

PROJECT: MAITREE STPP( 2 X 660MW)) FGD PACKAGE CONTRACTOR: BHEL - RANIPET CONTRACT NO: BIFPCL/EPC- MAIN PLANT/NOA/2016/215		CONTRACT QUALITY REQUIREMENTS (CQR) for <b><u>LT POWER&amp;CONTROL CABLE</u></b> MAITREE STPP( 2 X 660MW)) FGD PACKAGE (BHEL CUST No: R4M8 & R4M9)	DOC.NO: BAP/QR/ R4M8 & R4M9 Rev NO. : 00 PAGE : Page 1 of 7 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 CABLE**

01	Sub-QR Requirements	<p><b><u>1 KV Power Cable :</u></b></p> <ol style="list-style-type: none"> <li>1) Bidder/ sub vendor should have manufactured and supplied prior to the date of techno-commercial bid opening (22 09 2015). <ol style="list-style-type: none"> <li>a) A least one hundred (100) km of XLPE insulated PVC sheathed power cable of 1 kV or higher grade in one single contract.</li> <li>b) At least ten (10) km of flame retardant low smoke cable.</li> <li>c) At least ten (10) km of 1Kv or higher grade power cable of minimum 630sq.mm conductor size.</li> </ol> </li> </ol> <p><b><u>Control Cable:</u></b></p> <ol style="list-style-type: none"> <li>1) Bidder/ sub vendor should have manufactured and supplied prior to the date of techno-commercial bid opening (22 09 2015). <ol style="list-style-type: none"> <li>a) A least three hundred (300) km of PVC insulated PVC Sheathed stranded copper conductor 1 kV or higher grade in one single contract.</li> <li>b) At least ten (10) km of flame retardant low smoke cable.</li> </ol> </li> </ol> <p><b><u>No deviation on the above Sub-QR requirement is acceptable and those offers not meeting these specific Customer requirement is liable for rejection and hence the ESP Switchgear manufacturer shall submit all the required documentary evidences in the offer itself.</u></b></p>	
01	Type test requirements	<ol style="list-style-type: none"> <li>2. Vendor shall submit the type test reports of all the type tests as listed in SL NO:3 and carried out within 5 years from the data of BIFPCL bid opening (22.09.2015). 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/BIFPCL/FITCHNER</li> </ol>	
		<ol style="list-style-type: none"> <li>1. 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/BIFPCL/FITCHNER either at third party lab (or) own lab in the presence of TPI/BHEL/BIFPCL/FITCHNER and submit the reports for approval.</li> </ol>	
		<ol style="list-style-type: none"> <li>3. Type Test reports review and approval by BIFPCL/FITCHNER is a must.</li> </ol>	

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Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements		##Specific confirmations by the vendor

**ITEM: LT POWER & CONTROL CABLE**

	<p><b>TESTING REQUIREMENTS FOR XLPE/PVC (COPPER) POWER CABLE</b></p> <p><b>A. Type Test Conduction:</b> 1. Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test.</p> <p><b>2. Sampling:</b> a) Type test to be conducted on one size of cable for every lot and type of cable (CU conductor) b) Flammability Test to be conducted only on one sample/ lot.</p> <p><b>B. Sample Test Conduction(S)/Acceptance Test Conduction(A)</b> 1. Tests for which "S/A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Sample tests. <b>2. Sampling:</b> Sampling for sample tests shall be as per IEC 60502-1. 4. Flammability Test to be conducted only on one sample/ lot.</p> <p><b>C. Routine Test Conduction:</b> 1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests.</p> <p><b>D. Tests listed in S.No-7.0, 8.0, 9.0 &amp; 10.0 shall be conducted only on one sample / lot.</b></p> <p><b>E. Tests listed in S.No-7.0, 8.0, 9.0,10.0 &amp; 11.0 relevant test procedure shall be submitted for BHEL/BIFPCL /FITCHNER approval</b></p>	
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Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements		##Specific confirmations by the vendor

