Foreword

This Bangladesh Standard was adopted by the Bangladesh Standards and Testing Institution on ..... after the draft finalized by the Soap and Detergent Sectional Committee and approved by the Chemical Divisional Committee.

Feeding bottles are universally used for feeding infants. An Bangladesh Standard on 'Glass Feeding Bottles' is published as BDS 210. Over the last few decades plastics have become indispensable and have taken over glass, metal and paper as a material of choice in many sectors. In view of the convenience in usage plastics have become an automatic choice in the manufacturing of feeding bottles.

Due to its growing demand the sectional committee decided to formulate this standard. While revising this standard the sectional committee gave due consideration to the views of the producers, consumers and technologists and felt that it should be related to the prevailing trade and manufacturing practices followed in this field in the country.

This standard covered polypropylene (PP), polyethersulfone (PES) and olefin based polymers as raw material for manufacturing plastics feeding bottles owing to their excellent transparency and sterlizability.

Use of polycarbonate as a material for manufacturing infant feeding bottles has not been permitted in view of reports on Bisphenol A.

Bisphenol A, having chemical formula $(CH_3)_2C(C_6H_4OH)_2$, [IUPAC name: 4,4'-(propane-2,2-diyl) diphenol] is a building block monomer for polycarbonate resin that in turn is used to manufacture infant feeding bottles. It is used to make them clear and nearly shatter-proof.

Recently through studies, serious concerns have been raised about the polycarbonate type of plastic bottles because they contain Bisphenol A (BPA) which has serious health concerns even in very low dosages. It has been reported that BPA containing plastic feeding bottles leached high levels of Bisphenol A which is harmful for infants. Accordingly, BPA has been banned for use in manufacturing infant feeding bottles by many countries including US, EU, Canada, Australia, Brazil, Malaysia, China etc.

In the preparation of this standard, assistance derived from the following publications is acknowledged with thanks:

IS 14625:2015 Plastics Feeding Bottles; Bureau of Indian Standards.

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 analysis, shall be rounded off in accordance with BDS 103.

Bangladesh Standard

Specification for Plastics Feeding Bottles

1. Scope

1.1 This standard prescribes the requirements and methods of sampling and test for infant plastic feeding bottles and receptacles.

2. Normative references

2.1 The following Bangladesh Standards are necessary adjuncts to this Standard. For undated references the latest edition of the publication referred to applies.

BDS 38	Sulphuric Acid
BDS 103	Methods of rounding off numerical values.
BDS 127	Sodium Bichromate
BDS 833	Reagent grade water
BDS 1765	Methods for Random Sampling
BDS 1959	Methods of Test for Plastics Containers
BDS 1976	Determination of Overall Migration of Constituents of Plastics Materials and Articles Intended to Come in Contact with Foodstuffs – Method of Analysis
BDS 2022	Printing Ink for Food Packaging – Code of Practice
BDS 2030	Plastics - Guidelines for the Recovery and Recycling of Plastics Waste
BDS ISO 472	Plastics — Vocabulary
ISO 5961	Water quality — Determination of cadmium by atomic absorption spectrometry
ISO 8288	Water quality — Determination of cobalt, nickel, copper, zinc, cadmium and lead — Flame atomic absorption spectrometric methods
ISO 9174	Water quality — Determination of chromium — Atomic absorption spectrometric methods
ISO 11885	Water quality — Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES)
ISO 12846	Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment
ISO 13106	Plastics — Blow-moulded polypropylene containers for packaging of liquid foodstuffs
ISO 16770	Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)
ISO 17378-1	Water quality — Determination of arsenic and antimony Part 1: Method using hydride generation atomic fluorescence spectrometry (HG-AFS)
ISO/TS 17379-1	Water quality — Determination of seleniumPart 1: Method using hydride generation atomic fluorescence spectrometry (HG-AFS)
ISO/TS 17379-2	Water quality — Determination of selenium Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)
ISO 17852	Water quality — Determination of mercury — Method using atomic fluorescence spectrometry
BDS ASTM D1003	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

3. Terms and Definitions

For the purposes of this Standard, the definitions given in BDS ISO 472 and the following shall apply.

3.1 Accessories — It shall include the hood, disc/ stopper, teat, and cap ring.

3.2 Drinking Accessory — Any device other than a feeding teat which permits a child to obtain fluid from a container, for example feeding spout.

3.2.1 Straw — A hollow tube drinking accessory through which fluid is sucked.

3.3 Container — It is either a feeding bottle or receptacle.

3.3.1 Feeding Bottle — A container which is capable of holding a fluid and incorporates a graduated scale suitable for visual measurement and is intended for

feeding a child through a feeding teat or drinking accessory.

