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Ceramic/pottery handicrafts — Specification

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Foreword

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Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 311, *[Crafts and related products]*,

Ceramic/pottery handicrafts — Specification

1 Scope

This Draft Uganda Standard specifies requirements, sampling and test methods for ceramic/ pottery handcrafts such as; table ware, domestic containers, cooking/ firing ceramics, toys and games, ceramic furniture, lighting ceramics, garden ceramics, ceramics sculpture and gallery ceramics/ interior decoration

This Draft Uganda Standard is not applicable to other ceramic products which have standards specific to them including but not limited to jewellery, bricks, tiles, cooking stoves

2 Normative references

The following referenced documents 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.

US ISO 8391-1:1986, *Ceramic cookware in contact with food — Release of lead and cadmium — Part 1: Methods of test*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
ceramic product
Inorganic non-metallic item made from clay and hardened by heat

3.2
handcraft
made skilfully using hands from raw materials

Note 1 Finishing may be done using tools or machines

3.3
raw material
basic materials such as clay or any other materials used to make a ceramic/ pottery handcraft

3.4
lot
all items of same shape, size, decoration and materials of manufacture belonging to the same batch of manufacture

3.5
warpage
deviation from shape or roundness

3.6
food ware
ceramic ware used in the preparation, cooking, serving or storage of food and beverages

3.7
porosity
ratio of the volume of open pores and voids to the total volume occupied by the solid

3.8
glaze
having a shiny surface or coating

3.9
crazing
hair like cracking which occurs in fired glazes or other ceramic coatings due to critical tensile stresses

3.10
pottery handicrafts
products made from clay and other ceramic materials, which are fired at high temperatures to give them a hard, durable form

3.11
table ware
ceramic products used for serving and eating food such as: dishes, glasses, knives, forks, cups, plates, tea pots, drinking water pots etc.

4 Requirements

4.1 General requirements

4.1.1 Categories

Any ceramic/ pottery handicraft shall fall into one of the two categories in Table 1.

Table 1 — Categories of ceramic/ pottery handicrafts

Category	Intended application
Category 1 Ceramic/ pottery handicraft	A ceramic/ pottery handcraft whose use lead them to contact with foodstuff
Category 2 ceramic/ pottery handicraft	A ceramic/ pottery handicraft whose use is not intended for foodstuffs

NOTE 1 An example of category 1: table ware.

NOTE 2 An example of category2: flower vases

4.1.2 The handle when provided shall always be symmetrical and must be able to support the weight of the ceramic/ pottery handicraft and its contents.

4.1.3 Ceramic/ pottery handicrafts shall not contain any harmful products to the environment whether during service or disposal.

4.1.4 Ceramic/ pottery handicrafts shall not shatter upon grabbing

4.1.5 Raw materials shall be essentially ceramic materials. Additional materials can be used to improve properties of the intended product.

4.1.6 Raw materials, for category 1, shall not result, directly or indirectly, in becoming a component of food, or otherwise affecting the characteristics of food, including the imparting of a colour, taste, or odour to the food;

4.1.7 Manufacturing

4.1.7.1 Manufacturer shall use his/her hands to shape the product. Finishing may be done by hands or equipment.

4.1.7.2 A ceramic/pottery handicraft shall be free from deleterious substances, flaws and other manufacturing defects which might affect their intended utility.

4.1.7.3 A ceramic handicraft/ pottery product shall be sound and true to shape and heat maybe used to optimize the properties of the product.

4.1.8 Workmanship

4.1.8.1 Ceramic/ pottery handicrafts in one batch shall be of the same shape.

4.1.8.2 Where items have lids, the lids shall fit firmly.

4.1.9 The side which comes into contact with foodstuffs shall have a smooth surface finish and shall be free from any defects which would affect its intended use.

4.1.10 Finish

4.1.10.1 The surface of the ceramic/ pottery handicraft shall be as free as possible from any visual defects.

4.1.10.2 Paint and other organic coatings can be used on surfaces of ceramic/ pottery handcrafts. However, only food grade paints and coatings shall be used for category 1

4.1.11 Decoration

Decoration shall be done in accordance with agreement between the manufacturer and the customer.

