NTPC LTD

Vendor Development Cell (VDC), Raipur

Sub: Qualifying Requirement for Vendor Enlistment for supply of Instrumentation Cables (Type - A, B, F and G - PVC / FRLS Type - 0.5 Sqmm.)

A)	MEG DETAILS		
	1.0	MEG NO.	**81 MEG-05**
	2.0	MEG DESCRIPTION	Instrumentation Cables (**Type - A, B, F and G - PVC / FRLS Type - 0.5 Sqmm**.)
	3.0	RESPONSIBILITY CENTRE	VDC

B) **Technical Criteria of QR:**

1. The bidder should have manufactured and supplied during last five (5) years from the date of application:
    a) Minimum one (1) km of PVC insulated, PVC sheathed Instrumentation cables.
    b) Minimum one (1) km of Flame retardant low smoke Instrumentation cables.

Documents to be submitted in support of meeting Technical QR:

1. Latest annual report OR NSIC / SSI / MSME registration certificate / BIS license / ISO certificate / Certificate of registration from the concerned excise department / any other statutory document as a proof of being manufacturer of the Instrumentation cables. Brief details of manufacturing facilities or Standard published catalogue for Instrumentation cables also to be given.
2. The PO in support of award and completion certificate/copies of invoice to establish successful execution of the supply of Instrumentation cables as per QR.

C) **Documents to be submitted to find executed value of orders**:

In addition to the documents required in support of meeting technical requirements as stated above, following documents are required to be submitted by the Applicants applying for enlistment: -

1. Three (3) POs of the highest executed values of similar work (see definition at point E: Note- 1 below) during previous five (5) years from the date of application. Copy of Invoice / Completion certificate from the concerned buyer/s in support of successful execution of supply against the POs to be submitted. These will be required for calculation of execution capability.
2. Audited balance sheet including Profit & Loss statement for the previous three (3) completed financial year's reckoned from the date of application. In case where the audited results for the last financial years as on the date of application are not available, the financial result certified by a practicing Chartered accountant shall be considered acceptable.
3. GSTIN certificate, PAN, Power of attorney, Letter of undertaking, works information etc. as mentioned in enlistment application pages of website **www.vendor.ntpc.co.in**
4. NTPC can request for other documents as necessary during the course of evaluation.

	Similar works means: **NOTE-1**: Supply of Instrumentation cables to any Power Plants / Petroleum Refinery / Fertilizer Plants/ Steel / Aluminum Industry within last five (5) years from the date of application for enlistment. **NOTE-2**: The executed value means Basic value of quantity of similar works executed/supplied against the reference PO (also applicable to partly executed POs as on date of application). Where PO value is composite (i.e. including Taxes etc.), the applicant to give item-wise break-up of Composite PO value mentioning Basic Value, Taxes etc. In case PO submitted contains other types of cables also, then the applicant has to give item-wise break up for similar work as per Note-1 above.

SPECIFICATION OF INSTRUMENTATION CABLE

1.01.00 Common Requirements

S. No.	Property	Requirement
1	Operating Voltage	225 V (peak value)
2.	Codes and standard	All instrumentation cables shall comply with VDE 0815, VDE 0207, Part 4, Part 5, Part 6, VDE 0816, VDE 0472, SEN 4241475, ANSI MC 96.1, IS-8784, IS-10810 (latest editions) and their amendments read along with this specification.
3.	Continuous operation suitability	At 205 Deg C for heat resistant cables, at 70 Deg C for all other type of cables.
4.	Marking :- a.*Progressive automatic on-line sequential marking of length in meters to be provided at every one meter on outer sheath.* *b.*Marking to read 'FRLS' to be provided at every 5 meters on outer sheath c.Durable marking at intervals not exceeding 625 mm shall include manufacturer's name, insulation material, conductor's size, number of pairs, voltage rating, type of cable, year of manufacturer to be provided on outer sheath.	
5.	Allowable Tolerance on overall diameter	+/- 2 mm (maximum) over the declared value in data sheet
6.	Variation in diameter	Not more than 1.0 mm throughout the length of cable.
7.	Ovality at any cross-section	Not more than 1.0 mm
8.	CAGE-CLAMP suitability	To be provided
9.	Color	The outer sheath shall be of blue color.
10.	Others	Repaired cables shall not be acceptable.

