CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Water Pump

Assessment Standard

(Version 2.0)

Last updated: 26 July 2021

Water Pump

Summary of Assessment Criteria

CORE CRITERIA

Criteria	*Requirements*	*Verification*	*Points*		*Index*
			Basic	*+Bonus*	
Product Information	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	Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs	5		*4.1.2 (Page 4)*
Noise Level	The noise generated by pumps shall not exceed the requirement as stated in the Tables 4.2.2a and 4.2.2b: • Lower than the baseline noise level (15 Basic Points) • Lower than the baseline noise level by 3db (+10 Bonus Points)	Documentation including but not limited to product catalogue, MSDS and test report	15	+10	*4.2.2 (Page 5)*
Motor Efficiency	Product shall meet the following requirement of efficiency levels under IEC 60034-30-1:2014: • IE 3 (15 Basic Points) • IE 4 (+10 Bonus Points)	Documentation including but not limited to product catalogue, MSDS and test report	15	+10	*4.3.1 (Page 8)*

<table>
<tr><th>Criteria</th><th>Requirements</th><th>Verification</th><th colspan="2">Points</th><th>Index</th></tr>
<tr><th></th><th></th><th></th><th>Basic</th><th>+Bonus</th><th></th></tr>
<tr><td>Guarantee Point Acceptance Grades</td><td>Products shall achieve the guarantee point acceptance grade for pump head, flow, power and efficiency as shown in the following table. The tolerances are percentages of values guaranteed.

<table>
<tr><th>Acceptance Grade</th><th>1U</th><th>1E</th><th>1B</th><th>2B</th><th>2U</th><th>3B</th></tr>
<tr><td>Flow (τ_Q)</td><td>+10%</td><td colspan="2">±5 %</td><td>±8%</td><td>+16%</td><td>±9%</td></tr>
<tr><td>Head (τ_H)</td><td>+6%</td><td colspan="2">±3 %</td><td>±5%</td><td>+10%</td><td>±7%</td></tr>
<tr><td>Power (τ_P)</td><td>+10%</td><td colspan="2">+4%</td><td>+8%</td><td>+16%</td><td>+9%</td></tr>
<tr><td>Efficiency (τ_η)</td><td colspan="2">≥0%</td><td>-3%</td><td colspan="2">-5%</td><td>-7%</td></tr>
</table>

*τ_x (x = Q, H, P, η) stands for the tolerance of the indicated quantity.

For pumps with shaft power input of below 10 kW, the tolerances factors shall be the following:
Rate of flow, τ_Q = ±10%
Pump total head, τ_H = ±8%</td><td>Documentation including but not limited to product label, product catalogue, MSDS, test report and written declaration with date-stamped photographs</td><td>15</td><td></td><td>4.3.3 (Page 8)</td></tr>
<tr><td></td><td></td><td>Subtotal:</td><td>50</td><td>+20</td><td></td></tr>
</table>

NON-CORE CRITERIA

Criteria	*Requirements*	*Verification*	*Points* *+Bonus*	*Index*
Environmental Management System	Manufacturers shall possess valid certificates of ISO 14001, Water Regulations Approval Scheme (WRAS), 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)*
Hazardous Substance	**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. **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 compounds • Hexabromocyclododecane	Laboratory test report(s), MSDS, self-declaration letter and production documentation	+10	*4.2.1 (Page 4)*

Criteria	*Requirements*	*Verification*	*Points* *+Bonus*	*Index*
Mechanical Seal	Products shall have mechanical seal designed for the working and testing pressures.	Documentation including but not limited to product label, product catalogue, MSDS, and written declaration with date-stamped photographs.	+5	*4.3.2 (Page 8)*
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 9)*
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	*4.3.5 (Page 9)*
		Subtotal:	**+30**	

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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 water pump 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

Water pumps are used to move fluid from one location to another. They are mechanical devices which transform mechanical work into fluid energy. Static fluid pressure and flow energy are increased to maintain steady flow. Pumps give the ability to control water flows in the means of:

i) Taking fluid where it is needed with the desired pressure and flow;
ii) Taking away from areas where it is not needed;
iii) Controlling flow volume, pressure and timing; and
iv) Circulating liquid throughout a distribution system (e.g. cooling tower throughout machines and equipment).

