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IS 14151-2 (2008): Irrigation Equipment - Sprinkler Pipes, Part 2: Quick Coupled Polyethylene Pipes and fittings [FAD 17: Farm Irrigation and Drainage Systems]



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सिंचाई उपस्कर — सिंप्रकलर पाइप — विशिष्टि

भाग 2 सहज संयोजी पालीएथिलीन पाइप तथा फिटिंगस

( दूसरा पुनरीक्षण )

*Indian Standard*

IRRIGATION EQUIPMENT — SPRINKLER PIPES —  
SPECIFICATION

PART 2 QUICK COUPLED POLYETHYLENE PIPES AND FITTINGS

( *Second Revision* )

ICS 65.060.35

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

## FOREWORD

This Indian Standard (Part 2) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Farm Irrigation and Drainage System Sectional Committee had been approved by the Food and Agriculture Division Council.

Sprinkler irrigation system is one of the modern techniques being used for irrigation purpose. With the extensive use of quick coupled polyethylene pipes with sprinkler irrigation system a need was felt to formulate this standard to include the complete range of quick coupled pipes and fittings for intended use along with sprinkler irrigation systems.

This standard is published in two parts. This part covers the requirements of quick coupled polyethylene pipes and fittings for shiftable sprinkler irrigation systems whereas Part 1 covers requirement of plain polyethylene pipes for use as submains and mains in sprinkler and drip irrigation systems.

This standard was first published in 1994. The first revision of the standard was published to incorporate suggestions received during implementation of standard.

The second revision of standard has been taken up:

- a) to update the standard, and
- b) to include fitting as a part of irrigation system equipment.

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 : 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.

## *Indian Standard*

# IRRIGATION EQUIPMENT — SPRINKLER PIPES — SPECIFICATION

## PART 2 QUICK COUPLED POLYETHYLENE PIPES AND FITTINGS

### *( Second Revision )*

#### 1 SCOPE

This standard lays down the general requirements for materials, manufacture, method of tests and testing of quick coupled polyethylene pipes and fittings of outside diameters 40 mm to 200 mm used for portable sprinkler and drip irrigation systems as mains, submains or laterals. Manufacturer shall have capability to manufacture pipe conforming to IS 14151 (Part 1) before going for IS 14151 (Part 2) in order to maintain compatibility of pipes with the quick coupled fittings.

#### 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.</i>	<i>Title</i>
(Part 12) : 2002	Determination of vanadium ( <i>second revision</i> )
(Part 13) : 2003	Determination of sodium by atomic absorption and flame emission spectrophotometric methods ( <i>second revision</i> )
(Part 14) : 2003	Determination of beryllium by AAS and spectrophotometric methods ( <i>second revision</i> )
(Part 15) : 2003	Determination of zirconium by gravimetric and spectrophotometric methods ( <i>second revision</i> )
(Part 16) : 2003	Determination of lithium by atomic absorption and flame emission spectrometric methods ( <i>second revision</i> )
513 : 1994	Cold rolled low carbon steel sheets and strips ( <i>fourth revision</i> )
554 : 1999	Pipe threads where pressure tight joints are made on the thread — Dimensions, tolerances and designation ( <i>fourth revision</i> )
504	Chemical analysis of aluminium and its alloys:
(Part 1) : 2002	Determination of silicon and lead ( <i>second revision</i> )
(Part 2) : 2002	Determination of iron ( <i>second revision</i> )
(Part 3) : 2002	Determination of copper ( <i>second revision</i> )
(Part 4) : 2002	Determination of zinc ( <i>second revision</i> )
(Part 5) : 2002	Determination of manganese ( <i>second revision</i> )
(Part 6) : 2002	Determination of magnesium ( <i>second revision</i> )
(Part 7) : 2002	Determination of nickel ( <i>second revision</i> )
(Part 8) : 2002	Determination of chromium ( <i>second revision</i> )
(Part 9) : 2002	Determination of tin ( <i>second revision</i> )
(Part 10) : 2002	Determination of antimony ( <i>second revision</i> )
(Part 11) : 2002	Determination of titanium ( <i>second revision</i> )
617 : 1994	Aluminium and aluminium alloy ingots and castings for general engineering purposes ( <i>third revision</i> )
737 : 1986	Wrought aluminium and aluminium alloy sheet and strips for general engineering purposes ( <i>third revision</i> )
1573 : 1986	Specification for electroplated coating of zinc on iron and steel
4736 : 1986	Specification for hot-dip zinc coatings on mild steel tubes ( <i>first revision</i> )
4905 : 1968	Methods for random sampling
5382 : 1985	Specification for rubber sealing rings for gas mains, water mains and sewers ( <i>first revision</i> )
6418 : 1971	Cast iron and malleable cast iron flanges for general engineering purposes
7634	Code of practice for plastics pipe work for potable water supplies: Part 2
(Part 2) : 1975	Laying and jointing polyethylene (PE) pipes

