

TELENGANA SUPER THERMAL POWER PROJECT PHASE-I

2 X 800 MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION

FOR

SCREENED CONTROL CABLE

SPECIFICATION NO. : *PE - TS - 424 - 507 - E004*

REVISION : 0



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP (INDIA) - 201301**



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS
TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION -

REVISION 0

DATE: 16.09.2017

SHEET 1 OF 1

CONTENTS

<u>S. NO.</u>	<u>DESCRIPTION</u>	<u>NO. OF SHEETS</u>
01	CONTENTS	01
02	SECTION – 'I'	
	a) COMPLIANCE CERTIFICATE	01
	b) SPECIFIC TECHNICAL REQUIREMENTS	02
	c) DATA SHEET-A	06
	d) DATA SHEET-C (GUARANTEED TECHNICAL PARTICULARS)	04
03	SECTION – 'II'	
	a) GENERAL TECHNICAL SPECIFICATION	02
	b) ANNEXURE- A CORE IDENTIFICATION / PAIR IDENTIFICATION	02
	c) ANNEXURE-B – STEEL DRUM DRAWING	02
	d) STANDARD QUALITY PLAN	05
	e) ANNEXURE- C TO QP	04
TOTAL NO. OF SHEETS (INCLUDING COVER/SEPARATOR SHEETS)		=XX



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS- 424-507-E004

VOLUME II

REVISION 00

DATE: 29.09.2017

SHEET 1 of 1

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'
3. 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.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS- 424-507-E004

VOLUME II

SECTION I

REVISION - 0

DATE: 16.09.2017

SHEET -

SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS- 424-507-E004

VOLUME II

SECTION I

REVISION - 0

DATE: 29.09.2017

SHEET 1 OF 13

1.0 SCOPE

- 1.1 Design, Manufacture, Inspection and testing at manufacture's works, proper packing and delivery to site of **Screened Control cables** conforming to this specification.
- 1.2 General technical requirements of the Screened Control cables are indicated in Section-II. Project specific technical/ quality requirements / changes are listed in Section-I.
- 1.3 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail in case of any conflict between the stipulations of Section-I, Data Sheet - A & Section-II.
- 1.4 The documents shall be in English Language and MKS system of units.

2.0 BILL OF QUANTITIES:

- 2.1 Quantity requirements shall be as per BOQ-cum-price schedule enclosed in NIT.

3.0 SPECIFIC TECHNICAL REQUIREMENTS

<u>S.No.</u>	<u>Reference Clause No. of Section- II</u>	<u>Specific Requirement/ Change</u>
1	3.1	The standard quality plan no. shall be read as 0000-999-QOI-S-035 in place of PE-QP-999-507-E004.
1	3.3	Shall be read as "Type test report requirements, routine / acceptance testing and special testing requirements shall be as per Annexure – C of QP. All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
2	3.4	This clause is null & void.
3	3.7 (clause is added)	All equipment to be supplied shall be of type tested design. During detailed engineering, the successful bidder shall submit for BHEL/NTPC approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a process plant/refinery/power plant/nuclear plant client or client representatives.
4	3.8 (clause is added)	However, if the successful bidder is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the successful bidder shall conduct all such tests under this contract at no additional cost to the BHEL



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS- 424-507-E004

VOLUME II

SECTION I

REVISION - 0

DATE: 29.09.2017

SHEET 1 OF 13

		either at third party lab or in presence of BHEL/NTPC and submit the reports for approval.
5	3.9 (clause is added)	The type test reports (for type tests carried out within last ten years from the date of bid opening) once approved for any project of NTPC shall be treated as reference. For KARIMNAGAR TPS, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.
5	3.10 (clause is added)	If a cable drum fails in site testing then that drum shall be supplied again by vendor free of cost to BHEL.

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

Following documents/drawings shall be submitted after placement of order for BHEL customer's approval: -

Sl. No.	Drawings/Document Description	Drawings / Document Number
1.	Technical Data Sheet – Screened control cables	PE-V0-424-507-E141
2.	Cross-sectional Drawings – Screened control cables	PE-V0-424-507-E143
3.	Type Test Reports – Screened control cable	PE-V0-424-507-E144
4.	Steel drum drawing (if applicable)	PE-V0-424-507-E145
5.	Standard Quality Plan - Screened control cables	PE-V0-424-507-E916 (*)

NOTE: (*)

Standard Quality Plan as enclosed in the technical specification is to be appended with cover sheet bearing document number & description as stated above. The signed & stamped copy for the same shall be submitted to BHEL without making any changes in the contents of the document.

	DESIGN CALCULATIONS FOR LV CABLE SELECTION & SIZING	Doc. No. PE-TS-424-507-E004
	NTPC LIMITED	Rev No. 01
	2X800 MW TELANGANA TELANGANA STPP (SG ISLAND)	29.09.2017

DATA SHEET-A

CABLE DETAILS OF INSTRUMENTATION CABLES (AS PER VDE)

- 1.0 Voltage grade : 225 V (Peak)
- 2.0 Type of cable : FRLS SCREENED CONTROL CABLES
- 3.0 Standards Applicable :

1	VDE 0815, VDE 0816, VDE 0472	General Construction & tests for cables.
2	VDE 0207, Part-4, Part-5, Part-6	For insulation thickness.
3	SEN-SS-424-1475, IEC-60332 Part-3 Cat-B	Flammability Tests
4	ASTMD-2843, ASTMD-2863, IEC-754 Part-1	FRLS Tests
5	IS-8784	SPECIFICATION FOR THERMOCOUPLE COMPENSATING CABLES
6	IS-10810	METHODS OF TEST FOR CABLES
7	ANSI MC-96.1	Thermocouple cable color codes

