



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION
2 X 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT
COAL HANDLING & ASH HANDLING PLANT

TECHNICAL ENQUIRY SPECIFICATION
FOR CONTROL CABLE

BHARAT HEAVY ELECTRICALS LIMITED
INDUSTRIAL SYSTEMS GROUP BANGALORE

NOTE:

1. Bidder to note that the acceptance of the offer is subjected to the "Bidder approval from our customer- TANGEDCO/ Consultant".
2. In case Bidder is not an approved supplier of M/s TANGEDCO for 2X660MW Ennore STPP, Bidder has to submit the credentials properly indexed, for seeking approval of customer. The list of required credentials will be informed at the time of technical scrutiny of offer. In case customer does not approve the credentials of the bidder, the bidder will be technically rejected.

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Name	Signature	Name	Signature	Name	Signature
Designation	Sr. Engineer	Designation	Dy. Manager	Designation	Sr. Manager
Prepared by		Checked by		Approved by	



TECHNICAL ENQUIRY SPECIFICATION FOR CONTROL CABLE

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**SECTION-I
GENERAL SITE INFORMATION**

A. Project Information & Location

Project Title	Ennore SEZ project of 2 x 660 MW Coal Based Super Critical Thermal Power Project at ash dyke of NCTPS
Plant capacity	1320 MW (2 units of 660 MW each)
Type of project	Green field
Owner	Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)
Consultant	DESEIN
Plant site location	Ash dyke of North Chennai Thermal Power Station (NCTPS)
Location co-ordinates	Latitude : 13°17' N to 13°18' N Longitude : 80°18' E to 80°19' E
Nearest Village	Vayalur
Nearest Town & City	Chennai (35 Km)

B. Meteorological Condition

Climate	Tropical, very dry and hot summer, dry and cold winter and good rain-fall in monsoon accompanied with strong wind
Site Elevation	(+) 10.0 Meter above Mean Sea Level
Ambient Temperature	
a) Annual Maximum Mean Temperature	32°C
b) Annual Minimum Mean Temperature	24°C
c) Design ambient temperature	35°C
Relative Humidity	
a) Maximum	100%
b) Minimum	36%
c) Design	75%
Annual Rainfall	
Maximum	2540 mm
Average	1600 mm
Minimum	1175 mm
Prevailing Wind Direction	November to January – From NW & NE February to March – From East & SE April to May – From South & SE June – From SW July to August – From NW September to October – From SE & SW
Wind Speed	11.8 kmph (Avg), 50m/s max)
Seismic zone	Zone: III as defined in IS:1893-2002
Design ambient temperature (For Electrical equipments)	Air: 50°C Ground: 30°C



C. POWER SUPPLY SYSTEM

LT power supply	
i) Voltage	415 V AC 3 Ph, 4 Wire 50 Hz
ii) Voltage variation	±10%
iii) Frequency variation	+3% to - 5%
iv) Combined Voltage & Frequency Variation	10% (absolute sum)
v) Fault level	50kA RMS for 1 second
vi) Earthing	Solidly grounded

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**SECTION-II
APPLICABLE STANDARDS**

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS: codes, standards, IEC etc.) referred to herein, the former shall prevail. All the cables shall conform to the requirements of the following standards and codes:

IS :1554 - I	PVC insulated (heavy duty) electric cables for working voltages upto and including 1100V.
IS : 3961	Recommended current ratings for cables
IS : 3975	Low Carbon Galvanized steel wires, formed wires and tapes for armouring of cables.
IS : 4905	Methods for random sampling.
IS : 5831	PVC insulation and sheath of electrical cables.
IS : 8130	Conductors for insulated electrical cables and flexible cords.
IS : 10418	Specification for drums for electric cables.
IS : 10810	Methods of tests for cables.
ASTM-D -2843	Standard test method for density of smoke from the burning or decomposition of plastics.
ASTM-D-2863	Standard method for measuring the minimum oxygen concentration to support candle like combustion of plastics.
IEC-754 (Part-I)	Test on gases evolved during combustion of electric cables.
IEEE-383	Standard for type test of Class IE Electric Cables.
IEC -332	Tests on Electric cables under fire conditions. Part-3 : Tests on bunched wires or cables (category -B)
SS-4241475 classF3	Swedish Chimney test
NES-715-1	Temperature index