4.2 Specific requirements

4.2.1 Limits of contaminants

When tested in accordance with test method specified in Table 2, category 1 ceramic/ pottery handicrafts shall meet the limits as specified below

Table 2 — Maximum permissible levels of contaminants in category 1 ceramic/ pottery handicrafts

Contaminants	Maximum permissible levels ppm	Test method
Lead	5	US ISO 8391-1
Cadmium	0.5	

4.2.2 Warpage

Warpage shall be determined in accordance with Annex A and shall meet the permissible limits specified in Table 3.

Table 3 — Permissible limits for warpage

Parameter	Out-of-roundness limit, %	Edge warpage (mm)	Slope (degree, ˚)
Permissible limit value	0.8	1.5	1.5

4.2.4 Porosity

4.2.4.1 Porosity of a ceramic/ pottery handicraft is indicated by the amount of water absorbed.

4.2.4.2 When tested in accordance with Annex B, water absorption shall not exceed 3 % for glazed products and 6 % for unglazed products.

4.2.5 The ceramic/ pottery ware shall conform to the requirements indicated in table 4.

Table 4-Requirements for Ceramic ware

Parameter	Requirements	Test method
Thermal shock , °C Minimum	160	Annex C
Chipping resistance, Nm, Minimum	0.14	Annex D
Impact strength ,Nm, Minimum	0.267	Annex E
Crazing	None of the test pieces show crazing	Annex F

4.2.6 Ceramic decoration colour

4.2.6.1 The decoration colour of the ceramic/ pottery handicraft shall be highly resistant to acid with a maximum tolerance up to Grade No. 1 (see Table 5) when tested in accordance with the method given in Annex H.

4.2.6.2 The decoration colour on the surface of the ceramic/ pottery handicraft shall be highly resistant to alkali to Grade No. 2 (see Table 5) when tested in accordance with the method given in Annex H.

4.2.6.3. The decoration colour on the ceramic/ pottery handicraft surface shall be highly resistant to boiling water with a maximum tolerance up to Grade No. 1 (see Table 5) when tested in accordance with the method given in Annex H.

4.2.6.4 The decoration colour on the ceramic/ pottery handicraft surface shall be highly resistant to household detergent with a maximum tolerance up to Grade No. 1 (see Table 5) when tested in accordance the method given in Annex G.

Table 5 ─ Grades based on chemical test result

Item	Grades			
	0	1	2	3
Surface luster	Unchanged	Slightly matte	Considerably matte	No luster
Colour fading	Unchanged	Slightly fading	Considerably fading	Extreme fading

5 Sampling

5.1 When sampling for clause 4.2.1 (limits of contaminants), four items shall be sampled. For other tests, three items shall be sampled.

5.2 Each of the items shall be identical in size and shape.

5.3 Tests for workmanship finish and visual assessment shall be done on all samples, those that pass shall then be subjected to the other tests.

6 Dimensions

The dimensions shall be subject to a tolerance of ± 0.5 %. For ceramic/ pottery handcrafts where volume is important, a volume tolerance of ± 2.5 % shall apply.

NOTE 1 An example of a ceramic/ pottery handcraft where volume is important is a cup

7 Packaging

Ceramic/ pottery handcrafts shall be packaged in suitable packages that prevent damage during normal handling, storage and transportation.

8 Labelling/ Marking

Both bulk package and individual ceramic/ pottery handcraft(s) shall be legibly and indelibly labelled/ marked with the following information:

a) Manufacturer's/supplier's name, trade mark or both;

b) Batch and lot number

c) Dimension(s)/ volume of the packaged ceramic/ pottery product(s)

d) Country of origin/ manufacture

NOTE 1 Where items of different dimensions or volume are in one bulk package, a range of dimensions or volumes of packaged items can be labelled accordingly.

