
The Hong Kong Voluntary Energy Efficiency Labelling Scheme for

Electric Storage Water Heaters June 2018

Energy Efficiency  **EMSD**

Electrical and Mechanical Services Department

3 Kai Shing Street, Kowloon, Hong Kong

EMSD Homepage: <http://www.emsd.gov.hk>

Contents

1.	Purpose	1
2.	Background	1
3.	Scope	2
4.	Definitions	3
5.	Classification of Storage Water Heaters	4
6.	Test Methodology and Technical Standard	5
7.	Energy Efficiency Grading	11
8.	Performance Requirements	12
9.	Energy Label	12
10.	Testing Facilities, Laboratories & Accreditation Bodies	13
11.	Registration and Participation	15
12.	Legal Provisions	19
13.	Compliance, Monitoring and Inspection	19
14.	Complaints and Appeal	22
15.	Maintenance of Scheme	23

Tables

- 1 Classification of Storage Water Heaters
- 2 Fixed Loss per 24 hours
- 3 Local Factor to be subtracted from the measured standing loss
- 4 Average energy consumption due to standing loss and fixed loss
- 5 Derivation of energy efficiency grades

Annexes

- 1 The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters – Developing the Storage Water Heater Energy Efficiency Grade
- 2 The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters – Energy Label Format
- 3 Proforma Letter of Invitation
- 4 Proforma Letter of Application
- 5 Information to be submitted to Energy Efficiency Office
- 6 Proforma Letter of Acceptance
- 7 Proforma Letter of Rejection
- 8 The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters – Flow Chart for Registration
- 9 Example for Calculating the Energy Efficiency Grade of Storage Water Heater

1. Purpose

- 1.1 This set of document is intended to give a general description to the Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters (The Scheme).

2. Background

- 2.1 The Energy Efficiency Labelling Scheme (EELS) is an energy conservation initiative that the Government of the Hong Kong Special Administrative Region has adopted. Under the EELS, some common types of household electrical / gas appliances and office equipment will incorporate an energy label that serves to inform consumers of the product's energy consumption and efficiency. Consumers should then be able to take those factors into account in making their purchasing decision.
- 2.2 The concept of EELS has been implemented in several forms and in different stages of development in many countries. The EELS generally aims to achieve:
- greater public awareness of energy conservation and environmental improvement needs;
 - provision of readily available, pre-purchase information on energy consumption and efficiency data to enable ordinary consumers to select more energy efficient products;
 - stimulation to the manufactures/market for phasing out less energy efficient models; and
 - motivation of the actual energy savings behaviours and environmental improvements.
- 2.3 Hong Kong aims at achieving the above objectives. At present, the Hong Kong Voluntary Energy Efficiency Labelling Scheme covers 22 types of household electrical / gas appliances and office equipment. Amongst them, 13 types are electrical appliances, 7 types are office equipment, and 2 types are gas appliances.

3. Scope

- 3.1 The Scheme will only apply to the manufacturers and importers (i.e. local agents, retailers and the related parties) of storage water heaters who are interested to or have participated in the Scheme.
- 3.2 The Scheme commenced from 28 December 2000. It is further revised on 1 June 2018. This document will be reviewed before 1 December 2019. The existing and newly registered labels will remain valid till 30 November 2019. By then, re-registration may be required subject to the review of the Scheme.
- 3.3 The Scheme applies to the storage water heaters defined and specified below:
- (a) that is a household appliance –
 - (i) designed for heating water in a thermally well-insulated container and for the storage of heated water; and
 - (ii) having a device to control the water temperature; and
 - (b) that –
 - (i) uses mains electricity as the only power source; and
 - (ii) has a rated water storage capacity not exceeding 300 litres.
- 3.4 The Scheme does not include instantaneous water heaters, water heater that is designed for making hot drinks or food only, water heater that has more than one heated volume, water heaters that have larger storage capacity, those for industrial use, or those using non-electric energy sources.
- 3.5 The scope of the Scheme covers all new storage water heaters to be sold in Hong Kong, imported to or manufactured in Hong Kong, with effect from the date that is declared by the participant but does not cover the second-hand products, products already in use, under trans-shipment or manufactured for export, etc.
- 3.6 The Scheme is operated as a 'Grading Type' labelling system. All participating storage water heaters will be registered under this scheme provided that they have met the testing requirements specified in the Scheme.

4. Definitions

Unless otherwise specified, the following definitions shall apply throughout this document:

<i>Authority</i>	means the Electrical & Mechanical Services Department (EMSD), the Government of the HKSAR
<i>Director</i>	means the Director of Electrical & Mechanical Services Department.
<i>Government</i>	means the Government of the HKSAR.
<i>fixed loss</i> ($E_{st,fix}$)	means average energy consumption due to heat loss of a storage type electric water heater per 24 hours (kWh/24h) caused by heat bridges such as water and pipe connections
<i>local factor</i> ($E_{st,Ioc}$)	means additional energy consumption due to heat loss of a storage type electric water heaters per 24 hours (kWh/24h) caused by the requirements for the installation of safety valves at the water heater
<i>IEC</i>	means International Electrotechnical Commission.
<i>inspecting officer</i>	means the officer authorized by the Director to carry out inspection on storage water heaters.
<i>label</i>	means the energy label as described in Section 10 of this document.
<i>mains electricity</i>	means the electricity that is supplied in Hong Kong at a voltage of 380/220V and a frequency of 50 Hz
<i>mean water temperature</i> (θ_M)	means the average of the mean water temperature after a thermostat cut-out (θ_A) and the mean water temperature after a thermostat cut-in (θ_E)
<i>mean water temperature after a thermostat cut-in</i> (θ_E)	average value of n number of temperatures recorded after each cut-in of the thermostat of a storage type electric water heater
<i>mean water temperature after a thermostat cut-out</i> (θ_A)	average value of n number of temperatures recorded after each cut-out of the thermostat of a storage type electric water heater
<i>measured standing loss</i> ($E_{st,meas}$)	means the standing loss per 24 hours of a storage type electric water heater measured in accordance to IEC 60379 standard
<i>open outlet or vented water heater</i>	means a storage type electric water heater in which the pressure due to the expanded water can be released through the overflow or vent pipe and the

	flow of water is generally controlled by a valve in the inlet pipe.
<i>participant</i>	means the manufacturers, importers or the retailers of storage water heaters participating in the scheme.
<i>rated standing loss</i>	means the standing loss per 24 hours of a storage type electric water heater as determined and declared by the manufacturer or importer of the storage type electric water heater in accordance with the standard and requirements specified in the Code.
<i>rated water storage capacity (V)</i>	means the water storage capacity as determined and declared by the manufacturer or importer of the storage type electric water heater in accordance with the standard and requirements specified in the Code.
<i>recognized laboratory</i>	means a laboratory that complies with the requirements as stated in Section 11 of this document and is acceptable to the Authority for carrying out tests and issuing test reports on storage water heaters.
<i>standing loss</i>	means the electrical energy consumption of a filled storage type electric water-heater, after steady-state conditions have been reached, when connected to the electrical supply, during any 24 hours when no water is withdrawn.
<i>the/this Scheme</i>	means the Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters.
<i>unvented water heater</i>	means a storage type electric water heater designed to work under the pressure of the water supply mains and the flow of water being controlled by one or more valves in the outlet system.
<i>variable standing loss ($E_{st,var}$)</i>	means the result of fixed loss and local factor subtracted from the standing loss.
<i>IEC 60379</i>	means IEC 60379:1987

(IEC 60379 ed. 3.0 "Copyright © 1987 IEC Geneva, Switzerland.www.iec.ch")

5. Classification of Storage Water Heaters

Basic Requirements on Classification

- 5.1 The classification of storage water heaters shall be based on a common set of conditions so that meaningful comparison can be made. These basic requirements cover the most vital aspects of the storage water heaters and shall ensure that consumers are provided with unambiguous information.

