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Draft Indian Standard
BLOW MOULDED POLYOLEFIN CONTAINERS — SPECIFICATION
PART 1 UP TO 5 LITRES CAPACITY

(Third Revision of IS 7408 Part 1)

(ICS 55.120)

Plastics Packaging Sectional Committee,
PCD 21

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FOREWORD

(Formal clause will be added later)

This standard was originally published in 1974 and subsequently revised in 1984 and 2000. This revision (*third*) has been undertaken to update the standard by incorporating amendments and by updating the cross referred standards.

Other parts in this series are:

- Part 2 Over 5 litres up to and including 60 litres capacity
- Part 3 Over 60 litres up to and including 250 litres capacity

For polyolefin containers to hold products classified as dangerous goods it may be necessary to comply with certain statutory regulations, performance requirements and special carrier requirements [*see* IS 6312 : 1994 'Polyethylene containers for the transport of materials — Specification'].

For containers used for the packaging of food items, the plastics material shall conform to the requirements laid down in the relevant Indian Standards. The list of Indian Standards published so far on plastics for its safe use in contact with foodstuffs, pharmaceuticals and drinking water are given in Annex A for information.

A scheme of labelling environment friendly products with the ECO logo has been introduced at the instance of the Ministry of Environment, Forests & Climate Change (MoEF&CC). Government of India. The ECO-Mark is being administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolutions No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with the ECO logo, it shall also carry the ISI Mark of the BIS besides meeting additional environment friendly requirements. For this purpose the Standard Mark would be a single mark being a combination of the ISI mark and the ECO Logo.

This scheme is based on the gazette Notification No. 170 dated 18 May 1996 for plastic products as environment friendly products published in the Gazette of the Government of India. Therefore, this standard has included environment friendly requirements for Blow moulded polyolefin containers - Specification: Part 1 upto 5 litres capacity.

In the preparation of this standard, considerable assistance has been derived from BS 4839 Part 1: 1972 'Specification for blow moulded polyolefins containers: Part 1 Containers up to 5 litres capacity' issued by the British Standards Institution, UK.

For the purpose of deciding whether a particular requirement of this standards is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960

'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard (Part 1) specifies tolerances on mass, dimensions, performance requirements and methods of sampling and tests for blow moulded containers, made from polyolefins, with capacities up to and including 5 litres. A recommended range of nominal capacities for stock containers for liquid products is included.

1.2 This standard does not cover containers specifically intended for products classified as dangerous goods.

2 REFERENCES

The following standards contain provisions which through reference in this text constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No./ Other Publication</i>	<i>Title</i>
IS 2798: 1998	Methods of test for plastics containers (<i>first revision</i>)
IS 3025 (Part 2): 2019/ISO 11885: 2007	Methods of sampling and test (physical and chemical) for water and wastewater: Part 2 Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICO-OES) (<i>first revision</i>)
IS 4905: 2015/ ISO 24153: 2009	Random sampling and randomization procedures (<i>first revision</i>)
IS 6312: 1994	Polyethylene containers for the transport of materials — Specification (second revision)
IS 7019: 1998	Glossary of terms in plastics and flexible packaging, excluding paper (second revision)
IS 7328: 2020	Specification for polyethylene material for moulding and extrusion (<i>third revision</i>)
IS 8747: 1977	Methods of test for environmental stress-crack resistance of blow-moulded polyethylene containers
IS 9845: 1998	Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs — Method of analysis (second revision)
ISO 18856: 2004	Water quality — Determination of selected phthalates using gas chromatography/ mass spectrometry

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 7019 and the following shall apply:

3.1 Blow Moulded Container

A container formed from a parison of heat softened thermoplastics material by the application of pressure which forces it against the inside walls of a blow mould.

3.2 Neck Face

The upper most surface of the container neck.

3.3 Container Height to Neck Face

The height of the highest point of the neck face of the finished empty container.

3.4 Container Overall Height

The height of the finished empty container at its highest point with closure and fitment.

