

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 15410 (2003): Containers for Packaging of Natural Mineral Water and Packaged Drinking Water [PCD 21: Plastics Containers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS 15410 : 2003

भारतीय मानक
वैकञ्जबंद खण्ड जल और पैकजबं . पेय जल की
पैकेजबं-नी के लिए धारक—विशिष्टि

Indian Standard
CONTAINERS FOR PACKAGING OF NATURAL
MINERAL WATER AND PACKAGED DRINKING
WATER — SPECIFICATION

(First Reprint AUGUST 2004)

ICS 55.080; 83.080.20

© BIS 2003

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 2003

Price Group 4

FOREWORD

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

Government of India *vide* Gazette Notifications GSR 759(E) & GSR 760(E) dated September 29, 2000 has brought packaged natural mineral water and packaged drinking water under mandatory certification. In view of the Government notifications, the Committee decided to formulate a national standard on plastic packaging of packaged natural mineral water and packaged drinking water.

This standard covers the requirements for raw materials, dimensional and performance requirements and methods of tests for plastic containers for packaging of natural mineral water and packaged drinking water except flexible pouches. The Committee envisages preparing a separate specification for flexible pouches. Separate Indian Standard exists for plastics bottles for potable water [*see* IS 8688 : 2003 Plastics potable water bottles — Specification (*second revision*)].

The composition of the Committee responsible for formulation of this standard is given in Annex D.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

AMENDMENT NO. 2 APRIL 2005
TO
IS 15410 : 2003 CONTAINERS FOR PACKAGING
OF NATURAL MINERAL WATER AND PACKAGED
DRINKING WATER — SPECIFICATION

(*Page 1, clause 2*) — Substitute 'IS 14535 : 1998 Recycled plastics for the manufacturing of the products — Designation' for 'IS 14534 : 1998 Guidelines for recycling of plastics'.

(*Page 1, clause 4.2*) — Insert the following sub-clause after clause 4.2:

4.2.1 The top lid for glasses/cups shall be of suitable peelable laminate structure, thickness, shape and print as agreed to between the purchaser and the supplier. Aluminium foil of suitable thickness coated with film of olefinic polymers or co-polymers with foodgrade adhesives shall be used. Polymer film used for coating of aluminium foil shall conform to the relevant standards for its safe use in contact with foodstuffs, pharmaceuticals and drinking water (*see 4.1*).

(*Page 2, clause 4.6.1*) — Delete.

[*Page 2, clause 5.2(b)*] — Substitute the following for the existing:

'Recycling symbol in line with IS 14535.'

(*Page 3, Annex A, clause A-4.2*) — Substitute the following for the existing formula:

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

(*Page 3, Annex A, clause A-4.2*) — Insert the following new sub-clause after A-4.2:

A-4.3 Transparency test can also be carried out as per 'ASTM D 1003 -- Standard Test Method for Haze Transmittance of Transparent Plastics'. In case of dispute, the test method given in ASTM D 1003 shall be used as referee method."

Amend No. 2 to IS 15410 : 2003

(Page 5, Annex B, clause B-2) — Substitute the following for the existing clause:

'B-2 Heat the water to a temperature of $38 \pm 2^{\circ}\text{C}$, and fill the container to its nominal capacity and closed tightly with the closure. Keep the container at $38 \pm 2^{\circ}\text{C}$, for a period of 30 days. The container shall be opened after 30 days of storage period and the water shall be examined for any disagreeable odour or smell.'