Classification

- 5.2 All storage water heaters are classified into the following four categories according to the storage capacity and the way of mounting: -

Table 1 : Classification of Storage Water Heaters

Types of Storage Water Heaters	Category	Rated Capacity (V*)
Small-size Unvented type	1	$V \leq 50$ litres
Small-size Open Outlet or vented storage type	2	$V \leq 50$ litres
Horizontal type	3	$50 \text{ litres} < V \leq 300 \text{ litres}$
Vertical type	4	$50 \text{ litres} < V \leq 300 \text{ litres}$

* V is the rated capacity in litres

6. Test Methodology and Technical Standard

Tests Required to be Carried Out

- 6.1 The tests specified in this clause are required to be carried out, in accordance with IEC 60379, or other equivalent international standards approved by the Director, in order to find out the energy efficiency and performance characteristics of a storage type electric water heater. A test report required to be submitted to the Director under section 6 shall contain the results of these tests:
- Water storage capacity test;
 - Energy consumption test for the measurement of standing loss per 24 hours;
 - Hot water output test; and
 - Reheating time test.

Test Conditions

- 6.2 In carrying out the tests as specified in clause 6.1, the storage type electric water heater shall be tested at a voltage and frequency of mains electricity in Hong Kong i.e. at a voltage of 380/220 V and a frequency of 50 Hz. Measurements shall not be carried out if, in warm conditions, the voltage needed to provide the rated input deviates more than 5% from the rated voltage. Moreover, unless the Director approves otherwise, the requirements of IEC 60379 standard test conditions shall be followed:
- The measurements shall be carried out in a substantially draught-free

Measurement of Standing Loss and Calculation of Annual Standby Loss Energy Consumption

- 6.6 The methodology for measuring standing loss expressed in kilowatt-hour per 24 hours (kWh/24h) shall be based on IEC 60379 or other equivalent international standards approved by the Director.

The storage type electric water heater shall first be filled with cold water at the temperature θ_c for the measurement. The electrical supply shall then be switched on for a few cycles of operation of the thermostat until steady conditions have been reached. Starting and ending at a cut-out of the thermostat, the energy (E_1) consumed during time (t_1) in hours shall be measured over a period of not less than 48 hours. The water temperatures (θ_{Ei}) at each thermostat cut-in and (θ_{Ai}) at each thermostat cut-out shall be measured by means of a thermocouple positioned as described in clause 6.5.

The energy consumption (E) per 24 hours shall be calculated according to the following formula:

$$E = (E_1 \times 24)/t_1 \dots \dots \dots (eq. 3)$$

The mean water temperature θ_M shall be calculated by the formula:

$$\theta_M = (\theta_A + \theta_E)/2 \dots \dots \dots (eq. 4)$$

where θ_A and θ_E being calculated as indicated in clause 6.5.

Measured standing loss ($E_{st,meas}$) that is related to a temperature rise of 45K and expressed in kilowatt-hours per 24 hours shall be calculated according to the formula:

$$E_{st,meas} = \left[\frac{45}{\theta_M - \theta_{amb}} \right] \times E \dots \dots \dots (eq. 5)$$

where θ_{amb} is the ambient temperature during the test.

The measured standing loss ($E_{st,meas}$) of a storage type electric water heater shall be shown on the energy label after it is calculated to annual standby loss energy consumption by multiplying the kWh figure over the 24-hour period by 75, assuming an annual standby hours of 1,800 hours.

Calculation of Variable Standing Loss

- 6.7 The measured standing loss of a storage type electric water heater is composed of two components: the variable standing loss ($E_{st,var}$) which varies with a series of physical parameters of the storage type electric water heater itself, and the fixed loss ($E_{st,fix}$) caused by heat bridges such as water and pipe connections. While the variable standing loss differs from heater to heater, the fixed loss is more or less the same for all heaters of the same category. To better

compare the energy efficiency of the water heater, it is necessary to eliminate the fixed loss, and compare just the variable standing loss. The value of the fixed loss refers to given in Table 2.

Table 2 – Fixed loss per 24 hours

Category	Fixed Loss per 24 hours $E_{st,fix}$ (kWh/24h)
1 (unvented) and 2 (open outlet or vented)	$E_{st,fix} = 0.072$
3 (horizontal)	$E_{st,fix} = 0.12$
4 (vertical)	$E_{st,fix} = 0.12$

To reflect the effect of the requirements for installing safety valves and local conditions at the water heater, a local factor ($E_{st,Ioc}$) as shown in Table 3 is to be subtracted from the measured standing loss with respect to the different categories.

Table 3 – Local factor to be subtracted from the measured standing loss

Category	Local factor per 24 hours $E_{st,Ioc}$ (kWh/24h)
1 (unvented)	0.2
2 (open outlet or vented)	0.1
3 (horizontal)	0.3
4 (vertical)	0.3

The variable standing loss of a storage type electric water heater is thus calculated by the following equation:

$$E_{st,var} = E_{st,meas} - E_{st,fix} - E_{st,Ioc} \dots \dots \dots (eq. 6)$$

where

- $E_{st,var}$ = variable standing loss per 24 hours (kWh/24h).
- $E_{st,meas}$ = measured standing loss per 24 hours (kWh/24h).
- $E_{st,fix}$ = fixed loss per 24 hours (kWh/24h), as given in Table 2.
- $E_{st,Ioc}$ = local factor per 24 hours, as given in Table 3.

Average Appliance Energy Consumption

- 6.8 The average energy consumption of a storage type electric water heater due to standing loss and fixed loss shall be determined in accordance with Table 4.