4.0 CONDUCTOR

- a) Material : Annealed bare copper
- b) Grade : Electrolytic
- c) Standard applicable : VDE 0815
- d) Min number of strands, Dia : 7, 0.3 mm (nom), 0.5 sq.mm
and cross sectional area
- e) Maximum Conductor loop
resistance/km (in ohm) at 20 : 73.4
degrees celsius
- f) Continuous operation suitability : 70

5.0 INSULATION



DESIGN CALCULATIONS FOR LV CABLE SELECTION & SIZING

Doc. No. PE-DC-424-507-E002

NTPC LIMITED

Rev No. 01

2X800 MW TELENGANA TELANGANA STPP
(SG ISLAND)

- a) Material : PVC as per VDE 0207 Part 4, compound Y I3
- b) Application : Extruded
- c) Insulation thickness
- Min / Max : 0.25/ 0.35 (for 0.5 sq mm)
- d) Volume resistivity (Min) : 1×10^{14} at 20 deg .C & 1×10^{11} at 70 deg. C in ohm-cm

6.0 LAYING OF CORES

- a) Min. number of twist per Metre for paired cables. : 20 (For 0.5 Sqmm)
- b) Maximum lay of individual twisted pair : 50 mm (For 0.5 Sqmm)
- c) Diameter of core : In accordance with clause 5 (c)

7.0 IDENTIFICATION OF CORES : Band marking

8.0 INDIVIDUALLY SCREENED (F TYPE CABLE)

- a) Material : Aluminium-Mylar tape
- b) Coverage : 100%
- c) Overlap : Minimum 20%
- d) Min thickness (Micron) : 28
- e) Binder : Polyester tape.

9.0 OVERALL SCREENED (G TYPE CABLE)

- a) Material : Aluminium-Mylar tape
- b) Coverage : 100%
- c) Overlap : Minimum 20%
- d) Min. thickness (Micron) : 55

	DESIGN CALCULATIONS FOR LV CABLE SELECTION & SIZING	Doc. No. PE-DC-424-507-E002
	NTPC LIMITED	Rev No. 01
	2X800 MW TELANGANA TELANGANA STPP (SG ISLAND)	

e) Binder : Polyester tape.

10.0 DRAIN WIRE

To be provided separately for individual pair shield (wherever applicable) and overall shield.

a) Material : Annealed Tin coated copper conductor as per VDE: 0815

b) Min number of strands, Dia : 7, 0.3 mm (nom), 0.5 sq.mm
and cross sectional area

11.0 ACCESSORIES (BEDDING, BINDER, TAPE REQ.)

a) Material : Mylar Tape

12.0 OUTER SHEATH

a) Material : Extruded PVC (compound YM1) as per VDE 0207 Part-5

b) Thickness : As per VDE 0816 and VDE207 Part-5

Minimum Thickness at : 1.8 mm for unarmoured Cable / as per
any point IS-1554-I for armoured cable

Nominal Thickness at : >1.8 mm for unarmoured Cable / as per
any point IS-1554-I for armoured cable

c) Application : Extruded

d) Colour : Blue

e) Whether FRLS : YES

f) Other : Resistant to water, Fungus, Termite &
rodent attack.

g) filler : Non-hygrosopic, flame retardant

13.0 FRLS/ FLAMMABILITY TESTS

a) Oxygen Index : 29% Minimum as per ASTM D 2863

b) Temperature Index : 250 °C Minimum as per ASTM D 2863

c) Acid gas generation : less than 20% by weight (As per IEC-



DESIGN CALCULATIONS FOR LV CABLE SELECTION & SIZING

Doc. No. PE-DC-424-507-E002

NTPC LIMITED

Rev No. 01

2X800 MW TELANGANA TELANGANA STPP
(SG ISLAND)

754-1)

- d) Smoke density rating : Not more than 60% (As per ASTM D 2843) Defined as average area under curve when the results of smoke density plotted on a curve indicating light absorption v/s time as ASTM D 2843
- e) Flammability Test : IEEE-383
- f) Swedish Chimney Test : As SEN-SS-424-1475 Class F3,

14.0 TOLERANCE ON OVERALL DIAMETER : $\pm 2\text{mm}$ max. over the declared value in Technical Data Sheet

15.0 VARIATION IN DIA & OVALITY AT ANY CROSS-SECTION : Maximum 1 mm
: Not more than 1mm.

Cage clam suitability – to be provided

16.0 CABLE DRUM DETAILS

- a) Material Type & Construction: Wooden as per IS 10418 / Steel
- b) Standard drum length : 1000 metres: up to and including 12 Pairs.
500 metres: above 12 pairs
- c) Tolerance on drum length : $\pm 5\%$
- d) Painting : Entire surface to be painted
- e) Outermost Layer : To be covered with waterproof

17.0 RIP CORD : A non-hygroscopic and non-wicking non metallic cord polyethylene.

18.0 Markings on Outer Sheath

- a) Progressive sequential Length marking to be provided : @ 1M by Embossing / Printing
- b) Progressive marking @ 5M : Manufacturer's name, type of insulation,

	DESIGN CALCULATIONS FOR LV CABLE SELECTION & SIZING	Doc. No. PE-DC-424-507-E002
	NTPC LIMITED	Rev No. 01
	2X800 MW TELANGANA TELANGANA STPP (SG ISLAND)	

FRLS, conductor size, no. of pairs, voltage grade, type of cable, year of manufacture, BHEL-PEM & NTPC by Embossing / Printing.

