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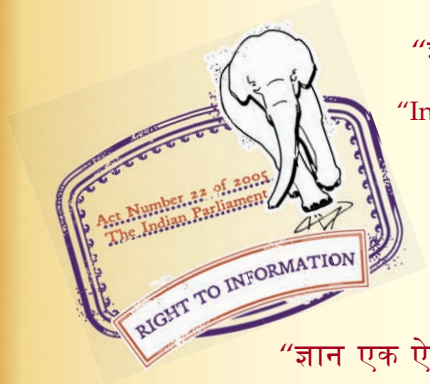
IS 13593 (1992): UPVC pipe fittings to be used with the UPVC pipes in the suction and delivery lines of agricultural pumps [CED 50: Plastic Piping System]

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"Knowledge is such a treasure which cannot be stolen"

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IS 13593 : 1992
( Reaffirmed 2002 )

भारतीय मानक

# कृषि पम्पों के चूषण तथा वितरण लाइनों में यू पी वी सी पाइपों के उपयोग के लिए यू पी वी सी पाइप फिटिंग – विशिष्टि

*Indian Standard*

# UPVC PIPE FITTINGS FOR USE WITH UPVC PIPES IN THE SUCTION AND DELIVERY LINES OF AGRICULTURAL PUMPS — SPECIFICATION

UDC 621·643·2 [ 678·743·22 ] : 631·626·2 : 621·65·03



BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

*December* 1992

Price Group 2

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastic Pipes and Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

Unplasticized PVC ( UPVC ) pipes are finding increasing use in the suction and delivery lines of agricultural pumps as they have lower frictional values and are cheaper than the other alternatives. Such lines are to be kept exposed to sunlight and atmosphere. The commonly produced UPVC pipes conforming to IS 4985 : 1988 are found to be adversely affected by ultraviolet rays of sunlight when they are exposed to sunlight and atmosphere. Moreover, the pipes used in the suction and delivery lines of agricultural pumps are also subjected to frequent water hammer effects and vibrations. Hence, a new standard for such Special UPVC pipes was formulated and was published as IS 12231 : 1987 'Specification for UPVC ( rigid ) pipes for use in suction and delivery lines of agricultural pumps'.

For use with UPVC pipes as specified in IS 12231 : 1987, some special fittings are also required. Such fittings include couplers, end pieces, male threaded pieces, female threaded pieces, bends, reducer couplers, reducer male threaded pieces, etc. Similar fittings for use with the conventional UPVC pipes conforming to IS 1985 : 1988 are not found suitable for use in the suction and delivery lines of agricultural pumps. They are adversely affected by ultraviolet rays of sunlight, impact loads when pump stops and vibrations when the pump operates. Hence, this new standard for such fittings has been formulated.

These fittings are fabricated from the UPVC pipes covered in IS 12231 : 1987 having ultraviolet inhibitors. These fittings along with the pipes of IS 12231 : 1987 are widely used by the consumer organizations like REC—New Delhi, Institute of Co-operative Management—Ahmadabad, Gujarat Energy Development Agency—Baroda, Petroleum Conservation Research Association—New Delhi and many State Electricity Boards for their pump rectification projects.

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*

# UPVC PIPE FITTINGS FOR USE WITH UPVC PIPES IN THE SUCTION AND DELIVERY LINES OF AGRICULTURAL PUMPS — SPECIFICATION

## 1 SCOPE

This specification covers the requirements regarding material, dimensions, workmanship, performance and marking of the following types of UPVC fittings used for preparation of suction and delivery lines of agricultural pumps:

Couplers
Bends 90°
End Pieces ( or Tail Pieces )
Reducer Couplers
Male Threaded Pieces ( MTPs )
Female Threaded Pieces ( FTPs )
Reducer Threaded Pieces
End Piece Rings

NOTE — These fittings are fabricated from the UPVC pipes specified in IS 12231 : 1987.