IS No.	Title
8008	Injection moulded/machined high density polyethylene (HDPE) fittings for potable water supplies — Specification:
(Part 1) : 2003	General requirements for fittings ( <i>first revision</i> )
(Part 2) : 2003	Specific requirements for 90° bend ( <i>first revision</i> )
(Part 3) : 2003	Specific requirements for 90° tee ( <i>first revision</i> )
(Part 4) : 2003	Specific requirements for reducers ( <i>first revision</i> )
(Part 5) : 2003	Specific requirements for ferrule reducers ( <i>first revision</i> )
(Part 6) : 2003	Specific requirements for pipe ends ( <i>first revision</i> )
(Part 7) : 2003	Specific requirements for sandwich flanges ( <i>first revision</i> )
8360	Specification for fabricated high density polyethylene (HDPE) fittings for potable water supplies:
(Part 1) : 1977	General requirements
(Part 2) : 1977	Specific requirements for 90° tees
(Part 3) : 1977	Specific requirements for 90° bends
14151	Irrigation equipment — Sprinkler pipes: Part 1 Polyethylene pipes ( <i>first revision</i> )

### 3 QUICK COUPLED PIPES

Quick coupled pipes shall consist of polyethylene pipes conforming to IS 14151 (Part 1) and male and female couplers shall be fixed on either side of such a pipe. The quick coupled male and female couplers shall be manufactured/fabricated conforming to 4.1.

### 4 QUICK COUPLED FITTINGS

The quick coupled pipe fittings consist of plain fittings (Couplers, Bends, Tees, Pump connecting nipples, End caps, Service saddles with base supports, Reducing couplers, Reducing tees, Reducing bends, Threaded adapters, Insert valve couplers, Valve openers and Transition pieces) welded or fixed with the male or female parts of the couplers of corresponding pressure class and with outside diameters to facilitate quick coupling with pipes. The male and female parts of the couplers on the quick coupling fittings shall conform to specifications given under 4.1, whereas the plain fittings shall conform to IS 8008 (Parts 1 to 7) and/or IS 8360 (Parts 1 to 3).

#### 4.1 Quick Coupled Male and Female Couplers

The male and female couplers shall be of any of the two types described below. These male and female couplers have to be welded or fixed to each end of the

pipes as well as to the other plain fittings. The types of male and female couplers are broadly:

- a) *Metallic couplers* — Manufactured completely from corrosion resistant metals, and
- b) *HDPE couplers* — Major parts of the couplers shall be manufactured from High Density Polyethylene (HDPE) with latching arrangements manufactured out of either hot-dip zinc galvanized strips or electroplated coating of zinc or yellow passivation or powder coating or tough engineering plastics (UV stabilized).

#### 4.1.1 Material

##### 4.1.1.1 Metallic couplers

Metallic couplers shall be made of either of following materials:

**4.1.1.1.1 Aluminium alloy** complying with the composition requirements of alloys 31000, 31500, 40800, 51300, 52000, 53000 and 55000 as specified in IS 737 or alloy 4600 of IS 617.

One coupler shall be selected at random from each lot (*see 7.1.1*) for chemical analysis. Before test sample is cut off, it shall be marked to identify the batch number it represents.