19.0 TECHNICAL PARAMETERS (C & I) As per Table below

STANDARD CABLE PARAMETERS FOR INSTRUMENTATION CABLE

Parameter	0.5 mm ² (I & OS) type-F	0.5 mm ² (OS) type-G
Mutual Capacitance (max.) at 0.8 kHz, nF/Km	120	100
Conductor Loop Resistance (max.), Ohm/Km	73.4 (Plain)	73.4 (Plain)
Insulation Resistance (min), M Ohm/ Km	100	100
Cross Talk Figure (min) at 0.8kHz, dB	60	60
Characteristic impedance(max.) at 1 kHz	320	340
Attenuation(max.) at 1 kHz db/Km	1.2	1.2

Note:

- Cable parameters indicated above are at 20 degC (+/- 3 degC)

20.0 TEST VOLTAGE

Core – Core

Core- shield

- High voltage test : 2kV RMS for 1 min 0.5kV RMS for 1 min
- Resistance to direct current test: 0.22kV DC for 240 hrs/ 10 days

TEST:-

- TYPE TEST REPORT SHALL BE SUBMITTED IN LINE WITH SUBSEC- IIIC-10 OF NTPC CONTRACT SPECIFICATIONS.
- ROUTING TEST AND ACCEPTANCE TEST SHALL BE AS PER QUALITY ASSURANCE AND INSPECTION TABLE OF LT SCREEN CONTROL CABLES ENCLOSED AS SUB SECTION E-32.



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS
 TECHNICAL SPECIFICATION FOR
 SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION - I

REVISION 0

DATE: 29.09.2017

Page 1

DATA SHEET-C

S.No.	Particulars	Unit	Description
1	Manufacturer's name	-	
2	Reference design standards	-	
3	Conductor size	sq. mm	
4	Rated Voltage	V	
5	Number of pairs	No.	
6	Cable suitable for both earthed & unearthed system	-	
7	Conductor		
	a) Material	-	
	b) Reference Standard	-	
	c) Grade	-	
	d) No. of strands	No.	
	e) Diameter of strands (nom.)	mm	
	f) Approx. dia of conductor	mm	
	g) Cross Section area	sq. mm	
	h) Maximum conductor resistance per Km at 20°C	ohm	
8	Insulation		
	a) Reference Standard	-	
	b) Material composition	-	
	c) Application	-	
	d) Minimum thickness	mm	
	e) Nom.Thickness	mm	
	f) Max. thickness	mm	
	g) Minimum volume resistivity as per IS 5831	Ohm cm	
	h) Dielectric constant	-	
	i) Maximum conductor temperature withstand capacity	°C	
	j) Core diameter including insulation	mm	
9	Core laying		
	a) Whether cores are twisted.	-	
	b) Maximum lay of twist	mm	
	c) Identification of cores	-	
10	Individual Shield		



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS
 TECHNICAL SPECIFICATION FOR
 SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION - I

REVISION 0

DATE: 29.09.2017

Page 2

	a) Material	-	
	b) Thickness of tape	micron	
	c) Coverage/ Overlap	%	
	d) Noise interference better than	dB	
11	Drain wire for individual shield		
	a) Reference standard	-	
	b) Size (No. of strands/ dia. of each strand)	sq. mm (no./mm)	
	c) Material	-	
	d) Resistance of drain wire per km at 20 deg.C	ohm	
12	Overall shield		
	a) Material	-	
	b) Thickness of tape	mm	
	c) Coverage/Overlap	%	
	d) Noise interference better than	dB	
13	Drain wire for overall shield		
	a) Reference standard	-	
	b) Size/ No.of strands	sq. mm/ no.	
	c) Material	-	
	d) Resistance per Km (with shield) at 20°C	Ohm/ km	
14	a) Fillers: Material (if applicable)		
	b) Bedding Material		
15	Inner sheath		
	a) Material, type and standard	-	
	b) Whether FRLS	-	
	c) Colour	-	
	d) Method of application	-	
	e) Thickness (min)	mm	
16	Armour		
	a) Material,	-	
	b) Formed wire / round wire		
	c) Minimum Coverage	%	
	d) Method of jointing	-	
	e) Breaking load of joint	-	
	f) Size (approx.)	mm	
	g) Dia of armour	mm	
	h) No. of wires	mm	
17	Outer sheath		
	a) Reference standard	-	
	b) Material	-	
	c) Minimum thickness of sheath	mm	



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS
 TECHNICAL SPECIFICATION FOR
 SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION - I

REVISION 0

DATE: 29.09.2017

Page 3

	d) Calculated dia under outersheath	mm	
	e) Oxygen index (as per ASTM D 2863)	-	
	f) Temperature index (in deg. C as per ASTM D 2863)	-	
	g) Maximum acid gas generation as per IEC754-1	%	
	h) Maximum smoke density rating as per ASTM D 2843	%	
	i) Colour of outer sheath	-	
18	Dia over laid-up core	mm	
19	Dia under armour	mm	
20	Dia above armour	mm	
21	Overall diameter of cable	mm	
22	Tolerance on overall diameter	mm	
23	Weight of		
	Copper (conductor & drain wire)	MT. / km	
	PVC (insulation, sheath & fillers)	MT. / km	
	Armour	MT. / km	
	Cable (approx.)	MT. / km	
24	Cable parameters at 20°C(+/-3 deg. C)		
	a) Conductor resistance (max)	Ohm/ km	
	b) Insulation resistance (min)	M-Ohm	
	c) Mutual capacitance at 0.8KHz (max)	nF/ km	
	d) Cross talk at 0.8KHz (min)	dB	
	e) Attenuation at 1 KHz (max)	dB/ km	
	f) Characteristic impedance at 1 KHz (max)	Ohm	
25	Continuous operating temp. (deg.C)	deg. C	
26	(a) Relevant IS standard including Part & category for Flame retardance of complete cable	-	
	(b) Relevant IEC standard including Part & category for Flammability of complete cable		
27	Whether complete cable passes Swedish Chimney test as per SEN 4241475 (F3)	-	
28	Identification		
	a) Length of cable marked at every mtr.	-	
	b) FRLS marked at every 5 mtrs	-	
	c) Each core of the pair numbered	-	
	d) Conductor identification details for pairs	-	
	e) Details of cable markings	-	
29	Test voltage		
	a) High voltage test/ Dielectric Strength		
	i) Voltage (KV), Core - Core	kV	
	ii) Duration	min	
	b) High Voltage test		