## 2 REFERENCES

The Indian Standards listed below are the necessary adjuncts to this standard:

| *IS No.* | *Title* |
|---|---|
| 554 : 1985 | Dimensions for pipe threads where pressure-tight joints are made on threads ( *third revision* ) |
| 1536 : 1989 | Centrifugally cast ( spun ) iron pressure pipes for water, gas and sewage ( *second revision* ) |
| 4905 : 1968 | Methods for random sampling |
| 4985 : 1988 | Specification for unplasticised PVC pipes for potable water supplies ( *second revision* ) |
| 12231 : 1987 | Specification for UPVC ( rigid ) pipes for use in suction and delivery lines of agricultural pumps |
| 12235 ( Part 8 ) : 1986 | Method of test for unplasticised PVC pipes for potable water supplies : Part 8 Internal hydrostatic pressure test |

## 3 TERMINOLOGY

### 3.1 Socket

It is enlarged end of pipe fitting in which the plain end of UPVC pipe is to be inserted for fixing through solvent/adhesive.

### 3.2 Coupler

It is the piece of pipe with sockets at both ends. Such sockets are created by specific actions like:

a) heating the required end of pipe piece of required length,
b) enlarging the end portion up to required depth by inserting moulds,
c) cooling the heated portion with mould,
d) removal of the mould, and
e) finishing the ends on emery.

### 3.3 Bend

It is a piece of pipe bent into the shape of quarter of a circle. Its both ends are socketed. It is used in delivery line to connect the vertical pipe with offset pipe for diversion of flow of water.

### 3.4 End Piece

It is the piece of pipe with socket at one end flanged portion at the other end. A special flange without threads called end piece ring, is inserted over the end piece in such a way that it would be suitable for fixing with normal flange of the pump or similar end piece with end piece ring. It is used for preparing detachable joints in the pipe line or fixing the delivery lines on the pumps.

### 3.5 Reducer Coupler

It is a piece of UPVC pipe with sockets for different sizes of pipes at both ends. It is used to connect one size of pipe with another larger size of pipe.

### 3.6 Male Threaded Piece

It is a piece of pipe of necessary wall thickness, required length and outside diameter, having socket at one end and male threads at the other end. Such threads should be matching with the female threads of flanges, couplings and foot-valves in which the male threaded piece is to be fitted.

### 3.7 Female Threaded Piece

It is similar to the male threaded piece as described in **3.6** with the threads cut on the inner surface of the pipe which should be suitable for nipples, ends of G.I. bends or male threaded piece described in **3.6**.

### 3.8 Reducer Threaded Piece

It is similar to the normal male threaded piece as described in **3.6** but has socket for pipe of higher outside diameter. The length of such male threaded piece is longer than that of normal male threaded piece.

### 3.9 End Piece Ring

It is similar to normal flange of cast iron except that it has no threaded portion and has recess of 2 to 3 mm on its plain surface, in which the flanged portion of end piece is to be mounted. The diameter of central bore is matching with the outside of the end piece.

## 4 MATERIAL

Pipes used for the fabrication of UPVC fittings shall conform to IS 12231 : 1987 except that the threaded pieces shall be fabricated from higher wall thickness ( *see* **7.2.1** ).

## 5 NOMINAL SIZES OF FITTINGS

The nominal sizes of fittings shall be designated by the nominal outside diameter of pipes given in IS 12231 : 1987.

## 6 CLASSIFICATION

**6.1** The fittings shall be classified by the pressure ratings ( working pressure ) at 27°C and colour as indicated in **6.1.1** and **6.1.2**.

**6.1.1** Pressure ratings ( working pressure ) of the fitting shall be as follows:

| *Class of Fitting* | *Working Pressure* |
|---|---|
| 1 W | 0·4 MPa |
| 2 W | 0·6 MPa |

**6.1.1.1** These fittings are recommended for water temperature ranging from +1 to 45°C. At higher temperature ( 27 to 45°C ), the strength of the fitting reduces and the working pressure shall be modified in accordance with Fig. 1.

NOTE — The recommended maximum safe working stress for these fittings is 10 MPa at 20°C.