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**SECTION-III
SCOPE OF SUPPLY**

Cables – Design Criteria

1. This specification covers the Design, Manufacture, Inspection and Testing at Bidder's works, proper packing and delivery to site of CONTROL CABLES.
2. Except where specified otherwise all materials, cables and construction shall conform to the Indian Electricity Act and Rules and the Indian and other international standards with latest revisions and amendments issued up to date.
3. All materials shall be new and of tested quality conforming to applicable National and Manufacturer's Standards and Indian Electricity Rules.
4. All materials shall be transportable to and suitable for installation at site with ease and without any damage. It shall give continuous reliable operation over long period under worst specified site conditions.
5. All materials shall be designed to withstand extremes of all magnetic, electrical, mechanical and thermal stresses which may be encountered during normal and abnormal operating conditions.
6. Cables shall be so designed and manufactured that damage does not occur in handling, during transit, storage, installation and operation under any or all the climatic and operating conditions which they may be subjected to.
7. Cables shall be suitable for laying in conduits, ducts, trenches, trays, racks or for direct burial in ground in both and wet locations
8. Cables shall be capable of operating satisfactorily under the power supply voltage and frequency variations as specified in the specification. Current ratings and ratings factors of cables shall not be worse than the ones specified in IS: 3961
9. Performance characteristics of cables shall be based on the following conditions of laying:
 - 9.1 All cables shall be laid in multilayer and touching each other.
 - 9.2 Cables shall be suitable for laying in duct or burying in ground upto a depth of 1.5 meters with uncontrolled back fill and chances of flooding by water.
10. The control cables shall function without breakdown for surges experienced in the control system.

It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.

BILL OF QUANTITY: The bidder to quote for items as per '**BOQ-cum-Unpriced format**' (Annexure-c)



SECTION IV TECHNICAL SPECIFICATION

SL.NO.	ITEM	TECHNICAL PARTICULARS
1	Voltage Grade	1.1 KV
2	CONDUCTOR	
(a)	Material	multi core Stranded copper conductor
(b)	Size	1.5 & 2.5 sq.mm cross section
3	INSULATION	
(a)	Material	Extruded HRPVC Type – C
(b)	Standard Applicable	IS 5831
(c)	Maximum continuous operating temperature under normal operation	85 deg C
(d)	Maximum continuous operating temperature under short circuit condition	160 deg C
4	CORE IDENTIFICATION	Cores of the cables shall be identified by colouring of insulation. Following colour scheme shall be adopted: 1 core - Red, Black, Yellow or Blue 2 core - Red & Black 3 core - Red, Yellow & Blue 4 core - Red, Yellow, Blue and Black
5	INNER SHEATH	
(a)	Material	Extruded FRLS HRPVC Type - ST2
(b)	Standard Applicable	IS: 5831
(c)	Fillers	Acceptable. It shall not stick to insulation and inner sheath
6	ARMOUR	
(a)	Applicable	YES
(b)	Material	Galvanised Steel Round wire as per IS : 3975
7	OUTERSHEATH	
(a)	Material conforming standard/type	Extruded FRLS HRPVC Type - ST2 as per IS 5831
(b)	Colour	Black
(c)	Marking	Cable identification shall be provided by embossing on every meter on the outer sheath the following: a) Owner's Name: TANGEDCO b) Bidder's name or trademark c) Voltage grade d) Year of manufacture, Type of cable e) Type of insulation and sheath as applicable. Word 'FRLS' at every 5 metre – To be embossed f) No. of core and size of cables (cross section area of conductor) g) IS number & ISI Mark h) Sequential marking of length of the cable in metres at every 1m throughout the length of the cable. To be embossed / printed. The embossing / printing shall be progressive, automatic, in line and marking shall be legible and indelible.
8	FR-LS CHARACTERISTICS	
(a)	Oxygen index	Min. 29 (As per IS 1554 part-1)

