

PRODUCT STANDARD
ELECTRICAL C & I
BAP/BHEL/RANIPET - 632 406.

TECI: NTPC: PCCAB: REV 01
Page - 01 of 07
EFFECTIVE DATE: 16.09.2016

TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS FOR ESP
ITEM : POWER AND CONTROL CABLES.
CUSTOMER : NATIONAL THERMAL POWER CORPORATION LTD (NTPC)

NAME		DESIGNATION	SIGNATURE	DATE
PREPARED	A.K.PALANISAMY	Sr Engineer		16.09.2016
CHECKED	M.JEYAMURUGANAND	SDGM		16.09.2016
APPROVED	M.JEYAMURUGANAND	SDGM		16.09.2016

ISSUED BY

EDC - ECI

REVISION NO: 01 - XLPE SPECIFICATION ADDED

INITIAL RELEASE: 09.03.2009

1.0.0 SCOPE:

1.1.0 The scope of supply of cables includes, design, manufacture, inspection, testing, packing and delivery.

2.0.0 APPLICATION:

2.1.0 The cables to be supplied under this specification are intended to be used for the interconnection of various electrical equipments of Electrostatic Precipitator (ESP), such as Transformer Rectifier, Electronic Controller, Auxiliary Control panel, Rapping Motors, Heaters etc.

3.0.0 APPLICABLE STANDARDS

3.1.0 The cable shall be manufactured, tested and packed as per the following standards (latest issues and their amendments if any). In case of any conflict between these standards and this technical specification, the latter shall prevail to the extent of such difference.

3.1.1 IS 1554 (Part I) – For PVC insulated (heavy duty) electric cables for working voltage upto and including 1100 V.

3.1.2 IS 7098 (Part - I) - For cross linked polyethylene (XLPE) insulated cables, for working voltages upto and including 1100V

3.1.3 IS 3961 - Recommended current ratings for cables.

3.1.4 IS 5831 - PVC insulation and sheath of electrical cables

3.1.5 IS 8130 - Conductors for insulated electric cables and flexible cords

3.1.6 IS 9938 - Recommended colours for PVC insulation for LF wires and cables

3.1.7 IS 10418 - Specification for drums for electric cables.

3.1.8 IS 10462 (Part-I) - Fictitious calculation method for determination of dimensions of protective coverings of cables

3.1.9 IS 10810 - Methods of test for cables.

3.1.10 IEEE 383 - Standard for type test of Class II electric cables, field splices and connections for Nuclear Power Generation stations.

3.1.11 ASTM D 2843 - Standard test method for density of smoke from the burning or decomposition of plastics.

3.1.12 ASTM D 2863 - Standard test method for measuring the minimum oxygen concentration to support candle like construction of plastics.

- 3.1.13 IEC 754 (Part-I). - Test on gases evolved during combustion of electric cables
- 3.1.14 SS 4241475 - Flammability testing of cables. (F3 CATEGORY)
- 3.1.15 IEC 332 (part 3) (category B) - Test on electric cables under fire condition.

4.0.0 SITE ENVIRONMENT:

- 4.1.1 Ambient Temperature : 5 deg.C to 50 deg.C
- 4.1.2 Relative Humidity : 100 %
- 4.1.3 Design Ambient Temp. : 50 deg.C
- 4.1.4 Fault Level : 50 KA for 1 sec.

5.0.0 SPECIFICATION OF CABLE:

5.1.0 CONDUCTOR

- 5.1.1 Material :
i. Stranded Aluminium - H2 grade as per IS 8130.
ii. Copper - Annealed bare copper of electrolytic grade as per IS 8130.
Bare/tinned copper as per enquiry/purchase order
- 5.1.2 Construction : Multi stranded for any cross section for both ALUMINIUM and COPPER conductor cables.
- 5.1.3 Number of strands : Minimum 7 strands.
- 5.1.4 Shape : Compacted type for sizes above 10 Sq.mm
- 5.1.5 Cross section area : As per Purchase enquiry / purchase order. The specified area shall be maintained strictly as per enquiry immaterial of DC resistance.
- 5.1.6 Tensile strength : Minimum 100 N/mm² for aluminium conductor

5.2.0 INSULATION

- 5.2.1 Material : XLPE as per IS 7098 (Part-I) or PVC type A as per IS 5831 as per Enquiry/PO.

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- 5.2.2 Method of application : Extrusion
- 5.2.3 Thickness : As per IS 1554 (Part-1) for PVC insulated cables as per IS 7098 (Part-1) for XLPE insulated cables.
- 5.2.4 Colour identification
- i) Cores of the cables of upto 5 cores shall be identified by colouring of insulation. Following colour scheme shall be adopted.
- ii)
- | | | |
|--------|---|-----------------------------------|
| 1 core | : | Red, Black, Yellow or Blue |
| 2 core | : | Red & Black |
| 3 core | : | Red, Yellow & Blue |
| 4 core | : | Red, Yellow, Blue and Black |
| 5 core | : | Red, Yellow, Blue, Black and Grey |
- 5.2.5 For cables having more than 5 cores, core identification shall be done by numbering the insulation of cores sequentially, starting by number 1 in the inner layer (e.g. say for 10 core cable, core numbering shall be from 1 to 10). The number shall be printed in Hindu-Arabic numerals on the outer surfaces of the cores. All the number shall be of the same colour, which shall contrast with the colour of insulation. The colour of insulation for all the cores shall be grey only. The numerals shall be legible and indelible. The numbers shall be repeated at regular intervals along the core, consecutive numbers being inverted in relation to each other. When the number is a single numeral, a dash shall be placed underneath it. If the number consists of two numerals, these shall be disposed one below the other and a dash placed below the lower numeral. The spacing between consecutive numerals shall not exceed 50 mm.
- 5.2.6 For reduced neutral conductors, the core shall be black.
- 5.2.7 Shade of insulation colour : As per IS 9938
- 5.3.0 FILLERS (if provided) :
- 5.3.1 Material : Non-hygroscopic, Fire Retardant, suitable for the operating temp. of cable.
- 5.4.0 **INNER SHEATH:**
- 5.4.1 Material : PVC type ST-1 as per IS 5831 for PVC insulated cable & PVC type ST-2 as per IS 5831 for XLPE insulated cable.
- 5.4.2 Method of application : Extrusion
- 5.4.3 Thickness : As per IS 1554 (Part-I)
- 5.4.4 Colour : Black for power & control cable
- 5.5.0 **ARMOURING** : No armouring shall be provided.

