CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Fan Coil Unit

Assessment Standard

(Version 1.1)

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Last updated: 23 Jul 2020

Fan Coil Unit

Summary of Assessment Criteria

CORE CRITERIA

<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>Product Information</td><td>Applicant shall provide the following product information 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 operating conditions
Recommended maintenance instructions for the product
Installation method
Instructions for consumer product disposal
Country of origin
Operation & Maintenance Manual</td><td>Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs</td><td>5</td><td></td><td>4.1.2 (page 4)</td></tr>
<tr><td>Casing Performance</td><td>Casings shall be suitably stiffened with thickness not less than 1.00mm to minimise the drumming and vibration.
Casings shall be lined with insulation materials for both thermal and acoustic insulation.
All corners shall be rounded off without sharp edges.
Casings shall include space for pipework connection, valves and access to all components in fan coil units.
All components shall undergo anti-rust treatment.</td><td>Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs</td><td>5</td><td></td><td>4.1.3 (page 4)</td></tr>
<tr><td>Noise level</td><td>Products shall not exceed the maximum noise levels as stated in below table.
<table>
<tr><th rowspan="2">Air flow capacity (m^3/hr)</th><th colspan="3">Sound Pressure level dB(A)</th></tr>
<tr><th>0Pa or 12Pa*</th><th>30Pa</th><th>50Pa</th></tr>
<tr><td>340</td><td>37</td><td>40</td><td>42</td></tr>
<tr><td>510</td><td>39</td><td>42</td><td>44</td></tr>
<tr><td>680</td><td>41</td><td>44</td><td>46</td></tr>
<tr><td>850</td><td>43</td><td>46</td><td>47</td></tr>
<tr><td>1020</td><td>45</td><td>47</td><td>49</td></tr>
<tr><td>1360</td><td>46</td><td>48</td><td>50</td></tr>
</table></td><td>Documentation including but not limited to product catalogue, MSDS and test report</td><td>15</td><td></td><td>4.2.2 (page 5)</td></tr>
</table>

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<table>
<tr><td></td><td><table>
<tr><td>1700</td><td>48</td><td>50</td><td>52</td></tr>
<tr><td>2040</td><td>50</td><td>52</td><td>54</td></tr>
<tr><td>2380</td><td>52</td><td>54</td><td>56</td></tr>
</table></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Fan and Motor Performance</td><td>• The fan operating efficiency at all intended operating points shall not be less than 15 percentage point below the fan peak total efficiency as required in AMCA 205-12 (Tables 4.3.1a&b).
• Fans shall be double inlet double width forward curved centrifugal or tangential flow type.
• Fan and motor assemblies shall be completed with neoprene rubber anti-vibration mountings.
• +5 Bonus point for products using DC brushless motors</td><td>Documentation including but not limited to product catalogue, MSDS and test report</td><td>15</td><td>+5</td><td>4.3.1 (page 6)</td></tr>
<tr><td>Sweat Test and Condensate Disposal Test</td><td>• No water shall drip, run or blow off from the fan coil units under the following test conditions of sweat test and condensate disposal test:<table>
<tr><th>Setting</th><th>Sweat test</th><th>Condensate disposal test</th></tr>
<tr><td><u>Air inlet temperature</u>
Dry bulb
Wet bulb</td><td>
27°C
24°C</td><td>
27°C
24°C</td></tr>
<tr><td>Water inlet temperature</td><td>6°C</td><td>6°C</td></tr>
<tr><td>Fan speed settings</td><td>Minimum</td><td>Maximum</td></tr>
</table>• No external resistance shall be added at the air inlet and outlet.
• After reaching the specified temperature conditions, the units shall be operated continuously for a period of 4 hours.</td><td>Documentation including but not limited to product catalogue, MSDS and test report</td><td>10</td><td></td><td>4.3.2 (page 9)</td></tr>
<tr><td></td><td></td><td>Subtotal:</td><td>50</td><td>+5</td><td></td></tr>
</table>