**ITEM: LT POWER & CONTROL CABLE**

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	Tests for Conductor				
I.	Resistance test	For Cu	T, S, R	IEC 60502-1/ IEC-60228	
2.0	Tests for Armour Wires/Strips				
I.	Measurement of dimensions	Applicable for Aluminium wire & GS wire/Strip	T,S	IEC 60502-1	
II.	Tensile test	Applicable for Aluminium wire & GS wire/Strip	T, S	Relevant IEC	
III.	Elongation at break test	Applicable for GS wire/Strip only	T, S	Relevant IEC	
IV.	Torsion test	For GS round wire only	T, S	Relevant IEC	
V.	Winding test	For GS strip only	T, S	Relevant IEC	
VI.	Resistivity test	Applicable for Aluminium wire & GS wire	T, S	Relevant IEC	
VII.	Uniformity of Zinc coating test	For G. S. wires/Strip only	T,S	Relevant IEC	
VIII.	Mass of Zinc coating test	For G. S. wires/Strip only	T, S	Relevant IEC	
IX.	Wrapping Test	For Aluminium wires only	T	Relevant IEC	
3.0	Physical Tests for XLPE Insulation & PVC sheath				
I.	Test for thickness	Applicable for XLPE insulation, PVC inner sheath & PVC outer sheath	T, S	IEC 60502-1/ IEC-60811-201/ IEC-60811-202	
II.	Tensile strength and elongation test at break	Applicable for XLPE insulation & PVC outer sheath			
(a)	Before ageing		T, S	IEC 60502-1/ IEC-60811-401/ IEC-60811-501	
(b)	After ageing		T, S	IEC 60502-1/ IEC-60811-401/ IEC-60811-501	
III.	Ageing in air oven	Applicable for XLPE insulation & PVC outer sheath	T	IEC 60502-1/ IEC-60811-401	
IV.	Loss of mass in air oven test	For PVC outer sheath only	T	IEC 60502-1/ IEC-60811-409	
V.	Hot deformation test	For PVC outer sheath only	T	IEC 60502-1/ IEC-60811-508	
VI.	Behaviour at low temperature	For PVC outer sheath only	T	IEC 60502-1/ IEC-60811-504 IEC-60811-505 IEC-60811-506	
VII.	Heat shock test	For PVC outer sheath only	T	IEC 60502-1/ IEC-60811-509	
VIII.	Shrinkage test	For XLPE insulation & PVC outer sheath only (As applicable)	T	IEC 60502-1/ IEC-60811-502/ IEC-60811-503	
IX.	Thermal stability test	For PVC outer sheath only	T	Relevant IEC	
X.	Hot set test	For XLPE insulation only	T, S	IEC 60502-1	

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SL NO.	DESCRIPTION	BHEL/NTPC Requirements		##Specific confirmations by the vendor

