VOLUME - IA
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Contents

1.0 Project Information (2x4 MLD Sewage Treatment Plat)

1	Customer	:	Bharat Heavy Electricals Limited, HPEP, R.C. Puram, Hyderabad - 502032
2	Project Title	:	E&C works for Mechanical & Electrical package for 2x4 MLD Sewage Treatment Plant for BHEL Township, HPEP, R.C.Puram
3	Location	:	BHEL Township, R.C. Puram, Hyderabad
4	Address Detail	:	BHEL Township, R.C. Puram, Near Petrol Pump, Hyderabad-502032
5	Nearest Railway Station	:	Lingampally, MMTS station/ Secunderabad/ Nampally station
6	Road Approach	:	Mumbai Highway
7	Nearest Air Port	:	Hyderabad
11	Ambient Air Temperature (Average)	:	a) Minimum : 16^0 C b) Maximum : 39^0 C
12	Average Relative Humidity	:	23-95 %
13	Climatic Condition	:	Tropical Climate

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

2.0 SCOPE OF WORK

This section list major scope of work for Erection & Commissioning for Mechanical & Electrical packages for 2x4 MLD Sewage Treatment Plant for BHEL Township, R.C. Puram, Hyderabad to be carried out by contractor, but not limited to following for safe, speedy completion of this package. Following are the major scope of the work for this work,

1. Receipt of materials at site/BHEL stores from road carriers, unloading, verification, etc.
2. Drawing of the materials from BHEL stores inside/outside the BHEL, R.C. Puram factory and transportation to site stores.
3. Preservation of components during storage and erection at site.
4. Leveling and alignment, erection, testing, commissioning, trial operation and handing over to customer for the equipments / packages supplied by PE&SD&BAP-Ranipet units of BHEL for Sewage treatment plant of BHEL RC Puram,Hyderabad and associated equipments/materials .
5. Deployment of necessary manpower and Tools & Plants for completing the works as per applicable standards and specifications.
6. Installation and removal of temporary piping and equipment for carrying out Chemical Cleaning.
7. Final painting .
8. Facilitate the customer to obtain approvals from statutory authorities.
9. Removal of surplus material, scraps out of fabrication yard, temporary infrastructures, subsequent cleaning up and handing over of plant to owner as per tender.
10. Handling of Spares.
11. Support for erection and commissioning including PG Test.

2.1 The work to be performed under the scope of this tender mainly consists of but not limited to complete E&C works for Mechanical & Electrical package and their maintenance for specified period of the following,

A. Main plant STP

The main plant STP includes the following equipment:

- DAF system

- Screens
- Chemical dosing pumps/tanks
- UF membranes
- Air Compressors, Blowers etc.
- Installation of Exhaust blowers and Fixing of AC's
- Under Ground and Above ground Fire Fighting System along with fixing of Hose reel boxes and installation of Fire Extinguishers.
- MCC
- PLC
- Piping with supports within the STP
- Electrical and Instrumentation Cabling with supports within the STP
- Instrumentation within the STP

A. MECHANICAL TERMINAL POINTS

1.	Industrial effluent	Approximately 200m from proposed sewage treatment plant. Location of terminal point is between supervisor hostel and BHEL LIG.
2.	Township sewage-I	Approximately 50m from proposed sewage treatment plant. Location of terminal point is on the existing discharge header of sewage transfer pumps(located in NRSP), which is near proposed sewage treatment plant.
3.	Township sewage-II(Diversion of existing sewage line)	Approximately 2500m from proposed sewage treatment plant. Location of terminal point is near BHEL check post.

4.	Permeate water	Approximately 7000m from proposed sewage treatment plant. The distribution considered is for all the parks within the township.
5.	Sludge	At centrifuge outlet. Further disposal (including any pumping) to be done by TA/HPEP.

B. <u>ELECTRICAL TERMINAL POINTS</u>

1.	Input Power(Normal)	415V, 3phase, 50Hz, 4wire **~1250kVA** normal supply shall be made available by customer at the incomer feeder terminals of STP plant MCC
2.	Input power(emergency)	415V, 3phase, 50Hz, 4wire **~450kVA** emergency supply shall be made available by customer at the incomer feeder terminals of STP plant MCC OR No terminal point with customer and emergency power requirement will be met through 415V, 450kVA DG set
3.	DC Supply	Not Applicable.
4.	UPS Supply	No terminal point with customer and required UPS supply for control system will be internally generated.

5.	Earthing	No terminal point with customer.
6.	Communication system	No scope, hence No terminal point with customer

2.1.8 GENERAL

2.1.8.1 The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.

Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

2.1.8.2 The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.

2.1.8.3 The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual construction requirements.

2.1.9 ALSO INCLUDED IN THE SCOPE

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the "Schedule of items", shall include but not be limited to the following.

2.1.9.1 Furnishing all labor, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

2.1.9.2 Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.

2.1.9.3 Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

2.1.9.4 Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.

2.1.9.5 Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.

2.1.9.6 Carrying out topographic survey of the entire and establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such a assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.

