MANUFACTURING QUALITY PLAN

Contractor	BHEL	BAP , RANIPET -CHENNAI	NAME DF THE EQUIPMENT	QP NO. :	PROJECT: 2 X 660 MW SUPER THERMALPOWER PROJECT- RAMPAL- BANGLADESH
Manufacturer / Vendor			LGS BUILDING : KG GOODS CUM PASSENGER ELEVATOR	REV NO. / DATE / PAGE NO. 1 of 3	CLIENT: BANGLADESH-INDIA FRIENDSHIP POWER CO. PVT LTD (BIFCL)

SL. NO.	COMPONENT & OPERATION	NATURE OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS BHEL PO / BHEL DATA SHEET	ACCEPTANCE NORMS BHEL PO / BHEL DATA SHEET	FORMAT OF RECORD	INSPECTION AGENCY M	C	I	REMARKS
CASTINGS											
A1	a) Traction Sheave	Visual Dimension Mechanical Properties	Measurement Measurement Lab Test	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V/R	R	
	b) Over Speed Governor Wheel	Visual Dimension Mechanical Properties	Measurement Measurement .do..	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V/P	V/R	R	
	c) Divertors	Visual Dimension Mechanical Properties	Measurement Measurement ..do..	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V/P	V/R	R	
	d) Gear Box	Visual Dimension Noise Vibration	Measurement Measurement Lab Test Lab Test	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V/R	V/R	
RAW MATERIALS											
A2	Stainless Steel Sheet	Thickness Length Width Squareness Flatness Free from surface defects	Measurement Measurement Measurement Measurement Visual Visual	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V	V	For Car Body only
A3	T-Guide Rail	Dimension & Visual	Measurement	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V	V	
A4	Steel Wire Rope	Diameter of Ropes construction No. of Strands Tensile Strength Breaking Strength proof load Test	Measurement Measurement Visual Lab Test Lab Test ..do..	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V/R	V/R	
A5	Travelling Cable	All Routine Test HV Test at 3 KV AC Conductor Resistance ohm/km at 20C	Measurement Lab Test Lab Test	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	R	R	
A6	Buffer Spring	Dimension Spring Rate / Dimension	Measurement Measurement	Sample per lot	Approved Technical Specification / Drg / Data Sheet / IS Specification	Approved Technical Specification / Drg / Data Sheet / IS Specification	Test Certificate	V	V/R	R	

NOTE: Commissioning of the system and providint the same at site is under vendor Scope

LEGENDS	
M	Manufacturer -
C	Contractor - BHEL
I	Purchaser - BIFCL
P	Perform
V	Verification
R	Review
W	Witness
CHP	Coustmer Holding Point

Manufacturer / Vendor - Beacon	Contractor - BHEL	Client -BIFCL
Name :	Name :	Name :
Designation :	Designation :	Designation :
Signature & Seal :	Signature & Seal :	Signature & Seal :

BHEL EVALUATION REPORT FOR SUB-SUPPLIER NO.

FICHTNER

ANNEXURE-VI

PACKAGE & PROJECT :

EQUIPMENT / ITEM :

GENERAL INFORMATION

1. **PROPOSED SUB-SUPPLIER'S NAME & WORKSHOP ADDRESS** :

2. **CONTACT PERSON** :
   TELEPHONE (LAND LINE/MOB.) :
   FAX :
   E-MAIL :

3. **BRIEF SPEC. OF EQUIPMENT ITEM / MODEL / TYPE / RANGE / CAPACITY:**

4. **REFERENCE LIST** (LIST OF PROJECTS THE EPC HAS PERFORMED TOGETHER WITH THE PROPOSED SUB-SUPPLIER FOR THE PROPOSED EQUIPMENT / ITEM / MODEL / RATING)

CUSTOMER / LOCATION WITH ADDRESS AND CONTACT PERSON	TYPE, RATING & CAPACITY	DATE OF COMMISS-IONING.	NO. OF YRS. IN OPERA-TION	PERFORMANCE FEEDBACK

5. **COMPLIANCE WITH RESPECT TO TECHNICAL SPECIFICATION**

   CLAUSE WISE COMPLIANCE WITH RESPECT TO TECHNICAL SPECIFICATION OF BIFPCL FOR THE PROPOSED ITEM / MODEL INCLUDING PROVENNESS REQUIREMENT.

6. **CONCLUSION**

   BHEL CONFIRMS THAT SUB-SUPPLIER FULFILLS ALL REQUIREMENTS AS REQUESTED BY MFS AND IS DEEMED AS CAPABLE FOR ENVISAGED TASK.

