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DRAFT STANDARD FOR PUBLIC COMMENT

(වෙනස්විමට ඉඩ ඇත. **திருத்தத்திற்குட்படக்கூடியது**. Liable to alteration)

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அபிப்பிராயங்களை தெவிப்பதற்கான இறுதித்திகதி
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Draft Sri Lanka Standard Specification for Ceramic Ware (First Revision)
SLS 1222: 2025

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SLS 1222: 2025

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This draft should not be regarded or used as a Sri Lanka Standard.

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Comments to be sent to: SRI LANKA STANDARDS INSTITUTION, 17, VICTORIA PLACE, ELVITIGALA MAWATHA, COLOMBO 08.

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Introduction

This Draft Sri Lanka Standard has been prepared by the Sri Lanka Standards Institution and is now being circulated for technical comments to all interested parties.

All comments received will be considered by the SLSI and the draft if necessary, before submission to the Council of the Institution through the relevant Divisional Committee for final approval.

The Institution would appreciate any views on this draft which should be sent before the specified date. It would also be helpful if those who find the draft generally acceptable could kindly notify us accordingly.

All Communications should be addressed to:

The Director General
Sri Lanka Standards Institution,
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.

SRI LANKA STANDARD 1222 : 2025
UDC 642.72 : 666.5

SPECIFICATION FOR
CERAMIC WARE
(First Revision)

SRI LANKA STANDARDS INSTITUTION

SRI LANKA STANDARD
SPECIFICATION FOR CERAMIC WARE
(First Revision)

SLS 1222 : 2025

Gr. 6

SRI LANKA STANDARDS INSTITUTION
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.
SRI LANKA

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

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SRI LANKA STANDARD
SPECIFICATION FOR CERAMIC WARE
(First Revision)

FOREWORD

This standard was approved by the Sectoral Committee on Building and Construction Materials and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2025 –XX -XX.

This standard was first published in 2001 in two parts, Part 1 specifying the requirements and Part 2 specifying the test methods of ceramic ware. This is the first revision of both parts of the standard. Part 1 and Part 2 of the 2001 version have been incorporated into one standard and specifying the requirements and test methods of Ceramic Ware. Further it incorporates the experience gained and brings the standard in line with the present practices followed internationally in production and testing of ceramic ware.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or measurement, shall be rounded off in accordance with **SLS 102**. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard the assistance derived from the publications of the International Organization for Standardization, the British Standards Institution, and the Bureau of Indian Standards is gratefully acknowledged.

1 SCOPE

This standard gives specifications, test methods, sampling, marking and labeling of glazed ceramic ware that is used for the preparation and serving of foods.

Ceramic ware includes earthenware, stoneware, porcelain ware, bone china and opalware.

This standard does not cover ornamental ware and red clay products.

2 REFERENCES

SLS 102	Presentation of numerical values
SLS 428	Random sampling method
SLS ISO 6486-1	Release of lead and cadmium
ASTM C368	Impact Resistance of Ceramic Tableware
EN 1183	Thermal shock and thermal shock endurance
EN 1184	Translucency of ceramic articles
EN 1217	Water absorption of ceramic articles
EN 12875	Mechanical dishwashing resistance of utensils

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply:

3.1 atomic absorption: Absorption of electromagnetic radiation by free atoms in the gas phase wherein a line spectrum is obtained which is specific for the absorbing atoms.

3.2 atomic absorption spectrometry: AAS spectroanalytical method for qualitative determination and quantitative evaluation of element concentrations wherein the technique determines these concentrations by measuring the atomic absorption of free atoms.

3.3 bone china: Type of soft paste porcelain containing at least 35 % by mass of the fired body, of tricalcium orthophosphate, which can be introduced in the form of bone ash. (from ISO 5644)

3.4 ceramic ware: Ceramic articles which are intended to be used in contact with foodstuffs, for example foodware.

3.5 cup/mug: Small ceramic hollowware upto 240 ml capacity with a handle, commonly used for consumption of beverages, for example coffee or tea, at elevated temperature.

NOTE: *Cups typically have curved sides and are generally used with a saucer*.

3.6 flatware: Ceramic ware having an internal depth not exceeding 25 mm, measured from the lowest point to the horizontal plane passing through the point of overflow.

3.7 earthenware : Glazed or unglazed or decorated non-vitreous, porous and opaque ceramic whiteware which contains clay as an essential ingredient and can be of variable colour, and their water absorption is not more than 8.0 % by weight. (specify a range?? ISO 13006)

3.8 stoneware: Glazed or unglazed or decorated vitreous or semi-vitreous ceramic whiteware which contains clay as an essential ingredient and can be of variable colour, will absorb not more than 1.0 % of its weight of water, and is naturally opaque (except in very thin pieces).