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(b)	Acid gas emission test	Max. 20% by weight (As per IEC-60754-1)
(c)	Smoke density rating	Max. 60% (As per ASTM D 2843)
9	Outer most cable layer	Should have water proof cover
10	Both the ends of the cables	Properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection
11	TOLERANCE ON OUTER DIAMETER	(±)2 mm maximum over the declared value
12	CABLE DRUMS (PACKING)	
(a)	Type of Drum	Non returnable wooden drums
(b)	Standard applicable	IS: 10418.
(c)	Surface of drum	Should have water proof cover
(d)	Wood preservative anti-termite treatment	Yes
(e)	Length per drum tolerance	Max +/- 5% of the standard drum length & +/-2% in overall length. Employer shall have the option of rejecting cable drums with shorter lengths
(f)	Marking on drum	Each drum shall carry a) Bidder's name or trademark b) Owner's name: TANGEDCO c) Address and contract number d) BHEL-ISG e) Type of cable & voltage grade f) Year of manufacture g) Type of insulation / sheath as applicable h) No. of core and size of cables i) Cable code j) Length of cable on drum k) No. of length on drum, if more than one l) Direction of rotation, by arrow m) IS number & ISI Mark n) Approx. gross mass The above information should be stenciled on both side of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

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SECTION V QUALITY ASSURANCE, INSPECTION & TESTING

A. QUALITY ASSURANCE REQUIREMENTS:

- a) QAP (Manufacturing Quality Plan) shall be submitted for customer (owner) approval. Any test not listed below but required as per latest standards shall be done without any price implication to BHEL.
- b) In these approved Quality Plans, Owner shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the Owner's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Owner in writing.
- (c) Necessary accommodation & local travel shall be arranged free of cost for the TANGEDCO inspecting officers by the bidder during inspection, testing at the premises.

B. TYPE/ ACCEPTANCE/ ROUTINE TEST REQUIREMENTS

GENERAL POINTS:

- a) An indicative list of **TESTS** is given in the table below. This list of tests is not exhaustive and owner may ask for submission of test report of any other test as per standards.
- b) During the manufacture of cables, bidder's standard tests shall be performed and record / test report shall be made available to purchaser's representative during inspection / testing.
- c) After completion of manufacture of cables, type, routine and acceptance tests shall be performed strictly as per relevant IS & other applicable standards amended up to date. Charges for these shall be deemed to be included in the equipment price

TYPE TEST:

- a) All equipments to be supplied shall be of type tested design. The bidder shall submit the type tests reports for the tests conducted on the cables similar to all the cables (as mentioned in the BOQ) to be supplied under this contract and the test(s) should have been conducted at an independent laboratory not earlier than five (5) years prior to supply under this contract.
- b) In case the bidder is not able to submit valid report of the type test(s) or in case type test report(s) are not found to be meeting the specification requirements, or not including all specified tests the bidder shall conduct all such tests under this contract. The cost of such test shall be deemed to be included in the price & such tests needs be done within the delivery period. The owner shall have right to witness the type tests. Waiver of type tests will not be entertained in normal circumstances.
- c) Even if the supplier furnishes valid test reports, owner may get some type test conducted under this contract as specified in the table below for bidder shall include in his total equipment price the cost of carrying out all such type tests.
- d) In case, facilities of any of the type tests are not available at the works of the supplier, then such type tests shall be carried out by the supplier at independent recognized Govt. approved laboratory at the cost of supplier.
- e) Type tests to be conducted & witnessed on one size of cable for every lot & type of cable (Cu/Al conductor)
- f) Tests for which "T" is indicated in the table below shall be conducted as Type Test.