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NON-CORE CRITERIA

Criteria	*Requirements*	*Verification*	*Points +Bonus*	*Index*
Environmental Management System	Manufacturers shall possess valid certificates of ISO 14001, EU Eco-Management and Audit Scheme (EMAS) or Cradle-to-Cradle.	A valid certificate issued by local or overseas accredited certification bodies	+5	*4.1.1 (page 3)*
Paint Used	Paints used on the products including but not limited to the corrosion resistant coatings and protective coatings shall not contain the following heavy metals or their compounds. If the paints used on the products contain the following heavy metal or their compounds, the concentration shall be less than 0.01% by weight of the product. • Cadmium • Lead • Chromium VI • Mercury If the paints used on the products contain the barium (excluding barium sulfate) or its compounds, the concentration shall be less than 0.1% by weight of the product. Volatile organic compound content of the paint used on the products shall be equal to or less than 500g/L minus water. Alternative No paint used on the products	Laboratory test report(s), MSDS, self-declaration letter and production documentation	+5	*4.2.1 (page 5)*
Energy Management	Manufacturers 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; and • Initiatives or requirements for suppliers or contract manufacturers.	Documentation including but not limited to detailed plan and report	+5	*4.3.3 (page 9)*

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Criteria	***Requirements***	***Verification***	***Points +Bonus***	***Index***
Waste Management	Manufacturers shall implement effective waste management policies, procedures and/or a waste management programs covering manufacturing operations. Documentation 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.	Documentation including but not limited to detailed plan and report	+5	*4.3.4 (page 10)*
Automation System	Products shall be able to communicate with Building Management System (BMS) via an open standard communication interface including but not limited to BACnet, Modbus, ZigBee and LonWorks for controlling and monitoring from BMS.	Documentation including but not limited to product catalogue, MSDS	+10	*4.4.1 (page 10)*
Design for disassembly	• The blowers and motors shall be demountable from enclosure for cleaning, repair, replacement or maintenance purpose. • Fan impeller scroll casing shall be removable for fan blades cleaning.	Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs	+5	*4.4.2 (page 10)*
Packaging Requirement	• All packaging shall be able to be reused/recycled in the country. • All plastic packaging (if applicable) shall be included plastic identification symbol and shall not contain halogenated plastics. • Packaging shall not be impregnated, labeled, coated or otherwise treated in a manner, which would prevent or significantly limit recycling (i.e. metallic labels).	Documentation including but not limited to written declaration with date-stamped photographs	+5	*4.4.3 (page 11)*

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Criteria	*Requirements*	*Verification*	*Points* *+Bonus*	*Index*
Regional Manufactured Equipment	Encourage the use of equipment manufactured locally so as to reduce the environmental impacts arising from transportation. The manufacturing location should be located within a radius of 800km of Hong Kong.	Documentation including but not limited to product catalogue and MSDS	+5	*4.4.4 (page 11)*
		Subtotal:	**+45**	

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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 to as the "Standard") sets out the assessment criteria and their benchmarks for fan coil unit 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

Fan coil units (FCU) can serve several functions: 1) introduce outdoor air into a space, 2) circulate and filter air within individual space, and 3) provide heating, cooling or both to the space. FCU are typically sized to heat and cool a small zone with specific load requirements such as an open space, a partitioned room, or multiple rooms within similar smaller loads that together add up to the total load the FCU is designed to handle. The medium used in FCU can be chilled water, hot water, refrigerant, electric resistance or steam.

Fan coil unit can place a significant burden on the environment. With increasing environmental claims of fan coil unit in the market, a more comprehensive and systematic approach to assess the environmental impacts of the fan coil unit 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 fan coil 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

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

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

The CIC or an appointed third party would conduct a random check of the labelled product during the validity period of the label. One of the laboratory tests listed below would be selected and performed to verify the compliancy of the product with the criteria stated in the Assessment Standard.

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

GB: Chinese National Standards

BS: British Standards

CIC: Construction Industry Council

CNAS: China National Accreditation Service for Conformity Assessment

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

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

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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.

4.1 GENERAL REQUIREMENTS

4.1.1 Environmental Management System

5 Points (Non-core Criterion)
Manufactures shall possess valid certificates 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 organizations 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, safe metabolisms.

Verification
A valid certificate issued by local or overseas accredited certification bodies.

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4.1.2 Product Information

5 Points (Core Criterion)

Applicant shall provide the following product information 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 operating conditions
- Recommended maintenance instructions for the product
- Installation method
- Instructions for consumer product disposal
- Country of origin
- Operation & Maintenance Manual

Verification

Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs.