**ITEM: LT POWER & CONTROL CABLE**

S.No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
XI.	Water absorption (gravimetric) test	For XLPE insulation only	T	IEC 60502-1/ IEC 60811-1-3	
<b>4.0</b>	<b>Improved Fire performance (FRLS) Tests</b>				
I.	Oxygen index test	For PVC outer sheath only	T, S	Relevant IEC / ASTM D 2863	
II.	Smoke density test	For PVC outer sheath only	T	IEC 60502-1/ IEC 61034-2 / ASTM D 2843	
III.	Acid gas generation test	For PVC outer sheath only	T, S	IEC 60502-1/ IEC 60754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	Relevant IEC / ASTM D 2863	
<b>5.0</b>	<b>Flammability Tests</b>				
I.	Flammability test for single cable	For complete cable	T,S	IEC-60332 Part-1	
II.	Swedish chimney test	For complete cable	S	SEN SS 424 1475 (Class F3)	
III.	Flammability test	For complete cable	S	IEEE: 60383	
<b>6.0</b>	<b>Electrical Tests</b>				
I.	AC voltage Test for 5 min	For complete cable	T, S, R	IEC 60502-1	
II.	Insulation Resistance Test At ambient temperature	For complete cable	T, S	IEC 60502-1	
III.	Insulation Resistance Test At maximum conductor temperature in normal operation	For complete cable	T, S	IEC 60502-1	
IV.	High voltage test for 4 hour	For complete cable	T, S	IEC 60502-1	
<b>7.0</b>	<b>Anti-rodent and Termite Repulsion test</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	<i>Internal Test Report to be furnished</i>
<b>8.0</b>	<b>Anti-Fungal Test</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	
<b>9.0</b>	<b>Resistant to solar radiation</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	<i>Internal Test Report to be furnished</i>
<b>10.0</b>	<b>Resistance to the effect of oil, seawater</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	
<b>11.0</b>	<b>Water Tree Test (Accelerated)</b>	XLPE Insulation	T	As per Technical Datasheet	<i>Type Test Report to be furnished</i>

The Testing procedure with Sketch/drg test setup shall submitted along with detailed reference standard and acceptance norms for BHEL/BIFPCL/FITCHNER approval.

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<b>TESTING REQUIREMENTS FOR PVC (CU/AL) CONTROL CABLE</b> <b>A. Type Test Conduction:</b> 1. Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test. 2. Sampling: a) Type test to be conducted on one size of cable for every lot and type of cable (CU/AL conductor) b) Flammability Test to be conducted only on one sample/ lot. <b>B. Sample Test Conduction (S)/Acceptance test Conduction (A)</b> 1. Tests for which "S/A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Sample tests. 2. Sampling: Sampling for sample tests shall be as per IEC 60502-1. 3. Flammability Test to be conducted only on one sample/ lot. <b>C. Routine Test Conduction:</b> 1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests. <b>D. Tests listed in S.No-6.0,7.0, 8.0, &amp; 9.0 shall be conducted only on one sample / lot &amp; relevant test procedure shall also be submitted for BHEL/BIFPCL /FITCHNER approval</b>					
S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	Tests for Conductor				
I.	Resistance test	For Al/Cu	T, S, R	IEC 60502-1	
2.0	<u>Physical Tests for PVC Insulation &amp; PVC sheath</u>				
I.	Test for thickness	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T,S	IEC 60502-1/ IEC 60811-1-1	
II.	Tensile strength and elongation test at break	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T,S		
(a)	Before ageing		T,S	IEC 60502-1/ IEC 60811-1-1/ 60811-1-2	
(b)	Ageing in air oven		T,S	IEC 60502-1/ IEC 60811-1-1/ 60811-1-2	
(c)	After ageing of pieces of complete cable		T	IEC 60502-1/ IEC 60811-1-1/ 60811-1-2	
III	Hot deformation test	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T	IEC 60502-1/ IEC 60811-3-1	