Annex A
(normative)

Test Method for warpage

A.1 Out-of-roundness

A dial indicator shall be used to determine the out-of-roundness of a ceramic/ pottery Handcraft. The sample, resting on its foot on a flat surface, shall be blocked in a manner to allow its rotation. The indicator plunger shall strike the outer rim edge of the sample from above at a 45˚ angle to a horizontal plane. The sample shall be rotated and the low and high readings shall be taken. The difference between the two readings shall denote the out of roundness

A.2 Edge warpage and slope for flatware

Edge warpage and slope of items shall be determined as follows:

a) Invert the sample and place it face down on a surface plate,

b) Place a weight across the resting surface of the item to stabilize it in place,

c) Attempt to insert a feeler gauge between the surface and any portion of the sample edge. The readings of the feeler gauge will indicate the warpage on the edge of the item.

d) Remove the weight from the resting surface and replace it with an inclinometer and

e) Determine the slope of the resting surface.

Annex B
(Normative)

Method of test for porosity

B.1 Hot water bath method

B.1.1 Principle

Water absorption of the sample is determined by the amount of water absorbed by boiling the sample in distilled water and finding the increase in the mass

B.1.2 Test pieces

Five test pieces from five different test samples are cut or broken to get a surface area of about 16 cm^2. At least two flat faces of the test pieces shall be glazed and other sides unglazed. The test samples shall be freshly cut or broken.

B.1.3 Procedure

B.1.3.1 Dry the test pieces to a constant weight at a temperature between 110˚C and 150˚C and then cool to room temperature in a desiccator.

B.1.3.2 Weigh the pieces to an accuracy of not less than 0.01g and place in a vessel from which the air can be removed maintaining the pressure at less than 3cm of mercury for one hour.

B.1.3.3 Admit cold or freshly boiled distilled water to the vessel without reducing the vacuum until the pieces are covered.

B.1.3.4 Then, admit air to the vessel without removing the pieces boil the pieces in distilled water for not less than 20 min. Cool, wipe the pieces with a damp soft cotton cloth to remove adhering surface water and weigh quickly

B.1.4 Calculation

Water absorption of the test pieces shall be calculated as follows:

$$Percentage\ water\ absorption = \frac{W_2 - W_1}{W_1} \times 100$$

Where:

W_1 weight of the dry test piece, and

W_2 weight of the test piece after treatment

All the six test pieces shall show a water absorption as specified in clause 4.2.6.2

B.2 Cold-water bath method

B.2.1 Procedure

B.2.1.1 Dry the test pieces to a constant weight at a temperature between 110˚C and 150˚C and then cool to room temperature in a desiccator

B.2.1.2 Weigh the test pieces to an accuracy of not less than 0.01g ($W_{1)}$

B.2.1.3 Immerse the samples in water at room temperature for 24 hours, remove, wipe the pieces with a damp soft cotton cloth to remove adhering surface water and weigh quickly ($W_{2)}$

B.2.1.4 Water absorption of the sample shall be calculated as in B.1.4

Annex C
(Normative)

Test for resistance to thermal shock

C.1 Principle

Thermal shock is measured by the difference between the upper temperature T_1 to which the specimens are heated and the lower temperature T_2 of the cold water-bath into which they are placed after heating. This is a test for tendency of crazing due to residual stresses after firing and not due to factors of moisture expansion.

C.2 Apparatus

C.2.1 Air-Oven

With a temperature range of 35 to 250°C and provided with an air stirrer or circulator to ensure uniformity of temperature. The oven shall have a thermostat capable of maintaining the temperature constant to ± 1°C up to 180°C and ±2°C between 180 and 250°C. It shall also be provided with a thermometer capable of being read to an accuracy of ±1°C.

C.3 Reagent

C.3.1 Eosin Solution

0.5 percent (m/v) in water.

C.4 Procedure

C.4.1 Place three specimens in the air-oven previously heated to the upper temperature T_1 so that the difference $(T_1 - T_2)$ is equal to 120°C, T_2 being the temperature of tap water in the cold water-bath. Maintain the samples in the oven at that temperature for 30 min. Then -remove the specimens from the oven, one at a time, by means of tongs with asbestos covered tips, completing the process of transference in 5 ± 1-5 for each article, and immerse the specimens for a specified period of not less than two minutes into the cold water-bath which has been maintained at temperature T_2. After immersing in the cold water-bath, dry the specimens and then immerse in the eosin solution. Examine the test specimens after cleaning. The specimens shall be subjected to this test five times.

