***भारतीय मानक***

***Indian Standard***

 **IS 9754 : 2024**

**तरल कीटनाशकों की पैकिंग के लिए उच्च घनत्व पॉलीथीन कंटेनर (1 लीटर क्षमता तक) — विशिष्टि**

*( पहला पुनरीक्षण )*

**High Density Polyethylene Containers For Packing of Liquid Pesticides (Up To 1 Litre Capacity) — Specification**

 *( First Revision )*

 ICS 83.080, 83.140.01

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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**July 2024 Price Group X**

Plastics Packaging Sectional Committee, PCD 21

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Packaging Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1981. This (first) revision has been undertaken to:

1. introduce tolerances for the container’s dimensions;
2. update the cross-referred standards; and
3. incorporate all the amendments.

Containers of nominal capacity 100 ml, 250 ml, 500 ml and 1 000 ml have been covered in this standard. Containers of nominal capacities 5 litres, 20 litres and 50 litres have been covered separately.

The container material as well as plug and closure materials selected for packing different formulations shall be tested specifically for their compatibility with the contents to be packed (*see* IS 2798 : 1998).

A scheme of labelling environment friendly products with the ECO logo has been introduced at the instance of the Ministry of Environment, Forests and 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.

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.

*Indian Standard*

HIGH DENSITY POLYETHYLENE CONTAINERS FOR PACKING OF LIQUID PESTICIDES (UP TO 1 LITRE CAPACITY) — SPECIFICATION

*( First Revision )*

**1 SCOPE**

This standard prescribes requirements and methods of tests for HDPE containers of nominal capacities 100 ml, 250 ml, 500 ml and 1 000 ml for packing of liquid pesticides.

**2 REFERENCES**

The standards given below 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 agreement based on standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 2798 : 1998 | Methods of test for plastics containers (*first revision*) |
| IS 4905 : 2015/ ISO 24153 : 2009 | Random sampling and randomization procedures (*first 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 (*third revision*) |
| IS 7408 | Blow moulded polyolefin containers — Specification |
| (Part 1) : 2000 | Up to 5 litres capacity (*second revision*) |
| (Part 2) : 2000 | Over 5 litres, up to and including 60 litres capacity (*first revision*) |
| (Part 3) : 2000 | Closed head containers over 60 litres, up to and including 250 litres capacity (*first revision*) |
| IS 8747 : 1977 | Methods of test for environmental stress-crack resistance of blow-moulded polyethylene containers |

**3 TERMINOLOGY**

For the purpose of this standard, definitions as given in IS 7019 and IS 7408 (all parts) shall apply.

**4 REQUIREMENTS**

**4.1 Material**

**4.1.1** The high-density polyethylene (HDPE) satisfying following parameters and performance criteria as per **4** of this standard shall be used in fabrication of containers.

Melt flow index (190 ºC/5 kg) as per **5.2.1.2** of IS 7328 : ≤ 2.0 g/10 min

Melt flow index (190 ºC/2.16 kg) as per **5.2.1.2** of IS 7328 : ≤ 0.7 g/10 min

Density at 23 ºC or 27 ºC as per **4.2.5.1** of IS 7328 : > 940 to ≤ 960

**4.1.2** The plug shall be made from high density polyethylene (HDPE) or low density polyethylene (LDPE) or linear low density polyethylene (LLDPE) or combination thereof as agreed between the purchaser and the supplier. The cap or the closure shall be made from HDPE or as agreed between the purchaser and the supplier.

**4.2 Capacity**

**4.2.1** The minimum ullage for containers of 100 ml, 250 ml and 500 ml nominal capacities shall be 15 percent and for 1 000 ml nominal capacity it shall be 12 percent of the nominal capacity.

**4.2.2** The mass of the container shall be as agreed to between the purchaser and the supplier.

**4.3 Wall Thickness**

**4.3.1** The minimum thickness of the wall at any point when measured with a caliper gauge fitted with spherical anvils shall be as agreed between purchaser and supplier.