NAME _____ **DESIGN** _____ **SIGN.:** _____

List of Encl. **Date:** _____

SUB-SUPPLIER QUESTIONNAIRE

FICHTNER

Name of the proposed Equipment / Item / Process with Model / Type / Rating / Capacity / Size / Tonnage etc. (As applicable):

_____

_____

1. **Name of Proposed Sub-Supplier**: _____

   Website: _____

2. **Address of Regd. Office:**
   _____
   _____
   _____

   Details of contact person:
   Name_____
   Mobile no._____
   Desig._____
   E-mail:

   - **Country of Head Office**

     _____

   - **Field of activitie**

     _____

3. **Address of Works where Item is being manufactured**
   _____
   _____
   _____

   Details of contact person:
   Name_____
   Mobile no._____
   Desig._____
   E-mail:

4. **Branch / Liaison office in Dhaka**
   _____
   _____
   _____

   Details of contact person:
   Name_____
   Mobile no._____
   Desig._____
   E-mail:

5. **Details of Proposed Works:**

a. Year of Establishment of present works: _____
b. Year of Commencement of: _____
Manufacturing at the above works

c. Details of change in works address in past, if any : _____
d. Total Covered Area : _____

e. Details of covered area like no. of sheds, : _____
Area of each shed etc.
f. Electric power- Connected load: _____
Electric power- Stand by load & system: _____

6. **Annual Turnover &** : _____
Profit in past three years _____
: _____

7. **Do you have in-house Department for**

a) Design Yes / No
b) Research & Development Yes / No
c) Quality control/Inspection Yes / No
d) After Sales Service Yes / No

If any of these items answered with "No", an explanation shall be provided.

8. **Shift works per day** One / Two / Three
Weekly day off

9. **Present Manpower Status:**

Division / Status	Graduate		Diploma	Skilled	Un-Skilled	Remarks
	Technical	Non-Technical				
Design						
Production						
Quality Control / Inspection						
After Sales Service						

a. Enclose organization chart of the proposed works (Y / N) _____

b. Enclose Organization chart of QA / QC Deptt. (Y / N) _____

c. Enclose List of Qualified Welders with process etc. (Y / N) _____

d. Enclose List of Qualified NDT personnel with area of specialization (Y / N) _____

10. **Trade Name of Product (if any)** _____

11. **Brief details of items manufactured:**

Sl. No.	Item & Material (Type / Size / Rating / Model / Tonnage, as applicable)	Installed Capacity	Annual Production Capacity	Annual Production for last Three years		
				I	II	III

12. **Details of foreign Collaboration, if any:**

Sl. No.	Product	Name & Address of Collaborator	Collaboration		
			Scope	Year	Valid upto

13. **Furnish Type Test report for the proposed product (if applicable).**

14. **Approval/Certification by National/International standards/accredited agency applicable for the proposed product (if applicable).**

15. **Furnish statutory/mandatory certification for proposed product (if applicable).**

16. **Furnish supply Experience list of the proposed product.**
List shall include Item description (Type / Size / Rating / Model / Tonnage, as applicable), Customer name, Quantity, Year of Supply, and Year of commissioning.

17. **Enclose End User's operational feedback certificate for the proposed product.**

18. **Enclose list of equipment & machinery specific to the proposed product.**
This should include name of equipment, capacity & nos. etc.:

19. **Enclose Process Flow Diagram indicating in-house & outsourced process.**

20. **General manufacturing facilities available:**

Sl. No.	Description of machine	Inhouse		Outsourced	
		Capacity	No.	Capacity	No.
a)	Material Handling Mobile Crane Fork Lift Over Head Cranes				
b)	Metal Cutting & Bending				
c)	Casting				
d)	Forging				
e)	Fabrication				
f)	Welding				
g)	Machining				
h)	Heat Treatment				
i)	Surface & Cleaning Sand Blasting Shot Blasting Pickling				
j)	Painting				
k)	Metal Coating				
l)	Packing				
m)	Other, if any				

21. **Enclose Testing & Inspection facilities specific to the proposed product:**

a. In-house _____
b. Outsourced _____

22. **Storage of finished goods (covered / open).** _____

23 **Enclose list of the source / make with location of major raw material, bought out items and out sourced process** _____

24. **Furnish details regarding local service support and spare parts availability in Bangladesh. process** _____

25. **Quality management**

25.1 General

25.1.1 Work Instruction for different processes available. (Y / N) _____

if yes, furnish list.

25.1.2 Evaluation system for raw material / bought out item's supplier is available. (Y / N) _____

25.1.3 Records generated during inspection maintained & available for review? (Y / N) _____

25.1.4 Statistical quality control techniques used? (Y/N) If yes please furnish details. (Y / N) _____

25.1.5 ISO certificate for the works available? (Y / N) _____

If yes, enclose copy of the certificate.

25.1.6 Quality & HSE Manual for the works available (Y / N) _____

If yes, enclose copy of the manual.

25.2 Corrective action

25.2.1 Specifically confirm whether System for identifying & disposition of Non Conformity in the process / product is available (Y / N) _____

25.2.2 Specifically confirm whether System for Customer complains & their satisfactory disposal is available. (Y / N) _____

25.3. Documentation Control

25.3.1 Procedure available for documentation control (Y / N) _____

25.4. Control of Inspection, measuring & testing equipments.

25.4.1 Procedure for calibration of testing & measuring instrument available. (Y / N) _____

27. **Certification of sub-supplier**

I CERTIFY THAT THE INFORMATION SUPPLIED HEREIN (INCLUDING ALL PAGES ATTACHED) IS CORRECT.

