

DRAFT TANZANIA STANDARD

Household electric cooking appliances - Minimum Energy Performance Requirements and test methods- Part 1: Electric Pressure Cooker

TANZANIA BUREAU OF STANDARDS

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Foreword

This Tanzania Standard was approved under the authority of the Board of Director of Tanzania Bureau of Standards.

Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established by Standards Act Cap. 130.

Tanzania Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. The Technical Committees work under the supervision of Divisional (sectoral) Committees. The Standards are developed in accordance with the Guide and Procedure for Development of Tanzania Standards and TZS 0: Guide for presentation of Tanzania standards.

Tanzania Standards are subject to review, to keep pace with science and technological advances. Users of the Tanzania Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

This Tanzania Standard was developed under the supervision of the Electrotechnical Divisional Standards Technical Committee (EDC). The Technical Committee responsible for the standard is EDC 7 – Energy Efficiency.

The reporting of the result of a test or analysis made in accordance with this Tanzania Standard, if the final value, observed or calculated is to be rounded off, shall be done in accordance with TZS 4.

Household electric cooking appliances - Minimum Energy Performance - Part 1 - Requirements and test method for electric pressure cooker

1 Scope

This draft Tanzania standard specifies minimum energy performance and labelling requirements for household electric pressure cookers. It also provides test methods for energy performance.

This document is applicable for the Electric pressure cooker (EPC) for household with a rated voltage of not greater than AC 250V, automatic working pressure control function, heated by electric heating elements or electromagnetic induction, with a rated power of not greater than 2,200W, a rated capacity of not larger than 12L and a rated cooking pressure of 40kPa up to 140kPa (gauge pressure).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 448-2-15/IEC 60335-2-15, Household and similar electrical appliances - Safety - Part 2-15: Particular requirements for appliances for heating liquids

IEC 60350-1 *Household electric cooking appliances – Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60350-1 and the following shall apply.

3.1

electric pressure cooker (EPC)

kitchen appliance designed to cook food by heating it under pressure within a sealed container, using an electric heating element or electromagnetic induction

Note to entry: It operates by maintaining a specific pressure and temperature within the container, allowing for faster cooking time

3.2

heating efficiency

ratio of effective output energy to input energy of electric pressure cooker

3.3

network mode(s)

network mode of EPC where the EPC is connected to a main power supply and at least one network function is activated (such as reactivation via network command or network integrity communication) but where the primary function is not activated

Note to entry: Where a network function is not activated and/or not connected to a network, then this mode is not applicable. The network function may be triggered by a pre-set instruction set or a network request response. The meaning of "network" herein includes communication between two, more mutually independent power supply devices, or kitchen appliances. A network does not include one or more controls, which are dedicated to a single kitchen appliance. Network mode may include one or more standby functions.

3.4

warm-keeping energy consumption

electricity consumption when the EPC enters the warm-keeping state

4 Requirements

EPCs within the scope of this standard shall meet the following requirements:

4.1 Safety requirements

EPCs shall comply with the safety requirements prescribed in TZS 448-2-15/IEC 60335-2-15

4.2 Energy Performance and labelling requirements

EPCs shall comply with the energy performance and labelling requirements given in **4.2.1** and **4.2.2** respectively

4.2.1 Energy Performance requirements

EPCs within the scope of this standard shall meet or exceed the energy efficiency levels given in Table 1 and shall not exceed the standby power and warm-keeping energy consumption given in Table 2.

Table 1 — Minimum Efficiency Requirements

Capacity in litres, L	Heating efficiency/%
$V \leq 3.5\text{L}$	≥ 60
$3.5 < V < 7.5\text{L}$	≥ 65
$7.5 \leq V \leq 12\text{L}$	≥ 72
Note 1: V refers to the rated volume of electric pressure cookers in Litres (L)	

Table 2 — Standby power and warm-keeping energy consumption requirements

Standby power in Watts (W)	Heated by electrical heating element	Network mode is not available	≤1.8
		Network mode is available	≤2.0
	Electromagnetic induction heating	Network mode is not available	≤1.8
		Network mode is available	≤2.0
Warm-keeping energy consumption/(W·h)			≤60
Note: If the network mode can be turned off, it is also necessary to test the standby power when the network mode is not available.			