3.9 foodware: Articles which are intended to be used for the preparation, cooking, serving and storage of food or drinks.

3.10 glass ceramic: Inorganic material produced by the complete fusion of raw materials at high temperatures into a homogeneous liquid which is then cooled to a rigid condition and temperature treated in such a way as to produce a mostly microcrystalline body.

3.11 hollowware: Ceramic ware having an internal depth greater than 25 mm, measured from the lowest point to the horizontal plane passing through the point of overflow. Hollowware is subdivided into three categories based on volume:

small: hollowware with a capacity < 1.1 litre;

large: hollowware with a capacity of ≥ 1.1 litre;

storage: hollowware with a capacity of ≥ 3 litre;

cups and mugs: small ceramic hollowware commonly used for consumption of beverages, e.g., coffee or tea at elevated temperature**.**

3.12 reference surface area: The area that is intended to come into contact with foodstuffs in normal use.

3.13 test solution: The solvent used in the test to extract lead and cadmium from the article [acetic acid, 4 % (V/V)]

3.14 crawling: A parting and contraction of the glaze on the surface of ceramic ware during drying or firing, resulting in unglazed area bordered by coalesced glaze.

3.15 crazing (or craze): The hairline cracking, which occurs in, fired glazes of ceramic ware due to localized critical tensile stresses.

3.16 consignment: Number of items supplied in response to a single order.

3.17 decorated: Adorned, embellished, or made more attractive by means of colour or surface and subsurface detail.

3.18 dinnerware: Combination of ceramic ware, glass ceramic ware and glassware specially intended for the serving of food on the table, including plates, dishes and salad bowls, but excluding ware typically used for beverages.

3.19 discolouration: A defect due to the appearance of an undesirable colour in a finished product.

3.20 drinking rim: 20 mm-wide section of the external surface of the item, measured downwards from the upper edge along the wall of the item.

3.21 extraction solution: 4 % per volume acetic acid solution recovered after the extraction test and which is analysed for lead and cadmium concentration

3.22 flame atomic absorption spectrometry: FAAS atomic absorption spectrometry that uses a flame to create free atoms of the analyte in the gas phase.

3.23 glaze: Glaze substance resulting from the melting or sintering of inorganic constituents and designed to form a surface layer which is fused, in one or more coats, during the firing process Note 1 to entry: Glazes can be opaque or transparent.

3.24 glass ceramic ware: Articles which are intended to be used in contact with foodstuffs and made of glass ceramic

NOTE: *Glass ceramic is an inorganic material produced by the complete fusion of raw materials at high temperatures into a homogeneous liquid which is then cooled to a rigid condition and temperature treated in such a way as to produce a mostly microcrystalline body***.**

3.25 graphite furnace atomic absorption spectrometry GFAAS: Atomic absorption

spectrometry involving electrothermal atomization in a graphite furnace.

3.26 inductively coupled plasma mass spectrometry ICP-MS: Analytical method for qualitative determination and quantitative evaluation of element concentrations by measuring the ions produced by a radiofrequency inductively coupled plasma.

NOTE: *In the mass spectrometer the ions are separated and the elements identified according to their mass-to-charge ratio m/z, while the concentration of the elements is proportional to the numbers of ions*.

3.27 inductively coupled optical emission spectrometry ICP-OES: Trace-level, elemental analysis technique that uses the emission spectra of a sample to identify and quantify the elements present.

3.28 porcelain: Porcelain is a white (or artificially coloured), translucent, hard vitreous ceramic body used for the manufacture of exclusive high-class ceramicware, which includes tableware and other products, with less than 0.5% water absorption.

3.29 tableware: All utensils and decorative articles used on the table for meal service such as cups, saucers, plates, bowls, dishes, jugs, tea-pots and coffee-pots.

3.30 translucency: Ability of a porcelain body to transmit a proportion of the light incident upon it.

3.31 thermal shock endurance: ΔT_{50} value for the resistance against sudden change in temperature corresponding to the temperature difference at which, for the first time, 50 % of the samples fail.

3.32 warpage: Distortion of shape during the manufacturing process.

4 GRADES

There shall be two grades of ceramic ware, namely, Grade 1 and Grade 2, in accordance with the visual assessment (*See* Annexe **A**), subject to its satisfying the requirements prescribed in Clause **5**.