SEAL

M/S. _____
PLACE _____

DATE _____

SIGNATURE _____
NAME _____
DESIGNATION _____
MOBILE NO _____
EMAIL _____

LIST OF ENCLOSURE:

28. **Certification by Main Supplier:**

ABOVE INFORMATION HAVE BEEN VERIFIED AND FOUND IN ORDER TO COMPLY WITH TECHNICAL SPECIFICATION AS PER EPC-CONTRACT.

Name: _____ **Designation:** _____ **Signature:** _____ **Date:** _____

NOTE:

1. *COLUMN SHALL NOT BE LEFT UNFILLED. IN CASE OF NOT APPLICABLE / NOT AVAILABLE, THE SAME SHALL BE INDICTED IN THE PROVIDED SPACE.*
2. *IN CASE PROVIDED SPACE IS NOT ADEQUATE, INFORMATION SHALL BE PROVIDED AS AN ATTACHMENT.*
3. ***PRODUCT CATALOGUE FOR** THE PROPOSED EQUIPMENT / ITEM / PROCESS, IF AVAILABLE, SHALL BE ENCLOSED*

TECHNICAL SPECIFICATION OF LV XLPE POWER CABLES

1.0	Type of Cable	Flame Retardant Low Smoke (FRLS)
2.0	Standard applicable in general (Latest amendment to be referred if any)	IEC 60502-1, IEC 60228, IEC 60287, IEC 60949, ASTMD:2843, ASTMD:2863, IEC-754-1, IEC:60332 (Part-1), IEC:60332-3-23, IEEE:60383 & other relevant IEC
3.0	Voltage Grade	0.6 /1.0 (1.2) kV
4.0	Number of cores, cross sectional area of conductors and quantities	As per enquiry
5.0	**FAULT CHARACTERISTICS**	
	Fault Level	50kA
	Fault Clearing Time	1 sec
6.0	**CONDUCTOR**	
(a)	Material	Copper
	Grade and Class	Stranded, annealed plain high conductivity, Class 2
(b)	Standard Applicable	IEC 60228
(c)	Shape	Circular / shaped as per IEC 60228
(d)	Min. number and diameter of strands for main and neutral conductor	As per Table-2 of IEC-60228
7.0	**INSULATION**	
(a)	Material	Cross-Linked Polyethylene(XLPE)
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Continuous withstand temperature	90°C
(d)	Short-circuit withstand temperature	250°C
(e)	Method of application	By extrusion; sleeve extrusion not permitted.
(f)	Method of curing	Dry/ Steam/ Gas/ Sioplas
(g)	Nominal Thickness of insulation	As per IEC-60502 (Part-1)
8.0	**CORE IDENTIFICATION**	Colour coding as per relevant IEC
9.0	**INNER SHEATH**	
(a)	Material	PVC Type ST-2
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Colour	Black
(d)	Whether FRLS	Yes
(e)	Inner sheath applicable for single core cable	NO
(f)	Fillers	Acceptable
(g)	Material of fillers (if permitted)	Same as inner sheath (Material of filler to be compatible with that of inner sheath)
(h)	Method of application	
(1)	Multi -core cables:	
(i)	With fillers	Pressure/ Vacuum extruded

(ii)	Without fillers	Pressure extruded
(2)	Single-core cables:	NA
10.0	**ARMOUR**	
(a)	Applicable	**FOR DIRECTLY BURIED CABLES**
(b)	Material	
(i)	Single core cables	Aluminium Round Wire grade to IEC-60502 (Part-1)
(ii)	Multi-core cables	Galvanised Steel Formed Wire/ Strip
(iii)	Standard Applicable	IEC-60502 (Part-1)
(c)	Minimum Coverage	90%
(d)	Gap between armour wires	Shall not exceed one armour wire space (No cross-over/ over-riding)
(e)	Breaking load of joint	95 % of normal armour
11.0	**OUTERSHEATH**	
(a)	Material	PVC Type ST2 as per IEC-60502 (Part-1)
(b)	Colour	Black
(c)	Whether FRLS	Yes
(d)	Method of application	Extruded
(e)	Thickness of outer sheath	As per IEC-60502 (Part-1)
(f)	Marking	Cable size (cross section area and no. of cores) and voltage grade @ 5m (by embossing) Word "XLPE" "FRLS" @ 5m (by embossing) Manufacturer's name and/ or trade name, and year of manufacture @ 5m (by embossing) 'BHEL-BAP' and 'CUSTOMER' Name @5m (by embossing) Progressive sequential marking @ 1m (by embossing/ printing)
12.0	**FRLS CHARACTERISTICS**	
(a)	Oxygen index	Min 29 (As per Relevant IEC / ASTMD 2863)
(b)	Temperature index	Min. 250 C (As per Relevant IEC / ASTMD 2863)
(c)	Acid gas generation	Max. 20% by weight (As per IEC 60502-1/ IEC 60754-1)
(d)	Smoke density rating	Max. 60% (As per IEC 60502-1/ IEC 61034-2 / ASTMD 2843)
(e)	**Flammability Test**	
(i)	Flammability test for single cable	YES As per IEC-60332 Part-1
(ii)	Flammability test as per IEEE: 60383	YES
(iii)	Swedish Chimney test SEN-SS-424-1475-F3	YES
13.0	**Anti-rodent and Termite repulsion Test**	YES
14.0	**Anti-Fungal Test**	YES
15.0	**TOLERANCE ON OUTER DIAMETER**	Up to 30mm; $\pm$ 1.5mm Above 30mm; + 5% or + 2mm, whichever is less.
16.0	**MINIMUM BENDING RADIUS**	
(a)	Single core cables	15 x O.D.
(b)	Multi core cables	12 x O.D.