5.6.0 OUTER SHEATH:

- 5.6.1 Material : FRLS PVC type ST1 as per IS 5831 for PVC insulated cable & FLRS PVC type ST2 as per IS 5831 for XLPE insulated cable.
- 5.6.2 Method of application : Extrusion
- 5.6.3 Thickness : As per IS 1554 (Part-1) for PVC insulated cable & as per IS 7098 (Part-1) for XLPE insulated cable.
- 5.6.4 Colour
- i) For power cable : Black
 - ii) For control cable : Grey

**5.7.0 ADDITIONAL REQUIREMENT OF OUTER SHEATH:
(REQUIREMENT OF FRLS PROPERTIES)**

- 5.7.1 i. Oxygen index : Minimum 29 (As per ASTM D 2863)
ii. Temperature index : Not less than 250°C at 21 oxygen index (when tested as per ASTM D 2863)
- 5.7.2 Max. acid gas generation by weight : Maximum 20% (when tested as per IEC 754 – A Part-I)
- 5.7.3 Light transmission : Minimum 40% (when tested as per ASTM D 2843), Smoke density rating shall be max.60%. This is average value and not instantaneous value.
- 5.7.4 Flammability : All cables shall pass the flammability test Per IEC 332 part 3 (category B) and as per IEEE 383.
- 5.7.5 Flame resistance : All cables shall meet the flame resistance requirement as per Category F3 of SS 4241475.

5.8.0 GENERAL REQUIREMENTS:

- 5.8.1 The cable shall be designed to withstand all mechanical, electrical and thermal stresses under the foreseen steady state and transient / fault operation conditions. All cables shall be suitable for high ambient, high humid tropical Indian conditions.
- 5.8.2 Cable shall be 1100V grade, PVC/XLPE insulated, unarmoured having outer sheath of FRLS (Fire retardant low smoke) PVC ST1/PVC ST2.

- 5.8.3 All cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour.
- 5.8.4 The PVC cable shall be designed for a steady state continuous conductor temperature of 70 deg. C and short circuit withstand temperature of 160 deg C.
- 5.8.5 The XLPE cable shall be designed for a steady state continuous conductor temperature of 90 deg. C and short circuit withstand temperature of 250 deg C.
- 5.8.6 For outer sheath, polyethylene based halogen free material is not acceptable.
- 5.8.7 Allowable tolerance on overall diameter of the cable shall be + / - 2 mm maximum over the declared value in the technical data sheet .
- 5.8.8 The nominal current rating of all PVC insulated cables shall be as per IS 3961.
- 5.8.9 Repaired cables shall not be offered and the same will not be accepted. Pimples, fish eye, blowholes etc., are not acceptable.
- 5.8.10 In addition to manufacturer's identification on cables as per IS, following embossing/printing shall also be provided over outer sheath.
- 1) Cable size & voltage grade - To be embossed
 - 2) Word FRLS at every 5 metre - To be embossed
 - 3) Sequential marking of length of cables in metres at every one metre – To be embossed / printed
- The embossing/printing shall be progressive, automatic, in line and shall be legible and indelible.
- 5.8.11 The cables shall be supplied in non-returnable wooden or steel drums in coil form of length 1000 metres $\pm 5\%$.
- 5.8.12 Progressive markings to read "FRLS" at every 5 metres shall be provided by embossing on the outer sheath of all cables.
- 5.8.13 The cable cores shall be laid up with fillers between the cores wherever necessary. The fillers should not be stick to insulation and inner sheath.

6.0.0 PACKING AND MARKING:

- 6.1.0 The cable shall be wound on a non-returnable drum in length of 1000 metres $\pm 5\%$ and packed. Cables of size 1C-240 sq.mm / 2C-185 sq.mm and above sizes can be supplied in 500 mtrs drum length or as mentioned in enquiry/purchase order. The packing shall be suitable for keeping it in outside which shall withstand heavy rain & dusty environment. The remaining length shall be supplied in a single drum. Cut bits or not acceptable. Over all quantity tolerance against each size shall be +0%, -2%.
- 6.1.1 The wooden drum shall be provided as per IS 10418.

- 6.1.2 The ends of the cable shall be properly sealed with heat shrinkable PVC / rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection.
- 6.1.3 The information as detailed in Clause 18.2 of IS 1554 (Part-I) shall be stencilled on each drum.
- 6.1.4 Non – hygroscopic PVC/ POLYETHYLENE sheet shall be provided on the surface of the barrel of the drum and over outermost layer of the cable.
- 6.1.5 Wood preservative anti-termite treatment shall be applied to the enter drum.
- 6.1.6 Each dream shall carry manufacturer's name, Purchaser's name, address, item number, contact number and type, size and length of cable and net gross weight stencilled on both sides of 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.

7.0.0 DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:

The data sheet shall be submitted in soft media, within 10 days from the date of order, for approval.

8.0.0 INSPECTION AND TESTING:

- 8.1.0 The cable shall be inspected and tested based on the following documents.