3.4 Locking Ring — A component used to secure a feeding teat or drinking accessory to the container.

3.5 Sealing Disc — A component used to create a seal between the container and the locking ring.

3.6 Protective Cover — A component as safety shield to cover a feeding teat.

3.7 Matched Components — Any of the above defined components which are used together whilst feeding a child.

3.8 Nominal Capacity — The volume of milk/fluid normally expected to be filled in the bottles at 27 ± 2°C.

3.9 Brimful Capacity — The volume of water required to fill the bottle completely to brim level at 27 ± 2°C.

3.10 Re-usable — A component intended to be used again after first use.

3.11 Numbered Graduations — The numbered markings which indicate the volume of fluid within the feeding bottle.

3.12 Single-use Feeding Teat, Drinking Accessory or Container — Any item of drinking equipment sold for single-use.

3.13 Protrusions — A drinking accessory, feeding teat or spoon, excluding straws or anything extruding from physical contour of the feeding device.

3.14 Receptacles — A container used for holding or storing the things.

4. Materials

4.1 The material used for plastics feeding bottles and accessories excluding teats shall be of virgin polypropylene or polyethersulfone (PES) or any other olefin based polymer, co-polyester material or other raw material as given in Annex A for manufacture of plastic feeding bottle. The materials used should be of no health hazards to babies.

4.2 Polyvenyl chloride (PVC), polycarbonate (PC) and polyethylene terephthalate (PET) shall not be used to manufacture feeding bottles. Plastics feeding bottles shall not contain Bisphenol A (BPA) when tested in accordance with BDS ASTM D7574.

4.3 Teats (nipple) shall conform to BDS……. and in case teats are made of silicone teats, these shall be manufactured from non-toxic and food grade material till such time Bangladesh Standard is available on the subject.

5. Requirements

5.1 Description

5.1 Physical Requirements

5.1.1 Description

The feeding bottle shall be of suitable design, shape and required dimensions as agreed to between the purchaser and the supplier. However, the shape shall be such that it is easily cleanable and does not permit the food remnants to remain stuck inside the feeding bottles. Neck shall be smooth from inside that is solid without any underside grooves.

Figures 1 illustrate typical examples of different items of feeding bottle. Figures 1 is illustrative and for information only.