**AMENDMENT NO. 1 SEPTEMBER 2004
TO
IS 15410 : 2003 CONTAINERS FOR PACKAGING
OF NATURAL MINERAL WATER AND PACKAGED
DRINKING WATER — SPECIFICATION**

(*Cover page and page 1, Title*) — Substitute the following for the existing:

**पैकेजबंद प्राकृतिक मिनरल जल और पैकेजबंद पेय जल
के लिए प्लास्टिक की बोटलें/कंटेनर — विशिष्टि**

**'PLASTICS BOTTLES/CONTAINERS FOR PACKAGED
NATURAL MINERAL WATER AND PACKAGED
DRINKING WATER — SPECIFICATION'**

(*Page 1, clause 2*) — Insert the following references at the appropriate place:

<i>IS No.</i>	<i>Title</i>
3025 (Part 5) : 1983	Methods of sampling and test (physical and chemical) for water and wastewater : Part 5 Odour (<i>first revision</i>)
3025 (Part 8) : 1984	Methods of sampling and test (physical and chemical) for water and wastewater : Part 8 Taste rating (<i>first revision</i>)

(*Page 2, clause 4.4*) — Substitute the following for the existing clause:

4.4 Capacity

The quantity of natural mineral water and drinking water packed shall be 100, 130*, 150, 200, 250, 300, 330*, 500, 600* and 750 ml; 1, 1.2*, 1.5, 2, 3, 4 and 5 litre. The brimful capacity shall exceed the nominal capacity by a minimum of 1.5 percent when determined by the method prescribed in 5 of IS 2798.

NOTES

1 The nominal capacity of containers for packaged natural mineral and drinking water has been specified in Schedule 3 of *Weights and Measures (Packaged Commodities) Rules, 1977*, as Amended vide Notification GSR 869(E) dated 26th November 2001.

Amend No. 1 to IS 15410 : 2003

2*The sizes 130 ml, 330 ml, 600 ml and 1.2 litre shall be allowed only for a period of 3 years from the date of notification.

3 There is no restriction on pack sizes in respect of quantities over 5 litre.'

(*Page 2, clause 4.5, second sentence*) — Substitute the following for the existing sentence:

'The tolerance on wall thickness when measured in accordance with **4.5** of IS 2798 shall be -2 percent of the declared value. No limit to the plus tolerance of wall thickness has been specified.'

(*Page 2, clause 4.6.6*) — Substitute the following for the existing clause:

'4.6.6 Water Potability Test

Packaged natural mineral water and packaged drinking water when stored in containers for 30 days, shall not acquire any unpleasant odour or bitter taste when tested according to the method prescribed in Annex B.'

(*Page 5, Annex B, clause B-3*) — Substitute the following for the existing clause:

'B-3 OBSERVATIONS

At the end of the 30 days, the water shall not give any unpleasant odour or taste, when tested as per IS 3025 (Part 5) and IS 3025 (Part 8) respectively.'

(PCD 21)

Indian Standard
**CONTAINERS FOR PACKAGING OF NATURAL
 MINERAL WATER AND PACKAGED DRINKING
 WATER — SPECIFICATION**

1 SCOPE

This standard covers the requirements for raw materials, dimensional and performance requirements and methods of tests for plastic containers except flexible pouches, for packaging of natural mineral water (see IS 13428) and packaged drinking water (see IS 14543).

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute the provisions of the standards. 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 standard indicated below:

<i>IS No.</i>	<i>Title</i>
2798 : 1998	Methods of test for plastics containers (<i>first revision</i>)
4905 : 1968	Methods for random sampling
7019 : 1998	Glossary of terms in plastics and flexible packaging excluding paper (<i>second revision</i>)
8747 : 1977	Methods of test for environmental stress-crack resistance of blow-moulded polyethylene containers
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>)
10142 : 1999	Polystyrene (crystal and high impact) for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification (<i>first revision</i>)
10146 : 1982	Specification for polyethylene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
10151 : 1982	Specification for polyvinyl chloride (PVC) and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
10910 : 1984	Polypropylene and its copolymers for its safe use in contact with

*IS No.**Title*

	foodstuffs, pharmaceuticals and drinking water
12252 : 1987	Polyalkylene terephthalates (PET and PBT) for their safe use in contact with foodstuffs, pharmaceuticals and drinking water
13428 : 1998	Packaged natural mineral water — Specification (<i>first revision</i>)
14534 : 1998	Guidelines for recycling of plastics
14543 : 1998	Packaged drinking water (other than packaged natural mineral water) — Specification
14971 : 2001	Polycarbonate resins for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification

3 TERMINOLOGY

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

3.1 Nominal Capacity — The volume of water normally expected to be filled in the container at $27 \pm 2^\circ\text{C}$.

3.2 Brimful Capacity — The volume of water required to be filled in the container completely at $27 \pm 2^\circ\text{C}$.