1. NTPC approved Quality Plan
2. BHEL Technical Specification (TEP)
3. BHEL Purchase order
4. BHEL approved suppliers data sheet

- 9.0.0 This specification meets NTPC contract specification. Hence no deviation shall be taken by the supplier.

PROJECT: NTPC-NCTPP DADRI-II (4X490MW) FGD PACKAGE CONTRACTOR:BHEL-RANIPET CONTRACT NO: .: CS-6130-109-9		CONTRACT QUALITY REQUIREMENTS (CQR) for POWER & CONTROL CABLE NTPC-NCTPP DADRI-II (4X490MW) FGD PACKAGE (BHEL CUST No: G501& G502)	DOC.NO: BAP/QR/G501&G502/ P&C:009 Rev NO. : 00 PAGE : Page 1 of 2 DATE: 17 05 2018	##Enquiry No: ##Supplier Name: ##Offer reference: ##Date:
Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements		##Specific confirmations by the vendor

ITEM: LT POWER & CONTROL CABLES

01	Type Test Requirements	- Vendor shall submit the type test reports of all the type tests as listed in SL NO:4 and carried out with in 10 years from the data of NTPC bid opening date 19 12 2017. These reports should be for the test conducted on the similar equipment to those proposed to be supplied under this enquiry and test(s) should have been either conducted at an independent laboratory (or) should have been witnessed by TPI/BHEL/NTPC. - However if vendor is not able to submit the similar type test report as per above condition (or) in the case of type test reports are not found to be meeting the specification requirement, the vendor shall conduct all the tests at no additional cost to BHEL either at third party lab (or) own lab in the presence of TPI/BHEL/NTPC and submit the reports for approval - Type Test reports review and approval by NTPC is a must - The following type test certificates shall be submitted. <u>CONDUCTOR</u> ✓ Resistance test : For Al/Cu ✓ Tensile test : For circular non-compacted conductors only ✓ Wrapping test: For circular non-compacted only <u>ARMOUR WIRES/FORMED WIRES (If it is applicable)</u> ✓ Measurement of dimensions ✓ Tensile test ✓ Elongation test ✓ Torsion test : For round wire only ✓ Wrapping test: For aluminum wires/formed wires only ✓ Resistance Test ✓ Mass of zinc coating test : For GS formed wires/ wires only ✓ Uniformity of Zinc coating t: For GS formed wires/wires only. ✓ Adhesion test : For GS formed wires/wires only. <u>PVC INSULATION & PVC SHEATH</u> ✓ Test for thickness ✓ Tensile strength and elongation test before ageing and after ageing ✓ Ageing in air oven ✓ Loss of mass test: For PVC Insulation & PVC sheath only ✓ Hot deformation test: PVC insulation & PVC sheath only. ✓ Shrinkage test ✓ Thermal stability test: For PVC insulation & PVC sheath only ✓ Oxygen index test: For outer sheath only ✓ Smoke density test : For other sheath only ✓ Acid gas generation test: For outer sheath only ✓ Heat shock Test: For PVC insulation & sheath only ✓ Hot set test (For XLPE Insulation Only) ✓ Water absorption test (For XLPE Insulation only) <u>COMPLETED CABLES</u> ✓ Flammability test as per IEC 332 Part – III. Cat -B ✓ Insulation Resistance test (Volume Resistivity Method) ✓ High Voltage Test	
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PROJECT: NTPC-NCTPP DADRI-II (4X490MW) FGD PACKAGE CONTRACTOR:BHEL-RANIPET CONTRACT NO: .: CS-6130-109-9		CONTRACT QUALITY REQUIREMENTS (CQR) for POWER & CONTROL CABLE NTPC-NCTPP DADRI-II (4X490MW) FGD PACKAGE (BHEL CUST No: G501& G502)	DOC.NO: BAP/QR/G501&G502/ P&C:009 Rev NO. : 00 PAGE : Page 2 of 2 DATE: 17 05 2018	##Enquiry No: ##Supplier Name: ##Offer reference: ##Date:
Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements		##Specific confirmations by the vendor

ITEM: LT POWER & CONTROL CABLES

		5. The Test reports along with test certificates shall also be given as PDF file with index sheet & page control thro Email & CD (File size to less than 9MB).(.)	
02	Quality Plan Requirement	1. NTPC SQP ref: SQP-0000-999-QOE-S-040 Rev: 00 Dt 21 01 2014 is applicable for Control cable and NTPC SQP ref: SQP-0000-999-QOE-S-041 Rev 00 Dt 21 01 2014 is applicable for Power cable. 2. The applicable NTPC SQPs for control and power cables are attached. 3. Vendor shall submit the filled up Endorsement sheet for above NTPC approved SQPs separately for control cable and power cable with signature & seal along with this offer (typical copy attached).	
		4. Specific confirmation for Document Package in the event of an order (2 hard copies + 2 CDs in PDF file) is to be given containing the following with proper linkages (.) (i) Index Sheet (ii) MQP/RQP/Endorsement sheet (iii) TCs identified by BHEL/NTPC for record for “CHP” and Verification portion as given in RQP/MQP. (iv) Final Inspection Report + all applicable Test Certificates (v) BHEL/BHEL authorized Inspection Agency report + TC (vi) Type test reports conducted/submitted with approval (vii) NTPC CHP/MDCC	

Supplier signature with seal

Necessarily to be filled up by the vendor at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirements being customer specific requirements.

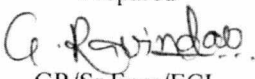
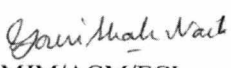
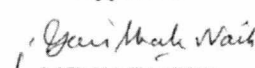
	BHEL: BAP: RANIPET ELECTRICAL C&I Pre-Qualification requirement for CONTROL CABLES	REF: RFW80196:CONTROL CABLES
		REVISION NO:00
		DATE:13.07.2018

The Qualification requirements (QR) for participation in the tender for CONTROL CABLES is detailed below. Bidders should meet the qualification requirement specified below.
Offers of bidders who do not meet qualification requirement will not be considered.

