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DRAFT TANZANIA STANDARD

Household electric cooking appliances - Minimum Energy Performance Requirements and test methods- Part 3: Induction 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 electrical cooking appliances — Minimum Energy Performance Requirements and test method- Part 3: Induction cooker

1 Scope

This draft Tanzania standard specifies minimum energy performance requirements and test methods for induction cookers for household use.

This document is applicable for the induction cooker (IC) for household with one or more heating unit(s), which has a rated power of 700W to 3,500W and a rated voltage of not greater than AC 250V.

This document is not applicable to the following kitchen appliances: commercial induction cookers, power frequency induction cookers and concave induction cookers.

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.

IEC 60350-2, *Household electric cooking appliances - Part 2: Hobs - Methods for measuring performance*

TZS 448-2-6/IEC 60335-2-6, *Household and similar electrical appliances - Safety - Part 2-6: Particular requirements for stationary cooking ranges, hobs, ovens and similar appliances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60350-1, TZS 448-2-6/IEC 60335-2-6 and the following shall apply.

3.1

induction cooker (IC)

an encased assembly with a radiant heating element which could be a heating ribbon, heating spiral or a tungsten wire that uses electromagnetic induction heating as heat source

Note to entry: Electromagnetic energy generated interact with compatible pots, pans, and turn them into their own heat source for household cooking.

3.2

heating efficiency

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

3.3

heating unit

part with independent heating function on the surface of induction cooker, on which an appliance is placed

3.4

network mode(s)

condition in which the IC 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 preset instruction set or a network request response. The meaning of "network" herein includes communication between two or 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.

4 Requirements

Induction cookers within the scope of this standard shall meet the following requirements:

4.1 Safety requirements

Induction cookers shall comply with the safety requirements given in TZX 448-2-6/IEC 60335-2-6.

4.2 Energy Performance and labelling requirements

Induction cookers 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

Induction cookers within the scope of this standard shall meet the minimum energy efficiency given in **Table 1** and shall not exceed the standby power given in **Table 2**.

For an induction cooker with multiple heating units, the heating unit with the lowest heating efficiency is chosen to represent the overall heating efficiency of the appliance.

Table 1 — Minimum Efficiency Requirements

induction cooker type	Heating efficiency/%
Induction cookers with circular coil heating unit, and the rated power of a single heating unit is greater than 1,200W	82
Induction cookers with non-circular coil heating unit, and the rated power of a single heating unit is at most 1,200W	80

Table 2 — Standby Power Requirements

Standby Power in watts (W)	Network mode is not available	≤ 1.8
	Network mode is available	≤ 2.0

4.2.2 Energy star rating classification

The energy star rating for induction cookers is classified into 5 categories, in which five

(5) stars category represents the most efficient induction cooker. The energy performance classes shall be as in Table 3.

Table 3 — Energy star rate classification

Energy star rating classification		Number of stars				
		1	2	3	4	5
Heating efficiency/%	Induction cookers with circular coil heating unit, and the rated power of a single heating unit is greater than 1,200W	≥82	≥84	≥86	≥88	≥90
	Induction cookers with non-circular coil heating unit, and the rated power of a single heating unit is at most 1,200W	≥80	≥82	≥84	≥86	≥88
Standby power/W	Network mode is not available	≤1.8				
	Network mode is available	≤2.0				
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.						

4.2.3 Labelling

The label shall be visibly affixed on the appliance, and shall be legible with the following information:

- Type of appliance;
- Rated power consumption in Watts, W;
- Energy star rating;
- Heating efficiency in percentage.
- Standard number;
- 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 in accordance with **Annex A**.

4.2.4 Label positioning and attachment

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

- Non-sticky pop-up type label affixed at the top, and
- 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% — 75%;
- c) atmospheric pressure: 98kPa — 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 frequency of $50\text{Hz} \pm 1\text{Hz}$.

5.1.3 Technical indexes of test instruments, apparatus and equipment

The technical indexes of the electrical energy meter, thermometer and timer for the test are as follows:

- a) the electrical energy meter is capable of measuring the energy consumption at a minimum level of $20\text{mW} \cdot \text{h}$;
- b) the resolution of the thermometer for measuring the temperature is 0.1°C and the resolution for measuring the mass is 0.1g ;
- c) the timer has a resolution of 0.01s and an accuracy of $\pm 2\text{s/h}$.