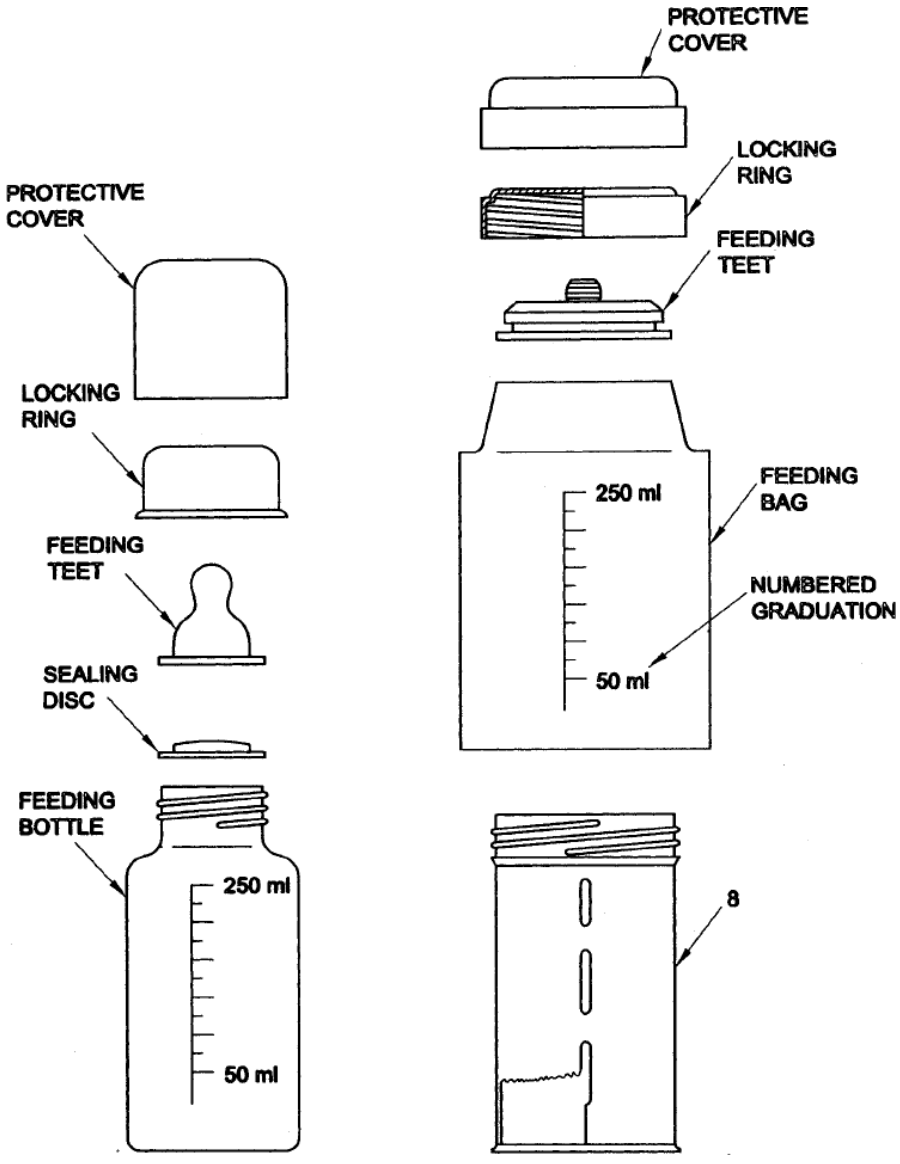

Fig. 1 Examples of Different Items of Feeding Bottle

5.1.2 Manufacture, Workmanship, Finish and Appearance

5.1.2.1 The bottles and accessories shall be manufactured by a suitable process adhering to good manufacturing practice (GMP).

5.1.2.2 The body of the bottle shall be smooth, both internally and externally, free from any visual defects like cavities, crevices, hooks, embedded foreign matters, detrimental bubbles, streaks, flaws, stains, etc. All components of plastic feeding bottle when assembled for use shall be free from points and edges and any harmful extrusions, which are likely to cause injury.

5.1.3 Wall Thickness

The minimum wall thickness shall be declared by the manufacturer. The wall thickness when measured in accordance with 4.5 of BDS 1959 shall not be less than the declared minimum value.

5.1.4 Capacity

5.1.4.1 The bottles shall be manufactured in nominal capacity of 125 mL, 150 mL and 250 mL or any other capacity as agreed to between the purchaser and the supplier. The brimful capacity shall exceed the nominal capacity by a minimum of 15 percent when tested in accordance with 5 of BDS 1959 or ISO 13106. In case of dispute, the test method given in BDS 1959 shall be used as referee method.

5.1.4.2 Capacity scale

All feeding bottles shall be marked with graduations at least in millilitres. The feeding bottles shall be provided with the following capacity scale:

a) If the feeding bottle is unprinted, then capacity scale shall be engraved on the bottle and if the bottle is printed then the capacity scale shall be clearly printed. The bottles with printed scale shall be tested for the permanency of pigment in accordance with method described in Annex B.

b) The scale interval and the maximum indicating scale mark shall be as agreed to between the purchaser and the supplier. However, the minimum scale mark and interval marking shall be not more than 20 percent of the maximum scale indicating mark.

c) The scale marks and the indicating numerical values shall be clear and shall not be affected by high temperature sterilizing treatment.

5.2 Chemical Requirements

5.2.1 Migration of Certain Elements

5.2.1.1 Principle

Soluble elements (antimony, arsenic, barium, cadmium, chromium, lead, mercury and selenium) are extracted from the individual components of the feeding bottle excluding hood. Conditions that stimulate contact with stomach acid shall be used. The concentrations of the soluble elements are described quantitatively.

5.2.1.2 Apparatus

5.2.1.2.1 Water bath, able to maintain the temperature of the test mixture at 37 ± 2 ºC and having the means to agitate the test mixture.

5.2.1.2.2 pH meter, with an accuracy of ± 0.2 pH units.

5.2.1.2.3 Membrane filter, with a pore size of 0.45 µm.

5.2.1.2.4 Centrifuge, capable of centrifuging at 5000 ± 500 rpm.

5.2.1.3 Reagents

Unless specified otherwise, pure chemicals and distilled water (see BDS 833) shall be employed in tests.

NOTE— 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

5.2.1.3.1 Hydrochloric acid solution, 0.07 ± 0.00 mol/L.

5.2.1.3.2 Hydrochloric acid solution, 2.0 ± 0.2 mol/L.

5.2.1.3.3 Distilled water

5.2.1.4 Selection of test portions - Test portions shall be taken from each individual component of the feeding bottle excluding hood. Components that are joined together shall be separated and tested as separate items.

5.2.1.5 Preparation of test portion

At least 100 mg and preferably at least 1 g, of a representative test portion of each individual component of the feeding bottle excluding hood shall be obtained. Heating of the materials, whilst separating components and during cutting into pieces, shall be avoided.

Feeding teats shall be cut length-wise only once. All other components excluding hood shall be cut, as far as possible, into pieces of length 4 - 6 mm and width not exceeding 6 mm.