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ACCEPTANCE TEST:

a) Acceptance tests shall be carried out on each type and size of the cables on the cable drums selected at random as per following sampling plan:

S. No.	No. of drums in the lot	No. of drums to be taken as sample
1.	Upto 100	10% (Subject to minimum of 1 drum)
2.	101 to 300	13
3.	301 to 500	20
4.	Above 500	32

b) Tests for which “A” is indicated in the table below shall be conducted as Acceptance Test.

ROUTINE TEST:

a) Routine tests shall be carried out as per relevant standard for each drum of cables of all types and sizes.

b) Tests for which “R” is indicated in the table below shall be conducted as Routine Test.

SL.NO.	TEST	TYPE/ ACCEPTANCE/ ROUTINE TEST	APPLICABLE FOR	REMARKS
1	For Conductor			
a)	Annealing test	T, A	For copper conductor only.	
b)	Tensile test	T,A	For aluminium conductor only.	
c)	Wrapping test	T,A	For aluminium conductor only.	
d)	Resistance test	T,A, R	For copper/ aluminium conductor	
2	For Armour Wires/ Formed Wires			
a)	Measurement of Dimensions	T,A		
b)	Tensile Test	T,A		
c)	Elongation test	T,A		
d)	Torsion test	T,A	For round wires only	
e)	Winding test	T,A	For Formed wires only	
f)	Resistivity	T,A		
g(1)	Mass of Zinc Coating test	T,A	For G.S. Formed wires /wires only.	
g(2)	Uniformity of zinc coating	T,A	For GS Formed wires /wires only	
3	For PVC insulation & PVC Sheath			
a)	Test for thickness	T,A		
b)	Tensile strength & elongation tests before ageing and after ageing	T,A		
c)	Ageing in air oven	T,A		
d)	Loss of mass in air oven	T,A	For PVC sheath only	
e)	Hot deformation test	T,A	For PVC sheath only	
f)	Heat shock test	T,A	For PVC sheath only	



g)	Shrinkage test	T,A		
h)	Thermal stability test	T,A	For PVC sheath only	
	Improved Fire performance (FR-LSH) Tests			
a)	Oxygen index test	T, A	For outer sheath only	
b)	Smoke density test	T, A	For outer sheath only	
c)	Acid gas generation test	T, A	For outer sheath only	
d)	Flame retardance test on single cable	T, A		
e)	Flame retardance test on bunched cables	T		
f)	Test for halogen acid gas evolution	T, A		
g)	Test for specific optical density of smoke	A		
4	For completed cables			
a)	Insulation resistance test	T,A		
b)	High voltage test (Water immersion test)	T		
c)	High voltage test at room temperature	T, A, R		
d)	Test for Rodent and termite repulsion properties	A		

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**SECTION-VI
TECHNICAL DOCUMENTATION REQUIREMENT**

A. Documents to be submitted during event of order

- a) Manufacturer's catalogues giving cable construction details and characteristics.
- b) Cross sectional drawing of cable.
- c) Cable current ratings for different types of installation, inclusive of derating factors for ambient temperature, grouping etc.
- d) Write-up on Manufacturer's recommended method of splicing, jointing, termination, etc. of the cables.
- e) Type test reports
- f) Filled-up proposal particulars