4.2.2 Energy star rating classification

The energy star rating for EPCs is classified into 5 categories, in which star 5 is the highest. The heating efficiency, standby power (if applicable) and warm-keeping energy consumption (if applicable) for each grade of products shall meet the requirements of Table 3

Table 3 — Energy star rating classification

Volume in Litres		Number of stars				
		5	4	3	2	1
Heating efficiency/%	$V \leq 3.5$	≥ 75	≥ 71	≥ 68	≥ 64	≥ 60
	$3.5 < V < 7.5$	≥ 81	≥ 76	≥ 74	≥ 70	≥ 65
	$7.5 \leq V \leq 10$	≥ 87	≥ 82	≥ 80	≥ 75	≥ 72
Note 2: V refers to the rated volume of electric pressure cookers in litres (L)						

4.2.3 Label Type and Size

The product shall be legibly and indelibly marked / labeled with the following:

- Type of appliance;
- Rated power consumption in Watts, W;
- Capacity in litres, L.

- d. Energy star rating;
- e. Energy efficiency (in one decimal place).
- f. Standard number; and
- g. Label serial numbers.

If applicable, Warm-keeping energy consumption/(W·h), Standby power in Watts, W, shall be included in the QR code on the label. Any other relevant information shall also be included in the QR code.

The label specification and user guide shall be as given in **Annex A**.

4.2.4 Label Positioning and Attachment

EPCs shall display the label at the point of sale. The label shall be,

- a) Non-sticky pop-up type label affixed to the side, and
- b) Self –adhesive affixed on the packaging box.

5.0 Test Method and Energy Performance calculations

5.1 Test conditions

The tests to be conducted shall adhere to the following conditions:

5.1.1 Environment conditions

Unless otherwise specified, the test shall be conducted indoor under the following environmental conditions:

- a) ambient temperature: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$, wind speed $< 0.5\text{m/s}$, with no significant influence of heat radiation;
- b) relative humidity: 45% up to 75%;
- c) Atmospheric pressure: 98kPa up to 106kPa.

5.1.2 Power supply

The test shall be carried out at a test voltage of $220\text{V} \pm 2.2\text{V}$ and a frequency of $50\text{Hz} \pm 1\text{Hz}$.

5.1.3 Measuring instruments and apparatus for the test

The test instruments and apparatus shall meet the following requirements:

- a) the accuracy of voltmeter, power meter and electrical energy meter is not less than $\pm 0.5\%$;
- b) the temperature measuring instrument has a resolution of 0.1°C and an accuracy of not less than $\pm 0.5\%$;
- c) the timer has a resolution of 0.01s and an accuracy of $\pm 2\text{s/h}$;
- d) when the weighing instrument is in full scale, the relative error is not greater than $\pm 0.1\%$, and the minimum display (scale) value is 1g ;
- e) fine-wire thermocouple with data logging capability having a wire diameter not exceeding 0.3mm or a wireless thermocouple may be adopted in order not to disrupt the seal.

5. 1.4 Water

Potable water shall be used for the test.

5. 1.5 Initial test conditions

Prior to each test, the temperature difference between the electric pressure cooker and the environment shall be within 5°C or the appliance shall be in idle state for at least 6h .

5.1.6 Preparation before test:

- a) the test shall be carried out under the maximum cooking pressure function specified in the instructions for use of the electric pressure cooker, and the pressure cooking time shall be greater than 30min ;
- b) for electric pressure cookers having two or more inner pots, if the use of inner pot is indicated in the instructions for use, the test shall be carried out according to the designated inner pot;
- c) the test procedure covered in this document shall not change or damage the structure and tightness of the electric pressure cooker.