4.1.3 Casing Performance

5 Points (Core Criterion)

- Casings shall be suitably stiffened with thickness not less than 1.00mm to minimise the drumming and vibration
- Casings shall be lined with insulation materials for both thermal and acoustic insulation.
- All corners shall be rounded off without sharp edges
- Casings shall include space for pipework connection, valves and access to all components in fan coil units
- All components shall undergo anti-rust treatment

Verification

Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs

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4.2 HUMAN TOXICITY

4.2.1 Paint Used

5 Points (Non-core Criterion)
Paints used on the products including but not limited to the corrosion resistant coatings and protective coatings shall not contain the following heavy metals or their compounds. The alternative is no paint used on the products.

If the paints used on the products contain the following heavy metal or their compounds, the concentration shall be less than 0.01% by weight of the product.

- Cadmium
- Lead
- Chromium VI
- Mercury

If the paints used on the products contain the barium (excluding barium sulfate) or its compounds, the concentration shall be less than 0.1% by weight of the product.

Volatile organic compound content of the paint used on the products shall be equal to or less than 500g/L minus water.

Verification
Documentation including but not limited to product catalogue, MSDS and test report issued by third party or the manufacturer who has received the ISO17025 certification or relevant national accreditation systems, e.g. HOKLAS, CNAS, etc.

4.2.2 Noise Level

15 Points (Core Criterion)
Products shall not exceed the noise levels as stated in GB/T 19232-2003 (or latest version); other related testing methods are also acceptable with justification provided by the applicant.

Table 4.2.3 Maximum Sound Pressure Level dB(A)

Air flow capacity (m^3/hr)	Sound Pressure level dB(A)		
	0Pa or 12Pa*	30Pa	50Pa
340	37	40	42
510	39	42	44
680	41	44	46

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850	43	46	47
1020	45	47	49
1360	46	48	50
1700	48	50	52
2040	50	52	54
2380	52	54	56

Note:
GB/T 19232-2003 specifies the fan coil units (hereinafter referred to as units) classification, the basic specifications and parameters, requirements, test methods, inspection rules and signs, packaging, transportation and storage.

*Units with discharge air grille, external static pressure shall be at 0Pa; Units without discharge air grille, external static pressure shall be at 12Pa.

Verification
Documentation including but not limited to product catalogue, MSDS and test report issued by third party or the manufacturer who has received the ISO17025 certification or relevant national accreditation systems, e.g. HOKLAS, CNAS, etc.

4.3 RESOURCE CONSUMPTION

4.3.1 Fan and Motor Performance

15 Basic Points + 5 Bonus Points (Core Criterion)

- The fan operating efficiency at all intended operating points shall not be less than 15 percentage point below the fan peak total efficiency as required in AMCA 205-12 (Tables 4.3.1a&b).
- Fans shall be double inlet double width forward curved centrifugal or tangential flow type.
- Fan and motor assemblies shall be completed with neoprene rubber anti-vibration mountings.
- +5 Bonus points for products use DC brushless motors