**4.3.2** The wall thickness shall be measured as per method prescribed in Annex A.

**4.4 Dimensions and Tolerances**

The containers may be circular, oval, or any other cross section suitable for application as agreed between the purchaser and the supplier.

NOTE — Containers of circular and oval cross section are commonly used.

**4.4.1** *Container Height to Neck Face*

This shall be as agreed to between the purchaser and the supplier and shall be measured in accordance with the method prescribed in Annex B. The tolerance on container height to neck face shall be maximum of ± 1.5 percent.

**4.4.2** *Container Overall Height*

This shall be as agreed to between the purchaser and the supplier. The tolerance on container overall height shall be maximum of ± 1.5 percent.

**4.4.3** *Container Diameter*

This shall be as agreed to between the purchaser and the supplier and shall be measured in accordance with the method prescribed in Annex C. The tolerance on container diameter shall be maximum of ± 1.5 percent.

NOTES

**1** For containers with major and minor axes, the tolerance on the minor axis cannot be realistically maintained at less than ± 3 percent.

**2** For containers with square cross section, the tolerance on the width and breadth shall be ± 1.5 percent.

**4.4.4** *Neck Height*

The tolerance on neck height when measured in accordance with the method prescribed in Annex D shall be as follows:

|  |  |  |
| --- | --- | --- |
| *Sl No.* | *Container Overall Height* mm | *Tolerance on Neck Height*mm |
|  |  |  |
|  | Up to and including 75 | ± 0.25 |
|  | Over 75 | ± 0.40 |

**4.4.5** *Neck Diameter and Thread Diameter*

The tolerances on the neck diameter and thread diameter when measured in accordance with the method prescribed in Annex E shall be ± 1.15 percent or ± 0.20 mm, whichever is greater.

**4.4.6** *Neck Bore*

The neck bore may be measured with the internal caliper, dial gauge and calibrated plugs or any other suitable method. The tolerance on internal neck diameter shall be maximum of ± 1.0 percent.

**4.4.7** *Neck Ovality*

The neck ovality shall be kept to a minimum and its extent shall be determined by the function of the closure. The tolerance on neck ovality shall be maximum of ±1 percent.

**4.5 Closing and Sealing**

The container after filling shall be closed by a HDPE, LDPE or LLDPE plug which shall be heat sealed. Finally, the container shall be closed by a suitable closure to make it leak proof.

**4.6 Workmanship and Finish**

The container and closure shall be manufactured in accordance with good manufacturing practice and shall be free from any burnt, oxidized or unhomogenized particles which would affect the performance or appearance of the container.

**5 PERFORMANCE REQUIREMENTS**

**5.1 Leakage Test**

**5.1.1** The container shall be filled with coloured water or the actual product, if necessary leaving normal head space. After filling, the container shall be closed and sealed as in the final form. The closed container shall then be kept upside down over a white blotting paper for 24 h. After 24 h the container shall be examined for any leakage which would be evident from any visible stains on the blotting paper.

**5.1.2** The same container as in **5.1.1** shall be kept in vertical upwards position on a white blotting paper for 24 h. After 24 h there shall be no visible stains on the blotting paper.

**5.2** **Stress Crack Resistance Test**

The container when tested as per method 1 of IS 8747 shall have F 50 value not less than 360 h.

**5.3 Drop Test**

The container shall pass the test when tested in accordance with **8** of IS 2798.

**5.4 Ink Adhesion**

The printed surface of the container when subjected to the test as per the details given in Annex F shall not show any significant sign of removal of the print.

**6 SAMPLING**

The number of samples to be drawn from a consignment or lot of containers and the criteria for its conformity to this standard shall be as detailed in Annex G.

**7 ADDITIONAL REQUIREMENTS FOR ECO-MARK**

**7.1 General Requirements**

**7.1.1** All the packaging material/package manufactured shall meet relevant standards of BIS (Bureau of Indian Standards) pertaining to safety, quality, and performance wherever applicable.