17.0	**SAFE PULLING FORCE**	
(a)	Copper conductor cable	50 N/ sq. mm.
18.0	**CABLE DRUMS**	
(a)	Type of Drum	Steel
(b)	Standard drum length	750m (±) 5% - For sizes 150 sq. mm. & above 1000m (±) 5% - For all other sizes
(c)	Painting	Entire surface to be painted with epoxy resin paint.
(d)	Outermost Layer	To be covered with waterproof polyethylene
19.0	**SEA WORTHY PACKING**	YES. Over the cables polythene sheet shall be wrapped & then sealed properly. Cable ends shall be carefully protected before packing
20.0	**WATER TREE TEST (ACCELERATED)**	Test Voltage = 3 x U_0 Test Frequency = 500 Hz Core Environment = 40$_0$C water Duration of Test = 4 months Test after 4 months: Dielectric stress withstand > 14 kV/mm.

TECHNICAL SPECIFICATION OF PVC CONTROL CABLES

1.0	Type of Cable	Flame Retardant Low Smoke (FRLS)
2.0	Standard applicable in general(Latest amendment to be referred if any)	IEC 60228, IEC 60502, ASTMD: 2843, ASTMD: 2863, ASTM D 3137:81, IEC-754-1, IEC: 60332 Part-1, IEC: 60332 Part-3-23, IEEE 60383 & other relevant IEC.
3.0	Voltage Grade	0.6 / 1 (1.2) kV
4.0	Number of cores, cross sectional area of conductors and quantities	As per enquiry
5.0	Design Ambient Temperature	45o C
6.0	**CONDUCTOR**	
(a)	Material	Copper
	Grade and Class	Stranded, annealed plain high conductivity, Class 2
(b)	Standard Applicable	IEC 60228
(c)	Shape	Circular as per IEC 60228
(d)	Min. number of Strands	As per Table-2 of IEC-60228
7.0	**INSULATION**	
(a)	Material	PVC
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Continuous withstand temperature	70°C
(d)	Short-circuit withstand temperature	160°C
(e)	Method of application	By extrusion; sleeve extrusion not permitted.
(f)	Nominal Thickness of insulation	As per Table-5 of IEC-60502 (Part-1)
8.0	**CORE IDENTIFICATION**	As per relevant IEC
9.0	**INNER SHEATH**	
(a)	Material	PVC Type ST-1
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Colour	Black
(d)	Whether FRLS	Yes
(e)	Thickness of inner sheath	As per Table-8 of IEC-60502 (Part-1)
(f)	Fillers	Acceptable
(g)	Material of fillers (if permitted)	Same as inner sheath (Material to be compatible with inner sheath)
(h)	Method of application	
(1)	Multi -core cables:	
(i)	With fillers	Pressure/Vacuum extruded
(ii)	Without fillers	Pressure extruded