Table 4 – Average energy consumption due to standing loss and fixed loss

Category	Average Energy Consumption due to Standing Loss per 24 hours $E_{st,av}$ (kWh/24h)	Average Energy Consumption of Fixed Loss per 24 hours $E_{st,fix}$ (kWh/24h)
1 (unvented) and 2 (open outlet or vented)	$E_{st,va} = 0.13 + 0.0553V^{2/3}$	$E_{st,fix} = 0.072$
3 (horizontal)	$E_{st,va} = 0.75 + 0.008V$	$E_{st,fix} = 0.12$
4 (vertical)	$E_{st,va} = 0.2 + 0.051V^{2/3}$	$E_{st,fix} = 0.12$

*V is the rated water storage capacity in litres

Note: The Average Energy Consumption due to Standing Loss and Fixed Loss adopted in table 4 are extracted from the statistical analysis results in the final report dated March 1998 of the study “Analysis of Energy Efficiency of Domestic Electric Storage Water Heaters” carried out by the study group assigned for Study for the Directorate General for Energy (DGXVII) of the Commission of the European Communities”. The results are based on the database provided by the European Committee of Manufacturers of Domestic Equipment comprising more than 2,700 models of storage water heaters available on the European market

The average appliance energy consumption is given by:

$$E_{st,av,var} = E_{st,va} - E_{st,fix} \dots \dots \dots (eq. 7)$$

where

- $E_{st,av,var}$ = average appliance energy consumption per 24 hours (kWh/24h).
- $E_{st,va}$ = average energy consumption due to standing loss per 24 hours (kWh/24h), as given in table 4.
- $E_{st,fix}$ = fixed loss per 24 hours (kWh/24h), as given in table 4.

Measurement of Hot Water Output

6.9 Immediately following the measurement of the standing loss according to clause 6.6, the water heater shall be switched off after a cut-out of the thermostat. Then, a quantity of water equal to the rated water storage capacity shall be withdrawn through the outlet at a constant rate of flow by supplying cold water at the temperature θ_c ; the flow of water from open outlet water or vented heaters shall be controlled by the inlet valve if applicable. The flow in other type of water heater shall be kept constant by means of a valve fitted in the outlet if applicable. The rate of flow shall be adjusted:

- to 2 litre/min. for water heaters with a rated water storage capacity less than 10 litre;
- to 5 litre/min. for water heaters with a rated water storage capacity of 10 litre up to 50 litre;

- to 10 litre/min. for water heaters with a rated water storage capacity of 50 litre up to 200 litre;
- to a value corresponding to 5% of the capacity per min for water-heaters with a rated capacity exceeding 200 L

The temperature of the withdrawn water shall be measured in the manner described in clause 6.5 and the average temperature of withdrawn water (θ'_p) established. The mean water temperature (θ_p) shall be calculated from the following formula:

$$\theta_p = 50 \times \frac{\theta'_p - \theta_c}{\theta_A - \theta_c} + 15 \dots \dots \dots (eq. 8)$$

where

- θ_c = temperature of cold water within $15 \pm 2^\circ\text{C}$.
- θ_A = mean water temperature after a thermostat cut-out

The hot water output shall be recorded as the rated water storage capacity at θ_p (...litres at ... $^\circ\text{C}$).

Measurement of Reheating Time

6.10 Immediately following determination of θ_p according to the precedent clause:

- the electrical supply shall be switched on;
- the heating time (t_R) from switch-on until the first cut-out of the thermostat when the temperature of the water (θ_R) as measured according to clause 6.5 shall be within 10K of (θ_A).

The reheating time required for heating up the water from 15°C to 65°C shall be calculated from the following formula and expressed in hours and minutes:

$$t_{R,50} = t_R \times \frac{50}{\theta_R - \theta_c} \dots \dots \dots (eq. 9)$$

where

- θ_R = water temperature after reheating;
- θ_c = temperature of cold water within $15 \pm 2^\circ\text{C}$.

7. Energy Efficiency Grading

7.1 Energy Consumption Index (I_{ε})

- (i) The energy consumption index (I_{ε}) of a storage type electric water heater is defined as the ratio of the variable standing loss of the storage type electric water heater to the average appliance energy consumption of a storage type electric water heater with similar category and same rated water storage capacity as found from the associated average appliance energy consumption equations in clause 6.8.
- (ii) The index is expressed in percentages, and calculated as follows:

$$\text{Energy Consumption Index } (I_{\varepsilon}) = \frac{E_{st,var}}{E_{st,av,var}} \times 100\% \dots \dots (eq. 10)$$

where

- $E_{st,var}$ = variable standing loss per 24 hours (kWh/24h), as given by clause 6.7.
- $E_{st,av,var}$ = average appliance energy consumption per 24 hours (kWh/24h), as given by clause 6.8.

Thus, within a category, a storage type electric water heater with a lower energy consumption index (i.e. a lower percentage) consumes less energy than a storage type electric water heater with a higher energy consumption index (i.e. a higher percentage).

(a) Storage Type Electric Water Heater Energy Efficiency Grading

The energy efficiency grading of a storage type electric water heater shall be determined from Energy Efficiency Index as shown in Table 5, with Grade 1 being the most energy efficient and Grade 5 the least.

Table 5 – Derivation of energy efficiency grades

Energy Efficiency Index : I_{ε} (%)	Energy Efficiency Grade
$I_{\varepsilon} \leq 75$	1
$75 < I_{\varepsilon} \leq 90$	2
$90 < I_{\varepsilon} \leq 105$	3
$105 < I_{\varepsilon} \leq 120$	4
$120 < I_{\varepsilon}$	5

An example illustrating the method on how to determine the energy efficiency grade of a storage type electric water heater is shown in Annex 9.

8. Performance Requirements

- 8.1 In the test report submitted to the Director, the results of the test carried out in accordance with the relevant clauses of IEC 60379, or other equivalent international standards approved by the Director shall show that the concerned model of the storage type electric water heater conforms with the following performance requirements—
- (a) The measured standing loss shall not be greater than 105% of the rated standing loss.
 - (b) The measured water storage capacity shall not be lower than 98% of the rated water storage capacity.
 - (c) The measured hot water output shall not be lower than 90% of the rated hot water output.
 - (d) The measured reheating time shall not be longer than 110% of the rated reheating time.
- 8.2 The rated standing loss, rated water storage capacity, rated hot water output and rated reheating time as declared by the manufacturer or importer shall meet the requirements specified in clause 8.1 of the Code.

Safety Requirements

- 8.3 In addition to the energy efficiency performance requirements, all storage water heaters shall comply with the Electrical Products (Safety) Regulation, Chapter 406G of the Laws of Hong Kong, and the safety standards specified under the Regulation, and all other legislation concerning the safety of the storage water heaters, e.g. the Gas Safety Ordinance and its subsidiary legislations, as appropriate.

Number of Samples to be Tested

- 8.4 For submission of product information of a storage water heater model under clause 11.4 of the Scheme, a test report on one sample of the model shall be submitted.

9. Energy Label

- 9.1 The specification of the energy label for storage type electric water heater is shown in Annex 2. After a reference number has been assigned to a product model in the name of a specified person and included in the Director's record, the specified person shall produce the energy label for his/her products showing the energy efficiency grade and associated information in strict accordance with the requirements in Annex 2.
- 9.2 (a) Subject to clause 9.2(c), the energy label is to be attached or affixed to a prominent position of the storage type electric water heater and is to be

clearly visible.

