UNITED ARAB EMIRATES STANDARD

UAE.S 5010-4:2021

Labeling – Energy Efficiency Label for Electrical Appliances
Part 4: Electric Storage Water Heaters

ICS: 75.020

ELECTRIC WATER HEATERS – FULL CERTIFICATION SCHEME

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1. **Scope**

This regulation establishes requirements for electric storage water heaters for household and similar purposes and intended for heating water below boiling temperature, their rated capacity being not more than 500 liters.

2. **Applicable Standards**

The following standard shall apply:

2.1. UAE.S IEC 60379:2013 1987 – Methods for measuring the performance of electric storage water heaters for household appliances
2.2. UAE.S IEC 60335-1: 2020 :
2.3. UAE.S IEC 60335-2-21: 2018 :

3. **Terms and Definitions**

For the purpose of this regulation, the following terms shall apply:

3.1. MOIAT – Ministry of Industry and Advance Technology , the national authority mandated to implement this regulation.
3.2. (ECAS) Emirates Conformity Assessment Scheme for Low Voltage Equipment (LVE)
3.3. • Rated water capacity: the water capacity (in liters) specified for the water heater and indicated on it by the manufacturer.
3.4. • Rated input: The electrical power (in watts or in kilowatts) specified for the water heater and indicated on it by the manufacturer.
3.5. • Stable loss per 24 hours: The energy consumed for a water-filled heater after it reaches stable conditions when it is connected to the electricity source during any 24-hour period without drawing water from the heater.
3.6. • Rated voltage: the voltage in volts (in the case of a three-phase source, the voltage between two phases) specified for the water heater and indicated on it by the manufacturer.
4. **Product Requirements**

Products covered by this regulation shall comply with the requirements stipulated under this section.

4.1. **National Deviations**

The following deviations shall be met by products covered by this regulation:

4.1.1. Voltage Rating: 220V-240V
4.1.2. Frequency Rating: 50Hz
4.1.3. Arabic Instruction Manual shall be provided along with the product.

4.2. **Electrical Safety**

This section gives reference to the requirements set by the Emirates Conformity Assessment Scheme (ECAS) for Low Voltage Equipment (LVE). Products covered by this Technical Regulation shall comply with the requirements set by the applicable standards reference in the ECAS for Low Voltage Equipment (LVE).

4.3. **Energy Efficiency Label**

The product shall be supplied with the energy efficiency label as per the prescribed design in this regulation. Products that are displayed in the market shall be affixed with the energy efficiency label.

The energy efficiency label shall be affixed on the packaging of the product without exemptions, as prescribed in Annex (A) of this regulation.

The energy efficiency label for products not intended for display may be provided or supplied along with the instruction manual.

All energy efficiency labels shall be printed with the energy efficiency serial number which is assigned

5. **Appliance Classification**

All electric storage water heaters covered by this regulation shall be classified into four (4) categories as per below descriptions:
Table 1: Appliance Classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unvented electric storage water heaters having a rated capacity not exceeding 30 liters</td>
</tr>
<tr>
<td>2</td>
<td>Open-outlet electric storage water heaters having a rated capacity not exceeding 30 liters</td>
</tr>
<tr>
<td>3</td>
<td>Horizontal tank type electric storage water heaters having a rated capacity 30 liters up to 500 liters</td>
</tr>
<tr>
<td>4</td>
<td>Vertical tank type electric storage water heaters having a rated capacity 30 liters up to 500 liters</td>
</tr>
</tbody>
</table>

6. **Energy Efficiency Index Calculation**

The following formula and factors shall apply in calculating the energy efficiency index of the product.

6.1. **Energy Consumed** ($E_{cons}$)

\[
E_{cons} = \frac{E_1}{t_1} \times 24
\]

Where: $E_1$ – Energy consumed over $t_1$ duration $> 48$ hours

$t_1$ – Elapsed time where steady state condition is reached and measurement of $E_1$ is done

6.2. **Mean Water Temperature** ($\theta_M$)

\[
\theta_M = \frac{\theta_A + \theta_E}{2}
\]

Where: $\theta_A$ – Mean water temperature after a thermostat cut-out

$\theta_E$ – Mean water temperature after thermostat cut-in

6.3. **Standby Loss** ($Q_{pr}$)

\[
Q_{pr} = \frac{45}{\theta_M - \theta_{amb}} \times E_{cons}
\]
Table 2: Average Energy Consumption for Standby and Fixed Loss

<table>
<thead>
<tr>
<th>Appliance Category</th>
<th>Average Energy Consumption (Standby Loss) (kWh/24h) $E_{av_{standby}}$</th>
<th>Average Energy Consumption (Fixed Loss) (kWh/24h) $E_{av_{fixed}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>0.13 + 0.0553$V^{0.6}$</td>
<td>0.072</td>
</tr>
<tr>
<td>3</td>
<td>0.75 + 0.008$V$</td>
<td>0.12</td>
</tr>
<tr>
<td>4</td>
<td>0.75 + 0.008$V$</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Note: $V$ is the rated capacity in liters

6.4. Standard Energy Consumption ($E_{std}$)

$$E_{std} = E_{av_{standby}} + E_{av_{fixed}}$$

Table 3: Local Factor

<table>
<thead>
<tr>
<th>Appliance Category</th>
<th>Local Factor (kWh/24h) $E_{loc}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>4</td>
<td>0.3</td>
</tr>
</tbody>
</table>

6.5. Calculated Energy Consumption ($E_{calc}$)

$$E_{calc} = Q_{pr} - E_{av_{fixed}} - E_{loc}$$

6.6. Energy Efficiency Index ($I_e$)

$$I_e = \frac{E_{calc}}{E_{std}} \times 100\%$$

Table 4: Energy Efficiency Index

<table>
<thead>
<tr>
<th>Star Rating</th>
<th>Energy Efficiency Index ($I_e$) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$I_e \leq 50$</td>
</tr>
<tr>
<td>4</td>
<td>$50 &lt; I_e \leq 60$</td>
</tr>
<tr>
<td>3</td>
<td>$60 &lt; I_e \leq 70$</td>
</tr>
<tr>
<td>2</td>
<td>$70 &lt; I_e \leq 85$</td>
</tr>
<tr>
<td>1</td>
<td>$85 &lt; I_e \leq 100$</td>
</tr>
</tbody>
</table>
7. **Annual Energy Consumption Calculation**

The annual energy consumption of the product shall be calculated using the formula below:

\[ AEC = Q_{pr} \times 75 \]

Note: An assumption of an annual standby hour of 1,800 hours.

8. **Manufacturer Requirements**

Manufacturers of the product shall have an effective implementation of a Quality Management System for production and control based on the latest edition of ISO 9001 standard.

9. **Product Certification**

The product(s) shall comply with the requirements of a Model H conformity assessment.

Annex A – Energy Efficiency Label Design