3.3 Plastics Containers — Plastics containers imply all plastics containers used for packaging of natural mineral water and packaged drinking water except flexible pouches.

4 REQUIREMENTS**4.1 Material**

The material used for plastic containers shall be made of polyethylene (PE) conforming to IS 10146 or polyvinyl chloride (PVC) conforming to IS 10151 or polyalkylene terephthalate (PET and PBT) conforming to IS 12252 or polypropylene conforming to IS 10910 or polycarbonate conforming to IS 14971 or polystyrene conforming to IS 10142.

4.2 Design, Shape and Dimensions

The containers shall be of suitable design, shape and required dimensions as agreed to between the purchaser and the supplier. The containers shall be provided with

IS 15410 : 2003

suitable closures made of metal or plastics pilfer-proof in character.

4.3 Manufacture, Workmanship, Finish and Appearance

4.3.1 The containers shall be manufactured by suitable process adhering to good manufacturing practice (GMP).

4.3.2 The body of the container shall be free from any visual defects like cavities, crevices, flaws, stains, etc.

4.4 Capacity

The quantity of mineral and drinking water packed shall be specified as 100, 150, 200, 250, 300, 330 (in cans only), 500, 750 ml, 1 litre, 1.5 litre, 2 litre, 3 litre, 4 litre, 5 litre and thereafter in multiples of 5 litre. The brimful capacity shall exceed the nominal capacity by a maximum of 1.5 percent. When determined by the method prescribed in 5 of IS 2798.

NOTE— The nominal capacity of containers for packaged mineral and drinking water has been specified in Schedule 3 of *Weights and Measures (Packaged Commodities) Rules 1977*, amended by Notification dated 28 February 2001 and made effective from 29 March 2001 by Ministry of Consumer Affairs.

4.5 Wall Thickness

The wall thickness shall be declared by the manufacturer. The wall thickness when measured in accordance with 4.5 of IS 2798 shall be within ± 2 percent of the declared value.

4.6 Tests

4.6.1 Environmental Stress-Crack Resistance

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

4.6.2 Transparency

The transparency of a container shall not be less than 85 percent in light transmittance, when tested in accordance with the method described in Annex A. The addition of colour/pigment is not permitted for making such containers.

4.6.3 Leakage Test

The containers shall pass the test when tested in accordance with 6 of IS 2798. The containers may be provided with a support, only for the purpose of keeping them in the up side down position during the test.

4.6.4 Drop Test

The containers shall pass the test when tested in

accordance with 8 of IS 2798. The drop height for containers of capacity 20 kg or 20 litre shall be 0.5 m.

4.6.5 Migration Test

Representative samples of container shall be subjected to overall migration test with distilled water at 40 ± 2 °C for 10 days 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. The maximum extraction values for the container material shall not exceed 10 mg/dm² or 60 mg/l (for details of the test see IS 9845).

4.6.6 Water Potability Test

Mineral water stored in container for 30 days, shall not acquire any unpleasant odour or bitter taste when tested according to the method prescribed in Annex B.

5 PACKING AND MARKING

5.1 The containers shall be packed as agreed to between the purchaser and the supplier.

5.2 Each container shall be permanently marked with the following:

- a) Indication of the source of manufacture and trade-mark, if any;
- b) Recycling symbol in line with IS 14534;
- c) Any other markings required under the *Standards of Weights & Measures (Packaged Commodities) Rules, 1977* and the *Prevention of Food Adulteration Act, 1954* and the Rules framed thereunder;
- d) Packing slip in each package shall be marked with the following:
 - 1) Nominal capacity; and
 - 2) Batch No. or Code No.

5.3 BIS Certification Marking

The containers may also be marked with the Standard Mark.

5.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

The samples of the containers shall be drawn and the criteria for conformity shall be determined as prescribed in Annex C.

