WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED
(A Govt. of West Bengal Enterprise)

Office of the Chief Engineer,
Procurement & Contracts Department
Vidyut Bhavan, 4th. floor,
Bidhannagar, Kolkata – 700091

Technical Specification

for

1.1 KV Copper Control Cable

TENDER NO. P-13/2016-17/PC-III

TECHNICAL SPECIFICATION FOR 1.1 KV GRADE COPPER CONTROL CABLE

1.00	SCOPE :
	The specification cover the design, manufacture, at manufacturer's works, supply and delivery of 1.1 KV grade PVC insulated armoured stranded Copper Control Cables for use in different 33/11 KV Sub-Stations of West Bengal State Electricity Distribution Company Limited in the State of west Bengal .
2.00	GENERAL INFORMATIONS :
	The Control Cables are required for the control, protection, instrumentation, auxiliary Power Supply.
	Each tender must be accompanied by full information required in the bidding schedule together with pertinent manufacturer's literatures, drawings, instruction manuals to enable the purchaser to make an appraisal of the quality and suitability of the materials offered. Failure to comply with the provision may be sufficient reasons to reject the bid.
3.00	STANDARDS AND REGULATIONS :
	All materials shall comply by this specification shall comply with the applicable provisions of the latest edition of Indian Standards, Indian Electricity Rules, Indian Electricity Act and other applicable statutory provisions, rules and regulations.
	The following standards with latest amendment would apply to the specification.
	1. IS-1554 (Part-I) – PVC insulated (heavy duty) electric cables.
	2. IS-8130-Conductors for insulated electric Cables and flexible cord.
	3. IS-3961 (Part-II)- Recommended current ratings for PVC insulated and PVC sheathed heavy duty Cables.
	4. IS-5831-PVC insulated and sheath of Electric Cable.
	5. IS:3975-Mild steel wires, formed wires and tapes for armoring of cables. 6. IS: 10810- Methods of test for cables . 7. IS: 10418- Cable drums for electric cables.
4.00	CLIMATIC AND ISOCERAUNIC CONDITIONS :
4.10	The climatic conditions at site under which the material shall operate satisfactory are as follows :

a)	Maximum ambient temperature (^{0}C)	:	50
b)	Minimum ambient temperature (^{0}C)	:	4
c)	Maximum Yearly average ambient temperature (^{0}C)	:	32
d)	Maximum relative humidity (%)	:	100
e)	Average number of thunderstorm days per annum	:	100
f)	Average annual rainfall (Cm)	:	200
g)	Maximum wind pressure (Kg/M^2)	:	150
h)	Earthquake acceleration (g)	:	0.04 x 2 g
i)	Height above Sea Level (m)	:	Not exceeding 1000

4.20	The material offered shall be suitable for continuous operation at the full rated capacity under the above conditions.
5.00	DESIGN CRITERIA / Technical Requirements :
	The Cables will be used for control protection and instrumentation, auxiliary Power Supply connections of the various equipment and various applications in substation etc. All such purposes PVC insulated armoured control cable of minimum 2.5 sq.mm with stranded copper conductor shall be used .
5.10	The Cable will be laid in ground or on ladder type trays or drawn in conduit in a hot, humid and tropical atmosphere. The trays may be over head, suspended or run in concrete trenches with removable covers. The tenderer shall indicate clearly the de rating factor for the above conditions.
5.11	The maximum conductor temperature for various classes and type of cables shall be limited to safe value as per applicable I.S. Cables shall be marked with ISI Certification Mark, if any.
5.12	The material of PVC insulated copper conductor shall be made from high conductivity copper rods complying IS: 613-1964 and its amendments. The conductors shall consist of Stranded Electrolyte annealed bare Copper Confirming to Class-2 of IS:8130-1984 & its amendments
5.13	Wire before stranding shall be approximately circular in cross-section. Smooth, uniform in quality and free from scale, spills and other defects.

