BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS ENGINEERING MANAGEMENT
NEW DELHI

DOCUMENT No.	TB-XXX-316-041	Rev. No.	02		Prepared	Checked	App.
TYPE OF DOC.	STANDARD TECHNICAL SPECIFICATION			NAME	NK	MK	KK
TITLE	PVC PIPE & BENDS			SIGN	Sd/-	Sd/-	Sd/-
				DATE			
				GROUP	TBEM	W.O. No	

CUSTOMER	
CONSULTANT	
PROJECT	RATE CONTRACT

SCOPE AND SPECIFIC TECHNICAL REQUIREMENT

1.0 SCOPE

This technical specification covers design, manufacture, testing at works, packing and dispatch of 'PVC pipe, its fittings and bends'. The material supplied shall fully comply with relevant Indian Standard given below and the product shall be BIS certified. The sizes and types of Pipes shall be as specified below. No Technical Deviations shall be acceptable in this regard.

1.1 SPECIFIC TECHNICAL REQUIREMENT

1.1.1 UPVC Pipe

The UPVC pipes shall be of nominal diameter 50 mm and/ or 110 mm, as per the indent. The pipe shall be of Class-II & Class-IV Grade as per IS 4985: 2000 and shall be of standard length of 6 meters. The pipe shall fully comply with specified standard and carry the BIS certification marking.

1.1.2 Sockets

The sockets shall fully comply with the requirements of IS 7834 (Part-6)-1977.

1.1.3 For Bends

The bends shall be of 45°, 60°, 90° and Tee as specified, for above mentioned pipes. The bends shall, in general, comply with the requirement of IS 10124. The specific requirements and BIS certification marking of these bends shall be as per IS 10124 (Part-9) and IS 10124 (Part-10) respectively.

1.2 BILL OF MATERIAL

As per enclosed Annexure-1.

02	06.09.13				90° Bends added.
01	30.11.10	-SD-	-SD-	-SD-	Document revised.
Rev No.	**Date**	**Altered**	**Checked**	**Approved**	**REVISION DETAILS**

Distribution	**To**	**TBMM**	**OFFICE COPY**
	Copies	1	1

Project: **765/400kV Jeerat SS** **ANNEXURE-1**

Item: **Bill of Quantities for PVC Pipes and Bend**

SN	Description	Unit	Quantity
1	225 MM DIAMETER CLASS-IV PIPES WITH SOCKET ON ONE END	Meter	650
2	90 DEGREE BEND FOR 225 MM DIAMETER CLASS IV PIPE	Nos.	160
3	TEE BENDS FOR 225 MM DIAMETER CLASS IV PIPES	Nos.	30
4	SOCKETS FOR 225 MM DIAMETER CLASS-IV PIPES	Nos.	30
5	90 DEGREE BEND FOR 50 MM DIAMETER CLASS IV PIPE	Nos.	1100
6	TEE BENDS FOR 50 MM DIAMETER CLASS-IV PIPES	Nos.	200

2.2.2 *Dimensions* — The dimensions of 45° bends shall comply with Table 1 read with Fig. 1.

2.2.3 The bends may either be plain at both ends or socketed either at one end or at both ends as agreed to between the manufacturer and the purchaser. In the case of socketed bends, the socket measurements shall comply with IS : 10124 (Part 1)-1988*.

NOTE 1 — For 0·25 MPa pressure class, fabricated bends should not be made from 0·25 MPa pressure class pipes. For this, bends made from 0·4 MPa pressure class pipe should be used.

NOTE 2 — The drawing is only intended to define the terms used in Table 1 and is not intended to illustrate specific design features.

3. MARKING

3.1 Each 45° bend fitting shall be marked with the following information:

a) Manufacturer's name or identification mark,

b) The size of the bend and the appropriate class (working pressure) of IS : 4985-1988* to which the pressure rating of the fitting corresponds,

c) The degree of bend, and

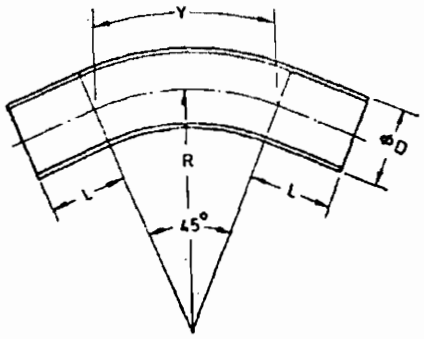

FIG. 1 45° BEND

*Specification for fabricated PVC fittings for potable water supplies: Part 1 General requirements.

*Specification for unplasticized PVC pipes for potable water supplies (*second revision*).

TABLE 1 DIMENSIONS OF 45° BENDS

(*Clauses* 2.2.2 and 2.2.3, and *Fig.* 1)

All dimensions in millimetres.