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS
 TECHNICAL SPECIFICATION FOR
 SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION - I

REVISION 0

DATE: 29.09.2017

Page 4

	i) Voltage (KV), Core - Screen	V	
	ii) Duration	min	
	c) Resistance to direct current test (applicable for 225 V cable as per VDE)	-	
	Voltage	V	
	Duration	hrs/days	
30	Min bending radius	mm	
31	Ovality at any cross section	mm	
32	Variation of dia through out cable length		
33	Cable cross-sectional drawings for each type of cable furnished		
34	i) Length of single coil in a drum	M	
	ii) Marking on drum	-	
	iii) Seasoned wood drum provided	-	
	iv) Both ends of cable to be sealed with PVC/ Rubber caps to prevent water/ moisture ingress		
	v) Gross weight (approx.)	kg.	
	vi) Net weight (approx.)	kg	
35	Type test procedures as per BHEL Technical Spec. and other relevant standards enclosed.		
36	Anti termite & rodent test		



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-TS-424-507-E004

VOLUME II

SECTION II

REVISION -0

DATE: 29.09.2017

SHEET -

SECTION-'II'

GENERAL TECHNICAL SPECIFICATION



DOCUMENT TITLE
2X800MW KARIMNAGAR TPS

TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO. PE-SS-000-507-E016B

VOLUME II

SECTION II

REVISION

DATE: 10.05.2016

SHEET 1 OF 1

1.0 TECHNICAL REQUIREMENTS

- 1.1 Technical requirements for SCREENED CONTROL CABLES shall be as indicated in this section, in addition to those specified in Datasheet-A.
- 1.2 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.

2.0 CODES & STANDARDS

- 2.1 The design, material, construction, manufacture, inspection and testing of Screened control cables shall conform to the latest revision of relevant standards and codes of practices mentioned in Data Sheet - A.
- 2.2 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

3.0 QUALITY ASSURANCE REQUIREMENTS

- 3.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-507-E004) as attached with the specification without any deviations. At contract stage, the successful bidder shall submit the same QP for BHEL/ ultimate customer's approval. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in QP during contract stage.
- 3.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved Quality Plan.
- 3.3 Type testing requirements, routine/ acceptance testing and special testing requirements shall be as per Annexure –C to QP. Charges for all these tests for all the equipments & components shall be deemed to be included in the bid price (except UV Radiation & Hydraulic Stability test).
- 3.4 The charges of UV Radiation test & Hydrolytic Stability test (if applicable) shall be reimbursed extra at actual against original money receipt of Govt. Lab. (CPRI/ ERDA etc).
- 3.5 Cost of cables consumed for testing shall be to bidder's account.
- 3.6 Type Test Reports for Tests conducted shall be submitted for BHEL's/ Customer's review/approval.

4.0 Packing

- 4.1 Cables shall be supplied in non-returnable drums. Material of cable drum shall be as specified in Datasheet-A.
- 4.2 In case of wooden drums, all wooden parts shall be manufactured from seasoned wood treated with copper naphthenates/ zinc naphthenates (refer IS: 401). Dimensions of wooden drums shall be as per IS 10418. All ferrous parts shall be treated with suitable rust protective finish or coating to avoid rusting during transit and storage. BIS certification mark shall be stamped on each cable drum. Over the cables polyethylene sheet shall be wrapped and then sealed properly.
- 4.3 In case of Steel drums, new or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. For Typical details of Steel drums, Annexure-B to Section-II, may be referred by the bidder. Bidder may modify, to choose appropriate dimensions of steel drums to suite various sizes/weight/ lengths.



TITLE :
**TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES**

SPECIFICATION NO.
PE-TS-404-507-E004

VOLUME NO. IIB

SECTION: C

REV NO. : **0** DATE 16.09.2017

SHEET: 1 OF 2

ANNEXURE : A

CORE IDENTIFICATION / PAIR IDENTIFICATION



TITLE :
TECHNICAL SPECIFICATION FOR
SCREENED CONTROL CABLES

SPECIFICATION NO.
PE-TS-404-507-E004

VOLUME NO. IIB

SECTION: C

REV NO. : 0 DATE 16.09.2017

SHEET: 2 OF 2

ANNEXURE : B-I

The cable cores shall be colour coded as mentioned below:

PAIR	CORE	COLOUR
1 st	1 st	Blue
1 st	2 nd	Red
2 nd	1 st	Grey
2 nd	2 nd	Yellow
3 rd	1 st	Green
3 rd	2 nd	Brown
4 th	1 st	White
4 th	2 nd	Black

Each four pair is laid to form one unit and wound with Mylar tape. The cores of each unit shall then be identified by colour bands for cables of more than 4-pair. eg. All eight cores of the first unit shall have a single band of pink colour (preferably rose pink).