5.2.1.6 Procedure

Mix at 37 ± 2 ºC, the prepared test portion (see 5.2.1.5) with 50 times its mass of an aqueous solution of the hydrochloric acid (see 5.2.1.3.1) in a container of 1.5 to 5 times the volume of acid. Agitate the container in the water bath (see 5.2.1.2.1) for 60 ± 5 seconds and determine the acidity of the mixture with the pH meter (see 5.2.1.2.2). If the pH is greater than 1.5, add drop wise, whilst continuing to shake the mixture, an aqueous solution of hydrochloric acid (see 5.2.1.3.2) until the pH is in the range of 1.0 to 1.5. The mixture shall be protected from light and continuously agitated under similar conditions for a further 60 ± 1 minutes before being allowed to stand for 60 ± 1 minutes at the same temperature.

Immediately after standing, separate the solid from the solution by membrane filtration (see 5.2.1.2.3) and, if necessary, centrifugation (see 5.2.1.2.4) at up to 5000 rpm and for no longer than 10 minutes. The use of centrifugation shall be reported.

If the solutions are to be kept for more than 1 day prior to analysis, they shall be stabilized by the addition of hydrochloric acid so that the concentration of the stored solution is approximately 1 mol/L.

5.2.1.7 Determination of the quantity of migrated elements

The methods specified in column 4 of Table 1 shall be used to determine their quantity.

5.2.1.8 Feeding bottle and its components excluding hood made of plastics, when tested in accordance with the method specified in column 4 of Table 1, shall not exceed the limits of elements as given in column 3 of Table 1.

Table 1 Permissible Levels of Heavy Metals in Plastic feeding bottle

(Clause 5.2.1.7)

Sl No.	Heavy Metals	Maximum Limit ppm	Ref to, IS No.
(1)	(2)	(3)	(4)
i)	Antimony	15	ISO 17378-1
ii)	Arsenic	10	ISO 17378-1
iii)	Chromium	10	ISO 9174
iv)	Mercury	10	ISO 12846, ISO 17852
v)	Cadmium	20	ISO 5961
vi)	Lead	25	ISO 8288
vii)	Barium	100	ISO 11885
viii)	Selenium	100	ISO TS 17379-1

5.2.2 Overall Migration Test

Representative samples of feeding bottle shall be subjected to overall migration test either by filling the whole container or by using sheets cut from the container; in the latter case the migration value has to be extrapolated to the container contact surface area and the volume of the contents with the following:

a) Distilled water at 40 ± 2 ºC for 2 hours, and

b) n-heptane at 38 ± 1 ºC for 30 minutes.

The maximum extraction values for the container material shall not exceed 60 mg/L or 60 ppm (for details of the test see BDS 1976).

5.2.3 The limits and tolerances of the pigments and colourants used in the printing shall conform to BDS 2022.

5.3 Performance Requirements

5.3.1 Environmental Stress-Crack Resistance

The bottles shall be tested in accordance with ISO 16770 and shall show no evidence of stress cracking or leakage after being kept in oven for 48 hours.

5.3.2 Transparency

The transparency of a plastics feeding bottle shall not be less than 70 percent in any light source transmittance when tested in accordance with the method described in Annex C.

5.3.3 Leakage Test

The bottles filled to brim level with water at ambient temperature and closed tight with closures shall be kept for 24 hours in a horizontal position. During and at the end of the period, the bottles shall not show any leakages. The bottles shall be then held vertically upside down for 10 minutes and the bottle shall not show any leakages. The bottles may be kept on a blotting paper in upside down position and any leakages observed shall be noted.

5.3.4 Drop Test

The bottles filled to brim level with water at ambient conditions and closed tight with closures shall not show any sign of rupture or leakage when tested in accordance with the method described in Annex D. The dropping height of the bottles shall be 1.2 m.

5.3.5 Ageing Resistance

Immerse the bottles into the boiling water for 20 minutes, then immediately into the ice water for 20 minutes alternately and repeat it 3 times. At the end of the test, the change in the capacity of bottles shall not be more than 1 percent and also there shall be no defective changes in the bottle. There shall be no significant changes in appearance when the accessories are tested in accordance with the method indicated above.

5.3.6 Compressive Deformation Resistance

The bottles shall not get deformed by more than 10 percent in diameter in compressive direction at the compressive load of 2 kgf (19.6 N) when tested in accordance with the method described in Annex E.

5.3.7 Product Resistance of Printed Containers

The printed bottles when tested in accordance with the method prescribed in 14 of BDS 1959 shall not show any significant removal of the print from the bottle surface and the print shall be legible to the naked eye after the test.

6. Sample Preparation

The sample preparation applies to all tests except ageing resistance (see 5.3.5) and migration test (see 5.3.8).