5.2 Test methods

5.2.1 Determination of electricity consumption

During the test, the initial water temperature is $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$, which shall be consistent with the ambient temperature (with a temperature difference not exceeding 1°C). The test procedure is as follows:

- a) add water up to 50% of the rated capacity into the inner pot, and measure the initial water temperature t_1 ;

- b) put the temperature measuring device into the inner pot, make the temperature measurement point dip into the water surface for 10mm to 30mm, and try to fix the temperature measurement point in the $\varnothing 50\text{mm}$ cylindrical space at the centre of the inner pot;
- c) power on and connect to the test voltage, select the mode with the maximum cooking pressure and the pressure cooking time longer than 30min, and start recording the electricity consumption of the electric pressure cooker with an electrical energy meter;
- d) when the internal cooking temperature of the electric pressure cooker reaches 100°C , start recording the temperature continuously, once per second. After the electric pressurecooker works continuously for 30min, read the electricity consumption E , stop recording the temperature t , and calculate the average value $\bar{t}$ using Equation A.3.

The energy efficiency of electric pressure cookers may be tested with thermocouples or real-time temperature measurement and wireless signal transmission instruments with the same higher accuracy. In case of any dispute in the test result, the test data of real-time temperature measurement and wireless signal transmission instruments with the same or higher accuracy shall prevail.

5.2.2 Calculation of heating efficiency

The heating efficiency of electric pressure cookers shall be calculated using Equation (A.1) to Equation (A.4):

$$n_p = \frac{\lambda x G x (H_t - H_{t_1})}{3.6 x E} x 100\% \quad \text{..... (A.1)}$$

$$H_t = 9.6012 x \bar{t} - 539.64 (100^{\circ}\text{C} \leq t < 140) \quad \text{..... (A.2)}$$

$$\bar{t} = \sum \frac{t}{1800} \quad \text{..... (A.3)}$$

$$H_{t_1} = 4.1875 x t_1 + 0.1439 (20^{\circ}\text{C} \leq t < 100^{\circ}\text{C}) \quad \text{..... (A.4)}$$

where,

η_p —the heating efficiency of electric pressure cookers, accurate to one decimal place;

λ —the heating method correction coefficient, $\lambda=1.15$ for products heated by electromagnetic induction; $\lambda=1.0$ for products heated by electric heating elements;

G —the mass of water before the test, kg;

H_t —the enthalpy corresponding to the arithmetic mean of the cooking temperature in the pot that works continuously for 30min when the temperature is higher than 100°C, kJ/kg, which is calculated using Equation (A.2);

H_i —the enthalpy corresponding to the initial water temperature before the test, kJ/kg, which is calculated using Equation (A.4);

E —the electricity consumption, W·h, accurate to two decimal places;

$\bar{t}$ —the arithmetic mean of the cooking temperature in the pot that works continuously for 30min when the temperature is higher than 100°C, °C, which is calculated using Equation (A.3), accurate to one decimal place;

t —the cooking temperature in the pot that works continuously for 30min when the temperature is higher than 100°C, which is recorded once per second, °C, accurate to one decimal place;

t_1 —the water temperature before the test, °C, accurate to one decimal place.

NOTE: The energy consumption measurement starts from the pressure phase to the heating phase in order to capture the total energy consumption of all phases for accurate efficiency measurement.

5.2.3 Test on warm-keeping energy consumption

During the test on warm-keeping energy consumption of electric pressure cookers, the initial water temperature is 23°C±2°C. The test procedure is as follows:

- add water up to 50% of the rated capacity into the inner pot;
- try to fix the temperature measuring thermocouple in the $\varnothing 50\text{mm}$ cylindrical space at the centre of the inner pot, 10mm±2mm away from the bottom of the pot;
- heat by powering on the electric pressure cooker, force the electric pressure cooker to enter the

warm-keeping state when the water temperature reaches 90°C, and start to record the time and electricity consumption;

- d) measure the electricity consumption within 5h, and then calculate the electricity consumption per hour as warm-keeping energy consumption; start to measure the temperature at the 4th hour, and monitor the temperature continuously until the 5th hour, during which the temperature in the pot shall be above 60°C.

