

**BANGLADESH-INDIA FRIENDSHIP
POWER COMPANY (PVT.) LIMITED,
BANGLADESH**

**2x660MW MAITREE SUPER THERMAL POWER
PROJECT, RAMPAL, BANGLADESH**

**TECHNICAL SPECIFICATION
FOR
FORK LIFT**

SPECIFICATION NO.: PE-TS-421-563-A301 Rev 0



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA**



PROJECT TITLE
2x660MW MAITREE SUPER THERMAL
POWER PROJECT, RAMPAL, BANGLADESH

SPECIFICATION No: PE-TS-421-563-A301

PACKAGE: FORK LIFT

VOLUME: II B & III

REV. 00

DATE: APR 2018

SHEET :

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VOLUME: II B

SECTION-I

REV. 00

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SECTION-I

SPECIFIC TECHNICAL REQUIREMENT

SUB-SECTION IA

**SPECIFIC TECHNICAL REQUIREMENT
(MECHANICAL)**

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1.0 **INTENT OF SPECIFICATION**

- 1.1. The specification includes, but not limited to SUPPLY PART comprising of design (i.e. preparation and submission of drawing /documents including “As Built” drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), fill of lubricants & consumables till warranty period, along with spares for erection, startup and commissioning as required, initial spares, forwarding, sea-worthy packing, shipment and delivery as specified in BHEL NIT for project and package specified above complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order in line with drawings/ documents/ test procedures approved by BHEL/ Customer for FORK LIFT as per details in different sections / volumes of this specification.
- 1.2. The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor of the responsibility of providing such facilities to complete the supply of FORK LIFT.
- 1.3. It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
- 1.4. The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.
- 1.5. The general term and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.
- 1.6. While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Sec-III of the specification within 10 days of receipt of technical specification. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

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- 1.7. The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.
- 1.8. Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If there are no deviations from the tender document, bidder shall indicate 'NO DEVIATION' in the deviation schedule.
- 1.9. In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, more stringent requirement as per the interpretation of the owner shall apply.
- 1.10. In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.11. Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder /vendor and Customer/ Purchaser/Employer will mean BHEL and /or Customer including their consultant as interpreted by BHEL in the relevant context.
- 1.12. Apart from specific design requirement, design of various systems/ Sub-systems and all equipment will also strictly meet the stipulations of part B0 of customer technical specification.



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A.0.0 SCOPE OF WORK

1.0.0 SUPPLIES

Equipment to be furnished by the bidder for FORK LIFT with accessories as per the details given in data sheet A. Any equipment / accessories not specified in the specification but required to make the fork lift unit complete and efficient shall also be under the bidder's scope of work.

1.1.1 Applicable codes and standards

- (a) International standards like IEC or ISO shall be followed to the extent possible.
- (b) Following design standards may be followed, as applicable, in case IEC or ISO standards are not available for any particular item:
 - i) JIS B 9620/ ASME HST-4/ Other equivalent international standard
 - ii) Hook: BS 2903 or any other equivalent International standard
- (c) Chinese Standards and codes are not allowed. In case bidder proposes any IS code, it shall be verified by reputed institutions like IIT that the proposed code is equivalent or superior to the codes mentioned above. Comparison report shall be established and provided to BHEL/Owner for information. Such report shall highlight the main items of the code, including material composition, material properties, design clauses and others as required. Report shall identify deviations of both codes and give justification for this deviation. No cost or time implication will be acceptable for any delay on account of non-acceptance by customer of justification for deviation by bidder. In case equivalence is not established, bidder has to provide material as per specified codes only.
- (d) SA/IS 2062 (as per ASME standard) for structural steel material has been accepted by customer in addition to the specified codes/ standards mentioned above and elsewhere in the specification:

1.1.2 Compliance with this specification shall not relieve the bidder of the responsibility of furnishing material and workmanship to meet the specified working/duty conditions and relevant Standards/Codes.

1.1.3 Maintenance Tools and Tackles

A complete unused new set of special purpose tools, tackles and accessories along with detailed instructions and maintenance manual shall be supplied. Each tool and wrench shall be stamped so as to be identified easy for its use. The tools shall be supplied in steel toolbox and with a copy



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of instruction manual. The items supplied shall be of the best quality and specially protected against rusting in tropical climate.