SIZE	Y* *Min*	L *Min* (Only for plain ends)	R† *Min*	MINIMUM WALL THICKNESS (*t*) FOR WORKING PRESSURE		
				0·4 MPa (Class 2)	0·6 MPa (Class 3)	1·0 MPa (Class 4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
63	149	63	189	1·4	2·0	3·2
75	177	75	225	1·7	2·4	3·8
90	212	90	270	1·9	2·8	4·5
110	259	110	330	2·3	3·4	5·5
125	295	125	375	2·7	3·9	6·3
140	330	140	420	2·9	4·4	7·0
160	377	160	480	3·4	4·9	8·0
180	424	180	540	3·8	5·5	9·0
200	471	200	600	4·2	6·2	10·0
225	530	225	675	4·7	6·9	11·2
250	589	250	750	5·2	7·7	12·5
280	660	280	840	5·8	8·6	13·9
315	742	315	945	6·5	9·7	15·6
355	837	355	1 065	7·3	10·8	17·7
400	842	400	1 200	8·2	12·2	19·8
450	1 060	450	1 350	9·3	13·7	22·4
500	1 178	500	1 500	10·3	15·3	24·8
560	1 319	560	1 680	11·6	17·2	27·8
630	1 484	630	1 890	13·0	19·2	31·3

NOTE — Minimum wall thickness if calculated on the basis of 90 percent of the minimum wall thickness of the corresponding size and pressure class of pipe rounded off to the next higher 0·1 mm.

*Y is calculated from $\frac{45°}{360°} \times 2\pi R$.

†*R, radius of the bend, is equal to 3 times the nominal outside diameter (D).*

2.2.2 *Dimensions* — The dimensions of 90° bends shall comply with Table 1 read with Fig. 1.

2.2.3 The bends may either be plain at both ends or socketed either at one end or at both ends as agreed between the manufacturer and the purchaser. In the case of socketed bend, the socket measurements shall comply with IS : 10124 (Part 1)-1988*.

NOTE — For 0·25 MPa pressure class, fabricated bends should not be made from 0·25 MPa pressure class pipes. For this, bends made from 0·4 MPa pressure class pipe should be used.

NOTE — The drawing is only intended to define the terms used in Table 1 and is not intended to illustrate specific design features.

3. MARKING

3.1 Each 90° bend fitting shall be marked with the following information:

a) Manufacturer's name identification mark,

b) The size of the bend and the appropriate class (working pressure) of IS : 4985-1988* to which the pressure rating of the fitting corresponds,

c) The degree of bend, and

d) The bend shall be marked in colour as indicated below for different classes of fittings:

Class of Fitting	*Colour*
Class 2 (0·4 MPa)	Blue
Class 3 (0·6 MPa)	Green
Class 4 (1·0 MPa)	Yellow

*Specification for fabricated PVC fittings for potable water supplies: Part 1 General requirements (*first revision*).

*Specification for unplasticized PVC pipes for potable water supplies (*second revision*).

TABLE 1 DIMENSIONS OF 90° BENDS

(*Clauses* 2.2.2, 2.2.3 and *Fig.* 1)

All dimensions in millimetres.

SIZE	*Y** *Min*	*L* *Min* (Only for plain ends)	*R*† *Min*	MINIMUM WALL THICKNESS (*t*) FOR WORKING PRESSURE		
				0·4 MPa (Class 2)	0·6 MPa (Class 3)	1·0 MPa (Class 4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
63	297	63	189	1·4	2·0	3·2
75	354	75	225	1·7	2·4	3·8
90	424	90	270	1·9	2·8	4·5
110	519	110	330	2·3	3·4	5·5
125	589	125	375	2·7	3·9	6·3
140	660	140	420	2·9	4·4	7·0
160	754	160	480	3·4	4·9	8·0
180	848	180	540	3·8	5·5	9·0
200	942	200	600	4·2	6·2	10·0
225	1 060	225	675	4·7	6·9	11·2
250	1 178	250	750	5·2	7·7	12·5
280	1 319	280	840	5·8	8·6	13·9
315	1 484	315	945	6·5	9·7	15·6
355	1 673	355	1065	7·3	10·8	17·7
400	1 884	400	1200	8·2	12·2	19·8
450	2 120	450	1350	9·3	13·7	22·4
500	2 355	500	1500	10·3	15·3	24·8
560	2 638	560	1680	11·6	17·2	27·8
630	2 968	630	1890	13·0	19·2	31·8

NOTE — Minimum wall thickness is calculated on the basis of 90 percent of the minimum wall thickness of the corresponding size and pressure class of pipe rounded off to the next higher 0·1 mm.

*Y is calculated from $\frac{90°}{360°} \times 2\pi R$.

†R, radius of the bend, is equal to 3 times the nominal outside diameter (D).