10.0	**ARMOUR**	
(a)	Applicable	**NO**
11.0	**OUTERSHEATH**	
(a)	Material	PVC Type ST2
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Colour	Black
(d)	Whether FRLS	Yes
(d)	Method of application	Extruded
(e)	Thickness of outer sheath	As per IEC-60502 (Part-1) (min. 1.8mm)
(f)	Marking	Cable size (cross section area and no. of cores) and voltage grade @ 5m (by embossing) Word "PVC" "FRLS" @ 5m (by embossing) Manufacturer's name and/ or trade name, and year of manufacture @ 5m (by embossing) 'BHEL-BAP' and 'CUSTOMER' Name @5m (by embossing) Progressive sequential marking @ 1m (by embossing/ printing)
12.0	**FRLS CHARACTERISTICS**	
(a)	Oxygen index	Min 29 (As per Relevant IEC / ASTMD 2863)
(b)	Temperature index	Min. 250 C (As per Relevant IEC / ASTMD 2863)
(c)	Acid gas generation	Max. 20% by weight (As per IEC 60502-1/ IEC 60754-1)
(d)	Smoke density rating	Max. 60% (As per IEC 60502-1/ IEC 61034-2 / ASTMD 2843)
(e)	**Flammability Test**	
(i)	Flammability test for single cable	YES As per IEC-60332 Part-1
(ii)	Flammability test as per IEEE: 60383	YES
(iii)	Swedish Chimney test SEN-SS-424-1475-F3	YES
13.0	**Anti-rodent and Termite repulsion Test**	YES
14.0	**Anti-Fungal Test**	YES
15.0	**TOLERANCE ON OUTER DIAMETER**	Up to 30mm; $\pm$ 1.5mm Above 30mm; + 5% or + 2mm, whichever is less.
16.0	**MINIMUM BENDING RADIUS**	
(a)	Multi core cables	12 x O.D.
17.0	**SAFE PULLING FORCE**	
(a)	Copper conductor cable	50 N/ sq. mm.
18.0	**CABLE DRUMS**	
(a)	Type of Drum	Steel
(b)	Standard drum length	1000m (±) 5%
(c)	Painting	Entire surface to be painted with epoxy resin paint.
(d)	Outermost Layer	To be covered with waterproof polyethylene
19.0	**SEA WORTHY PACKING**	YES. Over the cables polythene sheet shall be wrapped & then sealed properly. Cable ends shall be carefully protected before packing

PROJECT: MAITREE STPP(2 X 660MW)) CONTRACTOR: BHEL - RANIPET CONTRACT NO: BIFPCL/EPC-MAIN PLANT/NOA/2016/215	CONTRACT QUALITY REQUIREMENTS (CQR) for LT POWER&CONTROL CABLE MAITREE STPP(2 X 660MW)) EPC PACKAGE (BHEL CUST No: R 676, R677 & R4N2)	DOC.NO: BAP/QR/ R 676, R677 & R4N2:P&C:009 Rev NO. : 01 PAGE : Page 1 of 7 DATE : 21 04 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**	**1 KV Power Cable :** 1) Bidder/ sub vendor should have manufactured and supplied prior to the date of techno-commercial bid opening (22 09 2015). a) A least one hundred (100) km of XLPE insulated PVC sheathed power cable of 1 kV or higher grade in one single contract. b) At least ten (10) km of flame retardant low smoke cable. c) At least ten (10) km of, 1kV or higher grade power cable of minimum 630sqr.mm conductor size. **Control Cable:** 1) Bidder/ sub vendor should have manufactured and supplied prior to the date of techno-commercial bid opening (22 09 2015). a) A least three hundred (300) km of PVC insulated PVC Sheathed stranded copper conductor 1 kV or higher grade in one single contract. b) At least ten (10) km of flame retardant low smoke cable. **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.**	
01	**Type test requirements**	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	
		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.	
		3. Type Test reports review and approval by BIFPCL/FITCHNER is a must.	

27/04/2018

Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements	##Specific confirmations by the vendor
		ITEM: LT POWER & CONTROL CABLE	
		TESTING REQUIREMENTS FOR XLPE/PVC (COPPER) POWER CABLE **A. Type Test Conduction:** 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 conductor) b) Flammability Test to be conducted only on one sample/ lot. B. **Sample Test Conduction(S)/Acceptance Test Conduction(A)** 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. 4. Flammability Test to be conducted only on one sample/ lot. **C. Routine Test Conduction:** 1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests. **D. Tests listed in S.No-7.0, 8.0, 9.0 & 10.0 shall be conducted only on one sample / lot.** **E. Tests listed in S.No-7.0, 8.0, 9.0,10.0 & 11.0 relevant test procedure shall be submitted for BHEL/BIFPCL /FITCHNER approval**	

SI. 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	

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	
4.0	Improved Fire performance (FRLS) Tests				
I.	Oxygen index test	For PVC outer sheath only	T, S	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, S	IEC 60502-1/ IEC 60754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	Relevant IEC / ASTMD 2863	
5.0	Flammability Tests				
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	
6.0	Electrical Tests				
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	
7.0	Anti-rodent and Termite Repulsion test	For PVC outer sheath only	S *	Manufacturer's Testing Standard	Internal Test Report to be furnished
8.0	Anti-Fungal Test	For PVC outer sheath only	S *	Manufacturer's Testing Standard	
9.0	Resistant to solar radiation	For PVC outer sheath only	S *	Manufacturer's Testing Standard	Internal Test Report to be furnished
10.0	Resistance to the effect of oil, seawater	For PVC outer sheath only	S *	Manufacturer's Testing Standard	
11.0	Water Tree Test (Accelerated)	XLPE Insulation	T *	As per Technical Datasheet Manufacturer's Testing Standard	Type Test Report to be furnished

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

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

ITEM: LT POWER & CONTROL CABLE

TESTING REQUIREMENTS FOR PVC (CU/AL) CONTROL CABLE

A. Type Test Conduction:

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. Sample Test Conduction (S)/Acceptance test Conduction (A)

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.