- (b) For the avoidance of doubt, if only part of the storage type electric water heater is being exhibited, the energy label is to be attached or affixed to a prominent position of that part and is to be clearly visible.
 - (c) The energy label may be attached to the storage type electric water heater or its packaging in a manner specified by the Director where the Director has approved its being so attached.
- 9.3 The energy label shall be of cardboard, if it is to be attached as a swing tag, or be self-adhesive and shall be cut to the outline shown in Annex 2 or otherwise approved by the Director. A trim or die cut margin of up to 2 mm around the energy label is acceptable.
- 9.4 The paper used for the energy label shall be durable with good wear and tear characteristics.
- 9.5 The energy label should be printed in both Chinese and English. Soft copy of the energy label can be obtained from Energy Efficiency Office, Electrical and Mechanical Services Department

10. Testing Facilities, Laboratories & Accreditation Bodies

- 10.1 The testing shall be carried out either by independent test institutes or by the manufacturers or by the importers themselves at their own test facilities. The Authority will accept the results and certificates issued by the test laboratory, which fulfills one of the following criteria as specified in clauses 10.2, 10.3 or 10.4.
- 10.2 The laboratory is accredited by the Hong Kong Accreditation Service (HKAS) for the relevant test under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or a scheme with which HKAS has concluded a mutual recognition agreement (MRA) #, and the results are issued in a test report or certificate bearing the accreditation mark.
- 10.3 The Authority will also consider the following –
- (a) Self-certification by original manufacturers that the operations of their in-house laboratories satisfy the requirements of ISO/IEC 17025; and
 - (b) The manufacturers are currently operating according to a recognized international quality system (such as ISO 9001); and
 - (c) The manufacturer's in-house laboratories had successfully carried out tests on electric storage water heaters based on IEC 60379, and where these tests had been evaluated and certified by third party internationally recognised certification organisations.

- 10.4 The Authority will also consider the test results issued by a laboratory which is accredited by HKAS (or is under accreditation scheme operated by a laboratory accreditation body with which HKAS has concluded MRA) for the relevant tests on electrical and mechanical appliances other than the tests based on the technical standards stipulated in the Scheme; if the laboratory can demonstrate their capability of carrying out tests on Electric Storage Water Heaters based on the technical standard IEC 60379.

HKAS has concluded mutual recognition arrangements with overseas accreditation bodies for testing laboratory accreditation. The list of mutual recognition arrangement partners may change from time to time and the up-to-date list is available from the HKAS website of www.info.gov.hk/itc/hkas. Partners to these arrangements recognise the accreditations granted by one another as equivalent.

Laboratory Accreditation

- 10.5 Government takes cognizance of the need to ensure acceptable and compatible quality standards of testing laboratories, and considers that they need to be periodically accredited by some independent bodies.
- 10.6 The criteria of accreditation should be based on ISO/IEC 17025 and the certification body should operate in accordance with ISO/IEC 17011.
- 10.7 The Authority will recognize the accreditation granted by the HKAS under the HOKLAS and by overseas accreditation bodies with which HKAS has concluded MRA. For the accreditation by other certification bodies, the Authority will consider on a case-by-case basis.

Energy Efficiency Certification Service

- 10.8 An increasing number of countries now accept, as proof of product conformance, energy efficiency certification services provided by the organisation that has been accredited as a certification body. In accordance with this trend, the Authority will also consider test results that have been evaluated and certified according to the respective ISO or IEC standards of the Scheme by reputable certification organisations.

11. Registration and Participation

Registration Procedures

11.1 All manufacturers, importers and the other parties involved in the storage water heater distribution network are welcome and encouraged to participate in the Scheme. The Authority will send invitation to those known manufacturers and importers. However, no matter whether invited or not, any interested parties may submit their applications for the registration.

11.2 The proforma letter of invitation is shown in Annex 3.

11.3 Applicant should submit formal application to

*Chief Engineer/Energy Efficiency A
Energy Efficiency Office
Electrical and Mechanical Services Department
3 Kai Shing Street, Kowloon*

by means of an application letter through mail, facsimile or electronic mail. In order to ensure effective implementation of the Scheme, the applicant must commit himself to fully comply with the duties, responsibilities and obligations set out in the Scheme. The proforma letter of application as shown in Annex 4 details the aforesaid obligations and should be used for application. To facilitate the application process, the application form can be downloaded from EMSD website or via online application services.

Information/Documents to be Submitted for Registration

11.4 Each make and model of a storage water heater participating in the Scheme should be provided with a test report issued by a recognized laboratory. The test report should contain energy consumption tests and performance test results. The details of the technical information to be submitted together with the application are listed as follows: -

a) Information on the company

Name, Address, Telephone number, Fax number, E-mail address, Contact person, Importer, Distributor, etc.

b) Product to apply for participating in the Scheme:

Name of products, types, brand names, models, countries of origin

- c) The parties which will be responsible for making and fixing the Energy Labels;
- d) Commencement date to affix Energy Label on storage water heater
Year _____, Month _____
- e) Completion of the Information stated in the Energy Label for each product including the following:
- Brand (English & Chinese)
 - Model
 - Category of storage water heater
 - Rated Capacity
 - Heating Time[#]
 - Annual Energy Consumption due to Standby Loss[#]
 - Energy Efficiency Grade
- [#] *To enable easier public comprehension, the phrases "Heating Time" and "Standby Loss" are used on the energy label in place of "Reheating Time" and "Standing Loss" as in IEC 60379.*
- f) Supporting Technical Information and Calculations
- Test reports: -
- Energy Consumption due to Standing Loss
 - Performance Tests
- Calculations:-
- Energy Efficiency Index;
 - Energy Efficiency Grading
- g) Miscellaneous Technical Information:
- Product information catalogue
 - Information on insulation, pressure rating and pressure relief valve
 - Others
- h) Certificate of Safety Compliance prescribed by the "Electrical Products (Safety) Regulation of the Hong Kong Special Administrative Region" (Chapter 406G).

The above list of information can also be found in Annex 5, Information to be submitted to Energy Efficiency Office.

- 11.5 Company's name and chop should be stamped on all the documents provided. All photocopy test reports submitted to the Authority shall be certified true copy by appropriate organization.

Acceptance of Registration

- 11.6 On receipt of the application, the Authority will process the application and verify whether the storage water heater to be registered falls into the appropriate storage water heater category, and meets the energy efficiency and performance requirements based on the submitted data. The accuracy of the energy consumption data, their inconsistencies and non-compliance will be dealt with in accordance with clause 13.2.
- 11.7 If the application is accepted, the participants will be notified of the result in writing within 17 working days upon receipt of all necessary information requested. The participants will then be allowed to affix the label onto the 'registered' storage water heaters. Both manufacturer and importer of the registered storage water heater should ensure that the energy label is correctly printed and affixed on the storage water heater in accordance with section 9. The proforma letter of acceptance is shown in Annex 6.
- 11.8 If the application is rejected, the notification letter will also be issued within 17 working days upon receipt of all necessary information requested. The proforma letter of rejection is shown in Annex 7.
- 11.9 The flow chart for registration is shown in Annex 8

Participant's Duties, Responsibilities and Obligations

- 11.10 The participant is obliged to:-
- a) submit application and information including test results in accordance with format & procedures set out in clauses 11.4 and 11.5;
 - b) conduct tests via recognized laboratories and to comply with the specified test methodology and classification scheme;
 - c) produce and affix labels at his own costs;
 - d) fully inform other sales agents in his distribution network once the particular make and model of a storage water heater is registered under the Scheme;
 - e) allow random/ad-hoc inspection to be conducted by persons authorized by the Authority on registered storage water heater at his premises;

- f) conduct re-test(s) at his own costs at some recognized laboratories, if non-compliance is found on his registered water heater, or if the results of inspection suggest inaccurate energy label information being displayed. The result of re-test(s) shall reach the Authority within the prescribed period of time specified by the Authority; normally three months;
- g) inform the Authority of any change in the technical information and data that were previously submitted to the Authority together with the application letter;
- h) accept the fact that if registered water heater fails to perform in accordance with the required standard performance as given in section 8 and this cannot be readily rectified, the Authority may order it be de-registered from the Scheme; and
- i) remove all labels from the de-registered Electric Storage Water Heaters immediately.