If the electric pressure cooker is heated by electromagnetic induction, and its magnetic field excessively affects the measurement results, the electricity consumption may be measured by stranded platinum resistance thermometer or other equivalent methods.

5.2.4 Standby power test

The standby power test method is as follows:

- a) Standby power when the network mode is not available

Measure the electricity consumption of the electric pressure cooker in standby state for 4h, and then calculate the electricity consumption per hour as the standby power. For electric pressure cookers with wake-up function, they shall be kept in the non-wake-up state during the test.

- b) Standby power when the network mode is available

Measure the electricity consumption of the electric pressure cooker in network standby state for 4h, and then calculate the electricity consumption per hour as the network standby power. For networked electric pressure cookers with wake-up function, they shall be kept in the non-wake-up state during the test.

ANNEX A

(Normative)

ENERGY LABEL SPECIFICATION AND USER GUIDE FOR ELECTRIC PRESSURE COOKERS (EPC)

The Energy Efficiency labels shall be affixed to the side of an appliance in a clearly visible and upright position. The label shall be self-adhesive or non-sticky and shall be as per the example attached in **A.1**

A.1. Energy Label Example



Figure B.1 Typical example for EPC's energy label

The following information shall be included on the label:

A.2. Dimensions and positions of Label Elements

The label shall be 125mm long and 72mm wide. The dimensions and positions of the elements constituting the label shall be as indicated below:

- a) **NATIONAL FLAG:** The Tanzania flag shall be in a 15mm by 13 mm rectangular area, placed 2.25 mm from the left margin and 1.95mm from the top margins of the label.
- b) **“ENERGY LABEL” title:** This shall be 13 mm wide and 52.5 mm long, positioned 1.95 mm from the top margin and 2.25 mm from right margin of the label.
- c) **Type of Unit:** The word ‘**ELECTRIC PRESSURE COOKER**’ shall be 3 mm from the left margin and 17.55 mm from the top margin.
- d) **Colour bars:** They shall be 0.975 mm wide. The first and last bars, starting from the left, shall be 22.5 mm long, while each intermediate bar shall be 7.5 mm long. All bars shall be positioned 22.10 mm from the top margin
- e) **Most efficient” text:** The text shall be located 3 mm from the left margin and 27.30 mm from the top margin.
- f) **Least efficient” text:** The text shall be located 3 mm from the left margin and 63.05 mm from the top margin.
- g) **Stars bars:** The enclosing bar for the 5-star rating shall measure 5.525 mm in width and 37.50 mm in length. The subsequent bars for the 4-star, 3-star, 2-star, and 1-star ratings shall maintain the same width of 5.525 mm with a uniform spacing of 0.975 mm between each subsequent bar. The length of the enclosing bar shall decrease in length by 7.50 mm for each level, starting from 37.50 mm for the 5-star rating and reducing progressively. The 5-star enclosing bar shall be positioned 3 mm from the left margin and 30.55mm mm from the top margin.
- h) **Stars:** Shall be 5.20mm wide, 6.30 mm long, with a uniform spacing of 1.20 mm between each star, and centered within in the star bar.
- i) **The pointing arrow:** The arrow indicating the EPC star rating shall be 7.80 mm wide and 17.25 mm long, with a pointer angle of 73.74°, positioned 2.25 mm from the right margin and aligned centrally with the corresponding star bar (ranging from 1 to 5)."
- j) **EPC’s icon:** The EPC icon shall fit within a rectangle measuring 20.80 mm in height and 22.50 mm in width, positioned 2.25 mm from the left margin and 37.50 mm above the bottom margin
- k) **QR code:** The QR code shall measure 20mm by 20mm. It shall be 3.75 mm from the right margin and 50mm above the bottom margin.
- l) **Footer:** The bar shall be 26 mm wide and 72 mm long.