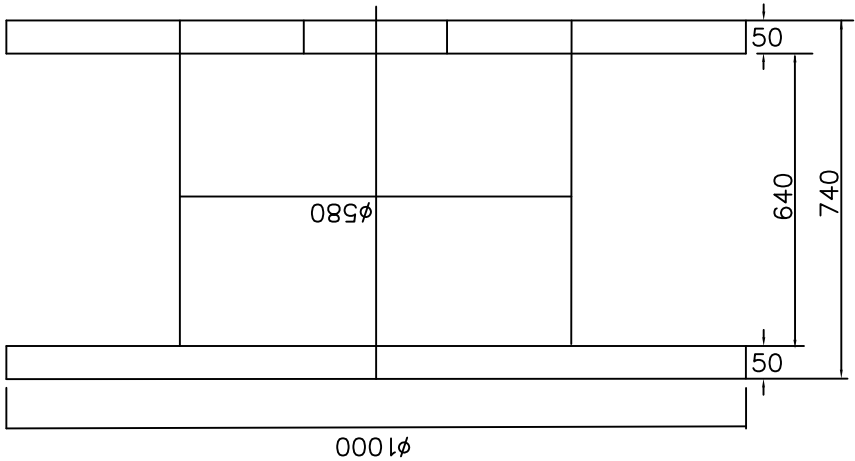
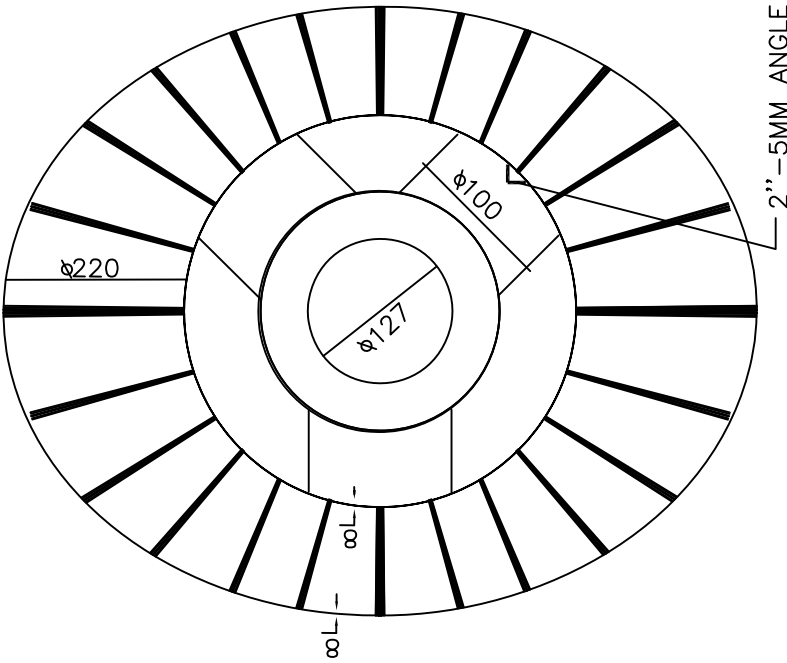
Unit No No.	COLOUR OF BANDS	BAND MARKS
1.	PINK	= === ==
2.		= ===== ==
3.		= ===== ==
4.		= ===== ==
5.	ORANGE	= === ==
6.		= ===== ==
7.		= ===== ==
8.		= ===== ==
9.	VIOLET	= === ==
10.		= ===== ==
11.		= ===== ==
12.		= ===== ==

The dimension L (distance between the marking) shall be limited to 60mm. The bands shall be neat and cover at least 2/3 of the periphery of the core.
eg: A grey wire having 3 orange bands is the first core of the second pair of the seventh unit.

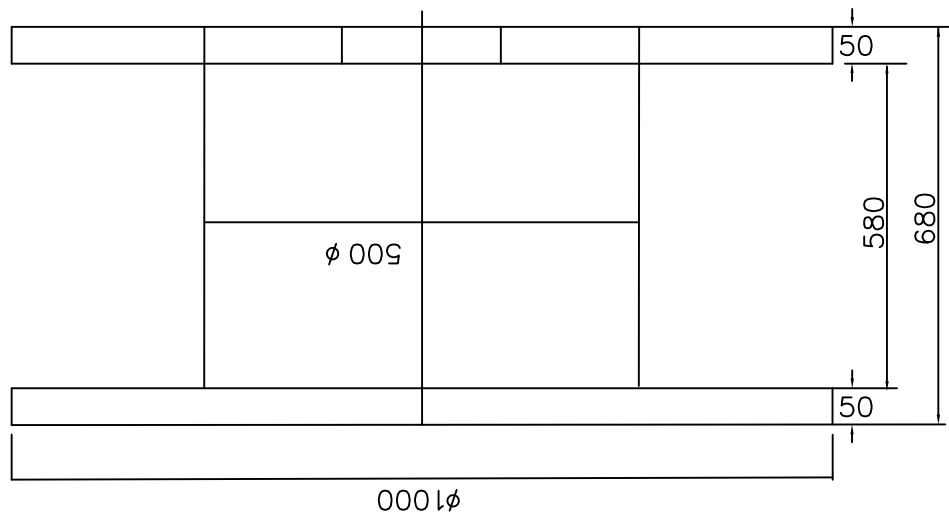
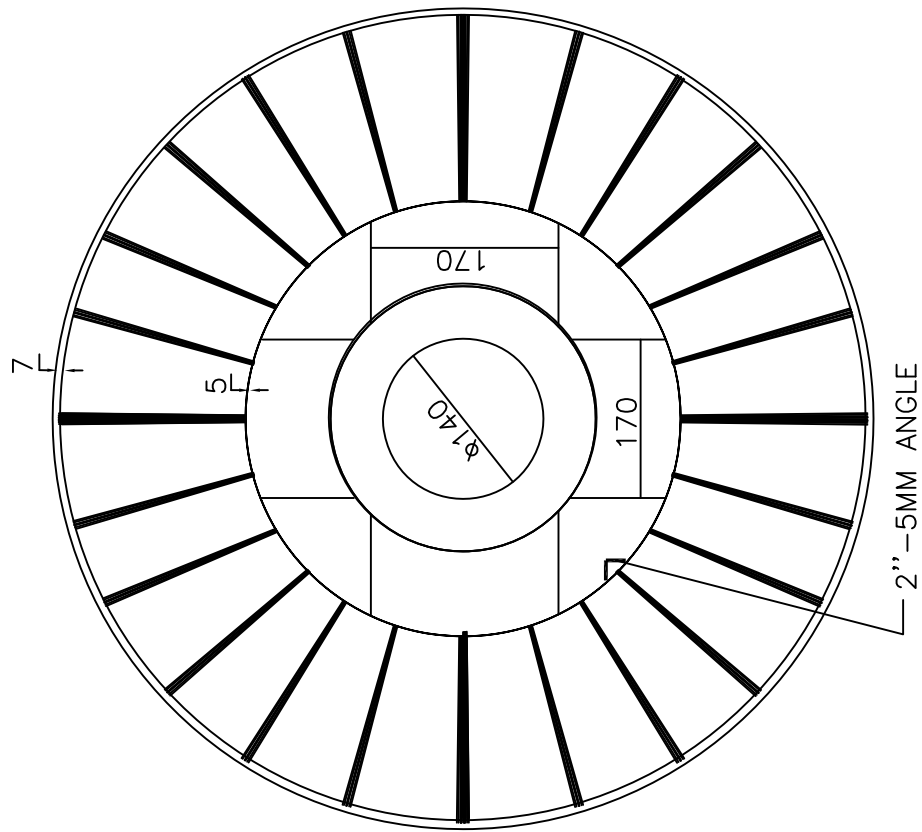
STEEL DRUM DRAWING (TYPICAL)