1.02.00 Specific Requirements

Specification Requirements	Type-A cable	Type-B cable	Type F & G cable
A. CONDUCTORS			
Cross section area	0.5 sq. mm		
Conductor material	ANSI type KX	ANSI type SX	Annealed bare copper
Colour code	Yellow-Red	Black-Red	As per VDE-815
Conductor Grade	As per ANSI MC 96.1		Electrolytic
No & dia of strands	7x0.3 mm (nom)		
No. of Pairs	2	2	2/4/8/12/16/24/ 48
Max. conductor loop resistance per Km (in ohm) at 20 deg. C	As per ANSI MC 96.1		73.4
Reference Standard	As per ANSI MC 96.1		VDE : 0815
B. INSULATION			
Material	Extruded PVC type YI 3		
Thickness in mm (Min/Max)	0.25/0.35		
Volume Resistivity (Min) in ohm-cm	1×10^{14} at 20 deg. C & 1×10^{11} at 70 deg. C.		
C. PAIRING & TWISTING			
Max. lay of pairs (mm)	50		
Single layer of binder tape on each pair provided	Each core printed with number or Numbered binder tape to be provided on each pair		Yes

Specification Requirements	**Type-A cable**	**Type-B cable**	**Type F & G cable**
Bunch (Unit Formation) for more than 4P	N.A		To be provided
Conductor /pair identification as per VDE0815	N.A.		To be provided
D. SHIELDING			
Type of shielding	Al-Mylar tape		
Individual pair shielding	No		To be provided for F-type cable
Minimum thickness of Individual pair shielding	No		0.028mm (28 micron)
Overall cable assembly shielding	To be provided		
Minimum thickness of Overall cable assembly shielding	0.055 mm (55 micron)		
Coverage / Overlapping	100% / 20%		
Drain wire provided for individual shield	N.A.		Yes (for F-type) Size- 0.5 sqmm No of strands-7 Dia of strands- 0.3mm Annealed Tin coated copper
Drain wire provided for overall shield	Yes, Size- 0.5 sqmm,No of strands-7,Dia of strands-0.3mm,Annealed Tin coated copper		
E. FILLERS (if applicable)			
Non-hygroscopic, flame retardant	To be provided		
F. OUTER SHEATH			
Material	Extruded PVC compound YM1 with FRLS properties		
Minimum Thickness at any point	1.8 mm		

Specification Requirements	**Type-A cable**	**Type-B cable**	**Type F & G cable**
Nominal Thickness at any point	>1.8 mm		
Resistant to water, fungus, termite & rodent attack	Required		
Minimum Oxygen index as per ASTMD-2863	29 %		
Minimum Temperature index as per ASTMD-2863	250 deg.C		
Maximum Acid gas generation by weight as per IEC-60754-1	20%		
Maximum Smoke Density Rating as per ASTMD-2843	60% (defined as the average area under the curve when the results of smoke density test plotted on a curve indicating light absorption vs. time as per ASTMD-2843)		
Reference standard	VDE207 Part 5,VDE-816		
G. Electrical Parameters			
Mutual Capacitance Between Conductors At 0.8 Khz (Max.)	200 nF/km		120 nF/km for F type 100 nF/km for G-type
Insulation Resistance (Min.)	100 M Ohm/Km		
Cross Talk Figure (Min.) At 0.8 Khz	60 dB		60 dB
Characteristic Impedance (Max) At 1 Khz	N.A.		320 ohm for F-type 340 ohm for G-type
Attenuation Figure At 1 Khz (Max)	N.A.		1.2 db/km

Specification Requirements	Type-A cable	Type-B cable	Type F & G cable
H. COMPLETE CABLE			
Complete Cable assembly	Shall pass Swedish Chimney test as per SEN-SS 4241475 class F3.		
Flammability	Shall pass flammability as per IEEE-383 read in conjunction to this specification		
I. CABLE DRUM			
Type	Non-returnable wooden drum (wooden drum to be constructed from seasoned wood free from defects with wood preservative applied to entire drum) or steel drum.		
Length	1000 m ± 5% for up to & including 12 pairs 500 m ± 5% for above12 pairs		

Note: Heat resistant instrumentation cable shall have same specification as of G/F type instrumentation cable as specified above, except that insulation and outer sheath material shall be Teflon and cable shall be suitable for continuous operation at 205 Deg. C

1.03.00 TESTS

All equipments to be supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Owner's 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 client.