11.11 The details of the registered storage water heaters under the Scheme will be kept in a register list maintained by the Authority. The registration records will be regularly uploaded and maintained in the EMSD Internet for public and interested parties for browsing and reference.

Termination

11.12 Under circumstances of poor performance such as –

- (a) (repeated) failure to fulfill the obligations set out under clause 11.10; or
- (b) false, inaccurate or misleading information is given on the energy label; or
- (c) in any other case where the Director is of the opinion that registration of the particular storage water heater is contrary to the public interest,

the Authority may de-register the concerned storage water heater from the Scheme with immediate effect by giving the participant a notice in writing. Once the storage water heater is de-registered, energy label is not allowed to fix on it. De-registration may occur even when there is no legal action taken under either the Trade Description Ordinance (Chapter 362) or the Copyright Ordinance (Chapter 528).

11.13 Participant who decides to discontinue participating in the Scheme or to withdraw any registered model from the registered Electric Storage Water Heaters list shall give at least three months' advance notice to the Authority.

12. Legal Provisions

- 12.1 The Scheme is a voluntary scheme. However, a participant who abuses the Scheme by giving false information on an energy label may contravene provisions of the Trade Description Ordinance (Chapter 362).
- 12.2 No one could take advantage of the Scheme by using the energy label on his storage water heaters without authorization of the Authority as that shall constitute an infringement of copyright under the Copyright Ordinance (Chapter 528).

13. Compliance, Monitoring and Inspection

Purpose

- 13.1 To uphold the credibility of the Scheme and to continue maintaining the confidence of the consumers, compliance check on energy labels on those storage water heaters participating in the Scheme are needed. Also, to avoid the non-participating parties from taking advantage of the Scheme by using unauthorized labels, suitable form of inspection shall be conducted on those storage water heaters which have not been registered under the Scheme.

Scope

- 13.2 The scope of inspection includes sample **checking** and **testing** of the following items:-
- (a) whether the energy label is affixed on the registered storage water heater;
 - (b) whether the energy label on the registered storage water heater is affixed to a prominent position in accordance with clause 9.2;
 - (c) whether the energy label being displayed is of correct format in accordance with section 9;
 - (d) whether the information on energy label accords with record;
 - (e) whether the registered storage water heater complies with the energy efficiency and the performance requirements;
 - (f) whether the data submitted by the participants are correct by random re-testing; and
 - (g) whether the unregistered storage water heaters display unauthorized energy labels.

- 13.3 The participants will be requested to take immediate remedial action and report of follow-up action taken if non-compliance is found on their storage water heaters.
- 13.4 During the compliance monitoring testing carried out by the Director, a registered model of storage type electric water heater will be accepted as conformance if the test results of a single sample of the registered model meet the following criteria:
- (a) The tested standing loss shall not be greater than 105% of the rated standing loss.
 - (b) The tested water storage capacity shall not be lower than 98% of the rated water storage capacity.
 - (c) The tested hot water output shall not be lower than 90% of the rated hot water output.
 - (d) The tested reheating time shall not be longer than 110% of the rated reheating time.
 - (e) The tested energy efficiency grade meeting either one of the following:
 - (i) The energy efficiency grade calculated in the compliance monitoring testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or
 - (ii) If the energy efficiency grade calculated in the compliance monitoring testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director by the specified person, the tested energy consumption index calculated in the compliance monitoring testing being not greater than 105% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.
- 13.5 The Director may remove from the registered record of storage type electric water heater, if he has reasonable grounds to believe that the storage type electric water heater does not conform with the specified information or a specified document, or their updates if any, submitted to the Director. The specified person may provide explanation on the failure of a product to pass the compliance monitoring testing stipulated in clause 13.4 above and apply for further testing of the concerned model for the Director's consideration.

- 13.6 If further testing is approved to be carried out, three samples of the same model shall be tested at the specified person's own costs. A registered model of storage type electric water heater will be accepted as conformance if the results of further testing meet the following criteria:
- (a) The average of the tested standing loss of all the samples shall not be greater than 105% of the rated standing loss.
 - (b) The average of the tested water storage capacity of all the samples shall not be lower than 98% of the rated water storage capacity.
 - (c) The average of the tested hot water output of all the samples shall not be lower than 90% of the rated hot water output.
 - (d) The average of the tested reheating time of all the samples shall not be longer than 110% of the rated reheating time.
 - (e) The tested energy efficiency grade meeting either one of the following:
 - (i) The energy efficiency grade determined by the average of the tested energy consumption index of all the samples calculated in the further testing being equal to or better than the energy efficiency grade determined by the test results submitted to the Director by the specified person; or
 - (ii) If the energy efficiency grade determined by the average of the tested energy consumption index of all the samples calculated in the further testing being not equal to nor better than the energy efficiency grade determined by the test results submitted to the Director by the specified person, the average of the tested energy consumption index of all the sample calculated in the further testing being not greater than 105% of the measured energy consumption index calculated by the test results submitted to the Director, and in any cases not greater than the highest energy consumption index allowed in the next lower energy efficiency grade.
- 13.7 If non-compliance is confirmed and no remedial action is to be taken by the applicant, the Authority may order it be de-registered from the Scheme. Failure to remove energy labels from the de-registered storage water heaters after the Director has withheld his authorization for using such labels may contravene the relevant ordinances.

Inspecting Officers

- 13.8 The Authority will authorize inspecting officers to carry out compliance monitoring and inspection on storage water heaters. The officers will carry proper identification cards which will be produced upon request during their inspection operations. However, the officer will not inform the participants in

advance of their intended inspection operation.

- 13.9 It is the participants' obligation to allow the inspecting officers to gain access to their premises to carry out inspection.

Mode of Inspection

- 13.10 Inspections will be carried out on registered storage water heaters under the Scheme on random basis. Based on the record of the registration, random inspection programmes will be developed.
- 13.11 In addition to the random inspections, the inspecting officers will carry out ad-hoc inspections in response to complaints. The items to be inspected in such a case will depend upon the nature of complaint and may include all types of inspection as stated in clause 13.2.
- 13.12 Inspections will normally be carried at the retail outlets and storage water heaters showrooms. Where necessary, inspection will also be done at warehouses.
- 13.13 The inspection results will be properly recorded for future analysis as well as on evaluation of the effectiveness of the Scheme.