For the purpose of this standard, ceramic ware is classified as follows:

a) Flatware - Extra large;
b) Flatware –Large;
c) Flatware –Medium;
d) Flatware – small;
e) Cups / Mugs;
f) Platter / Baker;
g) Small hollowware;
h) Large hollowware; and
i) Storage hollowware.

5 REQUIREMENTS

5.1 Material

Ceramic ware shall be fired ceramic body, covered by glaze properly matured and fitted in the body. The body shall show upon fracture a dense, homogeneous vitrified texture.

The glaze shall be of uniform colour impervious and as free as possible from visual defects.

5.2 Workmanship

5.2.1 *General*

All items of ceramic ware in a 'set' shall be generally of a matching design, colour and decoration.

5.2.2 The cup shall rest in the middle of the saucer without rocking or spinning.

5.2.3 The handle and spout, shall be appropriately placed.

5.2.4 The lip or spout shall be so designed that liquids may not trickle down the sides of the ware while pouring.

5.2.5 The lid shall fit properly and shall not fall down while pouring out liquids.

5.3 Finish

Except for the resting surface (bottom rim), the entire surface of items of ceramic ware shall be covered by a uniform and a continuous hard impervious glaze, which is cleanable and retains the quality. In addition, the resting surface of items shall be non-abrasive in texture.

5.3.1 The glazed surface shall be free from defects as in Table **A.1**.

5.3.2 *Edge warpage and slope*

The Edge warpage of ceramic shall not exceed the values given in Table **1** and the slope of the ceramic shall not exceed 2^0 respectively, when measured in accordance with the method prescribed in **Annexe B**.

TABLE 1 - Requirements for edge warpage

Item type	Diameter[1] (mm)	Capacity (litres)	Maximum acceptable warpage (mm)
Flatware - Extra large	>320	-	3.0
Flatware -Large	270-320	-	2.5
Flatware -Medium	170- 269		2.0
Flatware - Small	<170		2.0
Cups / Mugs	<90	0.24 approximately	2.5
Platter / Baker [2]	<350 / 240	-	3.0
Small hollowware	-	< 1.1	2.0
Large hollowware	-	≥ 1.1	2.5
Storage hollowware	-	≥ 3	3.0

[1] In products other than circular shape, diameter is considered as the maximum length of its cross section
[2] Applies to the Major Axis

5.3.3 *Whiteness of porcelain ware*

Whiteness shall be determined using **Annexe C** and the "L" value shall be a minimum of 84 and "a" value shall be from –2 to –1 and "b" value shall be from –0.5 to 0.5.

L - Value specifies the position on the bright / dark axis,
a - Value specifies the position on the red / green axis,
b - Value specifies the position on the blue / yellow axis,

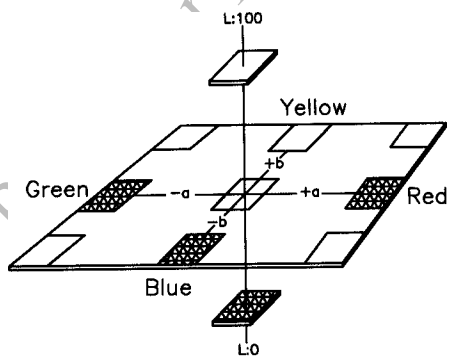

FIGURE 1: Colour graph

5.3.4 *Translucency of porcelain ware*

When tested in accordance with **EN 1184** the average ratio of the intensity of light transmitted through the sample to the intensity of the incident light, for all items tested shall exceed 0.75% for a sample thickness of 2.00 mm.

5.4 Physical properties

5.4.1 *Thermal shock and thermal shock endurance test*

When tested in accordance with **EN 1183** it shall be free from cracks and any visible aesthetical changes.

5.4.2 ***Freezer safe***

When tested in accordance with **Annexe D**, it shall be free from damages, cracks and any visible aesthetical changes.

5.4.3 ***Water absorption***

Items of ceramic ware, as a whole, shall be nonabsorbent. When pieces of broken ware are tested as specified in **EN 1217**. Water absorption for earthenware shall be < 8% and for stoneware < 1%, Porcelainware/opalware/ bone china < 0.5% .

5.4.4 ***Impact strength and chipping resistance***

The impact strength and chipping resistance, shall be tested by the pendulum type impact tester, in accordance with the method prescribed in **Annexe E.**

TABLE 2 - Requirements for impact strength and chipping resistance

Finalize after testing impact of 10 items and chipping of 5 items, as per the standard sample size.

	impact strength, min (Nm)	chipping resistance, min (Nm)
Porcelainware/opalware/bone china	0.25	0.05
Earthenware	0.22	0.2
Porcelainware..cup, mug	0.22	-
Porcelainware..flatware	0.25	0.22

5.4.5 ***Handle strength (****optional test done as per customer requirement)*

Handle Strength when tested according to **ASTM C368** shall be minimum 0.05 Nm.