ANNEX A

(Clause 4.6.2)

METHOD OF TEST FOR TRANSPARENCY

A-1 GENERAL

Test specimen shall be prepared from the part of container where markings are not found.

A-2 APPARATUS

The optical series principle diagram of integration ball type light transmittance measurement device is shown in Fig. 1 and Fig. 2. The device shall conform to the optical conditions specified in Table 1.

A-3 TEST SPECIMEN

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

The test specimens shall be prepared.

A-4 MEASUREMENT

A-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.

A-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:

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

where

T = full light transmittance, percent.

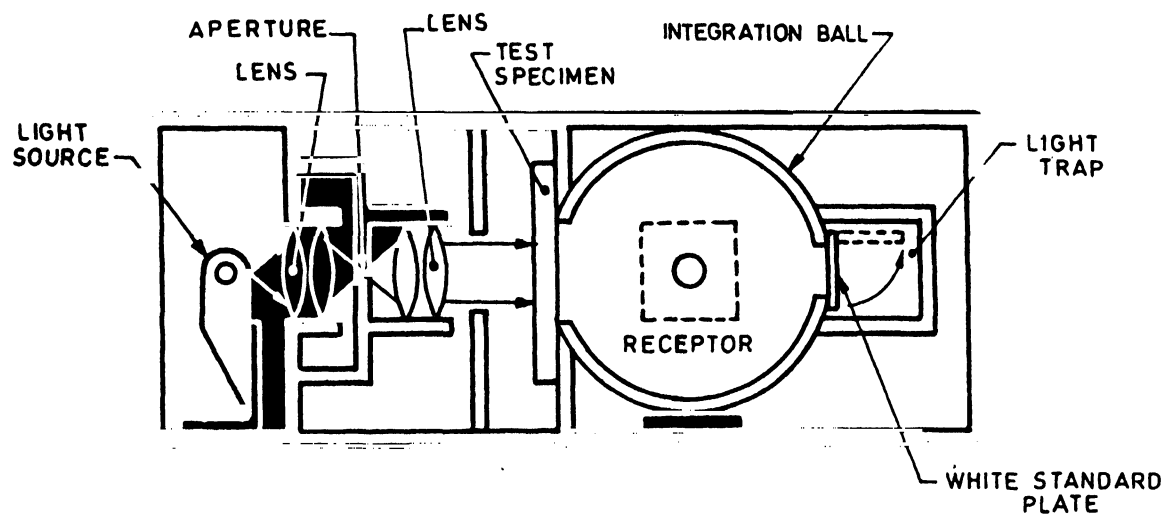


FIG. 1 PRINCIPLE DIAGRAM OF DEVICE

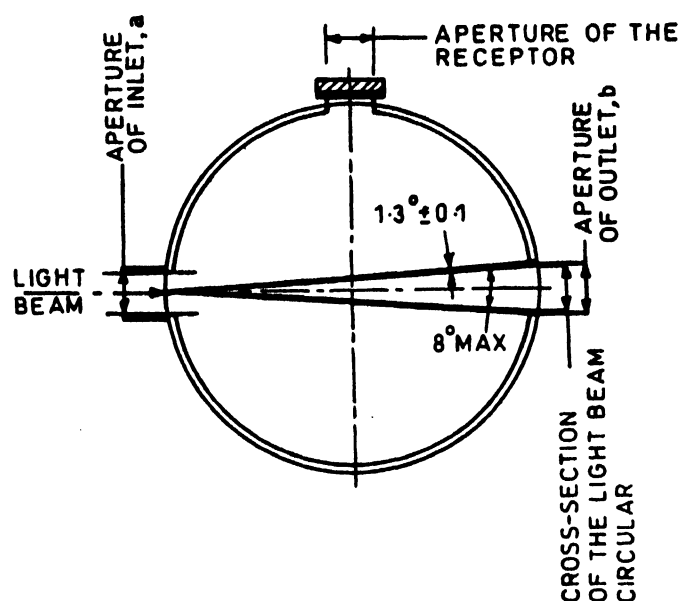


FIG. 2 CONDITIONS OF THE INTEGRATION BALL

Table 1 Optical Conditions of Device
(Clause A-2)