The chemical composition of the test piece shall be determined either by methods specified in IS 504 (Parts 1 to 12) and IS 504 (Parts 13 to 16) or any other established instrumental/chemical method. In case of dispute, method specified in IS 504 (Parts 1 to 12) and IS 504 (Parts 13 to 16) shall be the referee methods.

**4.1.1.1.2 Tested quality cold rolled steel** conforming to 'O' grade of IS 513. Couplers shall be hot-dip galvanized or electroplated, or passivated or powder coated after manufacture so that no part remains ungalvanized or unelectroplated or uncoated. The hot-dip galvanizing shall be done in accordance with IS 4736 with a minimum zinc coating of 500 g/m<sup>2</sup>. Electroplating shall not be less than 20 µm and powder coating shall not be less than 50 µm. Passivation for electroplate coating of zinc on iron or steel, if performed as per Table 1 of IS 1573.

##### 4.1.1.2 HDPE couplers

**4.1.1.2.1 HDPE parts of the coupler and fittings** shall meet the material requirements given in 4 of IS 14151 (Part 1). The wall thickness of the HDPE male and female couplers shall be not less than the wall thickness of the HDPE pipe to which these couplers at welding end are being welded/fixed.

**4.1.1.2.2 Metal parts of the coupler** shall be manufactured from the aluminium or steel conforming to requirements given in 4.1.1.1.1 and 4.1.1.1.2 respectively.

#### 4.1.2 Sizes of Coupler Parts

The size of coupler parts shall be designated by outside diameter and pressure class of pipes on which they are welded or fitted otherwise.

#### 4.1.3 Workmanship and Appearance

The coupler parts shall be clearly and neatly finished and be free from burrs or other features likely to damage the pipe.

The internal and external surfaces of the coupler shall be clean and free from pin holes, voids or other features likely to affect the performance and service of the system.

#### 4.1.4 Holding Attachments for Coupler Parts

In case any external attachment is provided for holding the coupler parts to form a quick leak proof joint, it must meet the following requirements:

- a) Material for holding attachment shall conform to requirements given in 4.1, and
- b) The holding attachments must be strong enough to withstand the pressure two times the working pressure of the pipes.

#### 4.1.5 Rubber Ring

The rubber ring or gasket or 'o' ring used for sealing the coupler against leakage, it shall be of natural rubber or nitrile or neoprene and shall have shore hardness (Shore-A) between 55 to 70 with black colour. Maximum change in the hardness after keeping it in air at 70°C for 7 days shall not vary by  $\pm 10$  percent when compared with the observed value at the beginning of the test.

### 4.2 Quick Coupled Type HDPE Fittings

If the HDPE quick coupled bends, tees, reducers, ferrule reducers, pipe ends, reducing tees and end caps

are made out of welding or fixing together of male end, female end on a plain fitting, the HDPE plain fitting shall meet the following material specifications.

**4.2.1** If the material of construction/manufacture is HDPE, it has to conform to requirements given in 4 of IS 14151 (Part 1).

**4.2.2** Metal parts of plain fitting shall be manufactured from the aluminium or steel meet requirements given in 4.1.1.1.

**4.2.3** The quick coupled insert valve coupler shall consist of a valve with a stud built into a HDPE plain Tee conforming to requirements under IS 8008 (Part 1 and Part 3) and IS 8360 (Parts 1 to 3). The stud shall match the corresponding stud holder at the end of valve spindle inside the valve opener. HDPE male or female quick couplers need to be welded or fixed on each side of the Tee depending on the requirements of corresponding quick coupled valve openers.

**4.2.4** The quick coupled valve openers shall consist of valve handle and spindle built into a HDPE plain bend conforming to requirements under IS 8008 (Part 1 and Part 2). HDPE male and female quick couplers need to be welded or fixed on either side of the bend matching the requirements of quick coupled insert valve coupler.

**4.2.5** The quick coupled sprinkler saddle/foot batten sprinkler assembly (plastic/mettalic) shall consist of quick coupler with a female threaded outlet to take the sprinkler riser pipe. The size of female threaded socket and length of plain saddle shall conform to Table 1. The threaded outlet shall consist of corrosion resistant galvanized iron socket insert-moulded into the saddle and also a metallic protection band on the outside diameter of the outlet to protect it from splitting or cracking. The saddle shall be adequately supported by a metallic or HDPE base so that it does not topple during the rotation of sprinkler on the riser.