5.4.6 ***Peel off test for decorated ware***

The lining and the decalcomania prints shall be vulnerable to peeling off trend.

Test shall have to be executed in order to ensure the strength of the decoration as prescribed in **Annexe F.**

5.4.6.1 Spalling test

If cracks have appeared under the temperature difference (between dryer temperature and water temperature) of 100 ^{0}C or more, test sample is considered as disqualified.

5.4.6.2 Outdoor leaving test

If cracks are found when tested according to **Annexe F** , the test sample is considered disqualified and rejected.

5.4.7 *Abrasive resistance*

Abrasive resistance when tested according to **Annexe G** shall withstand 50 strokes for gold and platinum lining of decorated ware.

5.5 Chemical properties

5.5.1 Drinking rim test

Drinking rim test Cups, mugs or other ceramic hollowware shall be tested by marking each of four units (20 ± 1) mm below the rim on the outside. Each item is placed inverted in a suitable laboratory glassware container with a diameter of between 1,25 times and 2 times that of the cup. Add sufficient test solution (5.1.3) to the glassware container to fill to the 20 mm mark on the cup. Leave to stand for (24 ± 0,5) h, depending on the case considered, at (22 ± 2) °C and protect from excessive evaporation. Before sampling the leachate, add test solution (5.1.3) to the glass container as necessary in order to re-establish the (20 ± 1) mm level. Determine lead and cadmium by the appropriate analytical methodology

5.5.2 *Release of Lead/ Cadmium*

Lead / cadmium dissolved content shall be determined in accordance with **SLS ISO 6486-1**.

TABLE 4 - Requirements for release of Lead and Cadmium

Type of ceramic **ware**	**Lead mg/l (max.)**	**Cadmium mg/l (max.)**
Flat ware[1]	0.8	0.07
Cups/ Mugs	0.5	0.25
Small hollowware	2.0	0.50
Large hollowware	1.0	0.25
Storage hollowware	0.5	0.25

NOTE: [1] *Refer Table 1 for flatware categories*

5.5.3 *Dish washer proof*

When tested according to **Annexe H**, shall withstand 750 cycles for onglazed and 1000 cycles for inglazed decorated ware and observe for noticeable effect on the gloss or shade.

5.5.4 ***Alkali proof test.***
Fired pigment / gold / platinum shall not be affected by alkali when tested according to **Annexe J**.

5.5.5 ***Neutral cleanser proof test***

Fired pigment / gold / platinum shall not be affected by neutral cleanser, when tested according to **Annexe K** and referred with Table **L.1**.

5.5.6 ***Acid proof test***

Fired pigment / gold / platinum shall not be affected by acid when tested according to **Annexe L** and referred with Table **L.1**.

5.5.7 ***Boiling water proof test***

Fired pigment / gold /platinum shall not be affected by boiling water when tested according to **Annexe M** and referred with Table **L.1**.

6 MARKING

6.1 Each item of ceramic ware shall be indelibly and legibly marked on its bottom surface with the name of the manufacturer or manufacturer's registered trademark and the country of origin, if any.

6.2 Where badging is required, it shall be as agreed between the purchaser and the supplier.

6.3 Packages containing ceramic ware shall be marked with the grade of ceramic ware. (see Clause 4)

6.4 Packages of ceramic ware may also be marked with the SLS Certification Mark.

NOTE

Attention is drawn to the certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this standard.

7 PACKING

ceramic ware shall be packed as agreed between the purchaser and the supplier.

ANNEXE A
VISUAL ASSESSMENT AND GRADING OF CERAMIC WARE

A.1 General

A.1.1 Visual assessment and grading of ceramic ware is done on the basis of the nature, number and distribution of defects in the finished ware in respect of their appearance, workmanship, finish and decoration as given in Table **A.1**.