ITEM: CONTROL CABLES

SCOPE: Supply : Yes; Erection & Commissioning : No;	
1	Vendor shall be a manufacturer of CONTROL cables.
2	Vendor shall produce test reports establishing in house test facilities
3	Capability of manufacturing capacity : 100 KM / month.
4	Vendor should have manufactured and supplied 1 KM of FRLS cable
5	Vendor should have supplied 20 KM of similar cable to any one project.
6	Vendor should be approved by NTPC for supply of similar cables
7	Vendor to furnish technical catalogue for cables.

Documentary evidence for the above requirements shall be submitted by bidder.
Final acceptance of Bidder is subject to approval of End customer.

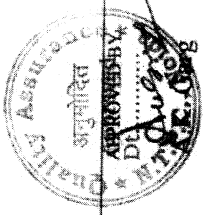
Prepared  GR/Sr.Engr/ECI	Reviewed  f. MJM/AGM/ECI	Approved  f. MJM/AGM/ECI
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Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART I AND NTPC TECHNICAL SPECIFICATION)				OP NO. 0000-999- QOE- S-040 REV-00 DATE: 25-11-11		REVIEWED BY INDERJIT SINGH		APPROVED BY	
Component & Operations		Characteristics		Class	Type of check	Quantum of check		Reference Document		Acceptance Norms	
Sl. No	2	3	4	5	M	C/N	6	7	8	9	10
1	Instructions: 1) Cable manufacturer to maintain records to show co-relation of raw materials to finished cables i.e raw material batch/ lot no. should be traceable to the cable drum.										
2	Cable manufacturer to maintain all quality control records identified as per all OP stages enumerated below whether it is identified for NTPC verification or witness or not										
Raw material/ Brought out Items											
1.01	Copper	1. Make	MA	Verify	100%	--		MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	QCR	
		2. Resistivity	MA	Elect	As per cable Mfr Std.	--		IS 613	IS 613	-do--	
1.02	PVC compound for insulation	1. Make	MA	Verify	--do--	100%		MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	-do--	
		2. Type/ Grade	MA	Verify	100%			NTPC ADS	NTPC ADS	-do--	
		3. All acceptance test as per manufacturer norms including Thermal Stability test	MA	Verify	As per manufacturer norms			--do--	--do--	-do--	Refer note
1.03	PVC Compound for inner sheath	1. Make	MA	Verify	--do--	--do--		MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	-do--	
		2. Type/ Grade	MA	Verify	--do--	--do--		NTPC ADS	NTPC ADS	-do--	
1.04	Steel wire / Formed Wire (As applicable)	1. Make	MA	Verify	--do--	--do--		MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	-do--	
		2. Dimension	MA	Meas	1 sample from each size / lot	--		NTPC APPROVED DATA SHEET & IS 3975	NTPC APPROVED DATA SHEET & IS 3975	-do--	
1.05	PVC compound for Sheath	3. All acceptance tests as per IS 3975	MA	Verify	As per IS 3975	--		IS 3975	IS 3975	Supplier TC	
		1. Make	MA	Verify	As per manufacturer norms	100%		MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	QCR	
		2. Type / Grade	MA	Verify	100%			NTPC ADS	NTPC ADS	-do--	
		3. All acceptance test as per manufacturer norms	MA	Verify	As per manufacturer norms			--do--	--do--	-do--	Refer note
		4. Thermal Stability	MA	Chem	One sample / Batch	--		NTPC ADS	NTPC ADS	QCR	
		5. Oxygen Index	MA	Chem	--do--	--		NTPC ADS/ IS 10810 Part 58	NTPC ADS	-do--	

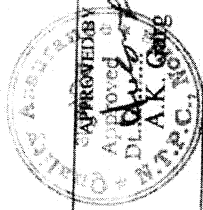
LEGEND: "RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

M: MANUFACTURER/SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM WITNESS, V: VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W" FORMAT NO: QS-01-QAL-P-10/F3-R1



Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)				CP NO 0000-999-QOE-S-040 REV-00 DATE: 23-11-11 Page 2 of 9		REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJESH K		APPROVED BY DR.	
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Record Format	D*	Agency	Remarks
					M / C/N					M C N	
1	2	3	4	5	6	7	8	9		10	11
1.06	Wooden Drum	6. Acid Gas Emission 1. Dimension 2. Anti termite treatment	MA MI MI	Chem Meas Chem	One sample / Batch Manuf. Std. Cable manuf std	NTPC ADS / IEC 60754 IS 10418 CABLE MANUF. STD.	NTPC ADS IS 10418 CABLE MANUF. STD.	QCR -do- COC		P P V	COC from drum manuf
1.07	Steel Drum	1. Dimension 2. Surface finish	MI MI	Meas Meas	-do- -do-	-do- -do-	-do- -do-	QCR -do-		P P	
B	Process & Stage Inspection										
2.01	Wire Drawing	1. Surface finish 2. Wire Diameter 3. Annealing Test	MA MA CR	Visual Meas Mech	One sample/Setting of each size -do- -do- Same as 6M	SHOULD BE SMOOTH & FREE FROM SCRATCHES NTPC ADS IS 8130/NTPC ADS	SHOULD BE SMOOTH & FREE FROM SCRATCHES NTPC ADS IS 8130/NTPC ADS	QCR -do- -do-		P P P	
2.02	Bunching / stranding	1. No. of wires 2. Dia of wire 3. Dimension of Conductor 4. Direction of lay 5. Records of strand breakage / welding during conductor stranding 6. Surface finish 7. DC Resistance	MA MA MA MA MA MA CR	Meas Meas Meas Visual Verify Visual Meas	-do- -do- -do- -do- -do- -do- -do-	NTPC ADS -do- -do- -do- -do- IS 8130 -do- IS 8130/NTPC ADS	NTPC ADS -do- -do- -do- -do- IS 8130 -do- IS 8130/NTPC ADS	-do- -do- -do- -do- -do- -do- -do-		P P P P P P P	Refer Sl No. 3.03(iii).
2.03	Insulation extrusion	1. Surface finish 2. Colour of cores	MA MA	Visual Visual	-do- -do-	NTPC spec NTPC ADS	SHOULD BE SMOOTH, NO POROSITY IS PERMITTED. NTPC ADS	-do- -do-		P P	PVC compound shall be preferably loaded in to extruder by suction method