**Table 1 Dimensions of Quick Coupled Sprinkler Saddles**

(Clauses 4.2.5 and 5.3)

All dimensions in millimetres.

Sl No.	Nominal Diameter	Minimum Length of Plain Saddle without Male and Female Couplers	Nominal Size of Threaded Female Outlet (see IS 554)
(1)	(2)	(3)	(4)
i)	40	75	12.70
ii)	50	75	12.7, 19.05
iii)	63	90	12.7, 19.05
iv)	75	105	12.7, 19.05
v)	90	135	19.05, 25.40
vi)	110	200	25.40, 31.75
vii)	125	200	25.40, 31.75, 38.10
viii)	140	400	31.75, 38.10, 50.80
ix)	160	400	38.10, 50.80
x)	180	400	38.10, 50.80
xi)	200	400	38.10, 50.80



Alternatively, the (Foot batten) sprinkler assembly may be made out of quick coupler base pipe and metal saddle cum pedestal. All HDPE parts shall conform to the material requirements of IS 14151 (Part 1) and all metallic parts shall conform to 4.1.1.

**4.2.6** The quick coupled pump connector (Threaded type) shall consist of quick male or female couplers attached with a galvanized iron (G. I.) nipple inserted into the HDPE pipe end, as per the procedure under 2.2 of IS 7634 (Part 2) or metallic scewed coupler or insert moulded threaded parts. All HDPE parts shall conform to the material requirements of IS 14151 (Part 1) and all metallic parts shall conform to 4.1.1. The threaded parts for connection to other threaded components shall comply with IS 554.

**4.2.7** Flanged connections shall comply with specifications given in Table 2. The quick coupled pump connector (flanged) shall consist of HDPE pipe end (stub end) and flange set attached to quick coupler.

## 5 DIMENSIONS

### 5.1 Dimensions of Quick Coupled Pipes and Fittings

The dimensions of the quick coupled pipes and fittings shall conform to the following requirements:

<i>Description of Pipes and Fitting</i>	<i>Reference Standard for Dimension</i>
(1)	(2)
Plain pipes	IS 14151 (Part 1)
90° Tees and Bends	Table 1 of IS 8008 (Part 2 and 3)/ IS 8360 (Part 3)
Reducers	Table 1 and 2 of IS 8008 (Part 4)
Ferrule reducers	Table 1 of IS 8008 (Part 5)
Pipe ends	Table 1 of IS 8008 (Part 6)
End caps	Table 1 of IS 8008 (Part 9)

Insert valve couplers Table 1 of IS 8008 (Part 3)  
Valve openers Table 1 of IS 8008 (Part 2)

### 5.2 Dimensions of Quick Coupled Pump Connectors

The dimensions of HDPE quick coupled pump connectors shall conform to Table 3.

### 5.3 Dimensions of Quick Coupled Sprinkler Saddles

The dimensions of metal (M. S.) or HDPE quick coupled saddles shall conform to Table 1.

## 6 PERFORMANCE REQUIREMENTS

### 6.1 Quick Coupled Pipes and Fittings

#### 6.1.1 Leakage Test

**6.1.1.1** Coupler parts duly welded or fitted otherwise to straight length of pipe or fitting of corresponding diameter shall be assembled together by holding attachment and free ends of the pipe or fitting shall be tested for leakage with water as a medium for a duration of 1 h. During the test, pressure shall be gradually raised from 0.0 MPa to maximum working pressure.

**6.1.1.2** As far as mechanical coupling is concerned there shall be no leakage. For pressure activated couplers, there shall be no leakage at or beyond the pressure of 0.05 MPa.

#### 6.1.2 Hydraulic Proof Test

**6.1.2.1** The same assembly as mentioned in 6.1.1.1 shall be subjected to a hydraulic proof test with water as medium at twice the recommended working pressure at ambient temperature for a period of 1 h. The assembly shall not show any sign of localized swelling, leakage, weeping or deformation and shall not burst during the prescribed test duration.