However if the contractor 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 contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client /owners representative and submit the reports for approval.

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

The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, 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.

1.03.01 TYPE TESTS

The reports for the following type tests shall be submitted for one size of Instrumentation cable. Size shall be decided by the employer during detailed engineering

TYPE TEST REQUIREMENT FOR INSTRUMENTATION CABLE

Sl.No	Item	Test Requirement	Standard	Test To Be Specifically Conducted	NTPC's Approval Req. On Test Certificate
Instrumentation Cables Twisted & Shielded					
1	-Conductor	Resistance test	VDE-0815	No	No
		Diameter test	IS-10810	No	No
		Tin Coating test (Persul-phate test)	IS-8130	No	No
2	-Insulation	Loss of mass	VDE 0472	No	No
		Heat shock	VDE 0472	No	No
		Hot deformation	VDE 0472	No	No
		Shrinkage	VDE 0472	No	No
		Bleeding & blooming	IS-10810	No	No
3	-Outer sheath	Loss of mass	VDE 0472	No	No
		Heat shock	VDE 0472	No	No
		Hot deformation	VDE 0472	No	No
		Shrinkage	VDE 0472	No	No
		Bleeding & blooming	IS-10810	No	No
		Colour fastness to water	IS-5831	No	No
		Cold bend/ cold impact test	VDE-0472	No	No
		Oxygen index test	ASTMD-2863	No	No

		Smoke Density Test	ASTMD-2843	No	No
		Acid gas generation test	IEC-60754-1	No	No
4	-fillers	Oxygen index test	ASTMD-2863	No	No
		Acid gas generation test	IEC-60754-1	No	No
5	-AL-MYLAR shield	Continuity test		No	No
		Shield thickness		No	No
		Overlap test		No	No
6	-Over all cable	Flammability Test	IEEE 383	No	No
		Swedish Chimney Test	SEN 4241475	No	No
		Noise interference	IEEE Trans-actions	No	No
		Dimensional checks	IS 10810	No	No
		Cross talk	VDE-0472	No	No
		Mutual capacitance	VDE-0472	No	No
		HV test	VDE-0815	No	No
		Drain wire continuity		No	No
		Drain wire continuity		No	No

एनटीपीसी NTPC

ITEM : Instrumentation Cables.
SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable
Instrumentation Cable

.Indicative Quality Plan

As Per latest Standards VDE 0815,VDE 0207 part 4,5,6,VDE 0816,VDE 0472,Sen 4241475,ANSI MC 96.1, ASTMD 2863, IEC 754-1,IS 3975, IS-8784 and IS 10810

To be filled by NTPC

QP No.: 0000-999-QOI-S-035
Revision:01
Date:24.09.2018
Page:1 OF 5

Reviewed By: Chanchal Verma, Alok Shrivastava, S K Lal

Approved By: K K Ojha

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record		Agency M	Agency C	Agency N	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	-	-	
		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	–	NTPC Approved Datasheet	NTPC Approved Datasheet	IMR/ TC	√	P	-	-	
		b) Resistance check	Maj	Elec	1 Sample / lot	–	NTPC Approved Datasheet	NTPC Approved Datasheet	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. cofficient.	Maj	Elec/Mech	1 Sample / lot	1 Sample / lot	MFR CATALOUGE	MFR CATALOUGE	IMR/ TC	√	V	V	V	
		e) Conductor Grade	Maj	Chem	1 Sample / lot	1 Sample / lot	NTPC Approved Datasheet	NTPC Approved Datasheet	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	ASTMD2863/ NTPC Approved Datasheet	ASTMD2863/ NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
		b) Temperature index deg. C	Cri.	Chem	1 sample/lot	1 sample/lot	ASTMD2863/ NTPC Approved Datasheet	ASTMD2863/ NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
B3	FRLS Properties for Sheath	a) Oxygen index	Cri.	Chem	1 sample/lot	1 sample/lot	ASTMD2863/ NTPC Approved Datasheet	ASTMD2863/ NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
		b) Temperature index	Cri.	Chem	1 sample/lot	1 sample/lot	NTPC Approved Datasheet	NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
		c) Smoke density rating	Cri.	Chem	1 sample/lot	1 sample/lot	NTPC Approved Datasheet	NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
		d) HCL Emission	Cri.	Chem	1 sample/lot	1 sample/lot	IEC754-1/ NTPC Approved Datasheet	IEC754-1/ NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
C	Tapes / Binders (Aluminium Mylar)	a) Thickness	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	NTPC Approved Datasheet	NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
		b) Size	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	NTPC Approved Datasheet	NTPC Approved Datasheet	IMR/ TC	√	P	V	-	
D	Armour (If applicable)	a) Dimension	Maj.	Mesu.	1 Sample/ Lot	1 Sample/ Lot	NTPC Approved Datasheet	NTPC 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: SUPPLIER/ NOMINATED INSPECTION AGENCY, N/E: NTPC/EMPLOYER, P: PERFORM, W: WITNESS AND V: VERIFICATION
APPROPRIATE CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W" $-IRRESPECTIVE OF SIZE AND TYPE

