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 PI

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

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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

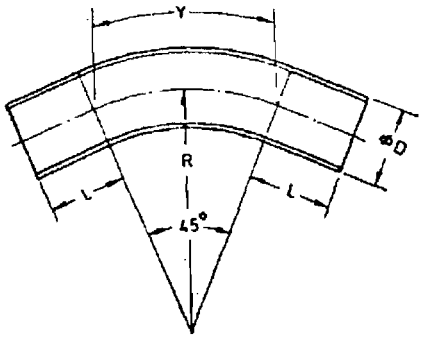

FIG. 1 45° BEND

*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).

SECTION – 3

PROEJCT DETAILS & GENERAL TECHNICAL REQUIREMENT

3.0 FOREWORD

The provisions under this section are intended to supplement general requirements for the materials, equipment's and services covered under other sections.

3.1 PROJECT INFORMATION AND SYSTEM PARAMETERS

a) Customer : M/s Tamil Nadu Transmission Corporation Limited

b) Project Title : 400/230-110 kV Substation at Vellalaviduthi

c) Transport facilities : Road/Rail

Physical and other parameters:

3.1.1 Location of the substation : Vellala viduthi, Pudukottai district

3.1.2 Nearest Railway station : Pudukottai
Railway : Southern Railway

3.1.3 Meteorological data

(i) Maximum ambient temperature	: 50°C
(ii) Minimum ambient temperature	: 20°C
(iii) Maximum daily average ambient air temperature	: 45° C
(iv) Maximum yearly average ambient air temperature	: 32° C
(v) Maximum Humidity (%)	: 100%
(vi) Average thunder storm days per annum	: 50
(vii) Average rainy days per annum	: 90
(viii) Average annual rainfall (mm)	: 1000 mm
(ix) No. of months during which tropical monsoon condition prevail	: 5
(x) Maximum wind pressure	: 150 Kgf/Sqmm
(xi) Altitude above MSL	: 1000M

However for design purpose, ambient temperature should be considered as 50° C and relative humidity as 100%.

MAIN ELECTRICAL PARAMETRS:		
a)	Fault Levels	400kV: 63kA for 1 sec. 230kV: 40kA for 3 sec. 110kV: 40kA for 3 sec.
a)	Creepage Distance	25mm/kV

3.1.4 AUXILIARY POWER SUPPLY :

Auxiliary electrical equipment's, maintenance equipment's etc., shall be suitable for operation on the following supply system.

3 phase AC Supply	415V, 3 phase 4 wire, 50 Hz, neutral grounded AC supply -10% to +10%, Frequency +/- 5%
1 phase AC supply	240V, single phase, 50 Hz, neutral grounded AC supply -10% to +10%, Frequency +/- 5%,
DC supply	220V, 2 wire DC supply + 10% to –15%, Ungrounded 48V, 2 wire DC supply , Positively earthed

3.2 GENERAL REQUIREMENT

3.2.0 ALL THE EQUIPMENTS / MATERIALS TO BE SUPPLIED SHOULD BE IN ACCORDANCE WITH RELEVANT LATEST / AMENDED IS/IEC, WHETHER IT HAS BEEN SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOT.

3.0.1 The bidder shall also furnish drawings for the following:

All EQUIPMENTS and type of clamps, fittings hardwares, insulators, bus bar. These designs/ drawing shall be got approved by the purchaser before commencing the manufacture/ construction/ erection and are to be as per latest IS/ IEC.

3.2.2 GENERAL:

The bidder shall be fully responsible for providing all equipment, materials system and services specified or otherwise which are required to complete the construction and successful commissioning of the substation in all respects.

Any other items not specifically mentioned in the specification but which are required for erection of materials/equipment under the scope of work, testing and commissioning are deemed to be included in the scope of the specification unless specifically excluded.

All items shall be supplied as per schedule and as specified in the relevant Indian standard of latest revision. The Technical specification of the main materials/equipment is furnished. The Technical specification contained herein for the materials are for the guidance of the tenderer.

The bidders are requested to procure the equipment's/materials/component only from reputed /qualified manufacturer as per Technical requirement stipulated in Section-1 of Technical specifications. Approval of make of item shall be taken up by vendor from TANTRANSCO himself.

ANNEXURE
SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Page No.	Clause No.	Deviation	Reason / Justification

Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date: Tenderer's Stamp & Signature

ANNEXURE-TQR

TECHNICAL PRE- QUALIFICATION REQUIREMENT

Name of Customer: TANTRANSCO

Name of Project: 765/400kV Ariyalur S/s

Name of Item: PVC Bends

PI No: 28I2200262 **PI Date:** 16.02.2022

PQR Sr. No	PQR Description	Supporting Document to be attached
1.	The Bidder should have supplied 50mm dia or higher size PVC Pipe/Bends in the last five years from originally scheduled date of technical bid opening of this tender.	a) Copy of Purchase Orders. b) Proof of dispatch like LR / MDCC / DI etc.

Prepared & Checked By: M. Vijay Kumar 16/2/22 **M Vijay Kumar** **(Sr. Manager-TBEM)**	**Approved By:** Sanjay 16/02/22. **S K Shukla** **(Sr. DGM-TBEM)**