There are two major areas in pumps which are suction area and discharge area. Pumps perform mechanical work through suction as inputs and deliver energy with the discharge area as output. Water pump can place a significant burden on the environment. With increasing environmental claims of water pump in the market, a more comprehensive and systematic approach to assess the environmental impacts of the water pump 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 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

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 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.

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 Standard. Applicant has to be responsible for the cost of the laboratory test.

3. DEFINITIONS

Applicant:	Organisation which apply for the label under the CIC Green Product Certification of the Construction Industry Council
ASTM:	American Society for Testing and Materials
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 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. Applicant has to bear the cost of the laboratory test.

4.1 GENERAL REQUIREMENTS

4.1.1 Environmental Management System

5 Points (Non-core Criterion)
Manufactures shall possess valid certificates of ISO 14001, Water Regulations Approval Scheme (WRAS)", 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.

Water Regulations Approval Scheme (WRAS) is a certification mark that demonstrates that an item or package complies with the high standards set out by water regulations.

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.

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

Verification

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

4.2 HUMAN TOXICITY

4.2.1 Hazardous Substance

10 Points (Non-core Criterion)

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.

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 compounds
- Hexabromocyclododecane

Products shall be tested based on the requirement as stated in BS 62321:2009 (or latest version); other related testing methods are also acceptable with justification provided by the applicant.

Note:

BS EN 62321:2009 specifies the determination of the levels of brominated flame retardants, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) contained in electrotechnical products.

Verification

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

4.2.2 Noise Level

15 Basic Points + 10 Bonus Points (Core Criterion)

The noise generated by pumps shall not exceed the requirement as stated in the Tables 4.2.2a and 4.2.2b:

- Lower than baseline noise level (15 Basic Points)
- Lower than the baseline noise level by 3dB (+10 Bonus Points)

Product shall be tested in accordance with relevant BS standard including but not limited to BS EN 60034-9:2005 (or latest version); other related testing methods are also acceptable with justification provided by the applicant.

Note:

BS EN 60034-9:2005 specifies test methods for the determination of sound power level of rotating electrical machines.

Table 4.2.2a Maximum A-weighted sound power level, LWA in dB, at no-load (excluding motors according to Table 4.2.2b) (Method of cooling, IC code, see IEC 60034-6) (Method of protection, IP code, see IEC 60034-5)

Rated speed n_N min^{-1}	$n_N \le 960$			$960 < n_N \le 1\ 320$			$1\ 320 < n_N \le 1\ 900$			$1\ 900 < n_N \le 2\ 360$			$2\ 360 < n_N \le 3\ 150$			$3\ 150 < n_N \le 3\ 750$		
Methods of cooling (simplified code)	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2	IC 01 IC 11 IC 21 Note 1	IC 411 IC 511 IC 611 Note 2	IC 31 IC 71W IC 81W IC 8A 1W 7 Note 2
Rated output P_N kW (or kVA)																		
$1 \le P_N \le 1{,}1$	73	73	–	76	76	–	77	78	–	79	81	–	81	84	–	82	88	–
$1{,}1 < P_N \le 2{,}2$	74	74	–	78	78	–	81	82	–	83	85	–	85	88	–	86	91	–
$2{,}2 < P_N \le 5{,}5$	77	78	–	81	82	–	85	86	–	86	90	–	89	93	–	93	95	–
$5{,}5 < P_N \le 11$	81	82	–	85	85	–	88	90	–	90	93	–	93	97	–	97	98	–
$11 < P_N \le 22$	84	86	–	88	88	–	91	94	–	93	97	–	96	100	–	97	100	–
$22 < P_N \le 37$	87	90	–	91	91	–	94	98	–	96	100	–	99	102	–	101	102	–
$37 < P_N \le 55$	90	93	–	94	94	–	97	100	–	98	102	–	101	104	–	103	104	–
$55 < P_N \le 110$	93	96	–	97	98	–	100	103	–	101	104	–	103	106	–	105	106	–
$110 < P_N \le 220$	97	99	–	100	102	–	103	106	–	103	107	–	105	109	–	107	110	–
$220 < P_N \le 550$	99	102	98	103	105	100	106	108	102	106	109	102	107	111	102	110	113	105
$550 < P_N \le 1\ 100$	101	105	100	106	108	103	108	111	104	108	111	104	109	112	104	111	116	106
$1\ 100 < P_N \le 2\ 200$	103	107	102	108	110	105	109	113	105	109	113	105	110	113	105	112	118	107
$2\ 200 < P_N \le 5\ 500$	105	109	104	110	112	106	110	115	106	111	115	107	112	115	107	114	120	109

NOTE 1 Typical enclosure classification IP22 or IP23.