B. The following documentation shall be supplied to BHEL at different stages of the Project.

Sl. No.	TYPE OF DOCUMENTS	No.of Hard/Soft Copies (for each document)	Submission Schedule	STATUS
1.	GTP & QAP (As per Annexure-a & b) catalogues, installation details, Type test procedures	PDF files+ 2 Hard Copies of each document (For each submission)	Within 1 Week from the date of LOI	For Approval
2.	GTP & QAP (As per Annexure-a & b) catalogues, installation details, Type test procedures	8 Hard copies+3 CD ROMs	After final approval	For Distribution
3.	Type test certificates	PDF files+ 2 Hard Copies of each document	Within a week from the date of conduction of Type Test	For Approval
4.	Routine & Acceptance Test Certificate	4 Hard Copies of each document	Immediately after testing	For Approval
5.	Storage, preservation, erection, operation & maintenance and safety instructions	4 Hard copies+2 CD ROMs	With dispatch documents	For Information
6.	QA Documentation for eg. Final type, acceptance, routine test certificates, etc	1 Hard copy	Before despatch	For Information
7.	QA Documentation for eg. Final type, acceptance, routine test certificates, etc	2 Hard copies+2 CD ROMs	Within 3 weeks from the date of despatch	For Distribution
8.	As built drawings	6 Hard copies+6 CD ROMs	Within 1 week from final inspection and acceptance	For Distribution

NOTE:

1. Test Certificates shall be strictly in A4 size. All documents/text information shall be in PDF.
2. Test certificates shall have all the information as per IS & all documents are required to be in English.
3. Test Certificates shall be marked "Certified" and shall be signed by competent authority from supplier side.

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4. The list of Technical particulars in GTP (Annexure-a) is indicative. Any Technical particular not listed but required as per specification & standard should be added in the GTP.

5. All documents shall show the following particulars in the title block :-

Name of the customer :

Project title :

Equipment number. :

Suppliers reference number :

Number of sheets :

Revision number :

Date :

7. Revised documents incorporating customer comments shall be re-submitted within 4 days for approval. All documents shall be neatly printed in font size not less than 12(twelve) and legible. Photo copies shall be clean prints. Delay in submission of documents and submission of revised documents shall be considered as delay and subject to delay calculation for LD purpose.

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SECTION-VII
INFORMATION TO BE FURNISHED ALONG WITH OFFER

S.NO	DESCRIPTION
1	Duly signed and stamped copy of BOQ cum Unpriced format (as per Annexure-c) mentioning the prices are “ Quoted ”
2	Duly Signed and stamped copy of “ Deviation Sheet “ by mentioning “ NO DEVIATION “ in the Technical Column
3	Signed and stamped copy of complete enquiry specifications (From Sheet No. 01 to 20).

Notes:

1. M/s BHEL shall not entertain any technical clarification after submitting the offer. Technical clarification (if any) pertaining to the Technical Specification must be obtained from M/s BHEL by the vendor before submitting the offer. Once the offer is received from the vendor it is deemed as offer is in line with the technical requirement.
2. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.



ANNEXURE – (a) GUARANTEED TECHNICAL PARTICULARS (TO BE SUBMITTED BY SUCCESSFUL BIDDER)

SL.NO.	ITEM	UNIT	SIZE OF CABLE
1	General		
1.1	Name of the Contractor		
1.2	Place & Country of manufacturer		
1.3	a. Applicable specifications and standards		
	b. Whether cable will carry ISI mark		
1.4	a. Cable type		
	b. Voltage grade of cable		
	c. Voltage designation of cable	(U0/U)	
	d. No. of cores x cross sectional area of conductor	sq.mm	
1.5	Suitable for earthed/unearthed system		
1.6	Permissible voltage and frequency variation for satisfactory operation		
	a. Voltage		
	b. Frequency		
	c. Voltage and Frequency combined		
1.7	Continuous current rating with single cable laid in air in an ambient temperature of 50 °C and for maximum conductor temperature of 85 °C for HRPVC/20 for FS (For single core cables, the continuous current rating shall be furnished both for armour earthed at one end and for armour earthed at both ends)		
1.8	Permissible conductor temp. corresponding to maximum continuous current	(°C)	
1.9	Maximum permissible conductor temp. for emergency Overloading	(°C)	
2	Derating factors for the following shall be furnished		
2.1	a. Variation in ambient air temp. (for cables laid in air from 30 °C to 55 °C in steps of 5 °C)		
	b. Variation in ambient air temp. (for cables laid direct in ground from 25 °C to 50 °C in steps of 5 °C)		
	c. Grouping		
3	Derating factors		
	Furnish chart showing derating factors for different spacing of cables in horizontal formation in single row and in trefoil formation (for single core cables) as well as in different tiers under the following methods of laying:		
	a. Cable laid in concrete cable trenches with removable covers		
	b. Cables laid in ground		
	c. Cables laid in air		