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 *M:MANUFACTURER/SUPPLIER, C:MAIN SUPPLIER, N:NTPC, P:PERFORM W:WITNESS, V:VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"
 FORMAT NO:QS-01-QALP-10/F3-R1



Item: 1.1 KV PVC Insulated FRLS Control cables										STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)					QP NO 0000-999-QOE-S-040 REV-00 DATE: 25-11-11 Page 3 of 9			REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG		APPROVED BY D.L. GARG A.K. GARG			
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Record Format	D*	M	C	N	Remarks									
1	2	3	4	5	M	C/N	7	8	9														
		3 Core identification	MA	Visual	One sample/Setting of each size	--	NTPC ADS	NTPC ADS	QCR		P	10	--	Core printing shall be legible & indelible									
		4 Thickness	CR	Meas	--do--	--	--do--	--do--	--do--		P	--	--										
		5 Spark Test	CR	Elect	100%	100%	CABLE MANUF. STD	No FAILURE	--do--		P	V	V	1. Spark test failure record is to be verified 2. Core repairing not permitted									
2.04	Laying up	1 Core sequence	MA	Visual	One sample/Setting of each size	--	IS 1554 (Part I)	IS 1554 (Part I)	--do--		P	--	--										
2.05	Inner Sheath	2. Direction of lay	MA	Visual	--do--	--	--do--	--do--	--do--		P	--	--										
		3. Dia over laid up core	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--										
		1. Colour	MA	Visual	--do--	--	--do--	--do--	--do--		P	--	--										
		2. Surface Finish	MA	Visual	100%	--	NTPC SPECIFICATION	FISH EYE, BLOW HOLE NOT PERMITTED	--do--		P	--	--										
		3. Thickness	MA	Meas	One sample/Setting of each size	--	NTPC ADS	NTPC ADS	--do--		P	--	--										
2.06	Armouring (As Applicable)	4. Dia over inner sheath	MI	Meas	--do--	--	--do--	--do--	--do--		P	--	--										
		1. Dimension	MA	Meas	--do--	--	--do--	--do--	--do--		P	--	--										
		2. No. of wires / strip	MA	Meas	--do--	--	--do--	--do--	--do--		P	--	--										
*RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION																							
-M: MANUFACTURER/SUPPLIER, C: MAIN SUPPLIER, N: NTPC, B: BUREAU OF STANDARDS																							

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
M: MANUFACTURER/SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM W: WITNESS, V: VERIFICATION AS APPROPRIATE, CHE: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"

Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)				Q.P. NO. 0000-999-QOE-S-040 REV-00 DATE: 25-11-11 Page 4 of 9 VALID UP TO: 24-11-14		REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV KADAM		APPROVED BY DR. A. K. Kishore	
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Record Format	D*	Agency	Remarks
					M C/N					M C N	
1		3 Direction of lay	4 MA	5 Visual	6 One sample/Setting of each size	7 IS 1554 (Part 1)	8 IS 1554 (Part 1)	9 QCR		P	11
		4 Coverage & Quality of armouring	MA	Meas.	100%	Min area of coverage of armouring shall be 90%. The gap between armour wires / formed wires shall not exceed one armour wire/ formed wire space & there shall be no cross over/ over riding of armour wire / formed wire. Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire. The breaking load of armour wire joint shall not be less than 95% of that of armour wire / formed wire. (As per NTPC specification)		--do--		P	
		5 Dia over armouring	MA	Meas.	One sample/Setting of each size	NTPC ADS	NTPC ADS	--do--		P	
2.07	Outer Sheath	1 Surface finish	MA	Visual	100%	Pimple, Fish Eye, Burnt particles, Blow Hole not permitted. Repairing on outer sheath not permitted (As per NTPC specification)		--do--		P	PVC FRLS compound shall be preferably loaded in to extruder by suction method
		2 Colour of sheath	MA	Visual	One sample/Setting of each size	NTPC ADS	NTPC ADS	--do--		P	
		3 Dia over outer sheath	MA	Meas	--do--	--do--	--do--	--do--		P	
		4 Thickness of outer sheath	CR	Meas	--do--	--do--	--do--	--do--		P	
		5 Embossing quality	MA	Visual	100%	Drum no. IS1554 Part-1. Cable size, Voltage grade & Words "FRLS" at every 5 meter is to be embossed. Embossing shall be automatic, in line & marking shall be legible & indelible. (As per NTPC specification)		--do--		P	Drum no on cable may be embossed/ printed

LEGEND: *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
-M=MANUFACTURER/SUPPLIER, C=MAIN SUPPLIER, N=NTPC, P=PERFORM W-WITNESS, V=VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W".

Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)				Q.P. NO. 0000-999- QOE- S-040 REV-00 DATE: 25-11-11 Page 5 of 9 VALID UP TO: 24-11-14		REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJESH BARI Acceptance Norms		APPROVED BY A.K. Garg	
Sl No	Component & Operations	Class	Type of check	Quantum of check	Reference Document	Record Format	D*	M	N	Remarks	
				M / C / N							
1	6. Sequential marking	MA	Visual	Full length	7	8	9			11	
					Sequential marking of length of cable in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible. (As per NTPC specification)	QCR					
3.01	Finished Cables Type test reports clearance from NTPC Engineering Routine Tests	CR	Doc.	100%	NTPC SPECIFICATION / NTPC ADS / IS 1554 (Part I)	NTPC SPECIFICATION / NTPC ADS / IS 1554 (Part I)	✓	✓	✓	V	
3.02	1. High Voltage test at room temperature 2. Conductor Resistance	CR	Elect	100%	NTPC ADS / IS 1554 (Part I)	NTPC ADS / IS 1554 (Part I)	✓	✓	✓	W	
3.03	Acceptance Tests	CR	Elect	100%	NTPC ADS / IS 1554 (Part I)	NTPC ADS / IS 1554 (Part I)	✓	✓	✓	W	
3.03(i)	Construction of finished Cable	MA	Meas.	Each type & size of cables as per sampling plan of IS 1554 (Part I)	NTPC ADS	NTPC ADS	✓	✓	✓	W	
	2. Laying of core	CR	Visual	--do--	IS 1554 (Part I)	NTPC ADS / IS 1554 (Part I)	✓	✓	✓	W	
	3. Core Identification	CR	Visual	--do--	--do--	--do--	✓	✓	✓	W	
	4. Colour of outer sheath	MA	Visual	--do--	NTPC ADS	NTPC ADS	✓	✓	✓	W	
	5. Inner sheath thickness	CR	Meas	- do -	--do--	--do--	✓	✓	✓	W	
	6. Inner sheath colour	MA	Visual	- do -	- do -	- do -	✓	✓	✓	W	
3.03 (ii)	Armour wires/ Formed wires (if applicable)	CR	Meas	Each type & size of cables as per sampling plan of IS 1554 (Part I)	NTPC ADS / IS 1554 (Part I) / IS 3975	NTPC ADS / IS 1554 (Part I) / IS 3975	✓	✓	✓	W	
	2. No of wires/ formed wire	CR	Mech	-- do --	--do--	--do--	✓	✓	✓	W	
	3. Tensile test	CR	Mech	--do--	--do--	--do--	✓	✓	✓	W	

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M: MANUFACTURER/SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM W/ WITNESS, V: VERIFICATION AS APPROPRIATE, CHF: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W".

Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)				QIP NO 0000-999-QOE-S-040 REV-00 DATE: 25-11-11 Page 6 of 9 VALID UP TO: 24-11-14		REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG		APPROVED BY A.K. Garg			
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Record Format	D*	M	C	N	Remarks
					M C/N								
1		4 Elongation test	CR	Mech	Each type & size of cables as per sampling plan of IS 1554 (Part 1)	7	NTPC ADS /IS1554(Part)/IS3975	Test certificate	✓	P	W	W	11
		5 Torsion test (for round wires only)	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	
		6 Wrapping test	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	
		7 Resistance test	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	
		8 Mass of Zinc coating	CR	Meas	--do--	--do--	--do--	--do--	✓	P	W	W	
		9 Uniformity of Zinc Coating	CR	Chem.	--do--	--do--	--do--	--do--	✓	P	W	W	
		10 Adhesion test	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	
		11 Freedom from defects	CR	Visual	--do--	--do--	--do--	--do--	✓	P	W	W	
3 03 (ii)	Conductor	1 Annealing test	CR	Mech	--do--	NTPC ADS/ IS 8130	NTPC ADS/ IS 8130	--do--	✓	P	V	V	Refer Sl No 2 01
		2 Resistance Test	CR	Elect	--do--	--do--	--do--	--do--	✓	P	W	W	
		1. Thickness of insulation & sheath	CR	Meas.	--do--	NTPC ADS/ IS 1554(Part1)	NTPC ADS/ IS 1554(Part1)	--do--	✓	P	W	W	
		2. Tensile strength & elongation at break of insulation & outer sheath (before ageing)	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	
		3 Tensile strength & elongation at break of insulation & outer sheath (after Ageing)	CR	Mech	--do--	--do--	--do--	--do--	✓	P	W	W	Refer Note 3 also
		4. Insulation resistance (Volume resistivity method)	CR	Elect	Each type & size of cables as per sampling plan of IS 1554 (Part 1)	NTPC ADS/ IS 1554(Part1)	NTPC ADS/ IS 1554(Part1)	--do--	✓	P	W	W	Refer Note 3
		5 High voltage test at room temperature	CR	Elect	--do--	--do--	--do--	--do--	✓	P	W	W	
		6 Thermal stability on PVC Insulation and outer sheath	CR	Chem	One sample of each offered lot of all offered sizes	--do--	--do--	--do--	✓	P	W	W	
		7 Oxygen index Test on outer sheath	CR	Chem	--do--	NTPC ADS / IS10810 Part 58	NTPC ADS	--do--	✓	P	W	W	
		8 Smoke density rating test on outer sheath	CR	Chem	--do--	NTPC ADS & ASTM D2843	NTPC ADS	--do--	✓	P	W	W	

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 *D:MANUFACTURER/SUPPLIER, C:MAIN SUPPLIER, N:NTPC, P:PERFORM W:WITNESS, V:VERIFICATION AS APPROPRIATE, CH: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"

STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)												Q.P. NO. 0000-999- QOE- S-040 REV-00 DATE: 25-11-11 Page 7 of 9 VALID UP TO: 24-11-14				REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJNEY K		APPROVED BY A.K. Garg			
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Record Format	D*	Agency			Remarks							
					M	C/N					M	C	N								
1	2	3	4	5	6	7	8	9	10	11				11							
		9. Acid gas generation test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes	NTPC ADS & IEC 60754-1	NTPC ADS	Test certificate	✓	P	W	W	W								
		10. Flammability test on completed cable	CR	Chem	Refer Note 4	NTPC ADS & IEC 60332 Part-3 (Category-B)	NTPC ADS	--do--	✓	P	W	W	W								
		11. Surface finish & length measurement.	CR	Visual & Meas	One length of each size	(1) Drum no. (2) IS 1554 -Part-1 (3) Cable size: Voltage grade & Words " FRLS" at every 5 meter is to be embossed. Embossing shall be automatic, in line & marking shall be legible & indelible. (4) Sequential marking of length of cable in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible	--do--	✓	P	W	W	W	Pimple, Fish Eye, Burnt particles, Blow Hole etc not permitted Repairing on outer sheath not permitted								
		12. Sequence of cores armour coverage, gap between two consecutive armour/ formed wire	CR	Visual & Meas	One length of each size	Min. area of coverage of armouring shall be 90%. The gap between armour wires / formed wires shall not exceed one armour wire/ formed wire space & there shall be no cross over/ riding of armour wire / formed wire. Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire	--do--	✓	✓	P	W	W	W								
4	Packing	1. Sealing	MA	Visual	100%	100%	(1) IS1554(Part-1) (2) The surface of the drum and the outer most cable layer shall be covered with water proof cover. (3) Both the ends of cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by "U" nails.	QCR	✓	P	--	--	--								
4.01	Identification	NTPC Sealing	MA	Visual	100%	100%	Sealing shall be visible	Sealing shall be visible	✓	P	V	V	V								

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-M=MANUFACTURER/SUPPLIER, C=MAIN SUPPLIER, N=NTPC, P=PERFORM WITNESS, V=VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"

		Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)		QP. NO. 0000-999- QOE- S-040 REV-00 DATE : 25-11-11 Page 8 of 9 VALID UP TO: 24-11-14 Reference Document	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV	APPROVED BY  A.K. Garg	
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Acceptance Norms	Record Format	Agency	Remarks
Notes:									
1)		If the compound manufacturer is carrying out Ageing test , test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer is to carry out ageing test & test report is to be reviewed (quantum of ageing test sample shall be one sample /batch)							
2)		(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre/ Regional Offices :- Routine Test of manufacturer internal test report are to be verified by NTPC at the time of final inspection. 2(b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre/ Regional Offices, :- Routine Test are to be witnessed by Main Contractor & NTPC. This is in addition to manufacturer internal test report to be verified by NTPC at the time of final inspection. Refer table on page 8 of 8 for Sampling & Acceptance criteria.							
3)									
4)		The test shall be carried out on every size & type of control cable offered for inspection as an acceptance test. This test will be carried out using composite sampling i.e. irrespective of sizes of cables of a particular type, may be tested together as per calculations in line with the IEC (all sizes will be covered)							
LEGEND:		NTPC ADS: NTPC approved data sheet, QCR: quality control records of cable manufacturer, CABLE MANUF STD- cable manufacturer's internal plant standard, MI: minor, MA: major, CR: critical, COC- certificate of conformance							

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		Item: 1.1 KV PVC Insulated FRLS Control cables		STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 AND NTPC TECHNICAL SPECIFICATION)		QP. NO. 0000-999- QOE- S-040 REV-00 DATE: 25-11-11 Page 9 of 9 VALID UP TO: 24-11-14 Reference Document	REVIEWED BY INDERJIT SINGH <i>for 1st</i> VIKRAM TALWALKAR RAJEEV GARG Acceptance Norms Record Format	APPROVED BY <i>A.K. Garg</i> A.K. Garg
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Agency	Remarks

SAMPLING & ACCEPTANCE CRITERIA

Criteria	Manufacturer experience prerequisite	Condition	Testing procedure	Remarks
Samples as per relevant IS from every size of cable in the offered lot shall be tested for Tensile Strength & Elongation (before ageing). The values will be compared with corresponding values mentioned in the Type Test report accepted by NTPC. These values of Tensile Strength & Elongation (before ageing) should be within $\pm 15\%$ tolerance (final values should be more than the minimum values indicated in relevant standard) of the Type Test report	In case of Manufacturers/ Supplier who have supplied cables in the past through Corporate Centre / Regional offices	In case of sizes which meet the criteria	1 Sample per type out of sizes which have met the criteria, will be put on accelerated ageing test (refer IRS specification no. IRS: S-63/2007 Rev 3.0). The samples shall be aged in air oven at temperature of $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 5 hours. After wards the samples shall be tested for Tensile Strength & Elongation. Acceptance norms shall be as per relevant IS. This test shall be witnessed by NTPC.	In case the samples do not meet the requirement in accelerated ageing test then 1 sample of that size will be put on ageing test as per IS.
		In case of size which do not meet the criteria	Particular size will be put on ageing test as per IS. This test shall be witnessed by NTPC.	
	In case of Manufacturers/ Supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre / Regional offices	In case of size which meet the criteria	1 Sample per type out of all sizes which have met the criteria, will be put on aging test and witnessed by NTPC as per relevant IS	
		In case of size which do not meet the criteria	Particular size will be put on ageing test as per IS. This test shall be witnessed by NTPC	

LEGEND: "RECORDS IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
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4

MFGR.'s LOGO	MANUFACTURER'S NAME AND ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
			ITEM :		QP NO.:		PACKAGE :				
			SUB-SYSTEM:		REV.NO.:		CONTRACT NO. :				
				DATE:		MAIN-SUPPLIER:					
PAGE: OF....											

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	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	**	10.		11.