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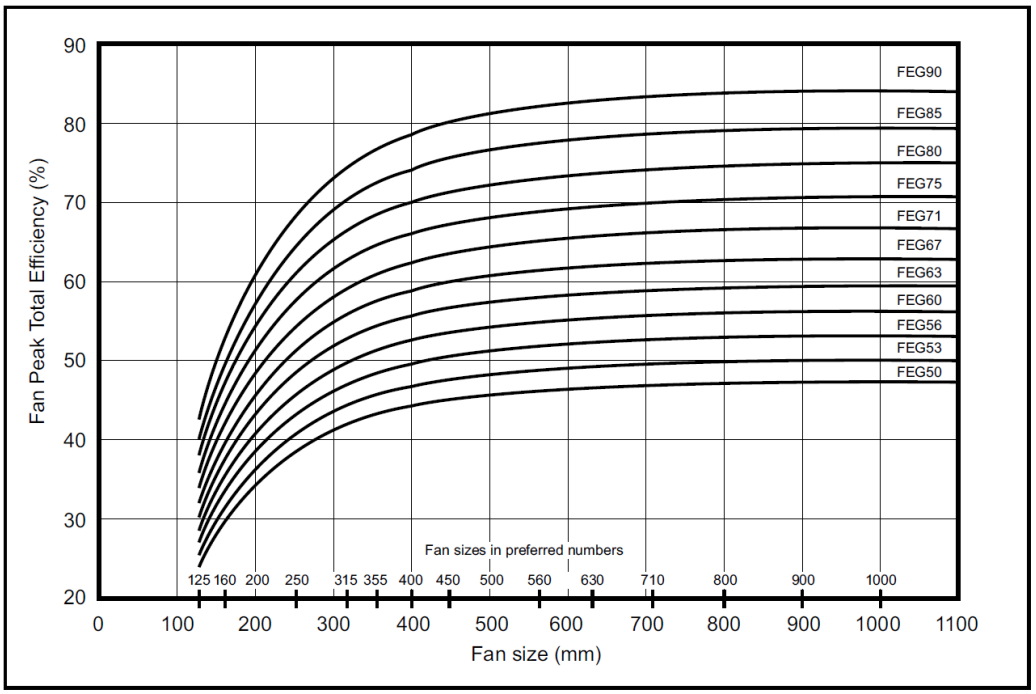
Table 4.3.1a Fan Efficiency Grades (FEG) for Fans without Drives (SI)



Notes:

1. Fan size is the impeller diameter in mm.
2. The fan peak efficiency shall be calculated from the fan total pressure.
3. If this method is used for a direct driven fan, the fan efficiency is the impeller efficiency.
4. The FEG label for a given fan size is assigned when the fan peak efficiency is equal or lower than the efficiency at the grade upper limit and higher than efficiency at the grade upper limit of the next lower grade for the fan size.
5. For any fan sizes larger than 1016 mm, the values of the grade upper limits are the same as for a size of 1016 mm.
6. No labels are considered for the fans with the fan peak total efficiency below FEG50.
7. The values of efficiencies are calculated for fan sizes in the preferred R40 Series.
8. Not all fan sizes in preferred numbers shown.

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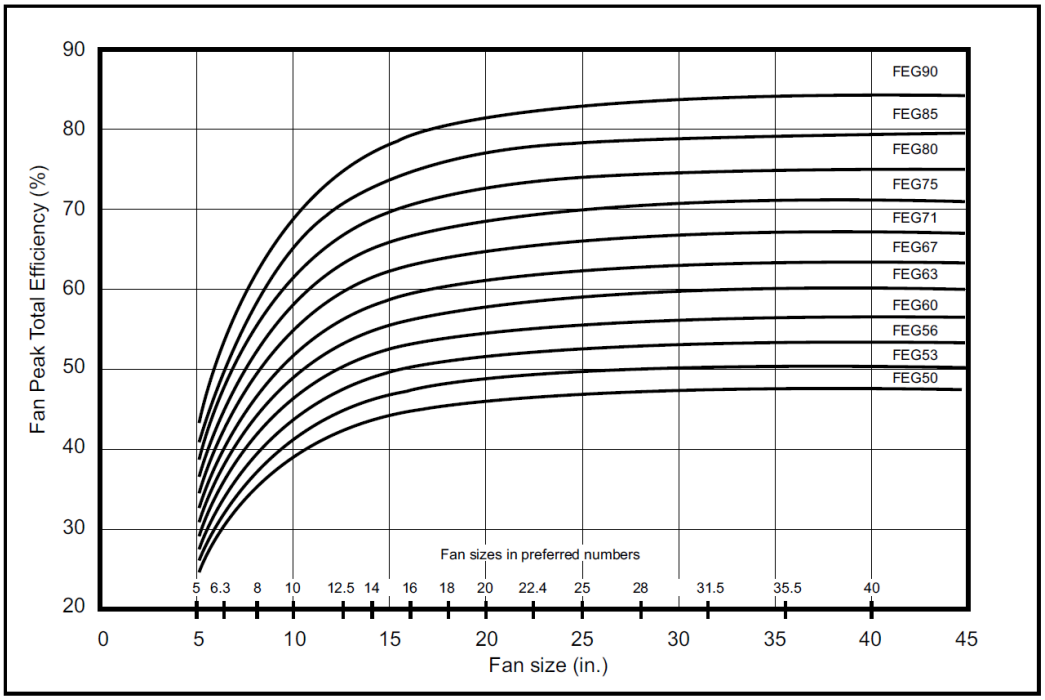
Table 4.3.1b Fan Efficiency Grades (FEG) for Fans Without Drives (IP)



