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Draft Indian Standard

**BLOW MOULDED POLYOLEFIN CONTAINERS SPECIFICATION
PART 2 OVER 5 LITRES, UPTO AND INCLUDING 60 LITRES CAPACITY**

(Second Revision of IS 7408 Part 2)

(ICS 55.120)

Plastics Packaging Sectional Committee,
PCD 21

Last date for receipt of comment is
1 October 2023

FOREWORD

(Formal clause will be added later)

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

Other parts in this series are:

Part 1 Upto 5 litres capacity

Part 3 Over 60 litres up to and including 250 litres capacity

No attempt has been made to specify shape or style for the containers and the details of closures, as this is considered to be the prerogative of the package designer.

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 (second revision)'*].

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 for its safe use in contact with foodstuffs, pharmaceuticals and drinking water are given in Annex A for information.

In the preparation of this standard, considerable assistance has been derived from BS 4839 Part 2: 1974 'Specification for blow moulded polyolefins containers: Part 2 Containers over 5 litres and up to 60 litres capacity' issued by the British Standards Institution, UK.

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 2 Over 5 litres, upto and including 60 litres capacity.

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 IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. 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 2) specifies tolerances on dimensions, performance requirements and methods of sampling and tests for free standing blow moulded containers, made from polyolefins, with capacities over 5 litres up to and including 60 litres and having an internal neck diameter not exceeding 75 mm. 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 revisions, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

<i>IS No.</i>	<i>Title</i>
IS 2798: 1998	Methods of test for plastic 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 (ICP-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 (<i>second revision</i>)
IS 7019 : 1998	Glossary of terms in plastics and flexible packaging, excluding paper (<i>second revision</i>)
IS 7328 : 2020	Specification for Polyethylene Material for Moulding and Extrusion (<i>third revision</i>)
IS 8747 : 1977	Method 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 (<i>second revision</i>)
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 Brimful Capacity

The volume of liquid held by the container when filled to the point of overflowing while standing on a level with all closures removed (*see* Fig. 1).

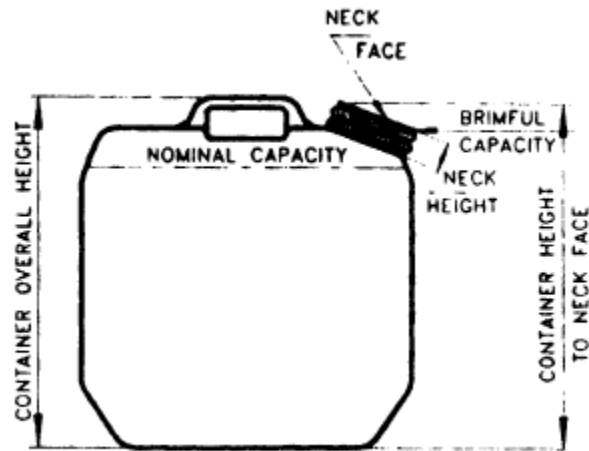


FIG. 1 CONTAINER DIMENSIONS

3.3 Nominal Capacity

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

3.4 Gross Capacity

The total enclosed volume of the container including any space which may not be capable of being filled.

3.5 Neck Face

The upper most surface of the container neck (*see* Fig. 1).

3.6 Container Height to Neck Face

The height of the highest point of the neck face of the finished empty container (*see* Fig. 1).

3.7 Container Overall Height

The height of the finished empty container at its highest point, excluding the closure (*see* Fig. 1).

3.8 Container Overall Plan Dimensions

The principal plan dimensions of the container, for example, the external diameter of a cylindrical container.

3.9 Neck Height

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

- a) 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;

b) in the case of plain cylindrical and internally threaded necks, the outermost diameter point excluding flash; and

c) in the case of neck having a bead and thread, or bead only, the outermost point of the bead (*see* Fig. 1).

NOTE — A bead is separated from the container by a region of diameter smaller than that of the bead.

3.10 Internal Neck Diameter

The minimum internal diameter of the neck whether it be parallel, tapered or internally threaded.