14. Complaints and Appeal

- 14.1 The Authority will be responsible for dealing with the complaints from participant and other parties against matters related to the Scheme.

Complaints Handling Procedures

- 14.2 The Director shall ensure that complaints are properly recorded and handled without undue delay.
- 14.3 The Authority shall carry out preliminary investigation on complaints and reply to the complainants within a reasonable time. For complaints that require site inspection and laboratory test, the complainant shall be notified through an interim reply.
- 14.4 The Authority shall inform the complainant of the results or decisions made on the complaint.

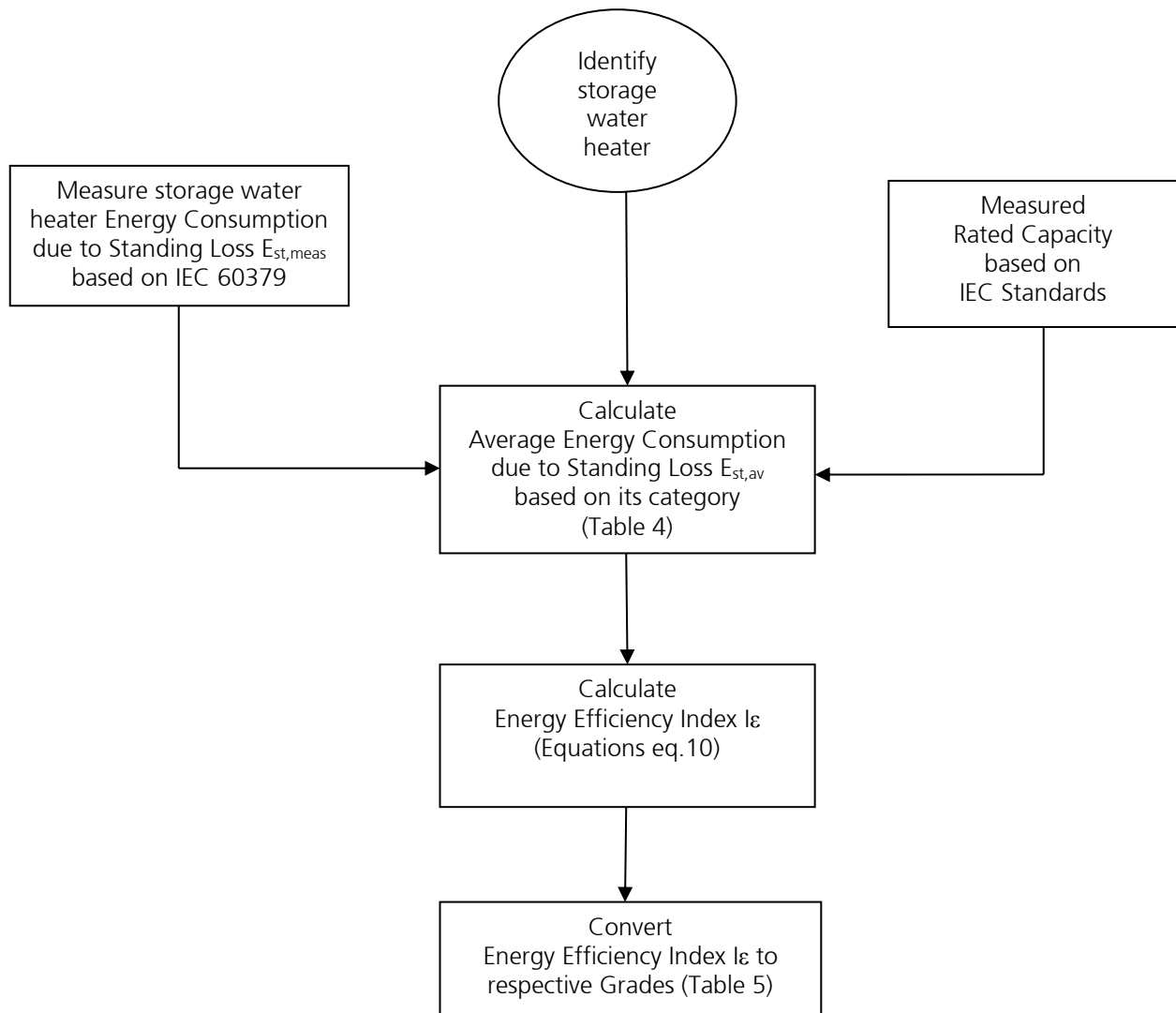
Appeal Procedures

- 14.5 A participant who feels aggrieved by the decision or action given by the Authority according to section 13 may appeal to the Director in writing stating the reason for the appeal.
- 14.6 The Director may decide to suspend the decision or action given by the Authority from the day on which the appeal is made until such appeal is disposed of, withdrawn or abandoned unless such suspension would, in the opinion of the Director, be contrary to public interest.
- 14.7 The Director may by notice to the appellant require that appellant to attend meeting with him or his representative, provide documents and give evidence relevant to the appeal.
- 14.8 The Director shall notify the appellant of his decision and the reasons for it. The decision will be final and binding.