C.4.2 The specimens shall be considered to have satisfied the requirement of the test if there is no crazing of the glaze or cracking of the ware indicated by coloured hair lines on the surface of any specimen.

Annex D
(Normative)

Test for Chipping resistance

D.1 Principle

This test is carried out to ensure that the ceramic/ pottery handcraft withstands impacts encountered in normal day to day use without breaking or chipping.

D.2 Apparatus

D.2.1 Impact Tester

A suitable pendulum type impact tester

D.3 Procedure

D.3.1 This test shall be carried out on flat ceramic/ pottery handcraft. Place the test specimen between two cast iron blocks forming a 90° 'V' and adjust it in such a manner that when the hammer.is hanging vertically the center of the impact face of the chipping hammer touches the edge of the test piece at the plane of the bisector of the angle of the 'V'. Strike the test piece at three equally spaced points on its periphery with the cylindrical end of the hammer with an impact force of 0.14 N.m.

D.3.2 The ware shall be considered as not conforming to the test if the impact results in chipping of the edge so that fragments of glaze and body are removed.

Annex E
(Normative)

Impact strength ,Nm Minimum

E.1 Principle

This test is carried out to ensure that the ceramic/ pottery handcraft withstands impacts encountered in normal day to day use without breaking or chipping.

E.2 Apparatus

E.2.1 Impact Tester

A suitable pendulum type impact tester.

E.3 Procedure

When testing a plate, saucer or platter, support the ware against three equally spaced 3 mm diameter steel halls so that when the hammer is hanging vertically the impact point of hammer touches the centre of the bottom of the test piece. When testing a cup or bowl, place the ware on its foot between two cast iron blocks forming a 90° 'V' whose sides are sufficiently high to support the upper edge of the cup or bowl and adjust it in such a manner that when the hammer is hanging vertically, its impact point touches the cup or bowl at its upper edge and on the plane of the bisector of the angle of 'V'. Strike the test piece with the spherical end of the hammer with an impact force impact of 0.267 N.m.

A ware such as a plate, saucer or platter shall be considered as not complying to the test if it develops a rupture which appears as a hole through the body or as a body crack extending through its rim. A cup or bowl shall be also treated as not conforming if it develops a body crack extending into any portion of the foot or a portion of the body breaks away.

Annex F
(Normative)

Test for crazing resistance

F.1 Procedure

F.1.1 Fresh whole dry articles shall be subjected to the crazing test. They shall be placed loosely at room temperature on a suitable support at least 50 mm above water level in an autoclave which shall be of sufficient capacity and equipped with a safety valve, blow-off valve; thermometer, pressure gauge and heating arrangement or other means of sufficient capacity to ensure constant steam pressure within the autoclave. Sufficient amount of distilled water shall be taken in the autoclave. Slight water will remain after the test. Initially the blow-off valve shall be kept open until steam begins to escape thereby expelling most of the air. Also closing the blow-off valve, water shall be kept boiling and the steam pressure increased at a uniform rate until it reaches the pressure of 5 kg/cm^2 within a period of 30 min or one and a half hour depending on the kind of the ware and hold it at the maximum pressure for 1 h. Sufficient heat shall be applied to maintain a constant steam pressure for the specified period.

F.1.2 The source of heat shall then be shut off and steam pressure released slowly in not less than 30 min by opening the blow off valve. The ware shall be allowed to cool to room temperature in the autoclave. The wares then shall be removed and tested for crazing by applying 0.5 percent eosin solution (m/v) in water or blue black fountain pen ink to the glazed surface. There should not be any hair like pattern after application of the dye or ink.

Annex G
(Normative)

Test for resistance to detergents

G.1 Principle

The ceramic/ pottery handcrafts are immersed into detergent solution at a temperature of 60°C for 48 h and loss of gloss of the glaze is compared visually against untested sample.