C. Routine Test Conduction:

1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests.

D. Tests listed in S.No-6.0,7.0, 8.0, & 9.0 shall be conducted only on one sample / lot & relevant test procedure shall also be submitted for BHEL/BIFPCL /FITCHNER approval

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	Physical Tests for PVC Insulation & PVC sheath				
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	

PROJECT: MAITREE STPP(2 X 660MW)) CONTRACTOR: BHEL - RANIPET CONTRACT NO: BIFPCL/EPC-MAIN PLANT/NOA/2016/215	CONTRACT QUALITY REQUIREMENTS (CQR) for LT POWER&CONTROL CABLE MAITREE STPP(2 X 660MW)) EPC PACKAGE (BHEL CUST No: R 676, R677 & R4N2)	DOC.NO: BAP/QR/ R 676, R677 & R4N2:P&C:009 Rev NO. : 01 PAGE : Page 6 of 7 DATE : 21 04 2018	##Enquiry No: ##Supplier Name: ##Offer reference: ##Date:

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
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	
3.0	Improved Fire performance (FRLS) Tests				
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	
4.0	Flammability Tests				
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	
5.0	Electrical Tests				
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	
6.0	Anti-rodent and Termite Repulsion test	For PVC outer sheath only	A	*Manufacturer's Testing Standard	*Internal Test Report to be furnished*
7.0	Anti-Fungal Test	For PVC outer sheath only	A	*Manufacturer's Testing Standard	
8.0	Resistant to solar radiation	For PVC outer sheath only	S	*Manufacturer's Testing Standard	*Internal Test Report to be furnished*
9.0	Resistance to the effect of oil, seawater	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.

PROJECT: MAITREE STPP(2 X 660MW)) CONTRACTOR: BHEL - RANIPET CONTRACT NO: BIFPCL/EPC-MAIN PLANT/NOA/2016/215	CONTRACT QUALITY REQUIREMENTS (CQR) for LT POWER&CONTROL CABLE MAITREE STPP(2 X 660MW)) EPC PACKAGE (BHEL CUST No: R 676, R677 & R4N2)	DOC.NO: BAP/QR/ R 676, R677 & R4N2:P&C:009 Rev NO. : 01 PAGE : Page 7 of 7 DATE : 21 04 2018	##Enquiry No: ##Supplier Name: ##Offer reference: ##Date:

Sl. NO.	DESCRIPTION	BHEL/NTPC Requirements	##Specific confirmations by the vendor
		ITEM: LT POWER & CONTROL CABLE	
02	Quality Plan Requirements	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. 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. 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. 4. Submission of all internal inspection report for BHEL/Third party Inspector review before undertaking inspection. 5. BHEL/TPI(Third Party Inspection)/Customer/BIFPCL inspection is applicable at vendor works 6. Inspection clearance for dispatch is to be obtained from BHEL/BHEL Third Party Inspection agency(TPI) prior to dispatch of cables	
03	Document Package	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 (.) a. Index Sheet b. Approved MQP c. Final Inspection Report issued by BHEL/TPI, BIFPCL/ FICHTNER(MDCC). d. Compliance certificate/report for any Nonconformance or observation made by BHEL/TPI/ BIFPCL/FICHTNER agencies during inspection at vendor works. e. Test certificates/internal reports for ***Verification portion*** as given in MQP and all the test reports etc witnessed by BHEL/TPI/Fitchnner/BIFPCL f. Approved Data sheet, Spec & Drgs g. BOM with actual make used with customer approved Drgs BHEL Inspection clearance for dispatch.	
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.

PROJECT: MAITREE STPP(2 X 660MW)) CONTRACTOR: BHEL - RANIPET CONTRACT NO: BIFPCL/EPC-MAIN PLANT/NOA/2016/215	CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTOR MAITREE STPP(2 X 660MW)) EPC PACKAGE (BHEL CUST No: R 676, R677 & R4N2)	DOC.NO: BAP/QR/ R 676, R677 & R4N2 LTM007 Rev NO.: 02 PAGE : Page 2 of 2 DATE : 02 12 2017	##Enquiry No: ##Supplier Name: ##Offer reference: ##Date:

Sl. NO.	DESCRIPTION	BHEL/BIFPCL/FITCHNER Requirements	## Specific **confirmations** by the vendor
		ITEM: LT Motor	
02	**Quality Plan Requirements**	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.*** 2. All **routine tests** Including oscillographic measurement for starting current, , over speed and Vibration test shall be clearly indicated in MQP and ***reference standard*** shall be relevant IEC. This is in addition to reference documents of Specification, approved drawings and Data sheet. 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. 4. Submission of all Internal inspection report for BHEL/Third party Inspector review before undertaking inspection. 5. BHEL/Third party inspection agency (TPI) and Customer/BIFPCL inspection is applicable at vendor works 6. Inspection clearance for dispatch is to be obtained from BHEL Quality department prior to dispatch of Motors.	
		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 (.) a. Index Sheet b. Approved MQP c. Final Inspection Report issued by BHEL/TPI d. Compliance certificate/report for any Nonconformance or observation made by BHEL/TPI agencies during inspection at vendor works. e. Test certificates/internal reports for ***Verification portion*** as given in MQP. f. Approved Data sheet, Spec & Drg g. BHEL Inspection clearance for dispatch. h. BOM with actual make used with customer approved drgs.	
03	**Painting Requirements**	1) **Surface preparation**: SA 2.5 2) **Thickness of painting for Outdoor Application Motors:** Zinc-Epoxy primer, 1 Coat, DFT **80 µm**. Intermediate 1 coat of Epoxy high solid, DFT **110 µm**. Finish 1 coat, 2-Comp.Polyurethane, DFT **50 µm**. **Total thickness = 240 µm.** 3) **Colour shade:** Shall be as per BHEL/BIFPCL/FICHTNER approved specifications, Drgs and Data sheet.	
04	**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.	
05	**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 and also being an EXPORT ORDER.

Electrical features for LT Motor:

1. Motors shall be designed as 3 phase squirrel cage motors suitable for direct online starting.
2. Motor rating shall be at least 110 % of the maximum electric power consumption of the driven machine.
3. Continuous delivery of rated power at voltages of 90 – 110 % of the rated voltage and allowable frequency range within the limits of thermal class F.
4. Motor starting current must not exceed 7.0 times rated current.
5. Anti condensing heating shall be considered for motors above 55 kw.

Construction:

1. Motor parts made of iron internally and externally shall be sandblasted and surface protected.

2. Paint finish shall be resistant to chemicals and seawater.

3. Bolts shall be with adequate corrosion protection.

4. All joint faces and gaps shall be sealed.

5. Special treatment of windings with resin impregnation plus immersion in varnish

6. Varnish – insulated laminations

7. Design and construction of the motors shall comply with IEC 60034-1, 60034-5 or VDE 0530 and DIN 40050.

Cl no	CHARACTERISTICS	Vendor Data (**To be filled by vendor)**
27.0	Stator winding connection	Delta / star
28.0	Class of insulation & temperature rise	Class F; 60°C by thermometer method / 70°C by resistance method.
29.0	Minimum permissible starting voltage	Volts
30.0	Resistance per phase @20 Deg C (Indicative)	Ohms
31.0	No of successive starts in Hot condition	ONE / TWO
32.0	Quantity and power consumption of space heater	Qty== Watts==
33.0	Direction of rotation	Bi-Directional.
34.0	Bearing make & type	Make:: Drive End; Non Drive End;
35.0	Lubricant quantity , grade & recommended interval of lubrication	
36.0	Type of mounting & shaft orientation	Foot mounting; Horizontal.
	Terminal Box	
37.0	Location & angle of rotation	
38.0	Gland size for stator winding	
39.0	Gland size for space heater	Suitable for 2CX2.5 sq.mm (armoured), if applicable.
40.0	Cable entry	
41.0	GD^2 of motor ($kg\text{-}m^2$)	
42.0	Total weight of motor (kg).	
43.0	Weight of stator (kg)	
44.0	Weight of rotor (kg)	
45.0	Anticipated bearing life in Hours	
46.0	Method of connection to driven equipment	
	Limiting rotor temperature for determining safe	☐
47.0	stall time	
48.0	RTD for winding/ Bearing	Applicable YES NO
49.0	Grade of balance of motor	
50.0	Standard continuous rating at 40 Deg C ambient	
51.0	De-rated rating of motor at 50 Deg C.	
52.0	a. Locked Rotor KVA b. Ratio of Locked rotor KVA / Rated KW	
53.0	a. Motor Dynamic Load b. Motor Static load	Upward/ Downward— Upward / Downward—
54.0	**PAINT SHADE**	

Vendor's signature and seal **Rev No:** **Date:**

Cl No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
36.0	Lifting Device	Eye bolt or lugs to facilitate safe lifting	
37.0	INSPECTION & TESTING	As per applicable quality plan	
38.0	DOCUMENTS a) Along with offer: b) After placement of Purchase order (**within 15 days**)	One set of technical data sheet as per the enclosed format and Motor general arrangement drawing giving foundation details, shaft details. Three sets of the following for approval: Technical Data sheet as per the enclosed format of TECI: MAIT: LTM: REV 00- sh 6 to 8 Motor general arrangement drawing giving foundation details, shaft details and weight Motor Terminal box arrangement drawing Motor characteristic curves. Steel crate packing drawing. The following shall be submitted 1. Guarantee certificate. 2. O & M manuals. 6. Acceleration time and LRWT calculation shall be submitted for review.	
39.0	PACKING	a) Seaworthy packing to be done b) The packing shall meet the Transport, Environment & Storage hazards. c) As per Packing Procedure PE: TS: 888:100:A001 or as per Manufacturer's Standard Seaworthy packing Practice subject to approval. Vendor shall check the applicable rated voltage in enquiry.	