ADS - APPROVED DATA SHEET, SPEC. - CONTRACT SPECIFICATION, TC - TEST CERTIFICATE, COC - CERTIFICATE OF COMPLIANCE
IMR - INWARD MATERIAL REGISTER, FIR.- FINAL INSPECTION REPORT

.Indicative Quality Plan

एनटीपीसी NTPC	SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable/ Instrumentation Cable	As Per latest Standards VDE 0815,VDE 0207 part 4,5,6,VDE 0816,VDE 0472,Sen 4241475,ANSI MC 96.1, ASTMD 2863, IEC 754-1,IS 3975, IS-8784 and IS 10810	QP No.: 0000-999-QOI-S-035 Revision:01 Date:24.09.2018 Page:2 OF 5

Reviewed By: Chanchal Verma, Alok Shrivastava, S K Lal

Approved By: K K Ojha

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
E	Wooden Drums	a) Dimension	Minor	Measurement	Sample	_	As per Mfr std	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	V	COC from drum manufacturer
		b) Anti termite treatment	Minor	Chemi	As per Mfr std	_	As per Mfr std	As per Mfr std	COC	√	P	V	V	
		c) Marking	Minor	visual	As per Mfr std	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet			P	V	V	
F	Steel Drum (If applicable)	a) Dimension	Minor	measurement	Sample	_	As per Mfr std	As per Mfr std	IMR/ TC		P	-	-	
		b) Surface Finish	Minor	visual	_	_	As per Mfr std	As per Mfr std	IMR/ TC		P	-	-	
		c) Marking	Minor	visual	As per Mfr std	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet			P	V	V	
II	INPROCESS INSPECTION													
A	Wire Drawing & Anealing	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 10810	IS 10810	IMR/ TC		P	-	-	
B	Tinning (Only for Drain wire)	a) Size	Maj.	Dimn.	1 Sample/ Lot	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		b) Percentage of Elongation	Maj.	Mech.	1 Sample/ Lot	1 Sample/ Lot	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	V	V	
C	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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		c) Radial Thickness(Min & Max.)	Maj.	Measu.	1 Sample/ Lot	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	No Repairs are allowed on the Insulated core
		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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	V	-	
		g) TS & %Elongation	Maj.	Mech.	1 Sample/ Lot	_	IS 10810 NTPC Approved Datasheet	IS 10810 NTPC Approved Datasheet	IMR/ TC		P	-	-	
D	Twisting	a) Lay length and Direction	Maj.	Measu. & Visual	1 Sample at Start and 1 Sample at	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		b) Size/ Dimension	Maj.	Measu.	1 Sample/ Lot	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		c) Pair Colour	Maj.	Visual	100%	_	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	

LEGEND: * RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: MANUFACTURER/ SUB-SUPPLIER, C: SUPPLIER/ NOMINATED INSPECTION AGENCY, N/E: NTPC/EMPLOYER, P: PERFORM, W: WITNESS AND V: VERIFICATION
APPROPRIATE CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W" $-IRRESPECTIVE OF SIZE AND TYPE

ADS - APPROVED DATA SHEET, SPEC. - CONTRACT SPECIFICATION, TC - TEST CERTIFICATE, COC - CERTIFICATE OF COMPLIANCE
IMR - INWARD MATERIAL REGISTER, FIR.- FINAL INSPECTION REPORT

	ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable Instrumentation Cable	.Indicative Quality Plan As Per latest Standards VDE 0815,VDE 0207 part 4,5,6,VDE 0816,VDE 0472,Sen 4241475,ANSI MC 96.1, ASTMD 2863, IEC 754-1,IS 3975, IS-8784 and IS 10810	To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:01 Date:24.09.2018 Page:3 OF 5	Reviewed By: Chanchal Verma, Alok Shrivastava, S K Lal	Approved By K K Ojha

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
E	Laying of Pairs/ Taping/ Shielding (Wherever Applicable)	a) Construction	Maj.	Visu.	100%	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		b) Dimension	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		c) Coverage/ Overlap	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		d) Continuity	Maj.	Dimn.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		e) Bunching(for >4P)	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P			
F	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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		c) Diameter / Thickness	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
G	Sheathing (Outer)	a) Surface Finish	Maj.	Visual	100%	–	Smooth, free from visual defects#	Smooth, free from visual defects#	IMR/ TC		P	-	-	# Porosity, Burnt particles, Pimples (No Repairs are allowed)
		b) Colour/ Marking/ Embossing	Maj.	Visual	100%	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		c) Overall Diameter, Thickness	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		d) TS & %Elongation	Maj.	Mech.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /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	-	-	Min coverage shall be 90 %. Gap should not be more than 1 wire/ Strip dimension.
		c) Size of Wire/ Strip	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
		d) Diameter over Armouring	Maj.	Measu.	1 Sample/ Lot	–	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	-	-	
III. FINAL INSPECTION														
A.	TYPE TEST	.Clearance of type test report from NTPC site, if envisaged by PO specification, shall be verified during final inspection.												
B.	ROUTINE TEST	a) Cond.resistance (Cable & Drain wire)	Cri.	Elec.	100%	100%	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR	√	P	V	V	
		b) HV Test	Cri.	Elec.	100%	100%	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR	√	P	V	V	
		c) IR Test (on drum length)	Cri.	Elec.	100%	100%	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR	√	P	V	V	
		d) Drain wire contunity	Cri.	Elec.	100%	100%	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /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: SUPPLIER/ NOMINATED INSPECTION AGENCY, N/E: NTPC/EMPLOYER, P: PERFORM, W: WITNESS AND V: VERIFICATION
APPROPRIATE CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W" $-IRRESPECTIVE OF SIZE AND TYPE

ADS - APPROVED DATA SHEET, SPEC. - CONTRACT SPECIFICATION, TC - TEST CERTIFICATE, COC - CERTIFICATE OF COMPLIANCE
IMR - INWARD MATERIAL REGISTER, FIR.- FINAL INSPECTION REPORT

	SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable Instrumentation Cable	STANDARD QUALITY PLAN As Per latest Standards VDE 0815,VDE 0207 part 4,5,6,VDE 0816,VDE 0472,Sen 4241475,ANSI MC 96.1, ASTMD 2863, IEC 754-1,IS 3975, IS-8784 and IS 10810	QP No.: 0000-999-QOI-S-035 Revision:01 Date:24.09.2018 Page:4 OF 5	Reviewed By: Chanchal Verma Alok Shrivastava S K Lal	Approved By K K Ojha

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
IV	ACCEPTANCE TEST													
A	Constructional Details & Dimensions of complete cable	a) Constructional Details(CONDUCTOR,DRAIN WIRE,SHEILDING ETC,)	Maj.	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		b) Shield Al-mylar thickness	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		c) Insulation thickness	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		d) Inner/ Outer sheath thickness (as applicable)	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	before and after ageing for insulation.
		e) Diameter over outer sheath	Maj.	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		f) Outer sheath - Colour, Marking/ Embossing & End sealing.	Maj.	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		g) Length checking.	Maj.	Measu.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		h) 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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		i) 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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	Continuity shall be checked as per Manufacturer practice.
		j) 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
B	Insulation	a) Volume Resistivity (At room and Elevated Temperature)	Maj.	Elec.	1 No./ Complete lot offered $	1 No./ Complete lot offered $	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		b) IR Test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		c) TS & %Elongation test of Insualtion (Before & After aging)	Maj.	Mech	1 No./ Complete lot offered $	1 No./ Complete lot offered $	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		d) Thermal Stability	Maj.	Chem.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	VDE 207 Part -4/5	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
C	Sheath	a) TS & %Elongation test of Sheath (Before & After aging)	Maj.	Mech	1 No./ Complete lot offered $	1 No./ Complete lot offered $	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		b) Thermal Stability	Maj.	Chem.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	VDE 207 Part -4/5	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		c) 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.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	