6.1 Samples from re-usable products shall be immersed in boiling water for 10 minutes without touching the walls of the container.

NOTE — This is to remove the surface coating arising from the manufacturing processes and ensure that the materials used are stable in boiling water.

6.2 New samples, preferably from the same batch, shall be used for each test.

6.3 Samples and test portions shall only be handled with suitable (non-rubber or plastic) gloves and shall only be stored in securely fastened, migration-free (glass) containers and protected from light.

7. Packing and Marking

7.1 The bottles shall be packed as agreed to between the purchaser and the supplier.

7.2 Each bottle shall be permanently marked with scale mark.

7.2.1 Each carton containing the bottle shall be permanently marked with the following:

a) Indication of the source of manufacture and trade-mark, or the company responsible for placing the product in the market, if any;

b) Nominal capacity;

c) Batch No. and Code No.;

d) Month and year of manufacture;

e) Made from plastics materials meant for food contact applications indicating material used;

f) Product symbol in line with BDS 2030; and

g) Instructions for use and hygienic care of the product shall be printed and may be included in a separate leaflet placed in or/on the product as given in 7.2.2.

7.2.2 Instructions for Use

7.2.2.1 The following information shall be provided:

a) Information for the safe use of the product; and

b) Information on unsuitable common methods of heating which might damage the product.

7.2.2.2 For re-usable products the following additional instructions shall be provided:

a) At least one method of cleaning;

b) Before first use, clean the product; and

c) Information on unsuitable common methods of cleaning, storage and use which might damage the product.

7.2.2.3 For products with feeding accessories the following 'WARNINGS' shall be provided in the form given:

For your child's safety and health

WARNING

a) Always use this product with adult supervision.

b) Always check food temperature before feeding.

c) Keep all components not in use out of the reach of children.

NOTE — It is recommended that the supplier of drinking equipment include informative literature to explain the reasons and background for these warnings.

7.2.2.3 Heating in a microwave oven may produce localised high temperatures.

For products where microwave heating is recommended as a suitable method of food preparation the following instructions shall be provided although alternative wording is permitted:

Take extra care when microwave heating. Always stir heated food to ensure even heat distribution and test the temperature before serving.

7.3 BSTI Certification Marking

7.3.1 The containers may also be marked with the BSTI Certification Mark.

NOTE - The use of the BSTI Certification Mark is governed by the provisions of the Bangladesh Standards and Testing Institution Act 2018 and the Rules and Regulations made there under. Details of conditions be under which a license for the use of the BSTI Certification Mark may granted to manufacturers or processors, may be obtained from the Bangladesh Standards and Testing Institution.

8. Sampling

The samples of the bottles shall be drawn and the criteria for conformity determined as prescribed in Annex F

Annex A

(Clause 4.1)

List of the Material for Manufacture of Plastic Feeding Bottles

(Based on Malaysian Standard, MS 735 and US FDA Regulations)

(1) (i) Polypropylene consists of basic polymers manufactured by the catalytic polymerization of propylene.

21 CFR 177.1520 (a)(3)(i)

Olefin basic copolymers consist of basic copolymers manufactured by the catalytic copolymerization of:

(i) Two or more of the 1-alkenes having 2 to 8 carbon atoms. Such olefin basic copolymers contain not less than 96 weight-percent of polymer units derived from ethylene and/or propylene, except that:

(a)

(1) Olefin basic copolymers manufactured by the catalytic copolymerization of ethylene and hexene-1 or ethylene and octene-1 shall contain not less than 90 weight percent of polymer units derived from ethylene;

(2) Olefin basic copolymers manufactured by the catalytic copolymerization of ethylene and hexene-1 shall contain not less than 80 but not more than 90 weight percent of polymer units derived from ethylene.

(3) Olefin basic copolymers manufactured by the catalytic copolymerization of ethylene and pentene-1 shall contain not less than 90 weight-percent of polymer units derived from ethylene.

(4) Olefin basic copolymers manufactured by the catalytic polymerization of ethylene and octene-1 shall contain not less than 50 weight-percent of polymer units derived from ethylene.

(b) Olefin basic copolymers manufactured by the catalytic copolymerization of ethylene and 4-methylpentene-1 shall contain not less than 89 weight percent of polymer units derived from ethylene;

(c)

(1) Olefin basic copolymers manufactured by the catalytic copolymerization of two or more of the monomers ethylene, propylene, butene-1, 2-methyl propene-1, and 2,4,4- trimethylpentene-1 shall contain not less than 85 weight percent of polymer units derived from ethylene and/or propylene;

(2) Olefin basic copolymers manufactured by the catalytic copolymerization of propylene and butene-1 shall contain greater than 15 but not greater than 35 weight percent of polymer units derived from butene-1 with the remainder being propylene.