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		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 IDENTIFIED IN COLUM "N" AS 'W'			DOC. NO.:		REV..... CAT.....		
MANUFACTURER/ SUB-SUPPLIER			MAIN-SUPPLIER		FOR NTPC USE				
SIGNATURE						REVIEWED BY		APPROVED BY	



ENDORSEMENT SHEET FOR QP REFERENCE / STANDARD / FIELD QUALITY PLAN (RQP / SQP/RFQP/SFQP)			
TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION			To be filled in by NTPC
PROJECT NAME	NTPC-NCTPP DADRI-II (4X490MW) FGD PACKAGE		REVIEW & ENDORSEMENT BY NTPC PROJECT SPECIFIC QP NUMBER ALLOTTED QP NO.: REV. NO.: DATE: ** The RQP/SQP/RFQP/SFQP once endorsed for a particular contract shall remain valid even though the original QP may have expired or revised, unless / otherwise mutually agreed with the supplier. ①
CONTRACT NO	CS-6130-109-9, BHEL WORK ORDER NO (G501 & G502)		
MAIN SUPPLIER	BHARATHEAVY ELECTRICALS LIMITED (RANIPET)		
MANUFACTURER WORKS & ADDRESS			
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE / SIZE /RATING etc.			
APPROVED QP NO.: RQP/SQP/RFQP/SFQP			
Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)			(TICK APPLICABLE)
I. That the item/ component is identical to that considered for QP approval. OR. ✓			The QP is endorsed for this project without any change The QP is endorsed for this project with changes as indicated. <u>DISTRIBUTION OF ENDORSEMENT OF</u> A) RQP/SQP: 1. MAIN SUPPLIER (WITH A COPY OF QP) 2. MANUFACTURER 3. RIO 4. CQA-SPL 5. CQA-O/C B) RFQP/SFQP: 1. MAIN SUPPLIER (with a copy of QP) 2. MANUFACTURER 3. NTPC FQA (with a copy of QP) 4. NTPC Erection (with a copy of QP) 5. CQA-SPL 6. CQA-O/C
II. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same do not affect the contents of QP. OR			
III. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same affect the QP slightly, as indicated below / in attached sheet.			
SIGN.: (Main Supplier) DATE:	SIGN.: (Manufacturer)	DATE:	NTPC (Reviewed /Approved by/ Date & Seal)

	CORPORATE QUALITY ASSURANCE SUB-VENDOR QUESTIONNAIRE	

i.	Item/Scope of Sub-contracting			
ii.	Address of the registered office	Details of Contact Person (Name, Designation, Mobile, Email)		
iii.	Name and Address of the proposed Sub-vendor's works where item is being manufactured	Details of Contact Person: (Name, Designation, Mobile, Email)		
iv.	Annual Production Capacity for proposed item/scope of sub-contracting			
v.	Annual production for last 3 years for proposed item/scope of sub-contracting			
vi.	Details of proposed works			
1.	Year of establishment of present works			
2.	Year of commencement of manufacturing at above works			
3.	Details of change in Works address in past (if any)			
4.	Total Area			
	Covered Area			
5.	Factory Registration Certificate	Details attached at Annexure – F2.1		
6.	Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)	Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design Details attached at Annexure – F2.2 (if applicable)		
7.	Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)	Details attached at Annexure – F2.3		
8.	After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)	Applicable / Not applicable Details attached at Annexure – F2.4		
9.	Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any	Details attached at Annexure – F2.5		

	CORPORATE QUALITY ASSURANCE SUB-VENDOR QUESTIONNAIRE
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10.	Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing	Details attached at Annexure – F2.6												
11.	Manufacturing facilities (List of machines, special process facilities, material handling etc.)	Details attached at Annexure – F2.7												
12.	Testing facilities (List of testing equipment)	Details attached at Annexure – F2.8												
13.	If manufacturing process involves fabrication then- List of qualified Welders List of qualified NDT personnel with area of specialization	Applicable / Not applicable Details attached at Annexure – F2.9 (if applicable)												
14.	List of out-sourced manufacturing processes with Sub-Vendors' names & addresses	Applicable / Not applicable Details attached at Annexure. –F2.10 (if applicable)												
15.	Supply reference list including recent supplies	Details attached at Annexure – F2.11 (as per format given below)												
	<table border="1" style="width: 100%;"> <tr> <th style="width: 10%;">Project/ package</th> <th style="width: 10%;">Customer Name</th> <th style="width: 30%;">Supplied Item (Type/Rating/Model /Capacity/Size etc)</th> <th style="width: 20%;">PO ref no/date</th> <th style="width: 20%;">Supplied Quantity</th> <th style="width: 10%;">Date of Supply</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Project/ package	Customer Name	Supplied Item (Type/Rating/Model /Capacity/Size etc)	PO ref no/date	Supplied Quantity	Date of Supply							
Project/ package	Customer Name	Supplied Item (Type/Rating/Model /Capacity/Size etc)	PO ref no/date	Supplied Quantity	Date of Supply									
16.	Product satisfactory performance feedback letter/certificates/End User Feedback	Attached at annexure - F2.12												
17.	Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating) Note:- Reports need not to be submitted	Applicable / Not applicable Details attached at Annexure – F2.13 (if applicable)												
18.	Statutory / mandatory certification for the proposed product	Applicable / Not applicable Details attached at Annexure – F2.14 (if applicable)												
19.	Copy of ISO 9001 certificate (if available)	Attached at Annexure – F2.15												
20.	Product technical catalogues for proposed item (if available)	Details attached at Annexure – F2.16												
<table border="1" style="width: 100%;"> <tr> <td style="width: 15%;">Name:</td> <td style="width: 30%;"> </td> <td style="width: 10%;">Desig:</td> <td style="width: 20%;"> </td> <td style="width: 10%;">Sign:</td> <td style="width: 15%;"> </td> <td style="width: 10%;">Date:</td> <td style="width: 10%;"> </td> </tr> </table>			Name:		Desig:		Sign:		Date:					
Name:		Desig:		Sign:		Date:								

Company's Seal/Stamp:-