3.5 Container Diameter

The external diameter of the finished empty container at a specified height, expressed as the mean of the two perpendicular diameters, or as the circumference multiplied by 0.318 at the same specified height.

3.6 Neck Height

The perpendicular distance from the highest point of the plane including the neck face to the nearest point of the finished container's shoulder along a line passing through:

- in the case of screw threaded necks, the outermost edge of the thread; a feature below the thread of greater diameter than the thread is considered as a part of the container's shoulder (*see* Fig. 1A and 1B);
- in the case of plain cylindrical necks, the outermost diameter point excluding flash (*see* Fig. 1C); and
- in the case of necks having a bead or beads only, the outermost point of the bead (*see* Fig. 1D).

3.7 Neck Diameter

The external diameter of the neck, excluding thread and/or prominences, measured as the mean.

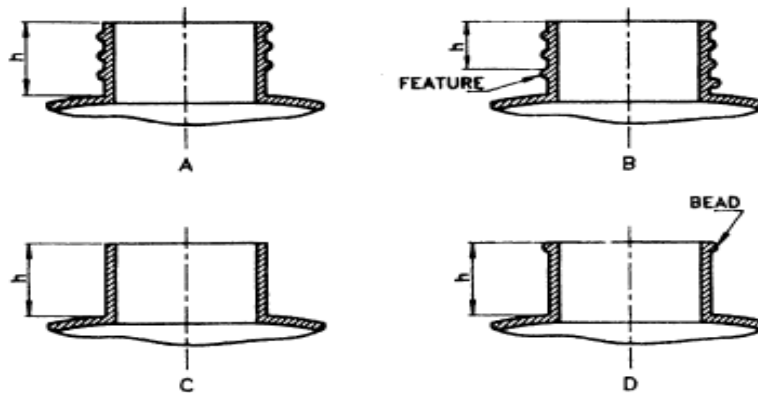


FIG. 1 NECK

3.8 Thread Diameter

The external diameter of the neck thread measured as the mean of two perpendicular diameters avoiding the part line.

3.9 Neck Bore

The diameter of the inner periphery of the neck at a specified depth.

3.10 Neck Ovality

The difference between the maximum and the minimum neck diameters.

3.11 Nominal Capacity

The volume of liquid in the container intended to hold at 27 ± 2 °C.

4 CAPACITY

A recommended range of nominal capacities for stock containers for liquid products, together with the corresponding minimum brimful capacities, is given in Table 1.

Table 1 Capacity
(Clause 4)

SI No.	Nominal Capacity (ml)	Minimum Brimful Capacity (ml)
(1)	(2)	(3)
i)	100	108
ii)	200	212
iii)	500	525
iv)	1000	1035
v)	2000	2060
vi)	3000	3075
vii)	5000	5125

NOTE - Capacities other than these may be agreed to between the purchaser and the supplier.

The brimful capacity shall be measured by the method described in 5 of IS 2798.

5 CONTAINER MASS

The container mass shall be as agreed to between the purchaser and the supplier and the tolerance on container mass shall be as given in Table 2.

Table 2 Container Mass
(Clause 5)

SI No.	Mass of Container (g)	Tolerance (percent)
(1)	(2)	(3)
i)	Up to and including 10	± 10
ii)	Over 10 up to and including 25	± 7.5
iii)	Over 25	± 5

The container mass shall be determined in accordance with the method described in Annex B.

6 MATERIAL

In case of HDPE containers, the material used for the container body shall be of any one of the HDPE grade designations conforming to IS 7328. The recommended HDPE grade designations are given in Annex C.

7 TOLERANCES ON DIMENSIONS

7.1 The tolerances on dimensions specified refer to finished empty containers. Dimensions of filled containers may show differences.

7.2 Container Height to Neck Face

The tolerance on container height to neck face shall be ± 1.0 percent or ± 0.5 mm, whichever is greater. The height shall be measured in accordance with the method described in Annex D.