(d) Olefin basic terpolymers manufactured by the catalytic copolymerization of ethylene, hexene-1 and either propylene or butene-1, shall contain not less than 85 weight percent polymer units derived from ethylene.

(e) Olefin basic copolymers manufactured by the catalytic polymerization of ethylene and octene-1, or ethylene, octene-1, and either hexene-1, butene-1, propylene, or 4-methyl pentene-1 shall contain not less than 80 weight percent of polymer units derived from ethylene.

21 CFR 177.1520 (b)

(b) Olefin basic copolymers manufactured by the catalytic copolymerization of ethylene and 4-methyl pentene-1 shall contain not less than 89 weight-percent of polymer units derived from ethylene;

21 CFR 177.1520 (c) Specifications

Item (1)	**Olefin polymers** (2)	**Density** (3)	**Melting Point (MP) or softening point** (4)	**Maximum extractable fraction (expressed as percent by weight of the polymer) in n- hexane at specified temperatures** (5)	**Maximum soluble fraction (expressed as percent by weight of polymer) in xylene at specified temperatures** (6)
1.1a	Polypropylene described in paragraph (a)(1)(i) of this section	0.880-0.913	MP: 160-180°C	6.4 percent at reflux temperature	9.8 percent at 25°C
3.1a	3.1a Olefin copolymers described in paragraph (a)(3)(i) of this section for use in articles that contact food except for articles used for packing or holding food during cooking; except olefin copolymers described in paragraph (a)(3)(i)(a)(3) of this section and listed in item 3.1c of this table and olefin copolymers described in paragraph (a)(3)(i)(e) of this section and listed in item 3.1b of this table	0.85-1.00		5.5 percent at 50°C	30 percent at 25°C

Annex B

[Clause 5.1.4.2 (a)]

Test for Permanency of Pigment

B-1 General

This test is meant only for those feeding bottles which have a printed scale, graduations and picture.

B-2 Reagents

B-2.1 Sodium Bichromate, see BDS 127.

B-2.2 Concentrated Sulphuric Acid, relative density – 1.834 approximately (see BDS 38).

B-3 Procedure

B-3.1 Weight about 20 g of sodium dichromate and dissolve in 1500 mL of concentrated sulphuric acid and dilute to 2500 mL with water. Immerse the bottles in the solution at room temperature for 15 minutes. Rinse the samples with water and dry.

B-3.1.1 The bottles shall be taken as having satisfied the requirements of the test, if the printed impressions do not become illegible.

Annex C

(Clause 5.3.2)

Transparency Test

C-1 General

Transparency of plastics feeding bottle can be tested either by using integration ball type light transmittance measurement apparatus or by method prescribed in BDS ASTM 1003. In case of dispute, the test method given in BDS ASTM 1003 shall be used as referee method.

C-2 Integration Ball Type Light Transmittance Measurement Method

C-2.1 Test Specimen - Test specimen shall be prepared from the part of feeding bottle where scale marks or other marks are not found.

C-2.2 Apparatus - The optical series principle diagram of integration ball type light transmittance measurement device is shown in Fig. 3 and Fig. 4. The device shall conform to the optical conditions specified in Table 2.