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 induction cooker and the environment shall be within 5°C or the appliance shall be in idle state for at least 6h.

5.2 Test methods for heating efficiency

Under the specified test conditions, select the minimum sized standard pot that can cover the heating area (a standard pot is the container used for the test. See Clause 5.2.4 for the dimensions and requirements of standard pot and its lid. The diameter of the bottom of the standard pot shall be greater than the effective diameter of the coil plate, which is referred to the requirements of 5.2.5.1).

Measure the mass of a standard pot with a lid, m_2 ; place the corresponding standard pot at the center of the heating unit of the induction cooker under test in cold state, and fill the pot with water ($15^{\circ}\text{C} \pm 1^{\circ}\text{C}$) of the mass specified in Table 4, m_1 ; cover the pot with the lid, put the thermometer into the center of the pot from the hole of the lid, immerse the temperature sensing part of the thermometer in water 10mm away from the bottom of the pot, read the thermometer and get the reading of the initial water temperature, t_1 , when the temperature fluctuates within the required range within 5min; start the induction cooker and quickly adjust it to the maximum power gear (specified by the manufacturer in the instructions for use); when the temperature reaches a certain value, turn off the induction cooker, record the electricity consumption, E , at the same time, take the maximum temperature reading, t_2 , after 1min, and the temperature rise t_2 is valid if within the range of $60\text{K} \pm 1\text{K}$; calculate the heating efficiency of the induction cooker, with one significant digit reserved.

According to the electricity consumption, E , recorded in the initial test, repeat the above-mentioned test procedure twice, and calculate the average value of the three measurements of heating efficiency with one significant digit reserved as the heating efficiency value of the product. In case the induction cooker has multiple heating units, test the heating units one by one.

Platinum resistance thermometer or mercury thermometer may be used for heating efficiency test of induction cooker. In case of any dispute in the test result, the test data of platinum resistance thermometer shall prevail.

Table 4: Mass of water added to a standard pot

Standard pot code	Effective diameter of bottom, <i>B</i> /mm	Inner diameter, <i>A</i> /mm	Height, <i>H</i> /mm	Mass of water added, <i>m</i> ₁ /kg
B1	120	140	75	0.80
B2	180	200	95	2.00
B3	200	220	110	2.80
B4	260	280	105	4.50

5.2.2 Calculation of the heating efficiency of induction cookers

The heating efficiency of induction cookers shall be calculated using Equation (1):

$$\eta_i = \frac{(c_1 \times m_1 + c_2 \times m_2) \times (t_2 - t_1)}{3.6 \times E} \times 100\%$$

where,

η_i ——the heating efficiency of induction cookers, accurate to one decimal place;

c_1 ——the specific heat capacity of water, 4.1875, kJ/(kg·K);

m_1 ——the mass of water, kg, accurate to four decimal places;

c_2 ——the specific heat capacity of the pot body and its lid, 0.46, kJ/(kg·K);

m_2 ——the total mass of the pot body and its lid, kg, accurate to four decimal places;

t_2 ——the maximum water temperature after the test, °C, accurate to one decimal place;

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

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

5.2.3 Test method for standby power

The standby power is tested by the average power method.

The average power is calculated using Equation (2):

$$P = \frac{E}{t} \quad (2)$$

where,

P ——the average power, accurate to 0.1W, W;

E ——the measured electricity consumption,

$W \cdot h; t$ ——the duration of measurement, h.

The specific test method is as follows:

The induction cooker under test is powered at rated voltage and in standby mode with maximum power consumption; start the test when the reading of the power meter is stable(after about 30min); record the measurement time and electricity consumption, and the measurement time is 1h.

The induction cooker under test shall be connected to the network during network standby power test.

For induction cookers or networked induction cookers with wake-up function, they shall be kept in the non-wake-up state during the test.

5.2.4 Dimensions and requirements of standard pots and lids shall be in accordance with IEC 60350-2

5.2.5 Effective diameter of the coil plate

5.2.5.1 Effective diameter measurement

The effective diameter of the coil plate is the distance corresponding to the heating coil:

- i. for circular coils: diameter of the heating circular coil;
- ii. for non-circular coils: diameter corresponding to the smallest circle covering the heating coil.