Notes:

1. Fan size is the impeller diameter in inches.
2. The fan peak efficiency shall be calculated from the fan total pressure.
3. If this method is used for a direct driven fan, the fan efficiency is the impeller efficiency.
4. The FEG label for a given fan size is assigned when the fan peak efficiency is equal or lower than the efficiency at the grade upper limit and higher than efficiency at the grade upper limit of the next lower grade for the fan size.
5. For any fan sizes larger than 40 in., the values of the grade upper limits are the same as for a size of 40 in.
6. No labels are considered for the fans with the fan peak total efficiency below FEG50.
7. The values of efficiencies are calculated for fan sizes in the preferred R40 Series.
8. Not all fan sizes in preferred numbers shown.

Note:

AMCA 205-12 defines the energy efficiency classification for fans.

Verification

Documentation including but not limited to product catalogue, MSDS and test report issued by third party or the manufacturer who has received the ISO17025 certification or relevant national accreditation systems, e.g. HOKLAS, CNAS, etc.

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4.3.2 Sweat Test and Condensate Disposal Test

10 Points (Core Criterion)

- No water shall drip, run or blow off from the fan coil units under the following test conditions of sweat test and condensate disposal test:

Setting	Sweat test	Condensate disposal test
Air inlet temperature Dry bulb	27°C	27°C
Wet bulb	24°C	24°C
Water inlet temperature	6°C	6°C
Fan speed settings	Minimum	Maximum

- No external resistance shall be added at the air inlet and outlet.
- After reaching the specified temperature conditions, the units shall be operated continuously for a period of 4 hours.

Verification

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

4.3.3 Energy Management

5 Points (Non-core Criterion)

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; and
- Initiatives or requirements for suppliers or contract manufacturers.

Verification

Documentation including but not limited to detailed plan and report.

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4.3.4 Waste Management

5 Points (Non-core Criterion)

Manufacturer shall implement effective waste management policies, procedures and/or a waste management programs covering manufacturing operations. Documentation should include but not 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 including but not limited to detailed plan and report.

4.4 ECOSYSTEM IMPACT

4.4.1 Automation System

10 Points (Non-core Criterion)

Products shall be able to communicate with Building Management System (BMS) via an open standard communication interface including but not limited to BACnet, Modbus, ZigBee and LonWorks for controlling and monitoring from BMS.

Verification

Documentation including but not limited to product catalogue, MSDS.

4.4.2 Design for Disassembly

5 Points (Non-core Criterion)

The blowers and motors shall be demountable from enclosure for cleaning, repair, replacement or maintenance purpose.

Fan impeller scroll casing shall be removable for fan blades cleaning.

Verification

Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs.

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4.4.3 Packaging Requirement

5 Points (Non-core Criterion)

- All packaging shall be able to be reused/recycled in the country.
- All plastic packaging (if applicable) shall be included plastic identification symbol and shall not contain halogenated plastics.
- Packaging shall not be impregnated, labeled, coated or otherwise treated in a manner, which would prevent or significantly limit recycling (i.e. metallic labels).

Verification

Documentation including but not limited to written declaration with date-stamped photographs.

4.4.4 ***Regionally Manufactured Equipment***

5 Points (Non-core Criterion)

- The use of equipment manufactured locally within 800 km from the default coordinates of Hong Kong.

Verification

Documentation including but not limited to product catalogue and MSDS.

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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 Casing Performance [CORE]	5	
4.2.1 Painted Used		+5
4.2.2 Noise Level [CORE]	15	
4.3.1 Fan and Motor Performance [CORE]	15	+5
4.3.2 Sweat Test and Condensate Disposal Test [CORE]	10	
4.3.3 Energy Management		+5
4.3.4 Waste Management		+5
4.4.1 Automation System		+10
4.4.2 Design for Disassembly		+5
4.4.3 Packaging Requirement		+5
4.4.4 Regionally Manufactured Equipment		+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 2: 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

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