7.3 Container Overall Height

The tolerance on container overall shall be ± 2.0 percent or ± 1.0 mm whichever is greater. The height shall be measured in accordance with the method described in **4.1** of IS 2798.

NOTE — For containers having a non-circular cross section it is permissible to have a peripheral method of measurement with tolerance, both of which shall be agreed between the purchaser and the supplier.

7.4 Container Diameter

The tolerance on external container diameter at an agreed height shall be ± 1.5 percent or ± 0.1 mm, whichever is greater. The diameter shall be measured in accordance with **4.2** of IS 2798.

7.5 Neck Height

The tolerance on neck height is relative to the finished container overall height and shall be as given in Table 3.

Table 3 Neck Height
(Clause 7.5)

SI No.	Container Overall Height (mm)	Tolerance of Neck Height (mm)
(1)	(2)	(3)
i)	Up to and including 75	± 0.25
ii)	Over 75	± 0.40

The neck height shall be measured in accordance with the method described in **4.3** of IS 2798.

7.6 Neck and Thread Diameters

The tolerance on neck and thread diameters shall be ± 1.25 percent or ± 0.25 mm, whichever is greater. These diameters shall be measured in accordance with the method described in **4.4** of IS 2798.

7.7 Wall Thickness

The wall thickness shall be measured in accordance with the method described in **4.5** of IS 2798. The minimum wall thickness at any point of the container shall be not less than 0.20 mm.

7.8 Neck Bore

The neck bore shall be measured at an agreed depth below the neck face using internal dial gauge callipers, calibrated plugs or any other suitable method. The tolerance on the neck bore shall be as agreed between the purchaser and the supplier.

7.9 Neck Ovality

The tolerance on the neck ovality shall be as agreed between the purchaser and the supplier.

8 PERFORMANCE REQUIREMENTS

8.1 Closure Leakage Test

The containers when tested by the method described in **6.1** of IS 2798 shall not show any leakage.

8.2 Drop Impact Strength

The container when subjected to the drop test by the method described in **8** of IS 2798 shall show no sign of rupture or leakage from the walls of the container. Slight deshaping of the body shall not render the container unacceptable in the test.

8.3 Stack Load Test

The containers shall not show any cracks or permanent buckling likely to reduce their strength, cause leakage or reduction in effectiveness of the closure or cause instability in stacks when tested in accordance with the method described in **9** of IS 2798.

8.4 Hydrostatic Pressure Test

The containers when tested by the method described in **10** of IS 2798 shall not show any sign of rupture or leakage from the container other than from around the mouth or localized bulging.

8.5 Environmental Stress-Crack Resistance

The containers when tested in accordance with Method 1 of IS 8747 shall show no evidence of stress cracking or leakage after being kept in the oven for 48h.

8.6 Effectiveness of Surface Treatment

The containers when tested by the method described in Annex E shall show no sign of paint removal.

8.7 Ink Adhesion of Printed Containers

The printed matter on the containers when tested in accordance with the method described in **13** of IS 2798 shall be still legible.

8.8 Product Resistance of Printed Containers

The printed matter on the containers when tested in accordance with the method described in **14** of IS 2798 shall be still legible.

8.9 Test for Compatibility

The containers shall be tested for determination of compatibility for an intended purpose as per the method described in **12** of IS 2798.

8.10 Determination of Overall Migration

The limit of overall migration when tested as prescribed in IS 9845 shall not exceed overall migration limit of 60 mg/kg or 10 mg/dm² with no visible colour migration.

8.11 Determination of Specific Migration

8.11.1 The specific migration is tested to determine the quantity of a specific substance that can migrate from a food packaging material or food container into food. Specific migration limits are usually expressed as mg/kg food.

8.11.2 The sample/simulants shall be prepared using the procedure described in IS 9845. The testing for detection of toxic substances shall be carried out as per method given in Table 6.