TABLE A.1 - Classification of defects in ceramic ware

	Nature, number and distribution of defects	Minor defect	Major defect
Characteristic : Appearance			
1	Foreign particles , <1 mm	√	
2	Total number of foreign particles shall not be more than 3 on the face and shall not be 4 on the back which are not directly visible. There shall be no grouping.	√	
3	Off standard colour	-	√
4	Foreign particles, 1 mm or more		√
Characteristic : Workmanship			
5	Pin-holes up to 0.5 mm in size not to exceed 2 on face and 3 on back. No grouping	√	
6	Spots up to 0.25 mm in size not to exceed 2 on face and 3 on back. No grouping	√	
7	Starved glaze, on the back only	√	
8	Matt texture of the glaze, on the back only	√	
9	Cracks		√
10	Chipping on surface directly visible (body chips less than 1.5 mm in size on edge and 3 mm Max.. in foot which are glazed over, not to be treated as defect)		√
11	Lack of uniformity in texture and finish		√
12	Pin-holes larger than 0. 5 mm		√
13	Spots larger than 0.25 mm		√
14	Bare spots in glaze. (One or more ground pin marks on back and fixture marks from spray machine are not to be treated as defects).		√
15	Heavy glaze resulting in open air bubbles		√
16	Dunting and crazing		√
Characteristic: Finish			
17	Flash discolour	√	
18	Out-of-roundness, edge warpage and flatness (where applicable) more than that is prescribed		√
19	Corner and sharp edges		√
20	Over / under firing		√
21	Rough edges		√
22	Uneven glaze thickness		√
23	Bloating		√
Characteristic : Decoration			
24	Badging smudge	√	
25	Gold band /design smudged or peel off		√
26	Decoration misplacement		√
27	Discolouration of Gold/platinum or any other metallic lines		√
28	Decal pieces, if noticeable		√
29	Patches without glaze on surface (crawling)		√
30	Glaze cracks without sealing		√

ANNEXE B
DETERMINATION OF EDGE WARPAGE AND SLOPE

Edge-warpage and slope of items of ceramic ware shall be tested as follows.

Invert the sample and place it face down on a levelled surface. Place a weight across the resting surface of the item to stabilize it in place. Attempt to insert a feeler gauge 2 mm between the surface and any portion of the sample edge. Remove the weight from the resting surface and replace it by an inclinometer and determine the slope of the resting surface.

ANNEXE C
DETERMINATION OF WHITENESS

Whiteness shall be determined according to the following method using a Colour Tester.

C.1 ***Apparatus***

C.1.1 Colour tester

An acceptable device for measuring colour to an accuracy of ± 1% having

a) a colour measuring head with photo optical section; and
b) an electronic display unit capable of recording R_x, R_y and R_z to be substituted in equation in 3.2.3 to determine L, a and b values.

C.2 ***Procedure***

C.2.1 Record the remission value R_X by inserting X filter.

C.2.2 Record the remission value R_Y by inserting Y filter.

C.2.3 Record the remission value R_Z by inserting Z filter.

C.2.4 Carry out the calculation as given in **3.2.3.**

C.3 ***Calculations***

$$X = A \cdot R_X + B \cdot R_Z$$

$$Y = R_Y$$

$$Z = C \cdot R_Z$$

where R_X is X filter reading of the whiteness meter
R_Y is Y filter reading of the whiteness meter
R_Z is Z filter reading of the whiteness meter

Filter factors for standard illuminants

A = 0.7832
B = 0.1972
C = 1.181

The L, a, b, co-ordinates are directly related to the x, y, z co-ordinates

L = $10.0\sqrt{\boldsymbol{Y}}$

a = $\frac{\mathbf{17.5\ (1.02\ X - Y)}}{\sqrt{\boldsymbol{Y}}}$

b = $\frac{\mathbf{17.5\ (Y - 0.847.Z)}}{\sqrt{\boldsymbol{Y}}}$

C.4 *Test record*

The test record should contain:

a) Reference standard - Specially prepared Barium sulphate or any other standard calibrated with reference to Barium sulphate.

b) Filters with spectral ranges,

Where Red = 630 nm
Green = 560 nm
Blue = 460 nm

c) Standard illuminate

ANNEXE D
DETERMINATION OF FREEZER SAFE

To determine if freezing of **ceramic** ware can cause any damage or visual changes.

D.1 ***Apparatus***

D.1.1 Freezer

D.1.2 Coloured Dye Bath (Tank) of suitable size

D.1.3 Coloured Dye Ink (Methyl Violet)

D.2 ***Procedure***

D.2.1 Prepare dye bath with visible ink dye.

D.2.2 Place testing sample in the tank for a minimum of 1 minute.

D.2.3 Remove, rinse and dry the sample and inspect for any damage revealed by liquid dye penetration. If any damage is detected, select another test sample and repeat the process until a sample free of damages is obtained.

D.2.4 Place a number of wet sponges in the test sample filling to approximately 75% of the internal volume. Add additional water to ensure that the sponges are fully wet.