Note: - The fork lift shall be supplied with one set of tool and tackles with O&M manual in the toolbox separately. Supplier to furnish list of tools& tackles along with the offer in the attached format at Annexure V

1.1.4 Erection and commissioning spares

One set of erection and commissioning spares, as deemed necessary by the bidder for commissioning of the fork lift shall be supplied along with the fork lift . List of these commissioning spares shall be furnished by the bidder along with their offer in the attached format at Annexure VI

1.1.5 Mandatory Spares – Not Applicable

1.1.6 Initial spares-

Bidder shall supply operation and maintenance spares as per list attached hereunder. Spares and quantities mentioned in this list are minimum. Any additional spare and/or quantities of the spares mentioned here, as deemed necessary by the bidder for proper operation & maintenance (preventive as well as break-down) of the fork lift shall be quoted by the bidder. List of the same shall be furnished by the bidder along with their offer.

FOR 3T DIESEL OPERATED FORK LIFT			
Sl.no	Description	Total quantity required	Unit
i	Oil Filter	1	set
ii	Fuel Filter	1	set
iii	AIR FILTER ELEMENT	1	set
iv	Transmission filter	1	set
v	Pilot line filter element Hyd.	1	set
vi	Filter-Air Breather Hyd.	1	set
vii	Element Assy Fuel	1	set
viii	Element-Safety	1	set
ix	Element-Primary	1	set
x	Hydraulic oil filter	1	set
xi	Fan Belt	1	set
xii	Radiator Hose	1	set
xiii	FUEL LINE HOSE	1	set
xiv	STRAINER	1	set
xiii	Ignition kit	1	set
xiv	Any other		
FOR 5T DIESEL OPERATED FORK LIFT			
i	Oil Filter	1	set



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ii	Fuel Filter	1	set
iii	AIR FILTER ELEMENT	1	set
iv	Transmission filter	1	set
v	Pilot line filter element Hyd.	1	set
vi	Filter-Air Breather Hyd.	1	set
vii	Element Assy Fuel	1	set
viii	Element-Safety	1	set
ix	Element-Primary	1	set
x	Hydraulic oil filter	1	set
xi	Fan Belt	1	set
xii	Radiator Hose	1	set
xiii	FUEL LINE HOSE	1	set
xiv	STRAINER	1	set
xiii	Ignition kit	1	set
xiv	Any other		

FOR 10T DIESEL OPERATED FORK LIFT

i	Oil Filter	1	set
ii	Fuel Filter	1	set
iii	AIR FILTER ELEMENT	1	set
iv	Transmission filter	1	set
v	Pilot line filter element Hyd.	1	set
vi	Filter-Air Breather Hyd.	1	set
vii	Element Assy Fuel	1	set
viii	Element-Safety	1	set
ix	Element-Primary	1	set
x	Hydraulic oil filter	1	set
xi	Fan Belt	1	set
xii	Radiator Hose	1	set
xiii	FUEL LINE HOSE	1	set
xiv	STRAINER	1	set
xiii	Ignition kit	1	set
xiv	Any other		
xv	Any other		

FOR 5T BATTERY OPERATED FORK LIFT

i	Hydraulic oil filter	1	set
ii	Hydraulic Suction filter	1	set
iii	Ignition kit	1	set
iv	Any other		

1.1.7 Consumables

Bidder shall supply all the consumables including lubricating oil, engine oil, coolant etc. as required for standard lubrication/service schedule of the forklift, till the warranty period. For



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this purpose, bidder is advised to calculate at their end, the total requirement of consumables till the warranty period of the fork lift and quote the prices accordingly. Further, considering the fact that these consumables have certain shelf life, these consumables shall be supplied to site as and when required at site, as per lubrication/ service schedule and not with the first consignment. Thus, the fork lift along with accessories as per requirements of this tender, shall be supplied with only first fill of lubricants in first consignment and consumables shall be supplied as per the lubrication/service schedule of the fork lift in multiple consignments, till the warranty of the forklift.

1.2.1 Services to be provided by the bidder

- a. Design, engineering with associated documentation
- b. Bidder's scope of work also includes arranging clearance from the concerned government body/authority as and when required
- c. Temporary registration and on road insurance as applicable will be responsibility of the bidder
- d. Permanent registration and 01 year insurance of the vehicle will be responsibility of bidder in the name of ultimate customer.