G.2 Reagent

G.2.1 Detergent

0.04 percent (m/v)

G.3 Procedure

Place fresh, clean whole article or piece in a suitable beaker. Add detergent solution so that the article is completely immersed and then cover with watch glass. Place the beaker in an air oven for 48 h at a temperature of 60°C. During the period of test, the concentration of the detergent solution shall be maintained by adding required amount of water periodically. At the end of the period, 'remove the test specimen, wash with water and dry. Compare the loss of gloss of glaze of the test specimen visually against untested sample.

Annex H
(Normative)

Test method for ceramic/ pottery handcraft decoration

H.1 Boiling water proof test

H.1.1 Principle

This test determines if fired pigment or luster is affected by boiling water.

H.1.2 Procedure

Leave the test piece at 100ºC controlled water bath for 24 hours. Wash, dry and observe for changes in luster, color and peeling-off of pigments or gold.

H.2 Alkali proof test

H.2.1 Principle

This test determines if fired pigment or luster is affected by alkali.

H.2.2 Procedure

Dip the test piece into a 0.5% solution of sodium carbonate in a controlled water bath at 100ºC for two hours. Wash, dry and observe for change in luster, color and peeling-off of pigments gold.

H.3 Acid proof test

H.3.1 Principle

This test evaluates the quality of design or decoration (gold or platinum) on the ware surface and if fired pigments of gold on the ware is affected by acid.

H.3.2 Procedure

Dip the test piece into a four percent solution of acetic acid. Soak at 25-55ºC for 24 hours. Wash thoroughly with water, dry with cloth and observe for any change in luster, color and peeling-off of fired pigments or gold.

Annex I
(Informative)

Categories of ceramic /pottery handicrafts

I.1 Table wares

These include teapots, coffee pots, mugs, plates, bowls, jugs, egg cups, platters, ceramic spoons, rice bowls, communal eating bowls, ceramic pilgrim flasks, water jars, harvest jugs, ceramic beakers, beer mugs, drinking mugs, sourcers, wine jars

I.2 Domestic containers

These include: milk pots, water pots (drinking water) eg Ensuuwva , storage water pot e.g. Ettogero, beer pots, ceramic bobbles, cosmetic pots, pig banks, Jewellery pots/ containers, storage jugs, spice pots, Salt shakers

I.3 Cooking / firing ceramics

These include: ceramic charcoal stoves, incinerators, fire boxes, cooking pots, earthenware Tajine (common in Morocco), cooking Casserole (common in Turkey), Oil and Pastille burners, Incense burners, Smoking pipes

I.4 Ceramics forms for sound

These: clay drums, clay whistles, clay bells, alert beads

I.5 Toys and games

These include ceramic toys, ceramic dolls, painted cars and buses, articulated figures, ceramic mementos (souvenirs), ceramic game marbles, clay masks, moulded plaques

1.6 Ceramic furniture

These include ceramic tables, ceramic chairs, ceramic door handles, ceramic door knobs

I.7 Ceramic jewellery

These include ceramic beads, ceramic earrings, ceramic buttons, ceramic necklaces, ceramic bungle

I.8 Sanitary ceramics

These include ceramic sinks, ceramic drainage pipes, ceramic soap dishes, washing jugs, washing bowls

I.9 Ceramic food preparing utensils

These include ceramic lemon reamers, ceramic mortar, ceramic pestle, ceramic churning butter containers, ceramic bottle yoghurt fermenter

I.10 Garden ceramics

These include flowerpots, planters, terracotta planters, glazed flowerpots, nursery bed planters

I.11 Ceramics sculpture

These include human figurine, wildlife figurine, religious figurine, traditional religious terms, storytelling figurines, abstract figurines, moulded plaques, ceramic mosaics and morals, nativity scenes, funeral figures, grave historical figurines

I.12 Gallery ceramics/ interior decoration

These include ceramic art forms, glazed pots, glazed plates, abstract forms, smoked ceramic/pottery forms, ceramics murals

Bibliography

[1] DKS, 432:2019, *Handmade ceramic products — Specification*

[2] DTZS *Tableware-Ceramic Ware-Specification*

[3] IS 14179: *Methods of test for ceramic tableware*

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