D.2.5 Place in freezer for a minimum 6 hours and to a maximum 24 hours duration at – 15 o C to - 23 ^{o} C.

D.2.6 Remove from freezer and leave to stabilize (Thaw out) to room temperature on draining surface.

D.2.7 Place in the dye bath for one minute.

D.2.8 Remove from dye bath and dry sample.

D.2.9 Inspect for damage and any visible aesthetical changes.

ANNEXE E
DETERMINATION OF IMPACT STRENGTH AND CHIPPING RESISTANCE

This test is carried out to ensure that the **ceramic** ware withstands impacts encountered in normal day-to-day use without breaking or chipping.

E.1 *Apparatus*

E.1.1 Impact tester

A suitable pendulum type impact tester is illustrated in Figure **E.1**.

E.2 *Procedure*

E.2.1 Impact strength

When testing a plate, saucer or platter, support the ware against three equally spaced 3 mm diameter steel balls 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^{0} '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.

A ware such as a plate, saucer or platter shall be considered as having failed in 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 treated as having failed if it develops a body crack extending into any portion of the foot or a portion of the body breaks away.

E.2.2 Chipping resistance

This test shall be carried out on flatware only. Place the plate or saucer on its foot between two cast iron blocks forming a 90^{0} 'V' and adjust it in such a manner that when the hammer is hanging vertically the centre 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 'V'. Strike the test piece at three equally spaced points on its periphery with the cylindrical end of the hammer with an impact.

The ware shall be considered as having failed in the test if the impact results in chipping of the edge so that fragments of glaze and body are removed.

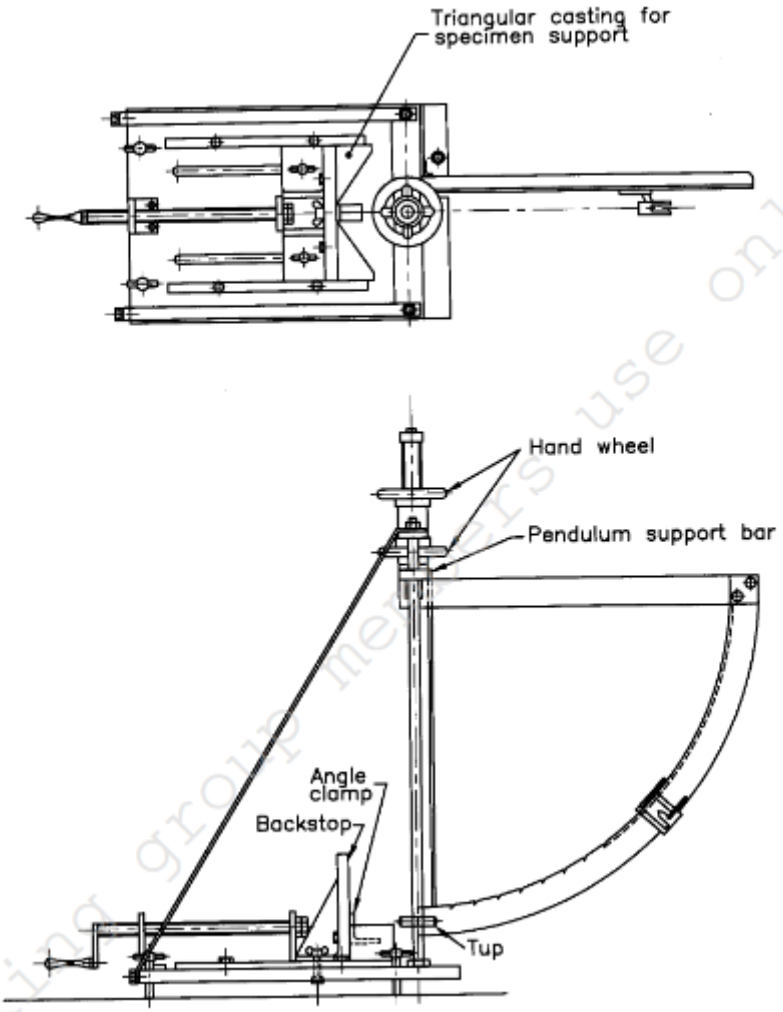

FIGURE E.1: Impact testing apparatus

ANNEXE F
PEEL OFF TEST FOR DECORATED WARE

F.1 *Spalling test*

Place test piece (270 mm plate is desirable) into dryer heated up between 100 ^{0}C and 150 ^{0}C and keep it warm therein for 30 minutes.