**Table 2 Specifications (M. S.) Slip on Flanges**  
(Clause 4.2.7)

Sl No.	Nominal Diameter of HDPE Pipe	Diameter of Flange	Pitch Circle Diameter	Thickness	No. of Holes	Hole Diameter
(1)	mm	mm	mm	mm	(6)	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	40	120.65	87.30	6.35	04	14
ii)	50	133.30	98.40	6.35	04	14
iii)	63	152.40	114.30	7.93	04	18
iv)	75	165.10	127.00	7.93	04	18
v)	90	184.15	146.05	9.52	04	18
vi)	110	215.90	177.80	9.52	04	18
vii)	125	254.00	209.55	12.70	08	18
viii)	140	254.00	209.55	12.70	08	18
ix)	160	279.40	234.95	12.70	08	18
x)	180	304.80	260.40	12.70	08	18
xi)	200	336.60	292.10	12.70	08	18

NOTE — Specifications of HDPE sandwich flanges shall be as per Table 1 of IS 8008 (Part 7).

**Table 3 Dimensions of Quick Coupled Pump Connectors***(Clause 5.2)*

All dimensions in millimetres.

SI No.	Nominal Diameter	Minimum Length of HDPE Plain Pipe	Minimum Length of GI Nipple	Minimum Length of Threaded Portion	Nominal Size of Female Threaded Socket for Fixing Pressure Gauge (see IS 554)
(1)	(2)	(3)	(4)	(5)	(6)
i)	40	100	125	20	6.35
ii)	50	100	125	20	6.35
iii)	63	100	125	25	6.35
iv)	75	100	125	30	6.35
v)	90	100	150	35	6.35
vi)	110	150	180	40	6.35
vii)	125	180	200	45	6.35, 12.7
viii)	140	300	300	45	6.35, 12.7
ix)	160	300	300	45	6.35, 12.7
x)	180	300	300	45	6.35, 12.7
xi)	200	300	300	45	6.35, 12.7

**6.1.2.2** During the test as mentioned in **6.1.2.1** the holding attachment used in the coupler shall not show any deformation of permanent nature.

### 6.1.3 Weldability Test

**6.1.3.1** If parts of couplers are welded at one end of quick coupled pipes the welded joints between the pipe and coupler shall conform to requirement specified in **7.1** of IS 14151 (Part 1).

**6.1.3.1.1** The total length of test piece including joint shall be 300 mm that is 150 mm on both sides of joint. However, other lengths may be chosen on the coupler side of the pipe, if design of coupler does not permit the same with the total length not less than 300 mm.

### 6.1.3.2 Quick coupled fittings

The coupler parts welded to the end of fitting, when tested as per the requirement in **7.1** of IS 14151 (Part 1) should not show any leakage from the weld or body of fitting nor should there be any swelling in the fittings.

**6.1.3.2.1** The assembly of test piece shall be based on the design of the fitting and shall be the responsibility of the manufacturer to demonstrate proper assembly of testing.

## 6.2 Quick Coupled Fittings

**6.2.1** For quick coupled fittings made in HDPE, the performance requirements shall be in accordance with **6.1** and IS 8008 (Part 1).

## 7 SAMPLING AND CRITERIA FOR CONFORMITY

### 7.1 Lot

**7.1.1** All quick coupled pipes or fittings of the same

size and thickness, same length/design and welded in a single consignment shall be grouped together to constitute a lot.

**7.1.2** The conformity of the lot to the requirements of this standard shall be ascertained for each lot separately.

**7.1.3** The quick coupled pipes or fittings shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS 4905 may be followed.

### 7.2 Visual and Workmanship Requirement

**7.2.1** The number of quick coupled pipes or fittings to be selected from each lot shall depend on the size of the lot and shall be in accordance with col 2 and 3 of Table 4. Each quick coupled pipe or fitting so selected shall be examined for proper workmanship and appearance. Any pipe or fitting failing in these requirements shall be considered as defective. The lot shall be considered as conforming to requirements of this standard, if the number of defective pipes or fittings found in the samples does not exceed the corresponding acceptance number 'A' in col 4 of Table 4 otherwise the lot shall be rejected.