NOTE 2 Typical enclosure classification IP44 or IP55.

Table 4.2.2b Maximum A-weighted sound power level, LWA in dB, at no-load (For single speed three-phase cage induction motors IC411, IC511, IC611)

Shaft height, H mm	2 pole	4 pole	6 pole	8 pole
90	78	66	63	63
100	82	70	64	64
112	83	72	70	70
132	85	75	73	71
160	87	77	73	72
180	88	80	77	76
200	90	83	80	79
225	92	84	80	79
250	92	85	82	80
280	94	88	85	82
315	98	94	89	88
355	100	95	94	92
400	100	96	95	94
450	100	98	98	96
500	103	99	98	97
560	105	100	99	98

NOTE 1 Motors of IC01, IC11, IC21 may have higher sound-power levels as follows: 2 and 4 poles: + 7 dB(A); 6 and 8 poles: + 4 dB(A).

NOTE 2 The sound-power levels for 2 and 4 poles motors with shaft heights > 315 mm recognize a directional fan configuration. All other values are for bi-directional.

NOTE 3 Values for 60 Hz motors are increased as follows: 2 pole: + 5 dB(A); 4, 6 and 8 poles: + 3 dB(A).

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 Motor Efficiency

15 Basic Points + 10 Bonus Points (Core Criterion)
Product shall meet the following requirement of efficiency levels under IEC 60034-30-1:2014:

- IE 3 (15 Basic Points)
- IE 4 (+10 Bonus Points)

Note:
IEC 60034-30-1:2014 defines four IE (International Efficiency) efficiency classes for single speed electric motors that are rated according to IEC 60034-1 or IEC 60079-0 (explosive atmospheres)

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

4.3.2 Mechanical Seal

5 Points (Non-core Criterion)
Products shall have mechanical seal designed for the working and test pressures.

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

4.3.3 Guarantee Point Acceptance Grades

15 Points (Core Criterion)
Products shall achieve the guarantee point acceptance grade for pump head, flow, power and efficiency as shown in the following table. The tolerances are percentages of values guaranteed.

Table 4.3.3 Pump test acceptance grades and corresponding tolerance

Acceptance Grade	1U	1E	1B	2B	2U	3B
Flow (τ_Q)	+10%	±5%		±8%	+16%	±9%
Head (τ_H)	+6%	±3%		±5%	+10%	±7%
Power (τ_P)	+10%	+4%		+8%	+16%	+9%
Efficiency (τ_η)	≥0%		-3%	-5%		-7%

*τ_x ($x = Q, H, P, \eta$) stands for the tolerance of the indicated quantity.

For pumps with shaft power input of below 10 kW, the tolerances factors shall be the following:
Rate of flow, $\tau_Q = \pm 10\%$
Pump total head, $\tau_H = \pm 8\%$
Product shall be tested in accordance with BS EN ISO 9906-2012 (or latest version); other related testing methods are also acceptable with justification provided by the applicant

Note:
BE EN ISO 9906-2012 specifies hydraulic performance tests for customers' acceptance of rotodynamic pumps (centrifugal, mixed flow and axial pumps, hereinafter "pumps"). This Standard specifies three levels of acceptance:

- Grades 1B, 1E and 1U with tighter tolerance;
- Grades 2B and 2U with broader tolerance;
- Grade 3B with even broader tolerance.

Grade 1 is the most stringent, and the "U" specifies having a unilateral tolerance band. The "B" specifies having a bilateral tolerance band. Acceptance grade 1E can be used when energy efficiency is of importance and is also bilateral.

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

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;
- 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.

4.3.5 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.

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	
4.2.1 Hazardous Substance		+10
4.2.2 Noise Level [CORE]	15	+10
4.3.1 Motor Efficiency [CORE]	15	+10
4.3.2 Mechanical Seal		+5
4.3.3 Guarantee Point Acceptance Grades [CORE]	15	
4.3.4 Energy Management		+5
4.3.5 Waste Management		+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