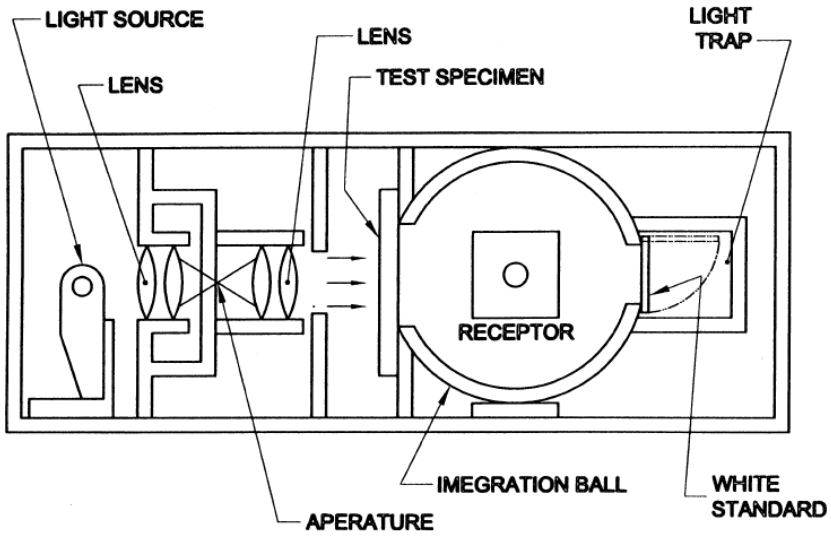

Fig. 3 Principle Diagram of Device

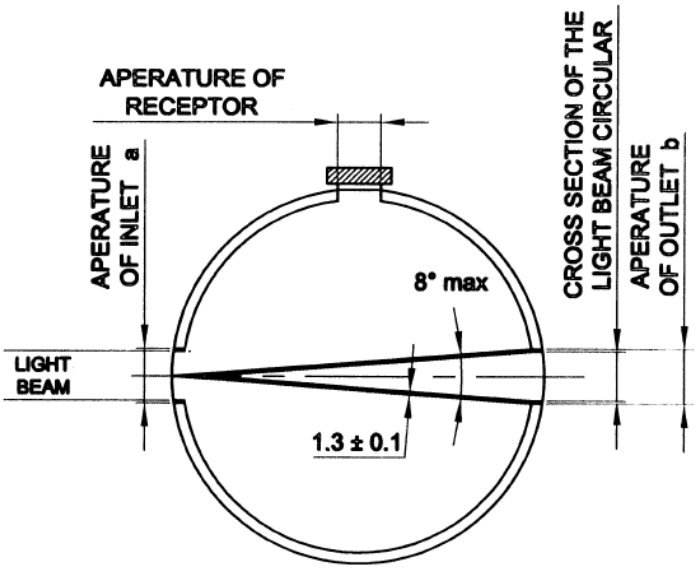

Fig. 4 Condition of the Integration Ball

C-2.3 Test Specimen

The size of test specimen shall be 50 × 50 mm and the thickness shall be the original thickness of the test specimen.

Three test specimens shall be prepared.

C-2.4 Measurement

C-2.4.1 Install the white standard plate, adjust the reading (T_1) of the device's current meter to be 100; adjust the amount of incident light.

C-2.4.2 Under the status where the white standard plate is installed, install and measure the test specimen to obtain the indication (T_2) of the current meter. The full light transmittance shall be calculated according to the following formula:

$$\frac{T_1}{T_2} \times 100$$

Where T = full light transmittance, in percent.

Table 2 Optical Condition of Device

(Clause C-2.2)

Sl No.	Item	Conditions
(1)	(2)	(3)
(i)	Integration ball	The sum of areas of light's inlets and outlet (the installation part of the test specimens and the white standard plate) (a + b + c) shall be less than 4 percent of overall internal surface are of the ball (see Fig. 2). The centre lines of the outlet and inlet shall be on the same large circle of the ball. The angle formed by the outlet diameter and the centre line of the inlet shall be within 8.
(ii)	Reflection surface	a. The white standard plate shall have same high reflectivity to full wavelength of the visible light. Magnesium oxide, barium sulphate and aluminium oxide, etc, can meet such requirements. The interior of the integration ball shall be coated with a material having the same reflectivity as the white standard plate b. The light beams used to shine on the test specimen shall be parallel light. Lights deviated from the optical axis for more than 3° shall not be used. The centre of light beam shall coincide with the centre line of the outlet.
(iii)	Light beam	The cross-section of the light beam at the outlet shall be circular and bright; the angle formed by its diameter and the centre of inlet shall be 1.3 ± 0.1° smaller than the angle formed by the outlet diameter. The cross section of the light beam at the integration ball shall conform to Fig. 4.
(iv)	Light trap	The light trap when not installed with the test specimen of the white standard plate shall be able to completely absorb the light.
(v)	Light source	a) The light source shall be the standard light source C. b) The comprehensive sensitivity of the receptor and the visually sensitivity filter used shall satisfy the Y value of Luther.
(vi)	Receptor	Conditions at the standard light source C. However, when designated specifically, the one which satisfies the Y value of Luther conditions at the standard light source A can be used.

Annex D

(Clause 5.3.4)

Drop Test

D-1 Sample Size

The sample size shall be ten bottles, taken at random from a batch, divided into two sets of 5 each, designate as Set 1 and Set 2.

D-2 Procedure

D-2.1 Fill each bottle with water at ambient conditions and close tight with closures.

D-2.2 Drop the bottles ten times under free fall conditions in Set 1 squarely on their base on to a rigid flat horizontal surface of steel or smooth concrete as the dropping surface.

D-2.3 Drop the bottles ten times under free fall condition in Set 2 on their side (the body of the bottle being parallel to the impacting floor) onto the dropping surface.

D-2.4 Examine each bottle for signs of rupture or leakage.

Annex E

(Clause 5.3.6)

Compressive Deformation Test

E-1 Procedure

Apply the compressive load of 2 kgf in the middle part of the body or to the part having the maximum diameter of a feeding bottle by the use of compression jig as shown in Fig. 5. Measure the deflection of the part at that time, and calculate percentage deflection. The measurements shall be carried out at 27 ± 2 °C.