**7.2.2** The lot rejected according to **7.2.1** may be retested for characteristics for which it has failed. For this purpose, the number of Quick coupled pipes or fittings to be selected at random from the lot, shall be according to col 2 and 3 of Table 4. Quick coupled pipes or fittings failing to satisfy the requirements of any of these characteristics shall be considered as defective. The lot shall be deemed to satisfy the requirement of this standard, if the number of defective quick coupled pipes or fittings found in the sample lot does not exceed the corresponding acceptance number 'B' in col 5 of Table 4 otherwise the lot shall be rejected.

**Table 4 Scale of Sampling and Permissible  
Number of Defectives**  
(Clauses 7.2.1 and 7.2.2)

Sl No.	Number of Quick Coupled Pipes/Fittings in the Lot	Sample Size	Acceptance Number	
			(4)	(5)
(1)	(2)	(3)	(4)	(5)
i)	Up to 150	2	0	0
ii)	151 to 300	3	0	0
iii)	301 to 500	4	0	0
iv)	501 to 1 000	7	1	0
v)	1 001 to 3 000	10	1	0
vi)	3 001 to 10 000	16	2	1

### 7.3 Leakage and Hydraulic Resistance Test

**7.3.1** The lot having met the requirements given in 7.2 shall be finally tested first for leakage test and then for hydraulic resistance test.

**7.3.2** For hydraulic resistance test and leakage test the number of quick coupled pipes or fittings at random (see 7.1.3) shall be according to Table 5.

**7.3.3** The lot shall be declared as conforming to the requirements of this specification if no failure occurs under 7.3.1 otherwise not.

**Table 5 Scale of Sampling and Criteria for  
Conformity for Leakage and Hydraulic  
Resistance Test**  
(Clause 7.3.2)

Sl No.	Number of Quick Coupled Pipes/Fittings in the Lot	Sample Size
(1)	(2)	(3)
i)	Up to 150	2
ii)	151 to 300	3
iii)	301 to 500	4
iv)	501 and above	6

### 7.4 Weldability Test

**7.4.1** For this purpose the number of pipes or fittings to be taken at random (see 7.1.3) from the lot shall be according to Table 6.

**7.4.2** The lot shall be declared as conforming to the requirement of the standard, if no failure occurs under 7.4.1 otherwise not.

## 8 MARKING

**8.1** Each quick coupled pipe and fitting shall be indelibly marked in English at intervals of not more

**Table 6 Scale of Sampling for Weldability Test**  
(Clause 7.4.1)

Sl No.	Number of Quick Coupled Pipes/ Fittings in the Lot	Sample Size
(1)	(2)	(3)
i)	Up to 500	1
ii)	501 to 1 200	2
iii)	1 201 to 3 200	3
iv)	3 200 and above	4

than 6 m in the pipe section and at a prominent place on the coupler which is visible even after installation by heat embossing or in colour as indicated in 8.1.1. However, if pipe section of the quick coupled pipe already bears permanent marking in accordance with 10.1 of IS 14151 (Part 1), marking of IS 14151 (Part 2) shall be done on both the male and female coupler sections only. In case of fittings, marking shall be on male end, female end and the plain fitting at a prominent place which is visible even after installation, by heat embossing or in colour as indicated in 8.1.1. The marking shall show the following:

- Manufacturer's name or trade-mark,
- Outside diameter,
- Class of pipe, and
- Batch number.

**8.1.1** The information specified in 8.1 shall be indelibly marked in coupler or heat embossed as indicated below for different classes of pipes:

<i>Class of Pipe</i>	<i>Coupler</i>
(1)	(2)
Class 1	Orange
Class 2	Red
Class 3	Blue
Class 4	Green

### 8.2 BIS Certification Marking

The product shall also be marked with the Standard Mark.

**8.2.1** The use of the Standard Mark is governed by the provisions of *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 procedures may be obtained from the Bureau of Indian Standards.

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### 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'.

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### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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