NOTE:

1. Refer current valid list for revision status of Quality Plan & Packing Procedure.

2. In 'Vendor compliance' column Vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'. Clarification, if any, in this column will not be considered.

Cl No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
2.15	Starting current	Less than or equal to 600% full load current subject to tolerance as per IS.(Normal motor) Less than or equal to 700% full load current subject to tolerance as per IS.(Energy efficient)	
2.16	Starting time & locked rotor withstand time	The locked rotor withstand time (LRWT) at 110% rated voltage (RV) under **HOT** condition shall be at least 3 sec more than the starting time at 80% of rated voltage for motors with acceleration time upto 20 sec at RV and 5 sec where the accelerating time is more than 20 sec at RV.	
2.17	Vibration	The peak amplitude of vibration shall be as per IEC 60034-14	
2.18	Noise level	Within the limits specified by IEC 60034-09. (<80 db at full load condition) @ 1 metre distance.	
2.19	Type of enclosure	TEFC, IP 55 as per IEC 60034-05.	
2.20	Type of mounting	Horizontal foot mounted.	
2.21	Bearings	Ball or roller type / bearings effectively sealed against ingress of dust. The bearing shall be so constructed that the loss of lubricating grease is kept to minimum. Sealed bearings are also acceptable.	
2.22	Lubricant Type	Grease	
2.23	Bearing life	Bearings shall have a minimum life of **40000** Working hours.	
2.24	Shaft extension	Motors shall be provided with key slotted bare shaft extension with key at the driving end.	
2.25	Terminal box Type	Weather proof IP 55 as per IEC60034-05, Capable of being turned through 360° in steps of 90°.	
2.26	Cable gland and lugs	Double compression type nickel plated brass cable glands and insulated tinned copper crimping lugs to suit the cable size shall be supplied along with the motor. i) Size of power cables will be intimated after PO. ii) For space heater cable glands and lugs suitable for 2CX2.5 to be provided Stud / screw type with plain washers, spring washers /	

LT MOTORS- APPROVED SOURCES

11	LT MOTORS (REFER NOTE 1)	II			KEC	BANGALORE/HUBLI	A
		II			SIEMENS	MUMBAI	A
		II			CGL	AHMEDNAGAR	A
		II			MARATHON	KOLKATA	A
		II			BBL	MUMBAI	A
		II			ABB	FARIDABAD/ BANGALORE	A
		II			JYOTI	VADODARA	A

ENGINEERING DIV./ QA&I

13/12/2015

PROJECT: CONTRACTOR: CONT_NO: Package:	MAITREE (2×660 M BHEL –RANIPET EPC PACKAGE	LIST OF ITEMS REQUIRING QUAL' 'PLAN AND SUBCONTRACTOR APPRO VAL SUB SYSTEM: Electrical,C&I	Ref No: Date: 13.12.2015

8	OPACITY MONITOR	III	SICK	GERMANY	A
		III	DURAG	GERMANY	A
		III	CODEL	UK	A
		III	LAND COMBUSTION	UK	A
9	HEATER (PANEL TYPE HOPPER HEATERS)	II	HTD HEAT TRACE INDIA	HYDERABAD	A
		II	HOT FOIL EHS INC	USA	A
		II	HTD HEAT TRACE	USA	A
		II	THERMON	USA	A
		II	THERMOPADS	HYDERABAD	A
		II	THERMON	PUNE	A
10	ELEVATOR	II	ECE	GHAZIABAD	A
		II	TECHNO	AHMEDABAD	A
		II	OTIS	MUMBAI	A
		II	KONE	CHENNAI	A
		II	OMEGA	AHMEDABAD	A
		II	SAMIL ELTEC	KOREA	A
11	LT MOTORS (REFER NOTE 1)	II	KEC	BANGALORE/HUBLI	A
		II	SIEMENS	MUMBAI	A
		II	CGL	AHMEDNAGAR	A
		II	MARATHON	KOLKATA	A
		II	BBL	MUMBAI	A
		II	ABB	FARIDABAD/ BANGALORE	A
		II	JYOTI	VADODARA	A

Bangladesh-India Friendship Power Company (Pvt.) Ltd. BIFPCL

13/12/2015

ENGINEERING DIV/ QA&I

	PROJECT: **CONTRACTOR:** **CONT_NO:** **Package:**	MAITREE (2×660 M BHEL –RANIPET EPC PACKAGE	**LIST OF ITEMS REQUIRING QUAL' PLAN AND SUBCONTRACTOR APPRO/AL** **SUB SYSTEM:** Electrical,C&I			**Ref No:** **Date:** 13.12.2015
		II		LHP	SOLAPUR	A
				NGEF	HUBLI	A

Bangladesh-India Friendship Power Company (P.V.L.) Pvt. BIFPCL

PANEL/ LTMSB

REFER SEPARATE LIST

13/12/2015

ENGINEERING DIV/ QA&I