8.11.3 The limit of specific migration of all toxic substances when tested as prescribed in column 4 of Table 6 shall not release the substances in quantities exceeding the specific migration limits listed under Table 6.

Table 6 Specific Migration Limits

(Clauses 8.11.2 and 8.11.3)

Sl. No.	Toxic substances	Migration Limit, Maximum, mg/kg	Test Method
(1)	(2)	(3)	(4)
i)	Barium	1.0	IS 3025 (Part 2)
ii)	Cobalt	0.05	-do-
iii)	Copper	5.0	-do-
iv)	Iron	48.0	-do-
v)	Lithium	0.6	-do-
vi)	Manganese	0.6	-do-
vii)	Zinc	25.0	-do-
viii)	Antimony	0.04	-do-
ix)	Phthalic acid, bis(2-ethylhexyl) ester (DEHP)	1.5	ISO 18856

9 ADDITIONAL REQUIREMENTS FOR ECO-MARK

9.1 General Requirement

9.1.1 The product shall conform to the requirement for quality, safety and performance prescribed.

9.1.2 The manufacturer shall produce to BIS the consent clearance as per the provisions of *Water (Prevention & Control of Pollution) Act, 1974* and *Air (Prevention & Control of Pollution) Act, 1981* along with the authorization, if required under *Environment (Protection) Act, 1986* and the Rules made thereunder while applying for the ECO-Mark. The manufacturers of plastic wares shall produce documentary evidence with respect to the compliance of regulation under *Drugs and Cosmetic Act, 1940* and the Rules made thereunder, wherever necessary.

9.1.3 The product must display a list of critical ingredients in descending order of quantity present expressed as percent of the total. The list of such ingredients shall be identified by Bureau of Indian Standards.

9.1.4 The product packaging shall display in brief the criteria based on which the product has been labelled as 'Environment Friendly'.

9.1.5 The material used for product packaging shall be recyclable or biodegradable.

9.1.6 It shall also suitably mention that ECO-Mark label is applicable only to the packaging material/package, if content is not separately covered under ECO-Mark. It may be stated that ECO-Mark is applicable to the product or packaging material or both.

9.2 Product Specific Requirements

The plastic products shall apart from fillers and reinforcing agents, be made from the minimum of 90 percent, by weight of compatible plastic wastes.

Note — The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect.

10 MARKING

10.1 The containers shall be legibly and indelibly marked with the following information:

- a) Manufacturer's name, initials or trade-mark, if any;
- b) Nominal capacity of the container in ml or litres;
- c) Classification, that is, type and class as per IS 6312; and
- d) Batch No. and year of manufacture.

10.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

11 SAMPLING AND CRITERIA FOR CONFORMITY

Samples of the containers shall be drawn and conformity of the lot to this specification determined as prescribed in Annex F. The tests given in **8.5**, **8.6** and **8.9** are type tests and are to be carried out on every new type or design of the containers. The tests given in **8.7** and **8.8** are applicable only to printed containers, for which the sample size shall be as agreed to between the purchaser and the supplier.

ANNEX A
(Foreword)

**LIST OF INDIAN STANDARDS ON PLASTICS FOR ITS SAFE USE WITH FOODSTUFFS,
PHARMACEUTICALS AND DRINKING WATER**

<i>IS No.</i>	<i>Title</i>
IS 10142: 1999	Polystyrene (Crystal and high impact) for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification (<i>first revision</i>)
IS 10146 : 1982	Specification for Polyethylene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
IS 10151: 2019	Polyvinyl Chloride (PVC) and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification (<i>first revision</i>)
IS 10910: 1984	Specification for Polypropylene and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
IS 11434 : 1985	Specification for Ionomers resins for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
IS 11704 : 1986	Specification for Ethylene/Acrylic acid (EAA) copolymers for their safe use in contact with food-stuffs, pharmaceuticals and drinking water
IS 12247 : 1988	Specification for Nylon-6 polymer for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
IS 12252: 2017	Polyalkylene Terephthalates (PET and PBT), their copolymers and List of constituents in raw materials and end products for their safe use in contact with foodstuffs and pharmaceuticals (<i>first revision</i>)
IS 13576: 1992	Ethylene Methacrylic acid (EMAA) copolymers and terpolymers for their safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification
IS 13601 : 1993	Ethylene Vinyl acetate (EVA) copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification

ANNEX B
(Clause 5)

MEASUREMENT OF CONTAINER MASS

B-1 Ascertain the container mass by weighing the empty container on a balance weighing to an accuracy of 0.1 g. The accuracy of weighing shall be:

- to the nearest 0.1 g for a container mass up to 50 g;
- to the nearest 0.5 g for a container mass over 50 g up to 200 g; and
- to the nearest 1 g, for a container mass over 200g.

ANNEX C
(Clause 6)

RECOMMENDED HOPE GRADE DESIGNATIONS

PE BAN C50 T012	PE BAN C57 T022
PE BAN C50 T022	PE BAN C45 T006
PE BAN C57 T012	PE BAN C45 T012

ANNEX D
(Clause 7.2)

MEASUREMENT OF CONTAINER HEIGHT TO NECK FACE

D-1 Ascertain the container height to neck face by placing the empty container on a flat surface and measuring to the highest point on the neck face using a micrometer height gauge.

The measurement shall be to an accuracy of 0.05 mm.

ANNEX E
(Clause 8.6)

TFSTS FOR EFFECTIVENESS OF SURFACE TREATMENT

E-1 PROCEDURE

E-1.1 Paint the container surface with a thin coating of a solution consisting of 20 percent Rotogravure ink in *N*-butyl acetate.

E-1.2 Allow to dry for 5 min at ambient temperature.

E-1.3 Apply transparent adhesive tape and leave for 15 s.

E-1.4 Remove the tape slowly.

ANNEX F
(Clause 10)

SAMPLING AND CRITERIA FOR CONFORMITY

F-1 SCALE OF SAMPLING

F-1.1 Lot

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

F-1.2 For ascertaining the conformity of the containers to the requirements of this standard, test shall be carried out separately for each lot. The number of container to be sampled from a lot shall be in accordance with Table 4.

F-1.3 The containers shall be selected at random from the lot. To ensure randomness of selection, methods given in IS 4905 may be followed.

F-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

F-2.1 The number of tests and criteria for conformity shall be determined according to Table 5.

F-2.2 Drop Impact Strength and Stack Load Test — One set of sample containers as given in the test methods (8.2 and 8.3) shall be drawn from the lot and these shall be subjected to the respective tests.

The sample shall pass the tests for acceptance of the lot in respect of drop impact and stacking requirements.

Table 4 Scale of Sampling and Permissible Number of Defectives

(Clause F- 1.2)

SI No.	Lot size	For Non-Destructive Tests		For Wall Thickness Measurement, Sub-Sample Size (Number or Containers to be Selected)
		Sample Size (Number of Containers to be Selected)	Permissible Number of Defectives	
(1)	(2)	(3)	(4)	(5)
i)	Up to 100	5	0	2
ii)	101 to 300	13	1	2
iii)	301 to 500	32	3	2
iv)	501 to 1000	50	5	3
v)	Over 1000	80	7	5

Table 5 Number of Tests and Criteria for Conformity
(Clause F-2.1)

SI No.	Characteristic	Clause Ref	Number of Tests	Criteria for Conformity
(1)	(2)	(3)	(4)	(5)
i)	Brimful capacity	4		The number of defective containers for one or more characteristics does not exceed the corresponding number given in col 3 of Table 4
ii)	Container mass	5		
iii)	Dimensions	7.2,7.3, 7.4,7.5, 7.6,7.8 and 7.9	According to col 3 of Table 4	
iv)	Closure leakage	8.1		
v)	Hydrostatic pressure test	8.4		
vi)	Wall thickness	7.7	According to col 5 of Table 4	All the containers satisfy the relevant requirements