3.11 External Neck Diameter

The external diameter of the neck, excluding thread and/or prominences, measured as the mean of two perpendicular diameters avoiding the part line.

3.12 Thread Diameter

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

4 MATERIAL

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

For weathering and UV resistance, the material shall be stabilized with proper additives as agreed to between the purchaser and the supplier.

4.2 The inner plug shall be of HDPE or LDPE or LLDPE as agreed between the purchaser and the supplier.

4.3 The cap or the closure shall be of HDPE or PP as agreed to between the purchaser and the supplier.

5 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. When the container is filled to nominal capacity, the liquid level shall be below the bottom of the closure neck, with the container standing level on its base (*see* Fig. 1). Capacities shall not be measured within 48 h of production. The water used shall be at a temperature of 27 ± 2 °C.

Table 1 Recommended Nominal Capacities Brimful Capacities for Stock Containers

Sl. No.	Nominal Capacity (litres)	Minimum Brimful Capacity (litres)
(1)	(2)	(3)
i)	10	10.5
ii)	20	21
iii)	25	26.25
iv)	30	31.5
v)	40	42
vi)	50	52.5
vii)	60	63

6 TOLERANCES ON DIMENSIONS

6.1 The tolerances on dimensions specified refer to finished empty containers. Dimensions of filled containers may show differences. All measuring equipment shall be capable of measuring to an accuracy of 10 percent of the agreed tolerance.

6.2 Wall Thickness

The wall thickness shall be measured in accordance with the method described in **4.5** of IS 2798.

NOTE — The wall thickness of the container subject to variation over the total area. The thinner sections generally occur at the top and bottom corners of rectangular containers or the top of bottom radii of cylindrical containers. The minimum wall thickness is governed by the performance requirements as detailed here after and shall be as agreed between the purchaser and the supplier.

6.3 Container Overall Height

The tolerance on container overall height shall be ± 1 percent. The height shall be measured in accordance with the method described in **4.1** of IS 2798.

6.4 Container Overall Plan Dimensions

The tolerance on container overall plan dimensions shall be ± 1.0 percent. The plan dimensions shall be measured in accordance with the method described in Annex C.

6.5 Container Height to Neck Face

The tolerance on container height to neck face shall be ± 1.0 percent. The height shall be measured in accordance with the method described in Annex D.

6.6 Internal Neck Diameter

The internal neck diameter shall be measured in accordance with the method described in **4.4** of IS 2798. The tolerance on internal neck diameter shall be as agreed to between the purchaser and the supplier.

6.7 External Neck Diameter

The external neck diameter shall be measured in accordance with the method described in **4.4** of IS 2798. The tolerance on external neck diameter shall be as agreed to between the purchaser and the supplier.

6.8 Thread Diameters

The length of thread in contact between cap and neck shall be a minimum of $1\frac{1}{2}$ turns. The major and minor thread diameters shall each be measured in accordance with the method described in **4.4** of IS 2798. The tolerance on thread diameters shall be as agreed to between the purchaser and the supplier.

6.9 Neck Height

The tolerance on neck height shall be ± 2.0 percent. The height shall be measured in accordance with the method described in **4.3** of IS 2798.

6.10 Non-Threaded Necks

Non-threaded necks shall be of such dimensions, tolerances and construction as to ensure that the container shall comply with the relevant performance requirements of this standard when the appropriate closure is applied.

7 PERFORMANCE REQUIREMENTS

7.1 Product Compatibility

Not all characteristics to cover complete compatibility between the container and the product to be packed can be defined in this standard. Tests shall be undertaken to determine the significance of such factors as permeation, absorption, extraction, softening, embrittlement and deterioration of the product where these are likely to apply. Such tests shall be the subject of agreement between the purchaser and the supplier. The method described in **12** of IS 2798 may be taken as a guide for carrying out compatibility test.

7.2 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 48 h.

7.3 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.

If it is known that the containers are to be used in temperature conditions below 0°C, a lower test temperature shall be agreed between the purchaser and the supplier. When tested at a lower temperature, the test liquid shall be agreed between the purchaser and the supplier.