**6.1.2** The fittings shall be snow white in colour.

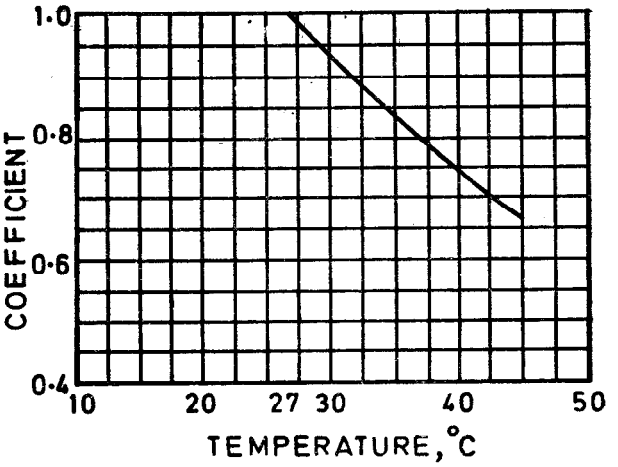


FIG. 1 GRAPH FOR MORE PRECISE CALCULATIONS GIVING THE MAXIMUM CONTINUOUS WORKING PRESSURE ( COEFFICIENT ) FOR TEMPERATURES UP TO 45°C

## 7 DIMENSIONS

### 7.1 Mean Outside Diameter

Couplers, bends, end pieces, reducer couplers and threaded pieces fabricated from pipes of 63, 75, 90, 110 and 140 mm nominal size shall have mean outside diameter as given in Table 1 of IS 12231 : 1987 for the appropriate class of fitting.

### 7.2 Thickness

Average and individual value of wall thickness at any place in a fitting shall not be less than those specified in Table 1 of IS 12231 : 1987 for the appropriate class of fitting.

**7.2.1** Threaded pieces shall be fabricated from pipes of wall thickness varying from 3·5 to 5·0 mm, as specified ( *see* **7.4.2** ) so that required threads can be cut at the end.

### 7.3 Depth of Socket

Socket end of the fittings shall have a minimum depth as given in Table 1.

**Table 1 Overall Length, Depth of Socket and Length of Flanged Portion**

( *Clauses* 7.2, 7.3 *and* 7.4.1 )

| Type of Fitting | Nominal Size of Fitting mm | Minimum Overall Length mm | Minimum Depth of the Socket mm | Length of Flanged Portion of End Piece, *Max* | Remarks |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Coupler | 63 | 95 | 37·5 | — | Sockets at both ends |
| | 75 | 110 | 43·5 | — | |
| | 90 | 140 | 51·0 | — | |
| | 110 | 160 | 61·0 | — | |
| | 140 | 200 | 76·0 | — | |
| End pieces | 63 | 68 | 37·5 | 20 | Socket flange at the two ends |
| | 75 | 80 | 43·5 | 20 | |
| | 90 | 95 | 51·0 | 25 | |
| | 110 | 115 | 61·0 | 25 | |
| | 140 | 145 | 76·0 | 25 | |
| Bends | 63 | 375* | 37·5 | — | Socket at both ends *Length of outer curve |
| | 75 | 400* | 43·5 | — | |
| | 90 | 530* | 51·0 | — | |
| | 110 | 645* | 61·0 | — | |
| | 140 | 815* | 76·0 | — | |
| Reducer | 63×75 | 110 | As indicated above on one side and that of the next higher size on the other end | — | — |
| | 75×90 | 135 | | — | |
| | 90×110 | 155 | | — | |
| | 110×140 | 195 | | — | |

### 7.4 Other Dimensions

**7.4.1** Minimum overall length, minimum depth of socket and length of flanged portion ( of end pieces ) for couplers, end pieces, bends and reducer coupler shall be as given in Table 1.

**7.4.2** Minimum overall length, minimum wall thickness and minimum length of threaded portion of the threaded pieces shall be as given in Table 2.

**7.4.2.1** The dimensions of the threads shall be in conformity with IS 554 : 1985.

### 7.5 Dimensions of Flanges

The material, dimensions and drilling of the metallic flanges for use with end pieces shall be in accordance with IS 1536 : 1989.

## 8 WORKMANSHIP

The fittings as fabricated shall have the internal and external surfaces smooth and clean, free from groovings and other defects such as cracks crazings, pinholes, foreign inclusion, etc.

## 9 PERFORMANCE REQUIREMENTS

### 9.1 Vacuum Test

**9.1.1** Fittings when subjected to partial vacuum test as given in **9.1.2** shall not deform or collapse. This test shall be taken as type test.