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	d. Cables laid in pipes or ducts		
	e. Variation in depth of laying for cables laid directly in ground		
	f. Variation in thermal resistivity of soil of cables laid directly in ground in range 600 mm to 1500	mm.	
4	Short circuit capacity		
	a. Short circuit Amp. (rms)	kA	
	b. Duration of short circuit	sec	
	c. Conductor temp. allowed for the short circuit duty (DC)	(°C)	
	d. Formula relating short circuit and duration	rms, sec respectively	
5	Conductor		
5.1	Material of conductor (if copper state whether tinned/untinned)		
5.2	Material of conductor conforms to (state standard)		
5.3	Grade		
5.4	Nominal cross sectional area		
5.5	Number and diameter of wires		
5.6	Shape of conductor		
5.7	Maximum conductor resistance (DC) at 20 (°C)	Ohms/km	
5.8	Shielding on conductor / heat barrier type (whichever is applicable)		
	a. Material		
	b. Type / applicable standard		
	c. Thickness		
6	Insulation		
6.1	Composition of insulation		
6.2	Material of insulation conforms to (State std & type & grade)		
6.3	Nominal thickness of insulation	mm	
6.4	Tolerance on thickness		
6.5	Minimum insulation resistance at 20 (°C)	megaohms/km	
6.6	Minimum volume resistivity for HRPVC insulation at		
	a. 27 (°C)		
	b. 85 (°C)		
6.7	Minimum tensile strength	N/sq.mm	
6.8	Minimum elongation percentage at rupture		
7	Shielding on insulation/ binder tape (as applicable)		
	a. Material		
	b. Type/Applicable standard		
	c. Thickness	mm	
8	Colour scheme for identification of cores: Furnish details		
9	Details and type of filters used in interstices should be specified		



10	Inner sheath		
10.1	Material		
10.2	Extruded/wrapped	Yes/No	
10.3	Calculated diameter over laid up cores		
10.4	Material of inner sheath conforms to standard/type		
10.5	Calculated diameter over laid up cores	mm	
10.6	Thickness (min)	mm	
10.7	Diameter of cable over inner sheath	mm	
10.8	Colour of inner sheath		
10.9	Whether inner sheath will be of FRLS/FS Material and meet special tests as per specification For FRLS/FS cables		
11	Armour		
11.1	Type and material of armour		
11.2	Material of armouring conforms to standard		
11.3	Calculated diameter of cable over inner sheath (or even insulation for single core cables)	mm	
11.4	Size of armour wire/strip	mm	
11.5	Number of armour wires/strips		
12	Outer sheath		
12.1	a. Material		
	b. Material conforming standard/type		
	c. Method of application		
12.2	Calculated diameter under the sheath (over armour)	mm	
12.3	Min. thickness of sheath	mm	
12.4	Tolerance on thickness of sheath	mm	
12.5	Min. tensile strength	N/sq.mm	
12.6	Min. elongation percentage at rupture		
12.7	Colour of outer sheath		
12.8	Whether outer sheath will be of FRLS/FS Material and meet special tests as per specification	Yes/No	
13	a. Overall diameter of cable	mm	
	b. Tolerance on O.D		
14	a. Weight of cable for 1000 metres (without drum)	kg	
	b. Bending radius		
15	Cable constants		
15.1	DC resistance of conductor at twenty (20) per 1000 m Degrees centigrade	ohm ohm/km	
15.2	Approx.AC resistance of conductor at 85 Degrees centigrade	ohm/km	
15.3	Calculated Reactance per phase at 50 Hz	ohm/km	
15.4	Calculated electrostatic Capacitance per core at 50 Hz	micro farad/km	