1.2.2 Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement. In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

1.2.3 Packing, forwarding and transportation as per NIT conditions

1.3.0. Inspection and Testing

Refer "QUALITY ASSURANCE AND INSPECTION REQUIREMENT" section in section I, sub-section IA of technical specification

1.4.0. Drawing / design document for submission: Drawing/ design documents to be submitted as per list & submission schedule attached as Annexure-III, Section IA.

Any other design document/ drawing as required by customer/ BHEL shall be submitted by bidder during detail engineering without any implication.

1.5.0 Number of drawing and documents for submission

The number of prints / copies required for various drawing and documents are listed in Annexure-III, Section IA of this specification.

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2.0.0. Deviations

If the bid submitted has got any deviation from the technical stipulations in the tender document, bidder shall tabulate the same appropriately in the "Schedule of Deviations- Cost of withdrawal" as attached along with General Condition of contracts (GCC) furnishing full particular of such deviations along with cost of withdrawal of deviation. Unpriced schedule of this schedule shall be submitted along with technical offer. Unpriced format should contain "QUOTED" / "NIL" / "NA" against each deviation. Deviations are to be furnished with mention to specific clause number. Reasons / explanations for such deviations shall be furnished. If there are no deviations from the tender document, bidder shall furnish NO DEVIATION CERTIFICATE regarding the same. Priced copy of same shall be submitted along with price schedule.

3 .0.0. Makes of Sub - Vendor items

List of makes of bought out items for fork lift shall be furnished by bidder to BHEL with complete vendor's details, in such manner that the proposals may be approved by customer (BIFPCL) prior to award of contract by BHEL. Bidder may suggest sub vendors to meet the International Standards as applicable for the manufacturing and supply of the respective component during detail engineering which shall be subject to customer approval. Non-approval of any make proposed by bidder shall not have any impact on manufacturing, delivery schedule and cost of the fork lift .

6.0.0 INFORMATION TO BE FURNISHED BY BIDDER ALONG WITH OFFER

6.1.0 Bidder shall submit only the documents indicated at Section III, Sub Section IIIA of this specification along with the bid.

7.0.0 Packing

Refer Annexure-IV, Section IA.



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QUALITY ASSURANCE AND INSPECTION REQUIREMENT

		MANUFACTURER'S NAME & ADDRESS			MANUFACTURING QUALITY PLAN				PROJECT: 2X660 MW BIFPCL MAITREE			
					ITEM: FORK LIFT (DIESEL OPERATED)				PACKAGE: FORK LIFT			
					REV				Rev 00			
					DATE				BHEL DOC. NO:			
CAPACITY: -			PAGE				CONTRACTOR: BHEL					
S.NO.		Component & Operation	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record	Agency	Remark	
1		2	3	4	5	6	7	8	9	10	11	
1.0 RECEIVING INSPECTION												
1.1	STRUCTURAL MATERIAL OF CHASSIS – All steel heavy duty, welded construction for strength. - Plate & Section	Physical & Chemical		Major	Lab Analysis	Initial sample of each lot	As per Raw Material specification sheet		STC / Lab Report	P/V	V	
2.0	INCOMING MATERIAL											
2.1	Fabricated item (Over-head guard)	Physical verification and fitment check		Major	Visual & fitment check	Initial sample	As per drawing		V	P	V	V
2.2	Hydraulic Hoses, cylinders	Pressure test & Proof Pr. test		Major	Visual & Proof test	one per lot	OEM Spec. Sheet		STC	P	V	V
2.3	Hydraulic Pump	Specification sheet		Major	Visual	One per batch	OEM Spec. Sheet		STC	P	V	V
2.4	Tyre	Batch No Specification date of Mfg.		Major	Visual	One per batch	OEM Spec. Sheet		V	P	V	V
2.5	Engine	Technical specification & Features		Major	OEM Performance certificate	Initial sample	OEM Performance test sheet		STC	P	V	V
3	INPROCESS- INSPECTION											
3.1	Welding of Chassis frame assembly, Welding of Mast	Visual & NDT Inspection		Major	Visual & NDT	Initial Sample	NDT Procedure		TC	P	V	V
3	FINAL INSPECTION											
3.1	Load testing	rated load at rated height		Critical	Measurement	100%	Appd GA drg & As per Relevant STD		I.R.	P	W	W
3.2	Gradient test	Rated load at rated gradient		Critical	by measuring	100%	Appd GA drg & As per Relevant STD		I.R.	P	W	W
			LEGEND: CLASS A: Critical, B: Major, C: Minor				DOC. NO.:					
			** M: MANUFACTURER / SUB-CONTRACTOR C: CONTRACTOR /NOMINATED INSPECTION AGENCY, ND: NDT LAB N: Customer R: Test / Dim Report, IR-Inspection Report INDICATE "P" PERFORMS, "W" WITNESS, MTC: Mfr's Test Cert. "V" VERIFICATION, ALC: Approved Laboratory Certificate, QCR: Quality Control Report									
MANUFACTURER NAME & SIGNATURE			CONTRACTOR				NAME & SIGN OF APPROVING AUTHORITY & SEAL					
							Page 10 of 355					