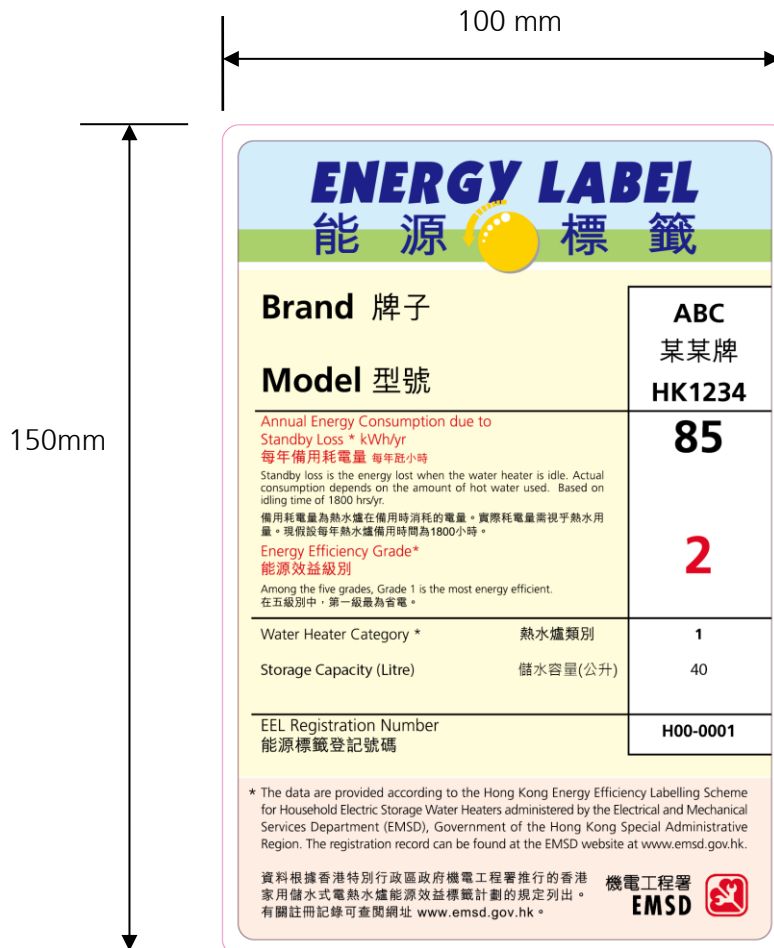
15. Maintenance of Scheme

- 15.1 To ensure that the Scheme can continue to operate effectively and efficiently after its introduction, a proper system of maintenance is needed.
- 15.2 The maintenance system consists essentially of -
- (a) Continuous updating of the following relevant information of the participants in the Scheme -
 - i. Details of the registered storage water heaters such as registration number, date of registration or de-registration if it occurs, energy consumption data, energy efficiency index, performance data, make, model, category and other related information; and
 - ii. Details of the registered importers, manufacturers, local agents, etc.; in the distribution network such as address, date of registration or de-registration if it incurs, etc.
 - (b) Periodic review of the test methodology, and procedures for application of registration and compliance monitoring, etc., to bring them in line with the latest needs of the manufacturers, importers and retailers, etc.
 - (c) Continuous evaluation of the effectiveness of the Scheme and assessment of what changes are necessary.

The Hong Kong Voluntary Energy Efficiency Labelling Scheme
for Electric Storage Water Heaters -
Developing Storage Water Heater Energy Efficiency Grade



The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters – Energy Label Format



(Not to Scale)

The figure of the energy label is shown not to scale.

Soft copy of this label can be obtained from Energy Efficiency Office, Electrical and Mechanical Services Department.

Proforma Letter of Invitation

Our ref. () EMSD/EEO/LB/11

Your ref.

Tel.

Fax.

Date

[Name and Address of
Manufacturers/Importers/Agents

]

Dear Sir/Madam,

**Invitation of Application for Registration in
The Hong Kong Voluntary Energy Efficiency Labelling Scheme for
Electric Storage Water Heaters**

Having gone through the necessary consultations and duly considered the views from various concerned parties, the government has decided to introduce a voluntary energy efficiency labelling scheme for Electric Storage Water Heaters to Hong Kong with effect from (_____). The details of the Scheme① have been finalized and I enclose herewith a guide of the Scheme for your reference.

Being one of the major Electric Storage Water Heaters manufacturers / importers / agents② in Hong Kong, you are invited to participate in the Scheme so as to take part in promoting public awareness in energy conservation and environmental improvement to Hong Kong. If you are interested to participate in the scheme, please apply in accordance with the proforma letter of application (Annex 4) and submit details including technical information in accordance with the attached Annex 5 to the 'Chief Engineer / Energy Efficiency A' at the following address.

Energy Efficiency Office

Electrical and Mechanical Services Department

3 Kai Shing Street, Kowloon

Hong Kong

Please be reminded to submit accurate test data to support your application. Under this Scheme, routine compliance monitoring and checking will be performed and if a registered water heater is found to be non-compliant, we may consider deregistering the Electric Storage Water Heaters from the Scheme.

Should you need further clarification or information, you are most welcome to contact the undersigned or Mr _____, at the telephone number _____.

Yours faithfully,

for Director of Electrical & Mechanical Services

— —
(Note : ❶ 'Scheme' means 'The Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters '

❷ delete as appropriate)

Proforma Letter of Application

Your ref. () EMSD/EEO/LB/11

Our ref.

Tel.

Date

Chief Engineer/Energy Efficiency A
Electrical & Mechanical Services Department
3 Kai Shing Street, Kowloon
Hong Kong

Dear Sir/Madam,

Application for Registration in The Hong Kong Voluntary Energy Efficiency Labelling Scheme for Electric Storage Water Heaters

Our company is the (manufacturer/importer/agent*) of _____ in Hong Kong. We support the introduction the labelling scheme to Hong Kong and would like to be one of the participants in the Scheme to promote energy efficiency.

I understand fully the obligations and duties stated in the Scheme and will comply with all relevant requirements, in particular those specified below:

- i) conduct tests via recognized laboratories and to comply with the specified test standards;
- ii) produce and affix specified labels at my own costs;
- iii) allow random/ad-hoc inspection to be conducted by persons authorized by the issuing Authority on registered water heater at my premises;
- iv) conduct re-test(s) at my own costs at some recognized laboratories, if the results of inspection suggest inaccurate energy label information being displayed. The result of re-test(s) shall reach the Authority within the prescribed period time specified by the Authority;
- v) inform the Authority of any change in the technical information and data that were previously submitted to the Authority together with the application letter; and
- vi) accept the fact that if water heater fails to perform in accordance with the required energy efficiency standards and performance as given in Sections 6 & 7 and this cannot be readily rectified, the Authority may order it be de-registered from the Scheme.

The details of information of those Electric Storage Water Heaters which we intend to register with the Authority are shown in the attached document (Annex 5), and are submitted herewith for your vetting.

Yours faithfully,

(Manufacturer/Importer/Agent's Name and Company Chop)

* *delete as appropriate*

Information to be submitted to Energy Efficiency Office

1. Information on the Company:
Name, Address, Telephone number, Fax number, Email address, Contact person, Importer, Distributor, etc.
2. Product to apply for participating in the Scheme:
Name of products, types, make, model references, countries of origin
3. Parties which will be responsible for making and fixing the Energy Label.
4. Commencement date to affix Energy Labels on Water heater package
Year _____, Month _____
5. Completion of the Information stated in the Energy Label for each product including the following:
 - Brand (English & Chinese)
 - Model
 - Category of Storage Water Heater
 - Rated Capacity
 - Heating Time[#]
 - Annual Energy Consumption due to Standby Loss[#]
 - Energy Efficiency Grade

[#] *To enable easier public comprehension, the phrases "Heating Time" and "Standby Loss" are used on the energy label in place of "Reheating Time" and "Standing Loss" as in IEC 60379.*
6. Supporting Technical Information and Calculations:
 - Test reports for : -
 - Energy Consumption due to Standing Loss (section 6)
 - Performance Tests (section 7)
 - Calculations for :-
 - Energy Efficiency Index
 - Energy Efficiency Grading
7. Miscellaneous Technical Information:
 - (a) Product information catalogue;
 - (b) Information on insulation, pressure relief valve and pressure rating; and
 - (c) Others
8. Certificate of Safety Compliance prescribed by the Electrical Products (Safety) Regulation of HKSAR for the concerned Electric Storage Water Heaters in the application.

Note: *Company's name and chop should be stamped on the all documents provided.*

All test reports submitted to the office should be certified true copy by appropriate organization.

Proforma Letter of Acceptance

Your ref.

Our ref. () EMSD/EEO/LB/11

Tel:

Fax:

Date

┌

Name and Address of
Manufacturers/Importers/Agents

└

Dear Sir/Madam,

**Acceptance of Application for Registration in
The Hong Kong Voluntary Energy Efficiency Labelling Scheme for
Electric Storage Water Heaters**

With reference to your letter of ref. _____ dated _____, we are pleased to inform you that your application to participate in the captioned scheme has been accepted.