16	Maximum charging current for cable at nominal voltage	Amps/km	
17	Test voltage & voltage duration		
	a. High voltage tests	kV	
	b. Water immersion test	kV	
	c. Test procedures conform to (state std.)		
18	Loss tangent at normal frequency		
19	Dielectric constant at normal frequency		
20	Recommended minimum bending radius in terms of O.D. of cable		
21	Recommended spacing of angle iron supports		
22	Safe pulling force when pulled by pulling eye	kg	
	a. Full details of tests proposed to be carried out and special tests for FRLS cables/FS cables		
	b. Whether all type test certificates enclosed		
23	Whether progressive sequential marking on outer sheath of cables can be provided?	Yes/No	
24	Derating factor for following ambient temperature in air/ground		
	a. At 30 °C		
	b. At 35 °C		
	c. At 45 °C		
	d. At 50 °C		
25	Cable drums		
25.1	Dimensions		
	a. Flange diameter	mm	
	b. Barrel diameter	mm	
	c. Traverse	mm	
25.2	Shipping weight of drum for standard drum length	kg	
25.3	Standard cable length for drum for each size of cable (single length)		
25.4	Tolerance on packing length		



MANUFACTURING QUALITY PLAN (ANNEXURE-b)

ANNEXURE-b												
 BHEL Industrial System Group, Bengaluru		JOB NO.	MANUFACTURING QUALITY PLAN				Project Name					
		PO NO. & DATE									ITEM	QP NO.
		SUPPLIER NAME & ADDRESS	SUB SYSTEM	REV NO.	Package							
				DATE	Contract No.							
			PAGE:			Main Supplier						
SL. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY			REMARKS
								M	B	C		
1	2	3	4	5	6	7	8	9	*D	10		11
Supplier's Signature & Seal		BHEL's Signature & Seal		Legends: *D: RECORDS, IDENTIFIED WITH "TICK" (V) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. MTC-Material Test Certificate, IR-Inspection Report P-Perform M-Manufacturer/supplier V-Verification B-BHEL/BHEL TPI W-Witness C-Customer/customer's TPIA CHP: THE OWNER SHALL IDENTIFY IN COLUMN "C"				 FOR OWNER USE		DOC. NO.: REV..... CAT.....		
										Name, Seal & Sign of Approving Authority		
										REVIEWED BY		
										APPROVED BY		
										APPROVAL SEAL		
Notes :												



TECHNICAL ENQUIRY SPECIFICATION FOR CONTROL CABLE

BOQ CUM UNPRICED FORMAT (ANNEXURE-c)

SL.NO.	ITEM DESCRIPTION	QUANTITY (in Mtrs.)	UNIT PRICE (IN ₹) (inclusive of packing & forwarding and Freight charges)	TOTAL PRICE (IN ₹)
1	1.1 KV 5Cx2.5 Cu CONTROL CABLE	3500		
2	1.1 KV 7Cx2.5 Cu CONTROL CABLE	3000		
3	1.1 KV 10Cx2.5 Cu CONTROL CABLE	2000		
4	1.1 KV 14Cx2.5 Cu CONTROL CABLE	5000		
5	1.1 KV 16Cx2.5 Cu CONTROL CABLE	6000		
6	1.1 KV 19Cx2.5 Cu CONTROL CABLE	5000		
7	1.1 KV 3Cx1.5 Cu CONTROL CABLE	9000		
8	1.1 KV 5Cx1.5 Cu CONTROL CABLE	66000		
9	1.1 KV 7Cx1.5 Cu CONTROL CABLE	20000		
10	1.1 KV 10Cx1.5 Cu CONTROL CABLE	3000		
	GRAND TOTAL			
NOTE : GST and applicable Taxes shall be considered extra at actuals on Total ex-works Price.				