 MANUFACTURER'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN						PROJECT: 2X660 MW BIFPCL MAITREE					
		ITEM: FORK LIFT (DIESEL OPERATED)			REV	Rev 00		PACKAGE: FORK LIFT					
		CAPACITY: -			DATE	BHEL DOC. NO:							
					PAGE	CONTRACTOR: BHEL							
S.NO.	Component & Operation	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record	Agency			Remark	
1	2	3	4	5	6	7	8	9	10			11	
3.3	Assembled forklift	Load test	Critical	Performance	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.4	Mast height	As per customer requirement	Critical	measure-ment	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.5	Mast tilting forward / backward	Angle as per specification sheet	Critical	Angle meas-urement	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.6	Turning radius (outside)	measurement	Critical	measure-ment	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.7	Ground Clearance	measurement	Critical	measure-ment	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.8	Hydraulic System	Visual Inspection	Critical	Check Leak-age	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
3.9	Accessories	All electrical / accessories and their working	Critical	Check proper working / operation	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W	
4	Painting	Examination – shade	Minor	Visual & measurement	100%	Appd GA drg				P	V	-	
		Dry Film Thickness	Major	Measurement	Sample						P	V	-

					DOC. NO.:
LEGEND: CLASS A: Critical, B: Major, C: Minor			** M: MANUFACTURER / SUB-CONTRACTOR D: Records for Data Fold C: CONTRACTOR /NOMINATED INSPECTION AGENCY, ND: NDT LAB N: Customer R: Test / Dim Report, IR-Inspection Report INDICATE “p” PERFORMS, “w” WITNESS, MTC: Mfr’s Test Cert. “v” VERIFICATION, ALC: Approved Laboratory Certificate, QCR: Quality Control Report		
MANUFACTURER NAME & SIGNATURE	CONTRACTOR		NAME & SIGN OF APPROVING AUTHORITY & SEALED Page 11 of 355		

 MANUFACTURER'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN						PROJECT: 2X660 MW BIFPCL MAITREE						
		ITEM: FORK LIFT (BATTERY OPERATED)			REV	Rev 00		PACKAGE: FORK LIFT BHEL DOC. NO: CONTRACTOR: BHEL						
		CAPACITY: -			DATE	Page 2 of 2								
		Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of Record							Agency
S.NO.	Component & Operation	Characteristics	4	5	6	7	8	9	D	M	C	N	10	11
1	2	3												
3.5	Mast tilting forward / backward	Angle as per specification sheet	Critical	Angle measurement	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W		
3.6	Turning radius (outside)	measurement	Critical	measurement	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W		
3.7	Ground Clearance	measurement	Critical	measurement	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W		
3.8	Hydraulic System	Visual Inspection	Critical	Check Leakage	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W		
3.9	Battery charger test	Performance	Critical		100%	As per mfg. specification		I.R.		P	W	W		
3.10	Accessories	All electrical / accessories and their working	Critical	Check proper working / operation	100%	Appd GA drg & As per Relevant STD		I.R.	✓	P	W	W		
4	Painting	Examination – shade	Minor	Visual & measurement	100%	Appd GA drg				P	V	-		
		Dry Film Thickness	Major	Measurement	Sample					P	V	-		