**7.1.2** The manufacturer of packaging material/package must produce the consent clearance as per the provisions of *Water (Prevention and Control of Pollution) Act*, 1974 and *Air (Prevention and Control of Pollution) Act*, 1981 along with the authorisation, if required, under the *Environment (Protection) Act*, 1986 and the rules made thereunder to BIS while applying for ECO-mark. Additionally, the manufacturer shall also comply with the provisions under *Prevention of* *Food Adulteration Act*, 1954 and rules made thereunder, wherever necessary.

**7.1.3** The packaging material/package may display in brief the criteria based on which the product has been labelled as Environment Friendly.

**7.1.4** The packaging material/package may be sold along with instruction for proper use and mode of safe disposal so as to maximise product performance and minimise wastage.

**7.1.5** It shall also be suitably mentioned 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 the ECO-mark is applicable to the product or packaging material or both.

**7.2 Product Specific Requirements**

The plastic packaging materials/packages used for packaging of food, pharmaceutical, cosmetics and drinking water shall comply with the relevant Indian standards and shall be manufactured from the plastics which shall comply with relevant Indian Standards.

NOTE — The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect to Bureau of Indian Standards while applying for ECO-Mark.

**8 MARKING**

**8.1** The container shall be marked with the manufacturer’s name, initials, or recognized trade-mark, if any.

**8.2** The following sign shall be embossed on the side (not on the bottom) of the containers to safeguard the re-use of these empty HDPE containers for storing edible items.



**8.3** The following recycle code for HDPE shall be embossed on the bottom of each container.



**8.4 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.

**ANNEX A**

(*Clause* 4.3.2)

**METHOD OF MEASUREMENT OF WALL THICKNESS**

**A-1 PROCEDURE**

**A-1.1** Measure the wall thickness with a dial caliper gauge fitted with spherical anvils, taking care to avoid movement of the container during measurement which may affect the reading obtained.

**A-1.2** Calculate the mean of 3 readings at any location as the wall thickness at that point.

**ANNEX B**

(*Clause* 4.4.1)

**METHOD OF MEASUREMENT OF CONTAINER HEIGHT TO NECK FACE**

**B-1 APPARATUS**

**B-1.1 Micrometer Height Gauge**

**B-2 PROCEDURE**

Place the container on a flat surface and measure the height using a micrometer height gauge at two positions as follows:

a) Close to but avoiding the part line; and

b) At 90 o to the position specified at (a).

**B-3 CALCULATION**

The height is recorded as the mean of the two readings. The accuracy of measurement shall be 0.02 mm.

**ANNEX C**

(*Clause* 4.4.3)

**METHOD OF MEASUREMENT OF CONTAINER DIAMETER**

**C-1 CIRCULAR SHAPED CONTAINER**

**C-1.1 Apparatus**

**C-1.1.1** *Vernier Micrometer or Circumference Gauge*

**C-1.2 Procedure**

**C-1.2.1** The container diameter shall be ascertained by either of the following methods.

**C-1.2.2** *Micrometer Method*

By using a vernier or micrometer, measure the diameter of the container at the specified height as follows:

a) Close to but avoiding the part line; and

b) At 90 º to the position specified at (a).

**C-1.2.2.1** *Calculation*

The accuracy of measurement should be 0.02 mm. The diameter is recorded as the mean of the two diameters at right angles.

**C-1.2.3** *Circumference Gauge Method*

By using a circumference gauge, measure the circumference at a specified height.

**C-1.2.3.1** *Calculation*

The diameter is recorded as the circumference multiplied by 0.318.

NOTE — The circumference gauge normally gives the mean diameter directly.

**C-2 OVAL SHAPED CONTAINER**

For oval shaped containers, the major axis and the minor axis shall be ascertain/measured by suitable size of vernier. The accuracy of measurement should be 0.02 mm. The average of five readings for each axis shall be taken for calculation of mean value.

**C-3 SQUARE SHAPED CONTAINER**

For square shaped containers, the width and breadth of the container shall be ascertain/measured by suitable size of vernier. The accuracy of measurement should be 0.02 mm. The average of five readings for each axis shall be taken for calculation of mean value.

