal:	+75	

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1. INTRODUCTION

1.1 PURPOSE

The CIC Green Product Certification (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 grade 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.

The Scheme is owned by the Construction Industry Council (CIC), 38/F, COS Centre, 56 Tsun Yip Street, Kwun Tong, Kowloon, Hong Kong; and operated by Hong Kong Green Building Council (HKGBC), 1/F, Jockey Club Environmental Building, 77 Tat Chee Avenue, Kowloon Tong, Hong Kong, Phone: +852 3994 8888, Email: cicgpc@hkgbc.org.hk

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1.2 BACKGROUND

Cooling tower is a device for lowering the temperature of water by evaporative cooling in which ambient air is in contact with falling water, thereby exchanging heat. Devices incorporating water refrigerant or water-water heat exchanger (evaporative condenser or closed-circuit cooling tower) are also included. “Evaporative” is used to term the type of heat rejection in a cooling tower because a small portion of water being cooled evaporates into a moving air stream to provide significant cooling to the rest of that water stream. The heat transferred from the water stream to the air stream raises the air temperature and its relative humidity to 100%, which is then discharged to the atmosphere.

Cooling tower can place a significant burden on the environment. With increasing environmental claims of cooling tower in the market, a more comprehensive and systematic approach to assess the environmental impacts of the cooling tower shall be developed. The aim of this Standard is to help designers and end-users choose 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 air handling unit. 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 different types of cooling towers, including open-circuit or closed-circuit, induced or forced draft, cross or counter flow, etc. Other components such as water pumps and chillers are not included in this Standard.

ONE application is only eligible for **ONE** product series.. All the related products have to be listed on the submitted documents.

Subsequent application is available for similar products with the same product serial number of a labelled product series, which is only eligible for applying within the validity period of the label.

Note:

Each application should specify the product code / serial number.

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3. DEFINITIONS

ASTM:	American Society for Testing and Materials
ASHRAE:	The American Society of Heating, Refrigerating and Air-Conditioning Engineers
BEC:	Building Energy Code
Biological Cycle:	The cycle by which materials or parts are released to, and ideally reprocessed in, the environment via composting, biodegradation, nutrient extraction, or other biological metabolic pathways
BS:	British Standards
BMS:	Building Management System
CIC:	Construction Industry Council
CNAS:	China National Accreditation Service for Conformity Assessment
CTI:	Cooling Technology Institute
GB:	Chinese National Standards
HKAS:	Hong Kong Accreditation Service
HKGBC:	Hong Kong Green Building Council
HOKLAS:	The Hong Kong Laboratory Accreditation Scheme
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
MiMEP:	Multi-trade integrated Mechanical, Electrical and Plumbing
Technical Cycle:	The cycle by which a product's materials or parts are reprocessed for a new product use cycle via recycling, repair, refurbishment, remanufacturing, or reuse
VOC:	Volatile organic compounds. VOCs are organic chemical compounds that have high enough vapour pressures under normal conditions to significantly vaporize and enter the atmosphere. VOCs are major contributors or precursors to the formation of ozone and smog.
VSDs:	Variable Speed Drives

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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) grade under the Scheme. Bonus points may be awarded if the product meets the "Non-core Criteria". "Bronze", "Silver", "Gold", or "Platinum" grade 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 grade

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 reports, and documentation must be valid during the assessment process and labelling period. The date of issue of all laboratory reports and documentation shall be within 5 years from the first application submission date.

If the certification expires during the labelling period or upon renewal, the applicant is required to provide an updated and valid certification. Failure to resubmit the required certification will result in the revocation of CIC Green Product Certificate without compensation.

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.

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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 the following product information the following product information for compliance:

- Country of origin
- Basic product specifications
- Installation method
- Instructions for consumer product disposal
- Operation & Maintenance Manual

Verification

Documentation showing the product information and instructions including, but not limited to, product catalogue, technical datasheet, webpages, and/or any other information freely accessible by customers.

4.2 CARBON

4.2.1 CFP Quantification – Non-core Criteria

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

Requirements

10 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). This can be achieved by either of the following:

Conduct CFP study report in accordance with ISO 14067:2018, GB/T 24067-2024, CIBSE TM 65 or equivalent

OR

10 Bonus Points for providing the product's CFP value from a product level EPD issued in accordance with ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024, GB/T 24025-2009 or BS EN 15804:2012.

Verification

CFP quantification report or Environmental Product Declaration endorsed by a third-party fulfilling the above requirements.

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4.3 RESOURCE

4.3.1 Circularity

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

4.3.1.1 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 be 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; and
- Identify potential partners for product reuse, recycling, and recovery in accordance with the intended cycling pathway(s); and
- 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); and
- 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.

4.3.1.2 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 following:

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.

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

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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.

Verification

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

4.3.1.3 Design for Disassembly– Non-core Criteria

Requirements

5 Bonus Points for the cooling tower incorporated design for disassembly features, specifically:

- The fans and motors shall be demountable from enclosure for cleaning, repair, replacement, or maintenance purpose; and
- Fan impeller scroll casing shall be removable for fan blades cleaning.