एनटीपीसी NTPC	ITEM : Instrumentation Cables. SUB SYSTEM : Shielded Instrument/ TC extension/ Compensating PVC FRLS Cable/ [redacted] Instrumentation Cable	**STANDARD QUALITY PLAN** As Per latest Standards VDE 0815,VDE 0207 part 4,5,6,VDE 0816,VDE 0472,Sen 4241475,ANSI MC 96.1, ASTMD 2863, IEC 754-1,IS 3975, IS-8784 and IS 10810	To be filled by NTPC QP No.: 0000-999-QOI-S-035 Revision:01 Date:24.09.2018 Page:5 OF 5	Reviewed By: Chanchal Verma Alok Shrivastava S K Lal	Approved By K K Ojha

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
D	Armouring (If applicable)	a) Surface finish	Crl	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	Smooth, free from visual defects like rusting etc.	Smooth, free from visual defects like rusting etc.	IMR/ TC		P	W	W	
		b) Direction of Lay & Coverage	Crl	Visual	Samples as per IS 1554/8784	Samples as per IS 1554/8784	Smooth, free from visual defects like rusting etc.	Smooth, free from visual defects like rusting etc.	IMR/ TC		P	W	W	Min coverage shall be 90 %. Gap should not be more than 1 wire/ Strip dimension.
		c) Size of Wire/ Strip	Crl	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
		d) Diameter over Armouring	Crl	Measu.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
		e)Resistance Test	Crl	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
		f) Wrapping Test	Crl	Mech	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
		g) Tensile Test	Crl	Mech	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
		h) Elongation Test	Crl	Mech	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	IMR/ TC		P	W	W	
E	Tests on complete cable	a) Electrical Parameters (Mutual capacitance, Cross talk, Attenuation, Charactristic Impedence as applicable)	Maj.	Elec.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		b) Swidesh chimney test (overall cable)	Maj.	Chem	1 No./ Complete lot offered $	1 No./ Complete lot offered $	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		c) Armouring Dimension & Zn coating. (If applicable)	Maj.	Measu.	1 No./ Complete lot offered $	1 No./ Complete lot offered $	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		d) Cond.resistance (Cable & Drain wire)	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		e) Flammability test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		f) HV Test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		g) IR test	Cri.	Elec.	Samples as per IS 1554/8784	Samples as per IS 1554/8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		h) Thermal EMF test (For compensating cable only)	Maj.	Elec.	Sample as per IS 8784	Sample as per IS 8784	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
		i) Persulphate Test (For Drain wire only)	Maj.	Chem.	1 No. of each size & type per Lot	1 No. of each size & type per Lot	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet	FIR		P	W	W	
F	Packaing and Dispatch	a) Stencileing, sealing, completeness & Verification with offered list	Maj.	Visual.	100%	1 No. of each size & type per Lot	NTPC Tech.Specfication /Approved Datasheet	NTPC Tech.Specfication /Approved Datasheet			P	-	W	
		b) Identification	Maj	Visual	100%	100%	Sealing shall be visible	Sealing shall be visible			P	V	V	

LEGEND: * RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: MANUFACTURER/ SUB-SUPPLIER, C: SUPPLIER/ NOMINATED INSPECTION AGENCY, N/E: NTPC/EMPLOYER, P: PERFORM, W: WITNESS AND V: VERIFICATION
APPROPRIATE CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W" $-IRRESPECTIVE OF SIZE AND TYPE

ADS - APPROVED DATA SHEET, SPEC. - CONTRACT SPECIFICATION, TC - TEST CERTIFICATE, COC - CERTIFICATE OF COMPLIANCE
IMR - INWARD MATERIAL REGISTER, FIR.- FINAL INSPECTION REPORT

Note: .A) Reference and Acceptance norms shall be derived from following in the same sequence-
1) NTPC Approved drawing / data sheet ; 2) NTPC tech specs ; 3) Purchase Order ; 4) Relevant national standard
5) Relevant International standard ; 6) Manufacturer's standard 7) Good Engineering practices
B) Main Contractor Column may please be ignored.