**ANNEX D**

(*Clause* 4.4.4)

**METHOD OF MEASUREMENT OF NECK HEIGHT**

**D-1 APPARATUS**

**D-1.1 Micrometer Depth Gauge**

**D-2 PROCEDURE**

Place the anvil of the depth gauge on the neck face, and move the instrument laterally until the spindle touches the outermost neck feature. See that the tip of the spindle is allowed to touch the container shoulder and read the scale.

**D-3 CALCULATION**

Record the neck height as the mean of the two readings taken at right angles at the neck face.

**ANNEX E**

(*Clause* 4.4.5)

**METHOD OF MEASUREMENT OF NECK AND THREAD DIAMETERS**

**E-1 APPARATUS**

Micrometer, giving an accuracy of measurement of 0.02 mm.

**E-2 PROCEDURE**

Measure the neck with a vernier or micrometer as follows:

a) Close to but avoiding the part line; and

b) At 90 ° to the position specified at (a).

**E-3 CALCULATION**

The diameter is recorded as the mean of the two diameters at right angles.

**ANNEX F**

(*Clause* 5.4)

**METHOD OF TEST FOR INK ADHESION**

**F-1 PROCEDURE**

Apply two strips of 25 mm wide transparent pressure sensitive tape to the print area of each container, one piece along the length of the container, and the other round the circumference. The position should be varied from container to container, if possible covering the whole print area in stages. Press the tape firmly into the container with a thumb and leave for 15 s. Pull off the tape slowly and then rapidly with a jerk.

**F-2 OBSERVATION**

Record whether the print is removed or not.

**ANNEX G**

(*Clause* 6.1)

 **SAMPLING**

**G-1 SCALE OF SAMPLING**

**G-1.1** In any consignment all the containers of the same material and drawn from a single batch of manufacture shall be grouped together to constitute a lot.

**G-1.2 Criteria for Conformity**

For ascertaining conformity to the requirements of this standard, tests shall be carried out separately for each lot. The number of containers to be sampled for a lot for ascertaining conformity to the requirements of this standard shall be in accordance with Table 1.

**G-1.3** The container shall be selected at random from the lot. To ensure the randomness of selection, method given in IS 4905 may be followed.

 **Table 1 Scale of Sampling and Permissible Number of Defectives**

(*Clauses* G-1.2 *and* G-2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Lot Size**(*N*) | **For Non-Destructive Tests** | **For Destructive Tests** |
|  | Sample Size (No. of Containers to be Selected) | Permissible Number of Defectives | Subsample Size (No. of Containers to be Selected) |
| (1) | (2) | (3) | (4) | (5) |
|  | Up to 100 | 5 | 0 | 2 |
|  | 101 to 300 | 13 | 1 | 2 |
|  | 301 to 500 | 32 | 3 | 2 |
|  | 501 to 1 000 | 50 | 5 | 3 |
|  | Above 1 001 | 80 | 7 | 5 |

**G-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY**

|  |  |  |  |
| --- | --- | --- | --- |
| *Sl No.* | *Characteristic* | *Number of Tests* | *Criteria for Conformity* |
|  |  |  |  |
|  | Brimful capacity, nominal capacity, containers mass, dimensions and tolerances and closure’s leakage test | According to col (2) and (3) of Table 1 | Number of defective containers for any one or more characteristics does not exceed the corresponding number given in co1 (4) of Table 1 |
|  | Drop tests, ink adhesion test and product resistance test | According to col (5) of Table 1 | All the containers satisfy the relevant requirements |

**ANNEX H**

(*Foreword*)