A.3 Label Design and Colour Specifications

- **Background:** The background of the label shall be 100% white.
- **Border:** The label border shall be 0.325 mm wide.
- **Typeface:** The typefaces used shall be Verdana and Calibri.
- **Colour Specifications (CMYK format):** The label's colours shall follow the CMYK format:
 - **Label and squares Border:** 100, 50, 0, 0
 - **National flag Logo:** Original colours as per the official logo
 - **Background of the Energy Label section:** 100, 0, 100, 50.
 - **The text colour for 'ENERGY LABEL'** shall be 100% white (CMYK: 0, 0, 0, 0), while the text colour for 'EPC' shall be 100% black
 - **Bars enclosing the star ratings:** Similar to the corresponding star's colour codes

B.3.1 Star bars size

The star efficiency rating bars shall follow these dimensions:

- **5-star bar:** 5.525 mm width, 35.50 mm length.
- **4-star bar:** 5.525 mm width, 30 mm length.
- **3-star bar:** 5.525 mm width, 22.50 mm length.
- **2-star bar:** 5.525 mm width, 15 mm length.
- **1-star bar:** 5.525 mm width, 7.5 mm length.

A.3.2 The star colours for energy efficiency rating:

- **5 stars (most efficient):** 100, 0, 100, 0.
- **4 stars:** 30, 0, 100, 0.
- **3 stars:** 0, 0, 100, 0.
- **2 stars:** 0, 30, 100, 0.
- **1 star (least efficient):** 0, 100, 100, 0.

A.3.3 Energy Efficiency Class Number (star rating) inside the stars arrow:

The energy efficiency class number shall be:

- **Colour:** 100% white.
- **Font:** Calibri Bold, size 22 pt.
- The rectangular black section of the arrow shall contain the star rating number, which is centered.

A.3.4 EPC icon

- Colour shall be 100% black.

- The background color shall be 100% white.

A.3.5 QR Code

The QR code shall be 100% black.

A.3.6 Additional Text Elements

- The phrase **“MORE STARS, MORE SAVINGS”**:
 - **Font:** Calibri Bold, size 10 pt.
 - **Colour:** 100% black.
- **Texts within the EPC symbol square:**
 - **Font:** Verdana Bold, 10 pt for the main element, Verdana Regular 10 pt for the unit.
 - **Colour:** 100% black.
 -

A.3.8 Footer

- **Background shall be:** 100, 50, 0, 0.
- **The texts:**
 - **Font:** Calibri, size 10 pt.
 - **Colour:** 100% white.

ANNEX B

(Informative)

RATIONALE FOR THE EPC ENERGY EFFICIENCY TEST METHOD

The employed test method has been designed to provide a more comprehensive and accurate determination of the energy efficiency of Electric Pressure Cookers (EPCs) by capturing the energy consumption during both the heating and pressure retention phases of operation.

In many existing procedures, efficiency is determined primarily based on the heating phase, which measures the energy consumed to raise the temperature and pressure to the desired cooking level. However, this approach does not account for the electricity consumed during the pressure phase, when the EPC maintains the required internal pressure and temperature for the actual cooking process.

Although the pressure phase may draw less power than the heating phase, it can represent a significant portion of the total energy consumption, particularly for foods requiring longer cooking durations or for EPCs with lower insulation performance. Excluding this phase leads to an underestimation of total energy consumption and consequently, an overestimation of the appliance's efficiency.

The inclusion of both phases in this method ensures that:

- All energy consumed during the complete cooking cycle is accurately measured.
- The resulting efficiency value reflects the true operational performance of the EPC under typical user conditions.
- Comparative assessments between different EPC models or designs are fair, consistent, and representative of real-world use.

By considering the full cooking cycle, the method promotes the development and selection of EPCs with genuine energy-saving potential, supporting more informed consumer choices and more effective policy or labelling programs aimed at energy efficiency improvement.