Annexure-B to Section II

(Sheet 1 of 2)



DIMENSION in mm



DIMENSION in mm

		ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable		STANDARD QUALITY PLAN				To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:00 Date:05/09/2012 Page:1 OF 5		Reviewed By: Archana Nath Rajeev Garg S.samanta		Approved By:  A.K. GARG Dt.....	
								Valid up to : 04/09/2015					
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Format of record	Agency			Remarks
1	2	3	4	5	6		7	8	9	D*	10		11
I. RAW MATERIAL													
A CONDUCTOR													
A1	COPPER ROD For Conductor/ Drain wire	a) Dimension	Maj.	Measu.	1 sample/lot	—	IS:613/IS:12444	IS:613/IS:12444	IMR/ TC	V	-	-	Make - As per Annexure enclosed
		b) Conductivity/ Resistivity	Cri.	Elec.	1 sample/lot	1 sample/lot	IS:613/IS:12444	IS:613/IS:12444	IMR/ TC	V	V	-	
A2	Conductor for compensating cable	a) Size	Min	Dimen	1 Sample / lot	—	APPROVED DATASHEET	APPROVED DATA SHEET	IMR/ TC	P	-	-	Make - As per Annexure enclosed
		b) Resistance check	Maj	Elec	1 Sample / lot	—	APPROVED DATASHEET	APPROVED DATA SHEET	IMR/ TC	P	-	-	
		c) Thermo emf	Cri	Elec	1 Sample / lot	—	ANSI MC 96.1	ANSI MC 96.1	IMR/ TC	P	-	-	
		d) Specific resistance, Temp. coefficient	Maj	Elec/Me ch	1 Sample / lot	1 Sample / lot	Mfr. catalog	Mfr. catalog	IMR/ TC	V	V	V	
		e) Chemical composition.	Maj	Chem.	1 Sample / lot	1 Sample / lot	Mfr. catalog	Mfr. catalog	IMR/ TC	V	V	V	
B PVC COMPOUND													
B1	PVC Compound (Insulation & Sheath) Type of compound as per NTPC Spec.	a) Thermal stability (for Insulation)	Maj.	Therm.	1 sample/lot	1 sample/lot	VDE 207 Part -4/5	VDE 207 Part -4/5	IMR/ TC	P	V	-	
		b) TS & % Elongation Before and After aging and variation.	Maj.	Mech.	1 sample/lot	1 sample/lot	VDE 207 Part -4/5	VDE 207 Part -4/5	IMR/ TC	P	V	-	
		c) Loss of Mass (Sheath)	Maj.	Therm.	1 sample/lot	1 sample/lot	VDE 207 Part -4/5	VDE 207 Part -4/5	IMR/ TC	P	V	-	
B2	FR Properties for Filler Compound	a) Oxygen index	Cri.	Chem	1 sample/lot	1 sample/lot	29 %(min)ASTMD2863	29%(min)ASTMD2863	IMR/ TC	P	V	-	
		b) Temperature index deg. C	Cri.	Chem	1 sample/lot	1 sample/lot	250 deg. C(min) ASTMD2863	250 deg. C(min) ASTMD2863	IMR/ TC	P	V	-	
B3	FRLS Properties for Sheath	a) Oxygen index	Cri.	Chem	1 sample/lot	1 sample/lot	ASTMD2863/ APPROVED DATASHEET	ASTMD2863/ APPROVED DATASHEET	IMR/ TC	P	V	-	
		b) Temperature index	Cri.	Chem	1 sample/lot	1 sample/lot	ASTMD2863/ APPROVED DATASHEET	ASTMD2863/ APPROVED DATASHEET	IMR/ TC	P	V	-	
		c) Smoke density rating	Cri.	Chem	1 sample/lot	1 sample/lot	ASTMD2843/ APPROVED DATASHEET	ASTMD2843/ APPROVED DATASHEET	IMR/ TC	P	V	-	
		d) HCL Emission	Cri.	Chem	1 sample/lot	1 sample/lot	IEC754-1/ APPROVED DATASHEET	IEC754-1/ APPROVED DATASHEET	IMR/ TC	P	V	-	
C	Tapes / Binders (Aluminium Mylar,Melinex & Binders)	a) Thickness	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	APPROVED DATASHEET	APPROVED DATASHEET	IMR/ TC	P	V	-	
		b) Size	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	APPROVED DATASHEET	APPROVED DATASHEET	IMR/ TC	P	V	-	
D	Armour (If applicable)	a) Dimension	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	APPROVED DATASHEET	APPROVED DATASHEET	IMR/ TC	P	V	-	
		b) TS & %Elongation	Maj.	Mech	1 Sample/ Lot	1 Sample/ Lot	IS 3975	IS 3975	IMR/ TC	P	V	-	
		c) Zn Coating	Maj.	Chem	1 Sample/ Lot	1 Sample/ Lot	IS 3975	IS 3975	IMR/ TC	P	V	-	
		d) Resistivity	Maj.	Elect	1 Sample/ Lot	1 Sample/ Lot	IS 3975	IS 3975	IMR/ TC	P	V	-	
LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"													
Format No. :QS-01-QAI-P-09/F1-R1													

		ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable	STANDARD QUALITY PLAN				To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:00 Date:05/09/2012 Page:2 OF 5		Reviewed By: Archana Nath Rajeev Garg S.samanta		Approved By A.K.GARG Dt.....	
							Valid up to : 04/09/2015					
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of record	Agency	Remarks		
1	2	3	4	5	6	7	8	9	D*	10	11	
E	Wooden Drums	a) Constructional checks	Maj.	Visu.	100%	IS 10418	IS 10418	IMR/ TC		P	-	-
		b) Dimensions	Maj.	Mesu.	1 Sample/ Lot	IS 10418	IS 10418	IMR/ TC		P	-	-
II INPROCESS INSPECTION												
A	Wire Drawing & Annealing	a)Size	Maj.	Dimn.	1 Sample at Start and 1 Sample at End	Approved Datasheet	Approved Datasheet	IMR/ TC		P	-	-
		b) Surface finish	Maj.	Visu.	100%	Surface shall be smooth	Surface shall be smooth	IMR/ TC		P	-	-
		c) % of Elongation	Maj.	Mech.	1 Sample/ Lot	IS:8130	IS:8130	IMR/ TC		P	-	-
B	Tinning (Only for Drain wire)	a) Size	Maj.	Dimn.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-
		b) Percentage of Elongation	Maj.	Mech.	1 Sample/ Lot	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC	P	V	V
C	Bunching	a) Dimension and No. of strand.	Maj.	Measu.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P		
		b)Resistance	Cri	Elec.	1 Sample/ Lot	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC	P	V	V
D	Insulation	a) Surface finish	Maj.	Visu.	100%	Surface shall be smooth & free from scratches	Surface shall be smooth & free from scratches	IMR/ TC		P	-	-
		b) Core Diameter	Maj.	Measu.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-
		c) Radial Thickness(Min & Max.)	Maj.	Measu.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-
		d) Spark Test	Maj.	Elec.	100%	100%	IS 10810(With 3KV ac)	No Spark failure is allowed	IMR/ TC	P	V	V
		e) Volume Resistivity/ Insulation Resistance	Maj.	Elec.	1 Sample/ Lot	1 Sample/ Lot	VDE -0207/ Approved Datasheet	VDE -0207/ Approved Datasheet	IMR/ TC	P	V	V
		f) Colour, Marking/ Identification	Maj.	Visual	100%	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC	P	V	-
		g) TS & %Elongation	Maj.	Mech.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	VDE -0207/ Approved Datasheet	IMR/ TC		P	-	-
E	Twisting	a) Lay length and Direction	Maj.	Measu. &	1 Sample at Start and 1 Sample at End	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-
		b) Size/ Dimension	Maj.	Measu.	1 Sample/ Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-
		c) Pair Colour	Maj.	Visual	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Format No. :QS-01-QAI-P-09/F1-R1

		ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable	STANDARD QUALITY PLAN				To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:00 Date:05/09/2012 Page:3 OF 5		Reviewed By: Archana Nath Rajeev Garg S.samanta		Approved By: अनुमोदित A.K.GARG Approved			
							Valid up to : 04/09/2015							
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M C,N	Reference Document	Acceptance Norms	Format of record	Agency			Remarks		
1	2	3	4	5	6	7	8	9	D*	10	11			
F	Laying of Pairs/ Taping/ Shielding (Wherever Applicable)	a) Construction	Maj.	Visu.	100%	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		b) Dimension	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		c) Coverage/ Overlap	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		d) Continuity	Maj.	Dimn.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
G	Sheathing (Inner - If applicable)	a) Surface Finish	Maj.	Visual	100%	—	Smooth, free from visual defects #	Smooth, free from visual defects#	IMR/ TC		-	-	# Porosity, Burnt particles, Pimples (Repairs are not allowed)	
		b) Colour	Maj.	Visual	100%	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-		-
		c) Diameter / Thickness	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-		-
H	Armouring (If applicable)	a) Surface finish	Maj.	Visual	100%	—	Smooth, free from visual defects like rusting etc.	Smooth, free from visual defects like rusting etc.	IMR/ TC		P	-	-	
		b) Direction of Lay & Coverage	Maj.	Visual	100%	—	Smooth, free from visual defects like rusting etc.	Smooth, free from visual defects like rusting etc.	IMR/ TC		P	-	-	
		c) Size of Wire/ Strip	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		d) Diameter over Armouring	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
I	Sheathing (Outer)	a) Surface Finish	Maj.	Visual	100%	—	Smooth, free from visual defects#	Smooth, free from visual defects#	IMR/ TC		P	-	-	
		b) Colour/ Marking/ Embossing	Maj.	Visual	100%	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		c) Overall Diameter, Thickness	Maj.	Measu.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
		d) TS & %Elongation	Maj.	Mech.	1 Sample/ Lot	—	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	IMR/ TC		P	-	-	
III. FINAL INSPECTION														
A.	TYPE TEST	Type test as per agreement with NTPC Engg. Review of type test clearance from NTPC Engg. before final Inspection - CHP												
B.	ROUTINE TEST	a) Cond.resistance (Cable & Drain wire)	Cri.	Elec.	100%	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	V	V	
		b) HV Test	Cri.	Elec.	100%	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	V	V	
LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"														
Format No. : QS-01-QAI-P-09/F1-R1														

Sl No		Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Format of record	Agency			Remarks	
						M	C,N				M	C	N		
1		2	3	4	5	6		7	8	9	D*	10		11	
			c) IR Test (on drum length)	Cri.	Elec.	100%	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	V	V	
			d) Drain wire continuity	Cri.	Elec.	100%	100%	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	V	V	
C.	ACCEPTANCE TEST		a) Cond.resistance (Cable & Drain wire)	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			b) HV Test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			c) IR Test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			d) Constructional Details & Dimensions												
			i) Constructional Details	Maj.	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			ii) Shield Al-mylar thickness	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			iii) Insulation thickness	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			iv) Inner/ Outer sheath thickness (as applicable)	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	before and after ageing for insulation.
			v) Diameter over outer sheath	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
			e) Outer sheath - Colour, Marking/ Embossing & End sealing.	Maj.	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	
	f) Length checking.	Maj.	Measu.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W			
	g) Core - Band marking/ Numbering, Colour.	Maj.	Visual	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W			
	h) Overall Coverage/overlap of shield & Continuity of drain wire.	Maj.	Visual	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	Continuity shall be checked as per Manufacturer practice.		

