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IS 8008-1 (2003): Injection Moulded/Machined High Density Polyethylene (HDPE) Fittings for Potable Water Supplies, Part 1: General Requirements for Fittings [CED 50: Plastic Piping System]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
पेयजल पूर्ति के लिए अन्तःक्षेपण संचकित
एच डी पी ई फिटिंगें – विशिष्टि

भाग 1 सामान्य अपेक्षाएँ
(पहला पुनरीक्षण)

Indian Standard

INJECTION MOULDED/MACHINED HIGH DENSITY
POLYETHYLENE (HDPE) FITTINGS FOR POTABLE
WATER SUPPLIES — SPECIFICATION

PART 1 GENERAL REQUIREMENTS FOR FITTINGS

(First Revision)

ICS 83.140.30; 91.140.60

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Part 1) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastic Piping System Sectional Committee had been approved by the Civil Engineering Division Council.

This standard covers general requirements for injection moulded/machined HDPE fittings which are used for connection by welding process to HDPE pipes covered by IS 4984 : 1995 'High density polyethylene pipe for water supply (*fourth revision*)'.

This standard was first published in 1976. Keeping in view the developments in this field and considering revision of IS 4984 this standard has been revised.

The requirements of injection moulded/machined HDPE fittings are covered in nine parts. The other parts in this series are:

(Part 2) : 2003	Specific requirements for 90° bends
(Part 3) : 2003	Specific requirements for 90° tees
(Part 4) : 2003	Specific requirements for reducers
(Part 5) : 2003	Specific requirements for ferrule reducers
(Part 6) : 2003	Specific requirements for pipe ends
(Part 7) : 2003	Specific requirements for sandwich flanges
(Part 8) : 2003	Specific requirements for reducing tees
(Part 9) : 2003	Specific requirements for end caps

All revised parts have been aligned with IS 4984 with respect to grade of material, dimensional requirements, testing procedures and sampling methodology.

Provisions has been made for rewelding, in case any weld gets rejected. Weld length had been kept constant with a uniform tolerance.

Drawings have been revised from short neck pipe ends to long neck pipe ends. The range of diameter of fittings, weld length and clarity of the dimensions in the drawings had been incorporated in each part of the standard, wherever applicable.

This standard covers general requirements for materials, manufacture, methods of test and inspection and marking of all types of injection moulded and machined HDPE fittings. Specific requirement of different types of fittings are covered in separate parts of this standard.

Fittings from 20 mm to 315 mm are manufactured by the injection moulding methods and machined, wherever so required and fittings of 355 mm and above shall be manufactured by machining process from thick walled extruded pipes or compression moulded slabs.

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

INJECTION MOULDED/MACHINED HIGH DENSITY POLYETHYLENE (HDPE) FITTINGS FOR POTABLE WATER SUPPLIES — SPECIFICATION

PART 1 GENERAL REQUIREMENTS FOR FITTINGS

(First Revision)

1 SCOPE

1.1 This standard (Part 1) covers general requirements for materials, manufacture, methods of test and inspection and marking of all types of injection moulded and machined HDPE fittings intended for connection to HDPE pipes covered by IS 4984 for potable water supplies.

1.2 For technical reasons the fittings may be welded to pipes of same pressure rating. Deviations from this requirement is allowed if the wall thicknesses are equal in the welding zone.

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>
2530 : 1963	Methods of test for polyethylene materials for moulding materials and polyethylene compounds
4984 : 1995	High density polyethylene pipes for water supply (<i>fourth revision</i>)
7328 : 1992	High density polyethylene materials for moulding and extrusion (<i>first revision</i>)
10141 : 1982	Positive list of constituents of polyethylene in contact with foodstuffs, pharmaceuticals and drinking water

3 COMPOSITION

3.1 The fitting shall be made from a compound consisting of virgin polyethylene grades of fibre PE 63/PE 80/PE 100, whichever is applicable.

3.2 The specified density shall be between 940.5 kg/m^3 and 946.4 kg/m^3 (both inclusive) when determined at 27°C in accordance with procedure prescribed in Annex A of IS 7328. The value of density shall also not differ from the nominal value by more than 3 kg/m^3 as per 5.2 of IS 7328.

3.3 The material used for the manufacture of fittings should not constitute toxic hazard and should not give rise to unpleasant taste or odour, cloudiness or discoloration of water.

3.4 The MFR of the material shall be between 0.41 and 1.10 (both inclusive) when tested at 190°C with nominal load of 5 kgf as determined by prescribed method in 7 of IS 2530.

3.5 The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 ± 0.5 percent.

3.6 Anti-oxidant

The percentage of anti-oxidant shall not be more than 0.3 percent by mass of finished resin. The anti-oxidant shall be physiologically harmless and shall be selected from the list given in IS 10141.

3.7 The compound (resin) supplier shall provide the certified test results for PE compound classification and other characteristics as per 3.1 to 3.6 for each individual lot of batch of material received by the fittings manufacturer.

4 REWORK MATERIAL

The addition of not more than 10 percent of the manufacturer's own rework material resulting from the manufacture of fittings to this standard is permissible. No other rework material shall be used.

5 COLOUR

The colour of the fitting shall be black.

6 SIZES OF FITTINGS

6.1 The nominal diameter of the fittings covered in this standard are 20, 25, 32, 40, 50, 63, 75, 90, 110, 125, 140, 160, 180, 200, 225, 250, 280, 315, 355, 400, 450, 500, 560, 630, 710, 800, 900 and 1 000 mm.

6.2 The sizes of fittings shall be designated by their outside diameters at the free ends and grade of material. The outside diameters at the free ends of the fittings shall correspond to the outside diameters of the pipes given in IS 4984.