**9.1.2** Fittings shall be subjected to partial vacuum test for one hour using a vacuum pump or any other device. A vacuum gauge shall be fitted in the fitting. A negative pressure of 500 mm Hg for fittings of class 1 W and 600 mm Hg for class 2 W fittings shall be applied.

### 9.2 Hydrostatic Test

When subjected to internal hydrostatic pressure in accordance with IS 12235 ( Part 8 ) : 1986, the fittings shall not burst during the prescribed duration. The temperature, duration of test and stresses for the test shall conform to the requirements given in Table 2 of IS 12231 : 1987.

## 10 SAMPLING AND CRITERIA FOR CONFORMITY

### 10.1 Lot

In a single consignment, all fittings of the same size, same class and fabricated under essentially similar conditions shall be forguidance grouped together to constitute a lot.

**Table 2 Overall Length, Thickness and Length of Threaded Portion of Threaded Pieces**

( *Clauses* 7.4.2 *and* 9.2 )

| Type of Fitting | Nominal Size | Minimum Overall Length | Minimum Wall Thickness | Minimum Length of Threaded Portion | Remarks |
|---|---|---|---|---|---|
| | mm | mm | mm | mm | |
| (1) | (2) | (3) | (4) | (5) | (6) |
| Male Threaded Piece/Adoptor | 63 | 100 | 3·50 | 31.0 | Sockets as specified in Table 1. |
| | 75 | 120 | 4·20 | 36·0 | |
| | 90 | 140 | 5·00 | 40·0 | |
| | 110 | 170 | 6·10 | 46·0 | |
| | 140 | 200 | 7·70 | 50·0 | |
| Female Threaded Piece/Adoptor | 63 | 105 | 3·50 | 36·0 | do |
| | 75 | 125 | 4·20 | 41·0 | |
| | 90 | 145 | 5·00 | 45·0 | |
| | 110 | 180 | 6·10 | 51·0 | |
| | 140 | 220 | 7·70 | 55·0 | |
| Reducer Male Threaded | 75×63 | 120 | 3·50 | 31·0 | Sockets of higher size and threads of lower size |
| | 90×75 | 140 | 4·20 | 36·0 | |
| | 110×90 | 160 | 5·00 | 40·0 | |
| | 140×110 | 180 | 6·10 | 46.0 | |

**10.2** The conformity of the lot to the requirements of this specification as specified under **6.1.2, 7.1, 7.2, 7.3, 7.4, 8** and **9.2** shall be ascertained for each lot separately. The number of fittings to be sampled from each lot shall depend on the size of the lot and shall be in accordance with col 1 and 2 of Table 3.

**10.2.1** These fittings shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS 4905 : 1968 may be followed.

**10.3 Number of Tests and Criteria for Conformity**

**10.3.1** Each fittings so selected shall be examined for the specified requirements. Any fitting failing in one or more of these rquirements shall be considered as conforming to the requirements of this specification if the number of defective fittings found in the sample does not exceed the corresponding acceptance number A given in col 3 of Table 3.

**10.3.2** The lot rejected according to **10.3.1** may be retested for characteristics for which it has failed. For this purpose, number of fittings to be selected at random from the lot shall be according to col 1 and 2 of Table 3. A fitting failing to satisfy the requirements of these characteristics shall be considered as defective. The lot shall be deemed to satisfy the requirements of this specification if the number of defective socket fittings found in the sample does not exceed the corresponding acceptance number B given in col 4 of Table 3, otherwise the lot shall be rejected.

## 11 MARKING

**11.1** All fittings shall be clearly and indelibly marked or embossed at prominent place with the following:

a) Manufacturer's name or identification Mark,

b) Size and class of fitting.

**11.1.1** Each fitting may also be marked with the Standard Mark.

**Table 3 Scale of Sampling and Permissible Number of Defectives**

( *Clauses* 10.2, 10.3.1 *and* 10.3.2 )

| Number of Fittings in the Lot | Sample Size | Acceptance Number (A) | Acceptance Number (B) |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| Up to 150 | 3 | 0 | 0 |
| 151 to 300 | 5 | 0 | 0 |
| 301 to 500 | 8 | 0 | 0 |
| 501 to 1 000 | 13 | 0 | 0 |
| 1 001 to 3 000 | 20 | 1 | 0 |
| 3 001 to 10 000 | 32 | 2 | 1 |

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