5.14	Cores shall be identified as per IS:1554(Part-I) for the cable up to 5C and cable with more than 5C, the identification of cores shall be by printing legible Hindu Arabic Numerals on all cores as per clause no .10.3 of IS:1554(Part-I) and its amendments.
5.15	The Normal Current rating of all PVC insulated cables shall be as per IS: 3961 and its amendments.
5.16	Cable shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating condition.
5.17	The 1100V grade control cable shall be FRLS Type ST-2 Category C-2 conforming to IS: 1554(Part-I) and its amendments.
5.18	Progressive sequential embossing of the length of cable in metre at every one metre shall be provided on the outer sheath of all cable with marking “WBSEDCL”.
5.19	Repaired cables shall not be accepted.
5.20	ARMOURING
5.20	Armouring shall be applied over the insulation over the inner sheath for the multi core cables. The armouring shall be galvanized round steel wires and its nominal diameter shall conform to clause no. 13.3 of IS: 1554(Part-I) and its amendment.
5.30	Insulation:
	The Insulation of sheath shall consists of a compound based on Polyvinyl Chloride (PVC).
5.40	Outer Sheath :
	The Outer sheath shall be applied by extrusion. The Outer sheath shall be FRLS Type ST-2 Category C-2 conforming to IS: 5831 and its latest amenment.
5.41	Outer sheath shall be fire Retardant Low Smoke (FRLS) type, FRLS Type ST-2 Category C-2 to IS: 1554(Part-I) and its amendments.
5.42	Minimum thickness of PVC outer sheath ,standard colour and tolerance on thickness of armoured cables shall be as per clause no.14.4.2 of IS: 1554(Part-I) and its amendments.
5.43	The cable shall have outer sheath of a material with an oxygen index of not less than 29 and a temperature index of not less than 250deg. Centigrate with smoke density 40% and halogen density 20%.
5.44	All cables shall pass fire resistance /heat resistance test as per IS: 1554(Part-I).

5.50	INNER SHEATH : For multi core armoured cables,the inner sheath shall be extruded PVC. The filler and inner sheath for common covering shall be non-hygroscopic, fire retardant (FR) material and shall be softer than insulation. The thickness of inner sheath shall be as per clause no. 12.3 of IS: 1554 (Part-I) and its amendments and suitable for operating temperature of cables.

6.00	SPECIFIC DESIGN REQUIREMENTS :

6.10	1100 Volts Grade Heat Resisting (HR) Copper Cables suitable for use where the combination of ambient temperature and temperature rise due to load results in conductor temperature not exceeding 85 deg.C under normal continuous operation and 160 deg.C under short-circuit condition with stranded annealed copper conductor, HR PVC insulated, HR extruded PVC inner sheathed, round galvanized steel wire armoured (for multicore cable only) and overall sheath shall be FRLS Type ST-2 Category C-2 generally conform to latest revision of IS:1554 (Part-I) and its latest amendments. The cores shall be colour coded as per I.S. for easy identification.
6.11	CURRENT RATING :
	The Cables will have current rating derating factors for an ambient temperature of 45 deg.C and ground cable is required to be taken into consideration. The current ratings shall be based on the maximum temperature 85 deg.C for continuous operation at the rated current.

6.12	OPERATION :
	Cables shall be capable of satisfactory operation under Power Supply System frequency variation of ± 5% and voltage variation of ± 10%.
7.00	PACKING AND MARKING :
7.10	The Cables shall be wound on a drum (Ref. IS : 10418-1972 and its amendments) of suitable size and packed . The ends of cable shall be sealed by means of non-hygroscopic sealing material. The Cables shall be packed in non-returnable wooden drums. The wooden drums should be bearing distinguishing number with following information duly stenciled on the outer side of one flange.
	1. Name of the Manufacturer. 2. Reference Indian Standard of Cable. 3. Normal sectional area of the Conductor of the Cable. 4. Number of Cores. 5. Type of Cable & Voltage for which it is suitable. 6. Length of Cable in this drum. 7. Number of lengths on drum(if more than one) 8. Direction of rotation of Drum (by means of arrow). 9. Gross Weight. 10. Colour code (in case of single core cable). 11. Purchase Order No. & Date. 12. Year of Manufacture. 13. Property of WBSEDCL. 14. Date of Delivery.
8.00	DRUM AND DRUM LENGTH OF CABLES :
8.10	Drums shall be proofed against attack by white ant and termite, Conforming to IS -10418-1982. A layer of water proof paper shall be applied to the surface of drum and over the outer most cable layer.
8.11	The Cables shall be supplied in Drum lengths of 500 Mtr. which shall be subject to tolerance of not more than (+/-)5%.WBSEDCL HAVE THE OPTION OF REJECTING CABLES DRUMS WITH SHORTER LENGTH. However, the total quantity of cables after taking in to consideration of all cable drums of each size shall be within the tolerance of (+/-) 2%. The no. of drums and the drum length shall be finalized by the purchaser at time of placement of order.
8.12	Embossing on the outer sheath of the Cable with marking “WBSEDCL” and length of the Cable in meters at suitable intermittent distance , preferably 1 Mtr. should be done.
9.00	DRAWING DATA & MANUAL:
	The following information shall be furnished in triplicate along with the tenders :
	(a) Manufacturer’s leaflets giving construction details, dimensions and characteristics of different Cables.
	(b) Current rating of cables including derating factor due to grouping, ambient temperature and Type of various installations.
	(c) Write up sketch illustrating the manufacturer’s recommendation for spliting, jointing and termination of different type of cables.
	d) List of customers to whom the cable for similar rating have been supplied.
10.00	TESTS :
10.10	Routine Tests in accordance with the provision of relevant standard specification shall be carried out for each drum of finished cable lengths.
	Type tests and acceptance tests on the samples taken on random basis from the lot of cables offered for inspection shall have to be carried out as per relevant Indian Standard Specification to prove the general qualities and design of a given type of cable and for the purpose of acceptance of the lot.