				DOC. NO.:	
LEGEND: CLASS A: Critical, B: Major, C: Minor ** M: MANUFACTURER / SUB-CONTRACTOR D: Records for Data Fold C: CONTRACTOR/NOMINATED INSPECTION AGENCY, ND: NDT LAB N: Customer R: Test / Dim Report, IR-Inspection Report INDICATE "P" PERFORMS, "W" WITNESS, MTC: Mfr's Test Cert. "V" VERIFICATION, ALC: Approved Laboratory Certificate, QCR: Quality Control Report					
MANUFACTURER NAME & SIGNATURE	CONTRACTOR		NAME & SIGN OF APPROVING AUTHORITY & SEALED Page 13 of 355		

BIFPCL SPECIFICATION

B0

General Technical Specification



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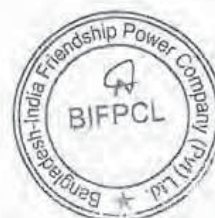
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B0.1 Subject of Specification

The Joint Venture of Bangladesh-India Friendship Power Corporation (pvt) Ltd (BIFPCL) intends to construct a 2x 660 MWe, gross coal fired power plant (the Plant, the Maitree-STPP Project or the Project) in the district of Khulna for which BIFPCL firms as Employer, utilizing high availability, high efficiency steam cycle technology.

The Contractor shall cover all works for the engineering, procurement, construction and commissioning of the whole plant on a turnkey basis.

Two power units with steam generator, steam turbine generator and ancillary systems shall be proposed in a technology that enables the Contractor to guarantee a high net efficiency while achieving a high reliability (certain restrictions regarding the technology and the design parameters apply, as detailed herein). A second phase of the same capacity is foreseen as a future possibility, however, this Specification deals only with 2 x 660 MW_{e, gross} unless otherwise and expressly stated.

The Plant shall be built on a "green field" basis. It shall be conceptualized in accordance with the above criteria, the thermodynamic cycle adopted must be capable of working successfully over prolonged periods and the system shall be able to withstand severe shocks when connected to the Grid as specified in this **Section B0**. The steam cycle shall operate with once-through technology at supercritical.

The Plant shall be based on supercritical technology. The main steam (MS) pressure at turbine inlet shall be in the range of 250 to 270 bar(g). The MS temperature at turbine inlet shall be in the range of 568 to 600 °C. The reheat steam (RH) temperature at turbine inlet shall be chosen by the Bidder/Contractor accordingly. That means, a proposed plant with a MS pressure at turbine inlet between 250 and 270 bar(g) and MS/RH temperature at turbine inlet upto 600°C/600° will be acceptable.

The Plant shall be suitable to be operated with the specified fuel. Only proven equipment and materials shall be used.

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shall also include workshops, admin and staff amenities buildings and the likes unless expressly excluded in this specification.

B0.2 General Plant Description

B0.2.1 General purpose of the plant

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- Turbine systems (refer to Section B2)

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B0.2.4 Site conditions

The following information on local conditions is investigated or compiled by the Employer. The Contractor is hereby in no way relieved from his duties of carrying out all investigations required for satisfactory performance of his works. The Contractor shall perform his own Site visits and investigations, prior to Contract award in order to familiarize him with the existing conditions of the Site and the surrounding area.

Location, accessibility and present condition of the Site

The site for the Maitree-STPP Project is geographically located between 22° 37'0'' N to 22°34'30''N and 89°32'0''E to 89°34'5''E, approximately 14 km northeast of the Mongla Port and 14 km northwest of the Sundarbans, is infringed by the Passur and Moidara Rivers to the west and south east respectively. The project requires an area of approximately 500 acres.

The topographical survey indicates a natural ground level of +1.15 to + 1.35 meters above sea level. A severe cyclone in 2009 raised the level to 4.47 meters and it was decided to raise the Plant level to +5.00 meters.

Politically, the site is located in Rampal Upazila of the Bagherat District in the Rajnagar Union

Currently, the Site is accessible by boat only.

The nearest inland port is Mongla port at around 14km direct distance.

The proposed Khan Jahan Ali Airport is located at a distance of approximately 12 km from the project site.