7.4 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 method described in **9** of IS 2798.

7.5 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.

7.6 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.

7.7 Handle Strength

The handles and the containers shall remain intact and undamaged when tested in accordance with the method described in **11** of IS 2798.

7.8 Determination of Overall Migration

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

7.9 Determination of Specific Migration

7.9.1 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.

7.9.2 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 4.

7.9.3 The limit of specific migration of all toxic substances when tested as prescribed in column 4 of Table 4 shall not release the substances in quantities exceeding the specific migration limits listed under Table 2.

Table 2 Specific Migration Limits

(Clauses 7.9.2 and 7.9.3)

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

8 CLOSURES

The closure shall be of a material as resistant to the product as is the container itself and shall correspond to the type and form of the container so as to ensure a good and leak proof when tested in accordance with the method described in 6.1 of IS 2798. Thread closures shall be tightened to a torque as agreed to between the purchaser and the supplier.

9 ADDITIONAL REQUIREMENTS FOR ECO-MARK

9.1 General Requirement

9.1.1 The product shall conform to the requirements 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 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 E. The tests given in **7.1**, **7.2** and **7.7** are type tests and are to be carried out on every new type or design of the containers. The tests given in **7.5** and **7.6** 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 SUITABLE FOR USE WITH FOODSTUFFS,
PHARMACEUTICALS AND DRINKING WATER**

IS No.	Title
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 its safe use in contact with foodstuffs, 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 4.1)

RECOMMENDED HDPE GRADE DESIGNATIONS

PE BAN C 50 T 003
PE BAN C 50 T 006
PE BAN C 50 G 045
PE BAN C 50 G 090
PE BAN C 57 T 003
PE BAN C 57 G 045
PE BAN C 57 G 090
PE BAN C 50 T 012
PE BAN C 50 T 022
PE BAN C 57 T 012
PE BAN C 57 T 022
PE BAN C 45 T 006
PE BAN C 45 T 012
PE BAN C 45 G 022

ANNEX C
(Clause 6.4)

MEASUREMENT OF CONTAINER OVER ALL PLAN DIMENSIONS

C-1 FOR CYLINDRICAL CONTAINERS

C-1.1 Using callipers and rule, measure the diameter of the empty container in the following position:

- a) in line with the mould part line; and
- b) at 90° to the above position.

Accuracy of measurement shall be in accordance with **6.1**. Record the diameter as the mean of the two diameters at right angles.

C-2 FOR RECTANGULAR CONTAINERS AND CONTAINERS OF SHAPES OTHER THAN CYLINDRICAL

C-2.1 Using callipers and rule, measure the maximum length and width of the empty container. Accuracy of measurement shall be in accordance with **6.1**.

ANNEX D
(Clause 6.5)

MEASUREMENT OF CONTAINER HEIGHT TO NECK FACE

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 accuracy of measurement shall be in accordance with **6.1**.

ANNEX E
(Clause 10)

SAMPLING AND CRITERIA FOR CONFORMITY

E-1 SCALE OF SAMPLING

E-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.

E-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 3.

E-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.

E-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMFLY

E-2.1 The number of tests and criteria for conformity shall be determined according to Table 4.

E-2.2 Drop Impact Strength and Stack Load Test

One set of sample containers as given in the test methods (7.3 and 7.4) 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 3 Scale of Sampling and Permissible Number of Defectives
(Clauses E-1.2 and E-2)

Sl. 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 4 Number of Tests and Criteria for Conformity
(Clause E-2.1)

Sl. No.	Characteristic	Clause Ref	Number of Tests	Criteria for Conformity
(1)	(2)	(3)	(4)	(5)
i)	Brimful capacity	4	According to col 2 of Table 2	The number of defective containers for one or more characteristics does not exceed the corresponding number given in col 3 of Table 2
ii)	Dimensions	6.3,6.4, 6.5,6.6, 6.7,6.8 and 6.9		
iii)	Closure leakage	8		
iv)	Wall thickness	6.2	According to col 4 of Table 2	All the containers satisfy the relevant requirements