Verification

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

4.3.2 Waste Management

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

4.3.2.1 Waste Management Plan– Non-core Criteria

Requirements

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

- Initiatives taken to reduce waste generation and improve recovery/recycling of waste; and
- 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 plan detailing the above, supported by organizational policy or other equivalent documents.

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4.3.3 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 the associated points.

Option A:

4.3.3.1 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, supported by water usage data acquired from water meter, water sub-meter, water bill, or other equivalent documents.

4.3.3.2 Water Recycling Program– Non-core Criteria

Requirements

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

Verification

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

Option B:

4.3.3.3 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.

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4.3.4 Energy 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 the associated points.

Option A:

4.3.4.1 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, optimising production processes, or implementing energy-saving technologies; and

- 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:

4.3.4.2 Energy Management System– Non-core Criteria

Requirements

10 Bonus Points for possessing valid certificates 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.

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4.4 ENVIRONMENT

4.4.1 Environmental Management

The Applicant can achieve maximum 5 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 are 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 ISO 14001 or EMAS certificate issued by accredited certification body.

4.4.2 Regional Product

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

4.4.2.1 Regional Manufactured Equipment – 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 can achieve maximum 15 Points under this section.

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The Applicant is required to achieve 10 Basic Points under this section. Additionally, the Applicant can achieve maximum 5 Bonus Points under this section.

4.4.3.1 Hazardous Substances – Non-core Criteria

Requirements

5 Bonus Points are awarded for meeting both paint requirements and flame retardant requirements.

Paints Used

Limit the concentration of Lead, Cadmium, Chromium (VI), Mercury, or their compounds in paint below 0.01% by weight.

Limit the VOC content in paint below 250g/L.

Flame Retardant

Concentration of the flame-retardants in the product shall be below 0.1% by weight of the product. The restricted fire retardants including the following types:

- Polybrominated diphenyl ether
- Polybrominated biphenyls
- Short-chained chlorinated paraffin
- Halogenated organic compound
- Hexabromocyclododecane

Products shall be tested based on the requirement as stated in IEC 62321-4:2013, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 (or the latest version). Other related testing methods are also acceptable with justification provided by the Applicant.

Verification

Laboratory test report(s) or self-declaration letter. The test report(s) shall be compiled according to IEC 62321 or other equivalent standards.

4.4.3.2 Noise Level – Core Criteria

Requirements

10 Basic Points are awarded if the product meets the limits specified in Table 2 and Table 3. Products shall be tested based on the requirement as stated in GB/T 7190.1:2018 and GB/T 7190.2:2018 (or latest version); other related testing methods are also acceptable with justification provided by the applicant.

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Table 2: Noise levels of cooling towers with cooling water capacity < 1,000m^3/h

Nominal cooling water capacity (m^3/h)	Noise levels dB (A)			
	Ordinary type	Low noise type	Ultra-low noise type	Industrial type
8	63.0	58.0	53.0	70.0
15	64.0	59.0	54.0	70.0
30	65.0	60.0	55.0	70.0
50	66.0	61.0	56.0	70.0
75	67.0	62.0	57.0	70.0
100	68.0	63.0	58.0	75.0
150	69.0	64.0	59.0	75.0
200	70.0	65.0	60.0	75.0
300	71.0	66.0	61.0	75.0
400	72.0	67.0	62.0	75.0
500	73.0	68.0	63.0	78.0
600	73.5	69.0	64.0	78.0
700	74.0	69.5	65.0	78.0
800	74.5	70.0	66.0	78.0
900	75.0	70.5	67.0	78.0
1,000	75.5	71.0	68.0	78.0

Table 3: Noise levels of cooling towers with cooling water capacity ≥ 1000m^3/h

Types	Nominal cooling water capacity Q (m^3/h)	Noise levels db(A)
Counterflow	1,000 ≤ Q < 2,000	78.0
	2,000 ≤ Q < 3,000	79.0
	3,000 ≤ Q	80.0
Crossflow	1,000 ≤ Q < 2,000	74.0
	2,000 ≤ Q < 3,000	75.0
	3,000 ≤ Q	76.0

GB/T 7190.1:2018 specifies the classification of small and medium cooling tower products along with the technical requirements, test methods and inspection rules. This standards is applicable to mechanical draft opened cooling tower with cooling water capacity less than 1000m^3/h.

GB/T 7190.2:2018 specifies the classification of large cooling towers products along with the technical requirements, test methods and inspection rules. This standards is

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applicable to mechanical draft opened cooling tower with cooling water capacity greater than 1000m^3/h.

Verification

Documentation including, but not limited to, product catalogue and test report(s).

4.5 PERFORMANCE

4.5.1 Efficiency Metrics

The Applicant can achieve maximum 55 Points under this section.

The Applicant is required to achieve 35 Basic Points under this section. Additionally, the Applicant can achieve maximum 20 Bonus Points under this section.