10.11	TYPE TEST REPORTS for the type tests conducted in accordance with IS:1554 (Part-I) with latest amendment for similar type of Cables (as per Tender Specification) : Type Test Report for the type tests conducted in accordance with IS:1554 (Part-I) with latest amendment and other relevant IS/IEC with latest amendment within last 5 years from the due date of Opening of Tender on identical Cables having same voltage grade, same design, same conductor material & size (as per Tender Specification) from CPRI/ NABL accredited Test House or Laboratory are to be submitted along with the tender otherwise tender may be rejected. The Certificates of the NABL accredited Test House or Laboratory should bear the Logo of NABL accreditation.
10.12	WITNESSING OF TESTS :
	The tabulation for each test result shall contain corresponding I.S. specified limiting figures to facilitate checking of test Results. Six (6) copies of type tests certificate lot-wise for each type of cables should be sent to the purchaser for acceptance. Type Test Certificate for each lot and routine test certificate for each drum of cables shall be submitted to the Purchaser for approval before despatch of cables from the Works. The test certificates shall be completed with all results.
11.00	TECHNICAL GUARANTEED PARTICULARS :
11.10	Technical characteristics shall be guaranteed by the bidder. Technical guaranteed particulars shall be furnished in triplicate as per format annexed herewith along with other relevant particulars with the tenders. In case of failure of materials to meet the guarantee, WBSEDCL shall have right to reject the material.
12.00	List of testing equipment/instruments made available at the manufacturer's premises is to be submitted along with tender paper.

GUARANTEED TECHNICAL PARTICULARS FOR 1.1 KV COPPER CONTROL CABLE

Detailed GTP in tabular form as per spec.

NAME OF MANUFACTURER		M/s. ----------		
Cable Size:		4 Core 2.5 sq. mm.	8 Core 2.5 sq. mm.	12 Core 2.5 sq. mm.
1	Rated Voltage	1.1K V		
2	Standard Referred	IS: 1554 (Part-I)/1988 up to latest amendment		
3	Conductor			
	i) Material	Stranded Electrolyte annealed bare Copper Confirming to Class-2 of IS:8130-1984 & its amendments		
	ii) Nominal Area of Cross-section (sq. mm)	2.5		
	iii) Total no. of Conductor/ Core	7		
	iv) Shape of conductor	Circular		
4	Insulation			
	i) Material	HR PVC Type C as per IS: 5831-1984 & its amendments		
	ii) Nom. Thickness (mm)	As per IS: 1554 (Part-I) :1984 and its amendments		
	iii) Suitable by with regard to temperature, moisture, acid, oil and alkaline surrounding	Yes		
5	Inner sheath			
	i) Material	FR PVC Category C-1 PVC Type ST-2, as per IS:5831-1988 & its latest amendments		
	ii) Minimum thickness of sheath (mm)	0.30 mm		
6	Armouring			
	a) Material & Type	Galvanized Steel rounded Wire		
	b) Nom. dia of armour wires in mm	1.40	1.40	1.6
7	Outer sheath			
	i) Material	FRLS Black Type ST-2		
	ii) Minimum thickness of sheath (mm)	1.24	1.40	1.40
8	Approx. overall dia of cable(in mm)	16.00	20.00	22.50
9	Method of core identification	4C - Red, Yellow, Blue, Black 8C & 12C – All Grey with numbering		
10	Electrical Properties :-			
	i) Maximum D.C. resistance of conductor at 20° C (Ohm/Km)	7.41 as per IS:8130 (Part-I): 1984 to comply with FRLS property		
	ii) Maximum permissible conductor temperature(°C) under full load	85		
	iii) Rated voltage (KV)	1.1		
	iv) Maximum operating voltage	10% Higher than the Rated Voltage		
	v) Permissible voltage variation	±10%		
	vi) Rated frequency	50Hz		
	vii) Permitted frequency variation	±5%		
	viii) Minimum voltage resistivity at 27°C/ 85 °C (Ohm/Cm)	1×10^{13} /1×10^{1}° ohm.cm		