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S.No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
IV	Behaviour at low temperature	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T	IEC 60502-1/ IEC 60811-1-4	
V	Loss of mass in air oven test	For PVC outer sheath only	T	IEC 60502-1/ IEC 60811-3-2	
VI	Heat shock test	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T	IEC 60502-1/ IEC 60811-3-1	
VII	Water absorption (gravimetric) test	For PVC insulation only	T	IEC 60502-1/ IEC 60811-1-3	
<b>3.0</b>	<b>Improved Fire performance (FRLS) Tests</b>				
I.	Oxygen index test	For PVC outer sheath only	T, A	Relevant IEC / ASTMD 2863	
II.	Smoke density test	For PVC outer sheath only	T	IEC 60502-1/ IEC 61034-2 / ASTMD 2843	
III.	Acid gas generation test	For PVC outer sheath only	T, A	IEC 60502-1/ IEC 60754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	Relevant IEC / ASTMD 2863	
<b>4.0</b>	<b>Flammability Tests</b>				
I.	Flammability test for single cable	For complete cable	T,A	IEC:60332 Part-1	
II.	Swedish chimney test	For complete cable	A	SEN SS 424 1475 (Class F3)	
III.	Flammability test	For complete cable	A	IEEE: 60383	
<b>5.0</b>	<b>Electrical Tests</b>				
I.	AC voltage Test for 5 min	For complete cable	T, A, R	IEC 60502-1	
II.	Insulation Resistance Test At ambient temperature	For complete cable	T, A	IEC 60502-1	
III.	Insulation Resistance Test At maximum conductor temperature in normal operation	For complete cable	T, A	IEC 60502-1	
IV.	High voltage test for 4 hour	For complete cable	T, A	IEC 60502-1	
<b>6.0</b>	<b>Anti-rodent and Termite Repulsion test</b>	For PVC outer sheath only	A	Manufacturer's Testing Standard	<i>Internal Test Report to be furnished</i>
<b>7.0</b>	<b>Anti-Fungal Test</b>	For PVC outer sheath only	A	Manufacturer's Testing Standard	
<b>8.0</b>	<b>Resistant to solar radiation</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	<i>Internal Test Report to be furnished</i>
<b>9.0</b>	<b>Resistance to the effect of oil, seawater</b>	For PVC outer sheath only	S	Manufacturer's Testing Standard	

The Testing procedure with Sketch/drg test setup shall submitted along with detailed reference standard and acceptance norms for BHEL/BIFPCL/FITCHNER approval.

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**ITEM: LT POWER & CONTROL CABLE**

02	Quality Plan Requirements	<ol style="list-style-type: none"> <li>1. Being an export order, MQP shall be submitted by the vendor in Customer/BIFPCL MQP format only (Copy attached) in line with specifications/approved data sheet/Drgs meeting various international standards / codes for BHEL/BIFPCL/Fichtner for review and approval.</li> <li>2. All routine tests/sample test shall be clearly indicated in MQP and reference standard shall be in line with relevant IEC. This is in addition to reference documents of Specification, approved drawings and Data sheet.</li> <li>3. During review and approval of MQP, in case BIFCL/Fitchner raises any clarification/Query on MQP, Vendor shall agree to visit BIFPCL/Consultant office for finalization and approval of MQP.</li> <li>4. Submission of all internal inspection report for BHEL/Third party Inspector review before undertaking inspection.</li> <li>5. BHEL/TPI(Third Party Inspection)/Customer/BIFPCL inspection is applicable at vendor works</li> <li>6. Inspection clearance for dispatch is to be obtained from BHEL/BHEL Third Party Inspection agency( TPI) prior to dispatch of cables</li> </ol>	
03	Document Package	<p>Specific confirmation for <b>Document Package</b> in the event of an order (2 hard copies + 2 CDs in Pdf file) is to be given containing the following with proper linkages (.)</p> <ol style="list-style-type: none"> <li>a. Index Sheet</li> <li>b. Approved MQP</li> <li>c. Final Inspection Report issued by BHEL/TPI, BIFPCL/ FICHTNER(MDCC).</li> <li>d. Compliance certificate/report for any Nonconformance or observation made by BHEL/TPI/ BIFPCL/FICHTNER agencies during inspection at vendor works.</li> <li>e. Test certificates/internal reports for <b>Verification portion</b> as given in MQP and all the test reports etc witnessed by BHEL/TPI/Fitchner/BIFPCL</li> <li>f. Approved Data sheet, Spec &amp; Drgs</li> <li>g. BOM with actual make used with customer approved Drgs BHEL Inspection clearance for dispatch.</li> </ol>	
05	Packing	Sea Worthy Packing shall be ensured as per Sea Worthy Packing specification No.PE-TS-888-100-A001 which is referred in Enquiry Specifications/ Drgs and Data sheet.	
06	Important Note	No Chinese Material are to be used in this Items/Assy of export contract	

**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.