4.5.1.1 Energy Efficiency – Core Criteria

Requirements

Points are awarded if the products meet the following efficiencies:

Table 4: Efficiency levels

Points	Efficiency levels
15 Basic	Achieve the performance stated in Table 5
15 Basic + 5 Bonus	Exceed the performance in Table 5 by 10%
15 Basic + 10 Bonus	Exceed the performance in Table 5 by 15%

Table 5: Performance requirements - minimum efficiency requirements[1]

Equipment type	Rating condition	Performance required	Test procedure
Open circuit type • Propeller type • Axial fan	37.0°C entering water 32.0°C leaving water 28.0°C entering wet-bulb	≥ 3.40 L/s·kW	CTI ATC-105 and CTI STD-201 RS
Open circuit type • Centrifugal fan	37.0°C entering water 32.0°C leaving water 28.0°C entering wet-bulb	≥ 1.70 L/s·kW	CTI ATC-105 and CTI STD-201 RS
Closed circuit type • Propeller type • Axial fan	38.9°C entering water 32.2°C leaving water 23.9°C entering wet-bulb	≥ 1.36 L/s·kW	CTI ATC-105S and CTI STD-201 RS
Closed circuit type • Centrifugal fan	38.9°C entering water 32.2°C leaving water 23.9°C entering wet-bulb	≥ 0.59 L/s·kW	CTI ATC-105S and CTI STD-201 RS

[1] Reference made to Building Energy Code (BEC) 2024 for open circuit type cooling towers and ASHRAE 90.1-2022-TABLE 6.8.1-7 for closed circuit type cooling towers

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For purposes of this table, open-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition divided by the fan motor nameplate power.

For purposes of this table, closed-circuit cooling tower performance is defined as the process water flow rating of the tower at the thermal rating condition divided by the sum of the fan motor nameplate power and the integral spray pump motor nameplate power.

Verification

Documentation including, but not limited to, product catalogue and test report(s).

4.5.1.2 Water Efficiency – Core Criteria

Requirement

10 Basic Points are awarded if the product demonstrates the evaporation loss and drift loss shall not exceed 1% and 0.005% of water circulation rate respectively, under maximum air flow and maximum water flow.

Verification

Documentation including, but not limited to, product catalogue and test report(s).

4.5.1.3 Variable Speed Drives – Non-core Criteria

Requirement

5 Bonus Points are awarded if Variable Speed Drives (VSDs) are added for the cooling tower fans.

Verification

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

4.5.1.4 Thermal Performance – Core Criteria

Requirements

Points are awarded for demonstration compliance of thermal performance ratio in Table 6 under the specific operating conditions as stated in Table 7. The performance ratio is defined as the percentage of the measured cooling capacity and the designed cooling capacity.

Table 6: Performance ratio requirements

Points	Performance Ratio
10 Basic	≥ 90%
10 Basic + 5 Bonus	≥ 95%

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Table 7 Standard rating condition

Operating Conditions	Types of cooling tower		
	Open Circuit Cooling Tower	**Closed Circuit Cooling Tower**	**Evaporative Refrigerant Condenser**
Fluid	Water	Water	Ammonia
Inlet Fluid temperature/°C	35.0	38.9	-
Outlet Fluid Temperature/°C	29.4	32.2	35.7
Wet bulb temperature/°C	25.6	25.6	25.6

Products shall be tested based on the requirement as stated in CTI STD 201; other related testing methods are also acceptable with justification provided by the applicant.

Note:

CTI STD 201 specifies the performance rating of evaporative heat rejection equipment.

Verification

Documentation including but not limited to product catalogue and test report(s).

4.6 INNOSMART

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

4.6.1 Innovations & Additions – Non-core Criteria

Requirements

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

OR

Incorporating various smart technologies to improve efficiency, reduce energy consumption, and optimise performance.

Examples include the following:

- Multi-trade Integrated MEP (MiMEP)
- Smart Controls and Automation
- IoT Integration and Data Analytics
- Energy-Efficient Designs

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Last updated: April 2026

Verification

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

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

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5. SCORING

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

Table 8 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		-	+10	
Resource	Circularity	Recyclability	-	+5	
		Package Requirement	-	+5	
		Design for Disassembly	-	+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	-		
Environment	Environmental Management	Environmental Management System	-	+5	
	Regional Product	Regional Manufactured Equipment	-	+5	MW 8
	Human Toxicity and Ecosystem Impact	Hazardous Substances	-	+5	
		Noise Level [CORE]	10	-	SS 5
Performance	Efficiency Metrics	Energy Efficiency [CORE]	15	+5/+10	EU 2 / EU 3
		Water Efficiency [CORE]	10	-	
		Variable Speed Drives	-	+5	EU 2 / EU 3
		Thermal Performance [CORE]	10	+5	
InnoSmart	Innovations & Additions		-	+5	IA
		Total:	**50**	**+90**	

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

- SS 5: Noise Control for Building Equipment
- EU 2: Reduction of CO_2 Emissions
- EU 3: Peak Electricity Demand Reduction
- MW 8: Regional Materials
- MW 9: Use of Green Products
- Innovations and Additions

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