SI No. (1)	Item (2)	Conditions (3)
i)	Integration ball	The sum of areas of light's inlet and outlet (the installation part of the test specimen and the white standard plate) ($a+b+c$) shall be less than 4 percent of the overall internal surface area of the ball (see Fig. 1). The centre line of the outlet and inlet shall be on the same large circle of the ball. The angle formed by outlet diameter and the centre line of the inlet shall be within 8°
ii)	Reflection surface	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 white standard plate The light beams used to shine on the test specimen shall be parallel lights. 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 the inlet shall be $1.3 \pm 0.1^\circ$ smaller than the angle formed by the outlet diameter. The cross-section of the light beam at the outlet of the integration ball shall conform to Fig.1
iv)	Light trap	The light trap, when not installed with the test specimen or the white standard plate, shall be able to completely absorb the light
v)	Light source	The light source shall be standard light source <i>c</i> The comprehensive sensitivity of the receptor and the visual sensitivity filter used shall satisfy the <i>Y</i> value of Luther
vi)	Receptor	Conditions at the standard light source <i>c</i> However, when designated specifically, the one which satisfies the <i>Y</i> value of Luther conditions at the standard light source <i>a</i> can be used.

ANNEX B*(Clause 4.6.6)***METHOD OF TEST FOR POTABILITY****B-1 GENERAL**

B-1.1 Odour of water, though very important, cannot be determined in absolute units. Olfactory sense, which is most sensitive means of detecting small concentration of odiferous substances is universally adopted in such cases.

B-1.2 Mineral water for testing shall be clear and fresh.

B-2 PROCEDURE

Heat the water to a temperature of 38 ± 2 °C, and

fill the container to its nominal capacity and closed tightly with the closure. Keep the container at 38 ± 2 °C, for a period of 30 days. Two containers shall be opened after every 10 days of storage period and the water shall be examined for any disagreeable odour or smell.

B-3 OBSERVATIONS

At the end of the 30 days, the water shall not give any unpleasant odour or taste.

ANNEX C*(Clause 6)***SAMPLING OF CONTAINERS****C-1 SCALE OF SAMPLING****C-1.1 Lot**

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

C-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 containers to be sampled from a lot shall be in accordance with Table 2.

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

C-2 CRITERIA FOR CONFORMITY**C-2.1 Manufacture, Workmanship, Finish and Appearance**

The sample containers selected as per col 2 of Table 2 shall be examined for manufacture, workmanship, finish and appearance. Any container 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 containers in sample does not exceed the acceptance number given in col 3 of Table 2.

C-2.2 Capacity

Five containers for lot size up to 5 000 and 10 containers for lot size above 5 000 shall be selected at random from the samples already drawn according to C-1.3 when subjected to capacity test (*see* 4.4). There shall be no failure, if the lot is to be accepted under this clause.

C-2.3 Transparency and Leakage

The number of sample containers to be drawn shall be in accordance with col 4 of Table 2. Each of the sample container shall be subjected to transparency (*see* 4.6.2) and leakage (*see* 4.6.3). The number of failures shall not exceed the acceptance number given in col 5 of Table 2 for transparency test. For leakage test the acceptance number is zero, that is no failure shall occur for lot acceptance.

C-2.4 Drop Test

The sample containers as given in test method (*see* 4.6.4) shall be drawn from the lot and these shall be subjected to drop test. There shall be no rupture or leakage in any container after the test for lot acceptance. In case even one container has any sign of rupture or leakage, the lot shall be considered as not conforming to the requirements of this standard.