Then, take it out of dryer and dip it into normal temperature water immediately. Check

if cracks have appeared on design surface, by a magnifying glass.

F.2 *Outdoor leaving test*

Leave the test piece outdoors for 6 days, under full exposure to outside atmosphere, but do not expose it under rain.

This condition is equivalent to indoor condition for about 12 to 18 months.

Thereafter, paint methyl violet on design surface, strike it by test stick, and then wipe off the methyl violet.

Check the cracks by magnifier. Cracked position may be identified easily by violet colour.

ANNEXE G
DETERMINATION OF ABRASIVE RESISTANCE

G.1 *Abrasion testers*

Abrasion testing for **ceramic** ware can be carried out using the typical Pin Abrasion Tester shown in Figure **G.1** or manually~~(describe the method~~). This instrument subjects the sample piece to a pinhead coated in an abrasive charge, which travels backward and forward. A knife holder is supplied along with an adapter to hold curved surface objects.

Use of a gloss meter will give a repeatable evaluation of the abrasion caused by the pin head.

Gold/Platinum decorated lines should withstand 50 strokes with Pinewood pin head, without causing any defects such as fading of surface luster, colour and peel off.

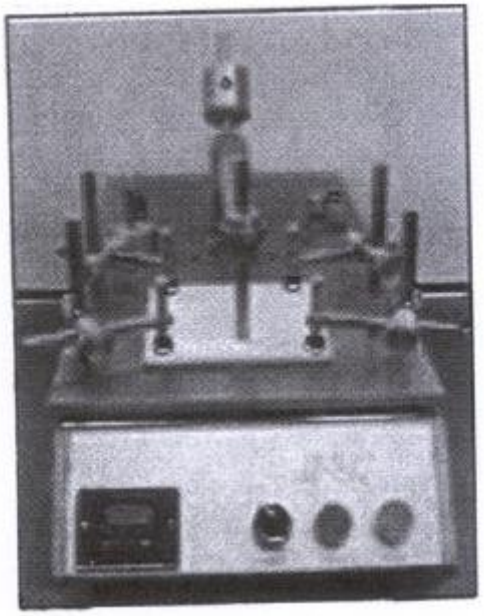

FIGURE G.1: Typical pin abrasion tester

ANNEXE H
DETERMINATION OF DISH WASHER PROOF

H.1 ***Reagent***

The alkaline dishwasher detergent , at a concentration of 0.4 % by weight in distilled water. Sufficient detergent solution shall be prepared to ensure that the total ware surface area to volume of detergent solution is not less than 70 cm^2/litre and does not exceed 130 cm^2/litre.

H.2 ***Test specimen***

A test specimen is any item of decorated ceramic ware which can be completely immersed in the detergent solution.

A minimum of two specimens of similar ware is required.

H.3 ***Procedure***

H.3.1 Hand wash the test samples in warm water containing a little, non – aggressive hand dishwashing detergent. Rinse and dry with a clean cloth.

H.3.2 Examine the sample by eye (with the aid of spectacles if normally worn) in the viewing cabinet. Retain one specimen for comparison after testing.

H.3.3 Determine the surface area of the specimen and satisfy the surface area to volume criteria, (see REAGENT Section). Cover the tanks and adjust the water bath temperature to $77 \pm 1\ ^0C$. Add sufficient dishwasher detergent to give a 0.4% solution and stir well to disperse. Immediately lower the test specimens in the racks in to the tanks and cover. Maintain the detergent solution at $77 \pm 1\ ^0C$.

H.3.4 After 16 hours ± 10 minutes, remove the specimens from the detergent solution , rinse with hot water and rub dry with a clean cloth. The rubbing action may also remove any loose decoration. Repeat the immersion procedure for a further 16 hours, using a fresh detergent solution, remove the test specimens and rinse and dry as above.

H.3.5 Examine the ware as described in heading 2 of Table **L.1**, comparing the tested specimen(s) with the untested specimen for changes in gloss or colour.

H.3.6 Report any changes in gloss, colour of the decoration using the Table **L.1** for guidance.

H.3.6.1 Little or no noticeable effect on the gloss or shade.

H.3.6.2 Slight attack on some of the colours, mainly reduction in the gloss but some fading may also be present.

H.3.6.3 Reduction in gloss or fading of most colours.

H.3.6.4 Considerable attack on most colours and complete removal of small areas of colour of up to 1 mm in diameter.

H.3.6.5 Severe attack, involving substantial removal of colour.