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER, N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Format No. :QS-01-QAI-P-09/F1-R1

		ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable		STANDARD QUALITY PLAN				To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:00 Date:05/09/2012 Page:5 OF 5				Reviewed By: Archana Nath Rajeev Garg S.samanta		Approved By A.K. GARG Dt.....	
								Valid up to : 04/09/2015							
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Format of record	Agency			Remarks		
1	2	3	4	5	M	C,N	7	8	9	D*	10			11	
		i) Thermal EMF test (For compensating cable only)	Maj.	Elec.	Sample as per IS 8784	Sample as per IS 8784	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
		j) Thermal Stability (Insulation & Sheath)	Maj.	Chem.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	Spec./ADS/IS:5831	Spec./ADS/IS:5831	FIR	✓	P	W	W		
		k) Visual & Surface Finish	Maj.	Visual	1 No. of each size & type per Lot	1 No. of each size & type per Lot	Smooth, free from visual defects #	Smooth, free from visual defects #	FIR	✓	P	W	W	# Like Porosity, Burnt particles, Pimples	
		l) Electrical Parameters (Mutual capacitance, Cross talk, Attenuation, Characteristic Impedence as applicable)	Maj.	Elec.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
		m) Persulphate Test (For Drain wire)	Maj.	Chem.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
		n) Swidesh chimney test (overall cable)	Maj.	Chem	1 No./ Complete lot offered \$	1 No./ Complete lot offered \$	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W	\$ Irrespective of size & type.	
		o) FRLS Test for outer sheath for OI(Oxygen Index), TI(Temperature Index), SDR(Smoke Density Rating) & HCL Emission.	Maj.	Chem	1 No./ Complete lot offered \$	1 No./ Complete lot offered \$	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
		p) TS & %Elongation test of Insualtion & Sheath (Before & After aging)	Maj.	Mech	1 No./ Complete lot offered \$	1 No./ Complete lot offered \$	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
		q) Volume Resistivity (At room and Elevated Temperature)	Maj.	Elec.	1 No./ Complete lot offered \$	1 No./ Complete lot offered \$	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W		
	r) Armouring Dimension & Zn coating. (If applicable)	Maj.	Measu.	1 No./ Complete lot offered \$	1 No./ Complete lot offered \$	NTPC Tech.Specification /Approved Datasheet	NTPC Tech.Specification /Approved Datasheet	FIR	✓	P	W	W			
D.	Packaing and Dispatch	Stencileing, completeness & Verification with packing list	Maj.	Visual.	100%	-	Mfg. Practice	Mfg. Practice			P	-	-		
NOTE 1 : Where witnessing and verification of records is done only by main contractor (Coloum "C"), NTPC inspection Engineer may do a survilience Verification/ Witnessing as per his discretion.															
NOTE 2 : IMR : Inword Material Register, TC : Test Certificates, Mfg. : Manufacturer, FIR : Final Inspection Report.															
NOTE 3: NTPC Inspection Enginner to check,approval date,revision no of reference documents at the time of Inspection.															
LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION .M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"															
Format No. :QS-01-QAI-P-09/F1-R1															

INSTRUMENTATION CABLE

ITEMS	TESTS												
	Conductor Resistance ® & (A)	High Voltage ® & (A)	Insulation Resistance ® & (A)	Constructional detail, dimensions (A)	Outer-Sheathe/core marking, end sealing (A)	Thermal Stability (A) +	Visual, Surface finish (A) +	Electrical Parameters ** (A) +	Persulphate Test (A) +	Overall/Coverage/Continuity (A)	Swidesh chimney Test (SS-4241475) (A) ++	FRLS Test * (A) ++	Tensile & Elongation before & after aging (A) ++
1. Instrument cable twisted and shielded													
Conductor(IS-8130)	Y			Y			Y						
Insulation(VDE-207)				Y	Y	Y	Y						Y
Pairing/Twisting				Y	Y		Y						
Shielding				Y			Y			Y			
Drain wire	Y			Y			Y		Y	Y			
Inner Sheath				Y	Y	Y	Y					Y	Y
Outer Sheath				Y	Y	Y	Y					Y	Y
Over all cable	Y	Y	Y	Y	Y		Y	Y			Y		Y
Cable Drums(IS-10418)				Y			Y						

Note : High Temp. cables shall be subjected to tests as per VDE-207(Part-6) Compensating cables shall be checked for Thermal EMF/Endurance test as per IS 8784.

Note : This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating his practice & Procedure along with relevant supporting documents during QP finalization for all items.

Note : ® - Routine Test A - Acceptance Test Y - Test Applicable

Note : Sampling Plan for Acceptance test shall be as per IS 8784 (As applicable)

- * FRLS Tests: Oxygen / Temp Index (ASTM D-2863), Smoke Density Rating (ASTM – D 2843), HCL Emission (IEC-754-1)

- ** Characterisitic Impedence, Attenuation, Mutual Capacitance, Cross Talk (As applicable)

+ Sample size will be One No. of each size/type per lot.

++ Sample size will be One No. sample for complete lot offered irrespective of size/type.