 **COMMITTEE COMPOSITION**

#### Plastics Packaging Sectional Committee, PCD 21

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| *Organization* | *Representative(s)* |
| --- | --- |
| Indian Institute of Packaging, Mumbai | Dr Babu Rao Guduri **(*Chairperson*)** |
| All India Food Processors Association, (AIFPA), New Delhi | Shri Mohit Chaudhary |
| All India Plastics Manufacturers  Association (AIPMA), Mumbai | Shri Kailash B. Murarka  Shri Kishore Sampat (*Alternate*) |
| Bisleri International Pvt Ltd, Delhi | Shri K. Ganesh Shrimati Saloni Chadha (*Alternate*) |
| Central Institute of Plastics Engineering & Technology (CIPET), Chennai | Dr S. N. Yadav Dr Smita Mohanty (*Alternate*) |
| Chemco Plastic Industries Private Ltd, Mumbai | Shri Gaurav Saraogi Shrimati Rupande Sampat (*Alternate*) |
| Chemicals & Petrochemicals Manufacturers Association (CPMA), New Delhi  | Shri Uday Chand |
| Coca-Cola India, Gurugram  | Shri Virendra Landge Shri Rajendra Dobriyal (*Alternate*) |
| CSIR-Central Food Technological Research Institute (CFTRI), Mysore  | Shri Rajeshwar Matche Dr Arun Kumar P. Selvam  (*Alternate*) |
| CSIR-Indian Institute of Toxicology  Research, Lucknow | Dr V. P. Sharma  Dr A. B. Pant (*Alternate*) |
| Essel Propack Limited, Vasind, Maharashtra | Shri Hariharan K. Dr Gurunath (*Alternate*) |
| Federation of Indian Packaged Drinking Water Manufacturers Association (FIPMA), Mumbai | Shri Apurva Doshi |
| Foundation for Innovative Packaging and Sustainability (FIPS), Mumbai | Shri M. K. Banerjee |
| Gas Authority of India Ltd., NOIDA | Shri Manish Khandelwal, Shri Nitin Gupta (*Alternate*) |
| Haldia Petrochemicals, Kolkata | Shri Suvomoy Ganguly Shri T. R. Srikanth Ramani (*Alternate* I) Shrimati Suman Hembram (*Alternate* II) |
| HPCL- MITTAL Energy Limited (HMEL), Noida | Shri Vineet K. Gupta Shri Alakesh Ghosh (*Alternate*) |
| Indian Centre for Plastics in the Environment (ICPE), Mumbai  | Shri T. K. Bandopadhyay  Shrimati Neha Maurya (*Alternate*) |
| Indian Flexible Packaging & Folding Carton Manufacturers Association (IFCA), Mumbai  | Shri Atin Chaudhary  |
| Indian Oil Corporation Limited (IOCL), New Delhi  | Shri Dhananjay Sahoo  Shri Sumit Basu (*Alternate* I) Shri Ponnuswamy K. (*Alternate* II) |
| Mother Dairy Fruit & Vegetable Pvt. Ltd., Noida  | Shri Kalpam Chauhan  |
| PET Packaging Association for Clean Environment (PACE) | Dr Vijay Habbu Shri Pankaj Uppal (*Alternate* |
| Pigeon India, Greater Noida | Shrimati Simple Bajaj Shrimati Sneha Gupta  (*Alternate* I) Shri Gopal Sharma (*Alternate* II) |
| Reliance Industries Ltd, Mumbai | Shri S. V. Raju Dr Shreeram Wadekar (*Alternate* I) Shri Jayakrishnan Venugopalan (*Alternate* II) |
| Shriram Institute for Industrial Research, Delhi | Shri Sanjay Kumar Singh  Dr. Mukti Tyagi (*Alternate*) |
| Skypack India Pvt. Ltd,. | Shri Naveen Talwar Shri Sukhpal (*Alternate*) |
| Sun Pharmaceutical Industries Ltd,.  | Shri Shantanu Chowdhary |
| Uflex Limited, Noida  | Shri Rahul Dubey Shri Jeevraj Pillai (*Alternate*) |
| Voluntary Organization in Interest of Consumer Education (VOICE),  New Delhi | Shri M. A. U. Khan Dr Rajiv Jha (*Alternate*) |
| In Personal Capacity, Dehradun  | Dr Yuvraj Singh Negi |
| BIS Directorate General | Shrimati Meenal Passi Scientist ‘F’/Senior Director and Head (Petroleum, Coal and Related Products Department) [Representing Director General (*Ex-officio*)] |
| *Member Secretary*Ms Anmol AgarwalScientist B/Assistant Director(Petroluem, Coal and Related Products), BIS |