We enclose herewith the registration certificates of Electric Storage Water Heaters registered. The registered Electric Storage Water Heaters are as follows:

<u>Brand/Make/Model</u>	<u>Registration No.</u>	<u>Effective date</u>
(_____)	(_____)	(_____)

You are allowed to affix a specified energy label onto each and every water heater package registered under the Scheme. The contents of the energy label should be based on the information that you have provided in your application ref. _____ and dated _____.

Should you have any queries regarding the scheme, please contact this office.

Yours faithfully,

for Director of Electrical & Mechanical Services

Proforma Letter of Rejection

Our ref. () EMSD/EEO/LB/11

Your ref.

Tel.

Fax.

Date

[

Name and Address of
Manufacturers/Importers/Agents

]

Dear Sir/Madam,

**Rejection of Application for Registration in
The Hong Kong Voluntary Energy Efficiency Labelling Scheme for
Electric Storage Water Heaters**

With reference to your letter of ref. _____ dated _ _____,
we regret to inform you that your application for registration in the scheme has not been
accepted for the following reasons:-

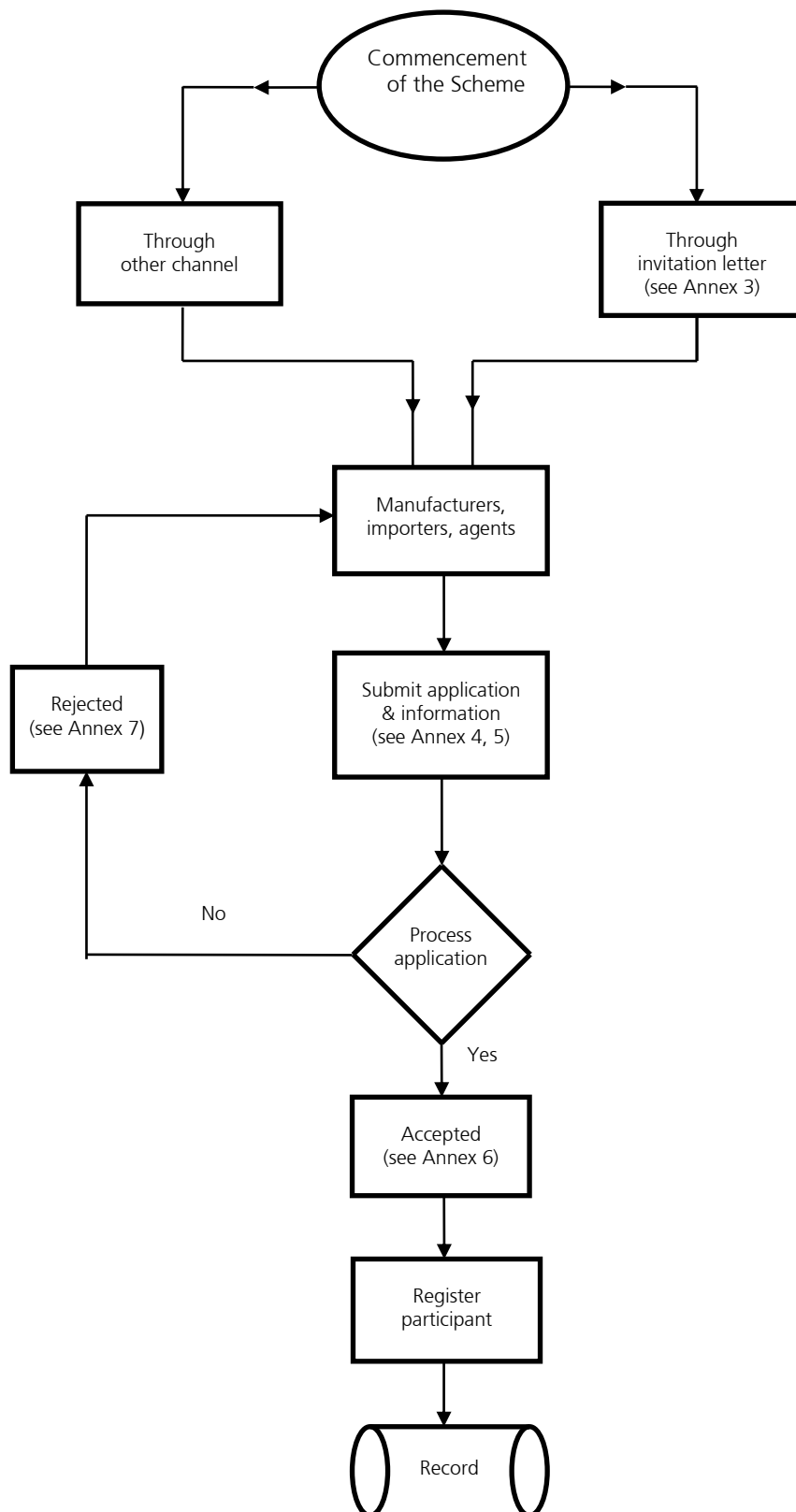
1. _____,
2. _____, etc.

You are most welcome to submit new application again in future, when you
have the necessary documents / information to support your application.

Yours faithfully,

for Director of Electrical & Mechanical Services

**The Hong Kong Voluntary Energy Efficiency Labelling Scheme
for Electric Storage Water Heaters –
Flow Chart of Registration**



Example for Calculating the Energy Efficiency Grade of Storage Water Heater

The given example in this Annex is a storage water heater of Category 1 (i.e. small unvented type domestic electric storage water heater).

The following data are measured according to the required standard:

Rated capacity (V) : 40 litres

Measured standing loss per 24 hours ($E_{st, meas}$) : 1.05 kWh/24h

According to Table 4 in clause 6.8 of the Scheme, for Category 1 storage water heater :

Average Energy Consumption per 24 hours due to standing loss :

$$\begin{aligned} E_{st, av} &= 0.13 + 0.0553 V^{2/3} && \text{(where } V = 40 \text{)} \\ &= 0.777 \text{ kWh/24h} \end{aligned}$$

Average energy consumption per 24 hours due to Fixed Loss, for Category 1 storage water heater,

$$E_{st, fix} = 0.072 \text{ kWh/24h}$$

According to Table 3 in clause 6.7 of the Scheme, for Category 1 storage water heater :

Local factor (Phase 3 - with effect from 1 May 2011) for Category 1 storage water heater,

$$E_{st, loc} = 0.2 \text{ kWh/24h}$$

According to equations eq.6 in clause 6.7, eq.7 in clause 6.8 and eq.10 in clause 7.1 of the Scheme, *Energy Efficiency Index* of the storage water heater :

$$\begin{aligned} I_{\epsilon} &= (E_{st, var} / E_{st, av, var}) \times 100\% \\ &= (E_{st, meas} - E_{st, fix} - E_{loc}) / (E_{st, av} - E_{st, fix}) \times 100\% \\ &= [(1.05 - 0.072 - 0.2) / (0.777 - 0.072)] \times 100\% \\ &= 110\% \end{aligned}$$

The value of energy efficiency index of the storage water heater is 110% which is between 105% and 120%. According to Table 5 in clause 7.1 of the Scheme, the storage water heater should be rated as **Grade 4** storage water heater.