E-2 Calculation

$$\text{Percentage Deflection of diameter} = \frac{\text{Outside diameter prior to test - Outside diameter at the time of compression}}{\text{Outside diameter prior to test}} \times 100$$

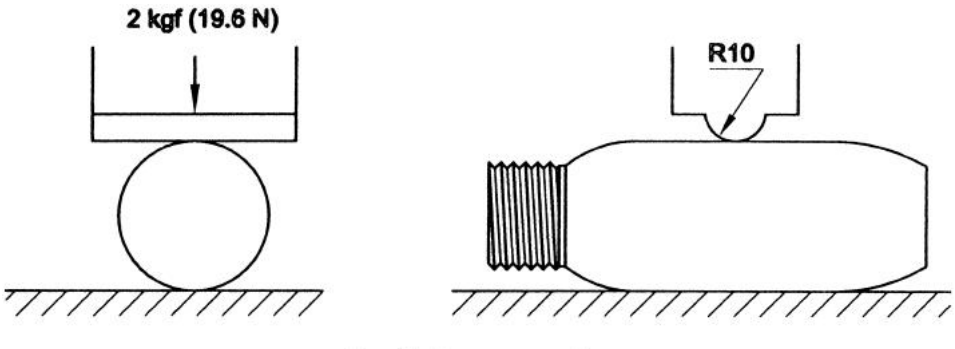

Fig. 5 Compression Jig

Annex F

(Clause 8)

Sampling of Plastic Feeding Bottles

F-1 Scale of Sampling

F-1.1 Lot

In any consignment, all the bottles of the same material, size and drawn from a single batch of manufacture shall be grouped together to constitute a lot.

F-1.2 Scale of Sampling

For ascertaining the conformity of the lot to the requirements of this standard, tests shall be carried out for each lot separately. The number of bottles to be sampled from a lot shall be in accordance with Table 3.

F-1.3 The bottles shall be selected at random from the lot. To ensure the randomness of selection, methods given in BDS 1765 may be followed.

F-2 Criteria for Conformity

F-2.1 Manufacture, Workmanship, Finish and Appearance

The sample bottles selected as per column 2 of Table 2 shall be examined for manufacture, workmanship, finish and appearance. Any bottle failing in one or more of the requirements shall be termed as defective. The lot shall be accepted under this head, if the number of defective bottles in sample does not exceed the acceptance number given in column 3 of Table 2.

F-2.2 Capacity (see also 5.1.4)

5 bottles for lot size up to 5000 and 10 bottles for lot size above 5000 shall be selected at random from the samples already drawn according to **F-1.3**. There shall be no failure, if the lot is to be accepted under this clause.

F-2.3 Permanency of pigments (see **5.1.4.2**), Transparency (see **5.3.2**), Leakage test (see **5.3.3**), Ageing resistance (see **5.3.5**), Compressive deformation resistance (see **5.3.6**), and ink adhesion for printed bottles (see **5.3.7**). The number of sample bottles to be drawn shall be in according to column 4 of Table 2. Each of the sample bottles shall be subjected to Permanency of pigments (see **5.1.4.2**), Transparency (see **5.3.2**), Leakage test (see **5.3.3**), Ageing resistance (see **5.3.5**), Compressive deformation resistance (see **5.3.6**), and ink adhesion for printed bottles (see **5.3.7**). The number of failures shall not exceed the acceptance number given in column 5 of Table 2 for all tests except leakage test. For leakage test the acceptance number is zero that is no failure shall occur for lot acceptance.

F-2.4 Drop Test (see also 5.3.4)

The sample bottles as given in test method (see **5.3.4**) shall be drawn from the lot and these shall be subjected to drop test. There shall be no rupture or leakage in any bottle after the test for acceptance. In case even one bottle has any sign of rupture or leakage, the lot shall be considered as not conforming to the requirements of this specification.

Table 2 Scale of Sampling and Acceptance Number

(Clauses F-I.2, F-2.1 and F-2.3)

Sl No.	Lot Size	Manufacture, Workmanship, Finish and Appearance		For Transparency (see 5.3.2), Leakage Test (see 5.3.3), Ageing Resistance (see 5.3.5), Compressive Deformation Resistance (see 5.3.6) and Ink Adhesion for Printed bottles (see 5.3.7)	
		Sample Size	Acceptance Number	Sample Size	Acceptance Number
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 500	13	1	5	0
ii)	501 to 1000	20	2	8	0
iii)	1001 to 3000	32	3	13	0
iv)	3001 to 5000	50	5	20	1
v)	5001 and above	80	7	32	1