5.2.5.2 Measuring instruments

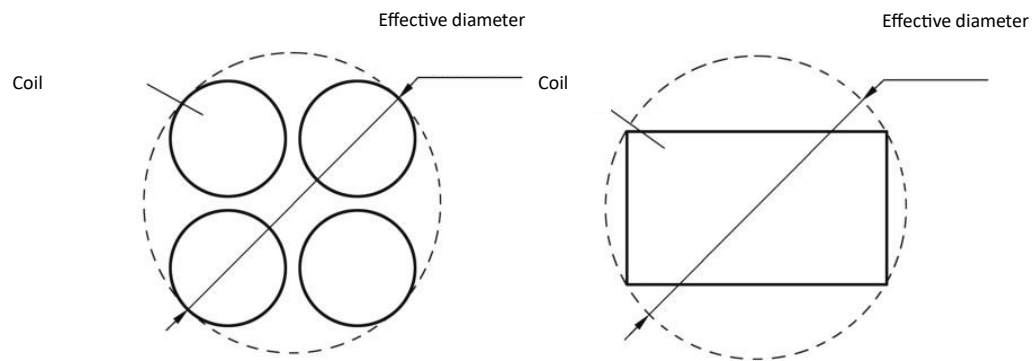
Vernier caliper, with a resolution of 0.01mm.

5.2.5.3 Test methods

The test methods for the effective diameter of the coil plate are as follows:

- a) for circular coils, use a vernier calliper to measure the diameter of the heating coil;

- b) for non-circular coils, use a vernier calliper to measure the diameter corresponding to the smallest circle covering the heating coil;



- c) see Figure .4 above.

Figure 4: Non-circular coil

ANNEX A (Normative)

ENERGY LABEL SPECIFICATION AND USER GUIDE FOR INDUCTION COOKERS

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

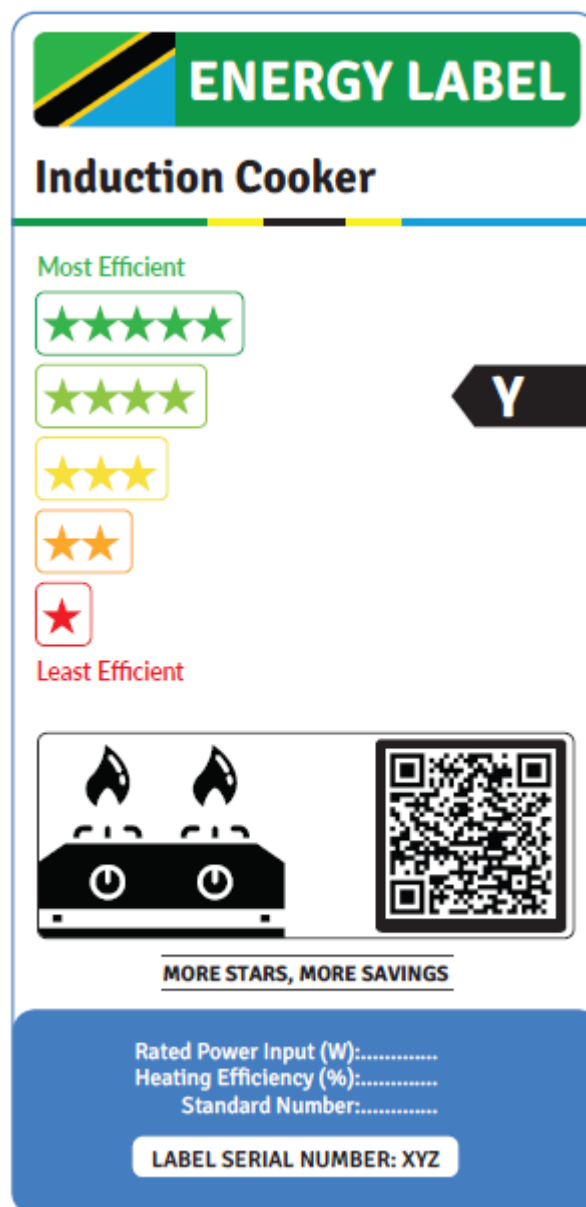


Figure B.1 Typical example for Induction cooker's energy label

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 ‘**INDUCTION 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 Induction cooker 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) **Induction cooker icon:** The Induction cooker 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 '**Induction cooker**' 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 Induction cooker 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 Induction cooker symbol squares:**
 - **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.