Table 2 Scale of Sampling and Acceptance Number
(Clauses C-1.2, C-2.1 and C-2.3)

Sl No.	Lot Size	Manufacture, Workmanship, Finish and Appearance		For Transparency and Leakage Test	
		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 1 000	20	2	8	0
iii)	1 001 to 3 000	32	3	13	0
iv)	3 001 to 5 000	50	5	20	1
v)	5 001 and above	80	7	32	2

ANNEX D

(Foreword)

COMMITTEE COMPOSITION

Plastics Containers Sectional Committee, PCD 21

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Packaging, Mumbai	SHRI RAJIV DHAR (<i>Chairman</i>)
Britannia Industries Ltd, Delhi	SHRI HARI IYER (<i>Alternate</i>)
Central Institute of Plastics Engineering & Technology, Chennai	SHRI S. K. CHAKRABORTY
Directorate General of Health Services, (DGHS), New Delhi	DR K. L. GABA (<i>Alternate</i>)
Directorate of Vanaspati, Vegetable Oils and Fats, New Delhi	SHRI D. H. RAIKER
Gujarat State Fertilizers Chemicals Ltd, Vadodara	DR S. K. NAYAK (<i>Alternate</i>)
Hindustan Lever Ltd, Mumbai	ASSISTANT DIRECTOR GENERAL (PFA)
Indian Petrochemicals Corporation Limited, Vadodara	DEPUTY ASSISTANT DIRECTOR GENERAL (PFA) (<i>Alternate</i>)
Indian Toxicological Research Institute, Lucknow	DR R. A. KHAN
Ministry of Food Processing Industries, New Delhi	DR P. K. SARDAR (<i>Alternate</i>)
Mipak Plastics Ltd, New Delhi	SHRI C. S. SHAH
National Dairy Development Board, Anand	SHRI S. P. PATEL (<i>Alternate</i>)
Nestle India Ltd, New Delhi	SHRI M. K. LAHIRI
New Delhi Municipal Council, New Delhi	SHRI D. C. AGARWAL (<i>Alternate</i>)
Nilkamal Crates & Containers, Mumbai	SHRI A.K. KHERA
Pearl Polymers Ltd, New Delhi	SHRI ASHISH SHRIVASTAVA (<i>Alternate I</i>)
Pesticides Association of India, New Delhi	SHRI ANUPAM DESI (<i>Alternate II</i>)
Reliance Industries Ltd, Mumbai	DR V. P. SHARMA
Sabarkantha District Co-operative Milk Producer's Union Ltd, Himatnagar	DR A. K. AGRAWAL (<i>Alternate</i>)
The Vanaspati Manufacturers' Association of India, New Delhi	SHRI R. GOPALAN
Voluntary Organization in Interest of Consumer Education (VOICE), New Delhi	SHRI R. K. BANSAL (<i>Alternate</i>)
BIS Directorate General	SHRI ARVID TIBREWALA
	SHRI B. DATTA
	SHRI S. K. KHANDELWAL (<i>Alternate</i>)
	SHRI V. K. SOOD
	DR G. S. THIND
	SHRI H. V. PAREKH
	SHRI V. S. IYER (<i>Alternate I</i>)
	SHRI A. K. KHARBANDA (<i>Alternate II</i>)
	SHRI CHAND SETH
	SHRI HARISH SETH (<i>Alternate I</i>)
	SHRI S. SARIN (<i>Alternate II</i>)
	SHRI PRADIP SAGAR
	DR L. C. ROHELA (<i>Alternate</i>)
	SHRI K. RANGAN
	SHRI A. S. AGHARKAR (<i>Alternate I</i>)
	DR R. S. BASARGEKAR (<i>Alternate II</i>)
	SHRI MAYUR N. VYAS
	SHRI M. J. BHAVSAR (<i>Alternate</i>)
	SHRI V. G. FERNANDEZ
	SHRI S. GURUMOORTHY (<i>Alternate</i>)
	SHRI S. K. MATHUR
	SHRI H. WADHWA (<i>Alternate</i>)
	SHRI ANJAN KAR, Director & Head (PCD)
	[Representing Director General (<i>Ex-officio</i>)]

Member Secretary
SHRI H. S. SIDHU
Director (PCD), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publication), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. PCD 21 (2120).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402

Telegrams: Manaksanstha
(Common to all offices)

Regional Offices:

	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022	{ 60 3843 60 9285
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892
Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.	