NOTE: *When determining the surface area of flatware, it is sufficient to determine the surface area of a flat disc having the same circumference as the ware. For other types of ware, allowance must be made for the curvature of the ware and for handles etc.*

ANNEXE J
ALKALI PROOF TEST

Dip test pieces into the 0.5 per cent solution of sodium carbonate in the controlled water bath at 100 ^{0}C for 2 hrs.

Wash them thoroughly with water and rub them with a dry cloth.

ANNEXE K
NEUTRAL CLEANSER PROOF TEST

Dip the test piece into the 0.5 per cent solution of neutral cleanser. Leave this vessel in the controlled water bath at 60 ^{0}C for 96 hrs. Wash it thoroughly with water, and rub it with dry cloth.

ANNEXE L
ACID PROOF TEST

The test piece is dipped in to 4 per cent solution of acetic acid and is left at 25 ^{0}C to 35 ^{0}C for 24 hrs. It is washed thoroughly with water and is rubbed with a dry cloth.

L.1 *Other proof standards*

Test pieces are subjected to the following standards after completing the above tests:

TABLE L.1 – Standard grades

Grade / Item	0	1	2	3	4
Surface lustre	Unchanged	Slight matting	Considerable matting	No lustre	-
Colour fading	Unchanged	Slight fading	Considerable fading	Extremely fading	-
Colour change	Unchanged	Slight discoloration	Considerable discoloration	Extremely discoloration	-
Peel off	Unchanged	Unchanged	Unchanged	Starting to peel off	Peeled off

If one of the above surface lustre, colour fading and colour change is found to be in Grade 2, 3 or 4, the test piece is considered as rejected.

If peel off is found to be in Grade 3 or 4, the test piece is considered as rejected.

ANNEXE M
BOILING PROOF TEST

Boiling water proof test

Leave the test piece in 80 - 100 ^{0}C controlled water bath for 24 hrs. Wash it thoroughly with water and rub it with dry cloth. Examine the fired pigment / gold / platinum for any defects.

ANNEXE N
COMPLIANCE OF A LOT

The sampling scheme given in this Annexe shall be applied where compliance of a lot to the requirements of this specification is to be assessed based on statistical sampling and inspection.

Where compliance with this specification is to be assured based on manufacturer's control systems coupled with type testing and check tests or any other procedure, appropriate schemes of sampling and inspection should be adopted.

N.1 Lot

In any consignments, all the packages of the same grade and type belonging to one batch of manufacture or supply shall constitute a lot.

N.2 Scale of sampling

N.2.1 Samples shall be tested from each lot to ascertain the conformity of the lot to the requirements of this specification.

N.2.2 The number of items to be selected from a lot shall be in accordance with Column 1 and Column 2 of Table **N.1**

TABLE N.1 - Scale of sampling

No of items in the lot (1)	No of items to be selected (2)	Size of the sub sample (3)
Up to 1 200	32	5
1 201 – 10 000	50	5
10 001 – 35 000	80	5

N.2.3 If the items are packed in packages, 10 percent of packages subject to a minimum of the two packages shall be selected from each of the selected lot to form a sub sample as given in Column 3 of Table **N.1**.

N.2.4 The packages and items shall be selected at random. In order to ensure randomness of selection, tables of random numbers as given in **SLS 428** shall be used.

N.3 Criteria for conformity

Any lot, when sampled in accordance with N.2, fails to comply with any of the following requirements, shall be deemed not to comply with this standard.

	Test	Number of test pieces to be tested	Number of test pieces to be conformed
01	Marking	32	32
02	Workmanship – visual inspection	32	A minimum of 95% of the ceramic ware are to be free from visible defects that can be impair the appearance of a major area of the ceramic ware
03	Finish	32	Refer Table **A.1**
04	Edge warpage and slope	6	6
05	Whiteness of ceramic ware	6	6
06	Translucency of porcelain ware	6	6
07	Thermal shock and thermal shock endurance test	6	6
08	Freezer safe	6	6
09	Water absorption for earthenware	6	6
10	Water absorption for porcelain ware/opal ware/bone china	6	6
11	Impact strength and	10	10
12	chipping resistance	05	05
13	Handle strength	optional	optional
14	Peel off for decorative ware	6	6
15	Spalling test	2	2
16	Outdoor leaving test	optional	optional
17	Abrasive resistance	4	4
18	Drinking rim test	6	6
19	Release of lead/cadmium	6	6
20	Dish washer proof	4	4
21	Alkaline proof test	2	2
22	Neutral cleanser proof test	2	2
23	Acid proof test	2	2
24	Boiling water proof	2	2

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