7 WELD LENGTHS (WHEREVER APPLICABLE)

Since 3 to 5 mm length goes in welding it is difficult to reweld the bend/tee, if any weld gets rejected. Hence a minimum weld length of 15 mm is specified, to make provision for rewelding and to avoid wastage of whole fitting due to shortage of weld length.

8 DIMENSIONS OF FITTINGS

The outside diameters and the corresponding wall thickness of fittings at the free ends for weld shall comply with those given in IS 4984, depending on the grade of material. However, the wall thickness of the fittings (with the exception and reducers sandwich flange) shall be a minimum of PN6 rated pipe material grade PE 80 as per IS 4984. The outside diameter shall be the average of two measurements taken at right angles. The wall thickness shall be measured with a ball ended micro-meter or dial caliper. Resulting dimensions shall be expressed to 0.1mm.

9 PERFORMANCE REQUIREMENTS

9.1 Hydraulic Characteristics

A fitting (except sandwich flange) duly welded on all sides to straight length of a pipe of pressure rating to which the fitting corresponds, when subjected to internal creep rupture testing in accordance with the procedure given in Annex B of IS 4984, and test assembly as given in Table 1, shall show no signs of localized swelling, leakage or weeping and shall not burst during the prescribed test duration. The temperature, duration of test and stresses for the test shall conform to the requirements given in Table 6 of IS 4984 according to the grade of material. Although the performance of welded joints is not the object of this test, the joints shall be such that they are not the cause of the system failure. However, in case of failure of the weld the test shall be repeated.

9.2 Sandwich Flange Hydraulic Testing

Sandwich flange shall be tested as per 9.1 by slipping on to the pipe duly welded with pipe end as per standard practice.

Table 1 Length of Pipe for Welding Test

(Clause 9.1)

All dimensions in millimetres.

Sl No.	Pipe Outside Diameter	Length of Pipe Section
(1)	(2)	(3)
i)	Up to 75	200
ii)	90 to 225	300
iii)	250 or more	500

9.3 Ovality

Ovality of the fittings shall conform to Table 2 of IS 4984 when measured according to 6.3.2 of IS 4984.

9.4 Carbon Black Content and Dispersion

When tested the fittings as per 8.6 of IS 4984 and as per IS 2530 the carbon black content shall be within 2.5 ± 0.5 percent and the dispersion shall be uniform.

10 SAMPLING, FREQUENCY OF TESTS AND CRITERIA FOR CONFORMITY

10.1 Type Tests

10.1.1 Type tests are intended to prove the suitability and performance of a new technique or a new size of fitting. Even, if no change is envisaged, type test shall be done at last once in one year on each pressure rating and grade of fitting of the highest size manufactured during the period.

10.1.2 Three samples of the same size, same pressure rating and same grade selected at random shall be tested for compliance with requirements of the type test (see 9.1 and Table 6 of IS 4984).

10.1.3 If all the samples pass the requirements of the type test, the type of the fitting under consideration shall be considered eligible for type approval. However, failure on the weld joint shall not be considered as a failure of the type test. In such a case the test shall be repeated.

10.1.4 In case any sample fails in the type test, the testing authority, at it's discretion, may call fresh samples not exceeding the original number and subject them to the type test again. In repeat test, no single failure occurs, the type of fittings under consideration shall be eligible for type approval.

10.1.5 At the end of the validity period (normally two years) or earlier as may be necessary, the testing authority may call for fresh samples for type test for the type approval.

10.2 Acceptance Tests

10.2.1 Lot

All fittings of the same size, same pressure rating and

same grade and also manufactured under similar conditions shall constitute a lot. For ascertaining conformity of the lot to the requirements of this standard sample shall be selected in accordance with the provisions as mentioned under 10.2.2 and 10.2.3 and tested for compliance.

10.2.2 Dimensional Requirements

10.2.2.1 The number of test samples shall be in accordance with Table 7 of IS 4984.

10.2.2.2 The fittings shall be selected random from the lot and in order to ensure the randomness of selection a random number table shall be used. In the absence of the random number table the following procedure may be adopted:

Starting from any fitting in the lot count them as 1, 2, 3 up to *r* and so on, where '*r*' is integral part of *N/n*, *N* being the number of fittings in the lot and *n* is the number of fittings in the sample. Every *r* fitting so counted shall be drawn so as to constitute the required sample size.

10.2.2.3 The scale of sampling shall be as per 9.2.3.3 of IS 4984.

10.2.3 Hydraulic Characteristics

10.2.3.1 The lot having satisfied dimensional requirements shall be tested for hydraulic characteristics.

10.2.3.2 A separate sample size for the test shall be taken as stipulated in Table 2 and selected at random from the sample already examined for dimensional inspection. All the fittings in each of the sample size

shall be tested for compliance in the requirements for hydraulic characteristics (see 9.1). The lot shall be considered to have met the requirements of the above test, if none of the samples test fails.

Table 2 Scale of Sampling for Hydraulic Characteristics (Clause 10.2.3.2)

Sl No.	No. of Fittings in a Lot	Sample Size
(1)	(2)	(3)
i)	Up to 25	2
ii)	26 to 1 50	3
iii)	151 to 1 200	5
iv)	>1 200	6

11 MARKING

11.1 All fittings shall be clearly marked at a prominent place, with the following information:

- a) Identification of source of manufacture, and
- b) The size of the fittings, grade of material and appropriate working pressure.

11.2 BIS Certification Marking

Each HDPE fittings may also be marked with the Standard Mark.

11.2.1 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 a licence for the use of the Standard Mark may be granted to the manufacturers or the producers may be obtained from the Bureau of Indian Standards.

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Amendments Issued Since Publication

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