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Seismic zone

Attention shall be paid to seismic parameters. Related to soil type as identified to Soil Investigation Report, the effect of local soils on earthquake ground motion shall be determined.

For site class "S1" and "S", as expected for the Project, site specific studies shall be carried out to determine the design acceleration response spectrum. During field study minimum the following tests shall be executed:

- Seismic cross hole test; and
- Seismic refraction test.

Based on these results a site specific Response Spectra shall be established. Peak spectral acceleration shall be determined, but shall be not less than 0.12g, as mentioned in BNBC 2012, Table 2.5.2.

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Design ambient conditions for Electrical Systems

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| • Maximum design temperature (outdoor) | 45°C |
| • Maximum daily average ambient shade temperature | 38°C |
| • Maximum monthly average temperature (in the shade) | 34.6°C |
| • Maximum annual average temperature (in the shade) | 27.3°C |
| • Maximum design temperature of the electrical equipment installed indoors in air conditioned rooms | 40°C |
| • Maximum design temperature of the electrical equipment installed indoors non in air conditioned rooms | 45°C |
| • Minimum design temperature | 0°C |

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Wind data

The project region is characterized by southerly winds from the Bay of Bengal during the Monsoon Season and north-westerly winds from the Himalayas during the Winter Season. During the Summer Season, the wind blows from south-southwest to north-northeast. The annual average wind speed amounts to 1.7 meter/second and the wind rose for the entire year is shown in Figure 5.5.

The wind load calculation for the buildings and structures shall be as per Bangladesh National Building Code -2012, Part 6, Chapter 2.4.

Basic wind Speed, V , shall be taken as 73 m/s, Three-second gust at 10 m above ground in exposure C, having a return period of 50 years.

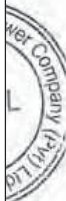
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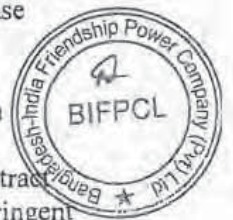
B0.2.7 Design requirements

This specification entails a functional technical specification (FTS). Hence, the Contractor is given as much freedom as possible in designing the main Plant components, characteristics and design data according to the Contractor's experiences and good engineering practice. One main acceptance requirement is that the Contractor's proposed design work shall be based on a very good reference basis. Prototype equipment and/or design features will not be accepted. All parts and equipment shall be arranged in such a manner as to facilitate surveillance by the operator and for ease maintenance, operation and control.

In the event of contradictions or discrepancies within B0 or between requirements in B0 and stipulations other parts of the Technical Specifications these shall be clarified by mutual consent before Contractor signature. In case contradictions have been not clarified the more stringent requirements shall apply.

The main design features (basic design reports, drawings, PFD, P&IDs, design data etc.) and the main vendors and subcontractors shall be subject to the approval by the Employer.

The main equipment/system subcontractors for: steam generator, steam turbine, main transformers, flue gas desulphurization plant shall be firm with the tender. Bidder's/Contractor's sub-suppliers and vendors shall



comply with Provennes Criteria as stipulated elsewhere in the bidding document.

The Employer has the right to refuse design features and vendors or subcontractors, if the Contractor cannot verify the reliability of the suggested design, vendor or subcontractor.

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The Plant is expected to operate in base-load mode with high plant load factor. The design lifetime of the Plant shall be of not less than 30 years of operation or 200,000 full load operating hours, whichever is longer. The Plant and all its auxiliaries shall be designed to operate for the complete lifetime under the site conditions as described in **Section B0** and dedicated other part of this FTS.

All Plant equipment and material must be suitable for the range of ambient site conditions. In particular the saline atmosphere has to be considered.

The thermodynamic process of the Plant is to be optimized by the Contractor according to the proposed equipment. An economic optimal balance between investment, maintenance and operation expenses and Plant availability (planned and unplanned outages) shall be proposed.

The Contractor shall ensure a design of the Plant to achieve an average target availability of 90 % (regarding the definition and calculation of the availability please refer to Chapter B0.2.9.5). The Contractor shall accordingly provide for all systems:

- sufficient redundancies
- sufficient storage capacity
- appropriate adjustment of control parameters, and
- shall provide an appropriate spare part concept/proposal as further described under Chapter B0.3.7.



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