2.1.9.7 Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

2.1.10 WORK BY OTHERS

No work under the specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT TECHNICAL SPECIFICATIONS PROVIDED IN THE SUBSEQUENT CHAPTERS IN THE TCC

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with customer(HPEP)
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with customer(HPEP)
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)	Yes*		Can be provided as per availability on chargeable basis
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V	Yes		On chargeable basis @ Rs.4.95 per unit consumption of electricity. Contractor has to provide a certified electricity meter for the purpose. If meter is not provided, electricity @ 70 units for each MT fabrication of structural steel will be considered.
a	Single point source	Yes		At a distance of approx. 1000 M from site (Distance is only estimated, it may vary up to an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc. of the bidder**			On chargeable basis @ Rs.4.95 per unit consumption of electricity.
a	Single point source	Yes		At a distance of approx. 1000 M from site (Distance is only estimated, it may vary up to an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			Not applicable
a	Single point source			
b	Further distribution including all materials, Energy Meter, Protection devices and its service			
c	Duties and deposits including statutory clearances if applicable			
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes**			On chargeable basis @ Rs. 15/- per 1000Lit. Contractor is required to provide water meter for this purpose. In case contractor does not provide the water meter, recovery towards water will be made @ 1.00% of the value of respective items of the work.
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.3.2	**<u>Water supply for bidder's office, stores, canteen etc</u>**			On chargeable basis @ Rs. 15/- per 1000Lit. Contractor is required to provide water meter for this purpose. In case contractor does not provide the water meter, recovery towards water will be made @ 1.00% of the value of respective items of the work.
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**<u>Water supply for Living Purpose</u>**			Not applicable
a	Making the water available at single point			
b	Further distribution as per the requirement of work including supply of materials and execution			
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the construction drawings for all the works covered under this scope	Yes		
b	Drawings for construction methods	Yes		
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		**YES**	In consultation with BHEL
d	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
e	Preparation of construction (Concreting B/W, etc.) schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Arranging the materials required for Work		Yes	

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
k	Coordination for inspection &checking and getting clearance from customer		Yes	
l	Preparation of formats for completion of activities		Yes	

Sl	Description	Specifications	Qty.
A.	**HANDLING & LIFTING EQUIPMENT**:		
1.	Hydraulic jack.	Capacity-25 T lift = 200 mm Dia of the table, piston = 90 mm Min. height above the ground level = 260 mm, Force on the lever = 30 Kg. Length of the level = 625 mm	4 Nos.
2	Screw Jack (ratchet type)	Capacity: 5T lift 200 mm	4 Nos
3.	Jack bolts	Min. ht. 75 mm, lift- 30 mm dia of bolt - 36 mm	16 Nos.
4.	Hand ratchet Jack	Capacity -5T stroke: 370 mm Height above the ground level 90 mm Force on the Level – 50 Kg	2 Nos.
5.	Hand ratchet Jack with chain and hooks.	Capacity- 1.5 lift-- 2M Arm length -440 mm force on the lever-55 Kg. Min. distance between the top and bottom Hook: 440 mm, Hook size = 40 mm	6 Nos.
6.	Chain pulley blocks	Capacity - 3T, lift -6m	4 Nos.
7.	Steel ropes with loops as per Site requirement		
8.	Eye bolts CSNO2 as per site requirement		
B.	**MACHINERY:**		
1.	Power saw	H. P. -1.5 Blade length 600 mm throats 200 mm, strokes/min = 60	1 No.
2.	Elec. Air compressor	Capacity -5m3/minute With air receiver (Tank) pressure = 7 atp Tank capacity = 3.5 M3 3 phase electrical motor: 440 V, 50 C/s air cooled, With pressure gauge, starter for Motor, auto-start/stop, necessary Valves, tank with drain and Safety valve OR 2 of 2.6 M3/min. 6 atp tank: 1. 8 M3 all other things are same as above.	1 No
3.	Bench grinder with twoWheels	H. P. =1, RPM =2900, wheel dia =200 mm Thickness = 25 mm, 440V 3 phase 50 c/s	1 No

4.	Portable electrical drilling Machine dia: 15 mm	Dia. of the drill =15 mm Power=350 watts 250V, 50 c/s	2 Nos.
5.	Flexible shaft portable elec. Grinding machine	Shaft dia, =20 mm, Length-5M Min. RPM = 2800 Input -1.3 kW With various shaped grinding wheels	1 No.
6.	Portable pneumatic drill with Morse taper No-3 dia 32 mm	Drill dia. 32 mm Air condenser 1.8 M3/min. working pressure 5/7 atp RPM -190/360	1 No.
	Portable pneumatic grinder	Wheel dia=100 mm Thickness=20 mm Working pressure 5/7 atp	1 No.
	Portable pneumatic grinder	Wheel dia=200 mm Thickness=40 mm Working pressure 5/7 atp.	1 No
	Chamfering machine Portable size 75 to 250 mm dia	Czechoslovakian make (CKD) 6.8 KW 415 V motor with a starter on a trolley with a universal shaft coupling chamfering tool. Jaws are to accommodate the sizes 75 to 250 mm. OR similar one	1 No.
	Hydraulic pipe bending	1/2" to 2" mean radius of bend 45 to 230 mm with machine, hand operated with the blocks for 1/2",3/4.', ;1",1 1/4", 1 1/2", 1 3/4" and 2"	1 set
	Gas welding & cutting set with pressure gauges for oxygen and acetylene	Cutting & welding up to 50 mm	1 set
	Welding transformer setwith regulator	350 A, AC Max = 450 Amps Min = 75 Amps About 30 KVA Secondary = 85 V, Primary = 400/440V	4 sets
	Welding D. C. Generator set with regulator	320 A, DC 90 V, Max: 320 Amps, Min: 30 A Motor KVA: 20, 2910 RPM 440V	4 sets
	Annealing Transformer and inductor	Full set suitable for annealing alloy steel pipes (Mat. 13 cr. 44 Mo), after welding annealing temp reqd. 600ºC to 720°C similar to A.C.L.C. Belgium makes)	1 set
	Argon welding equipment		2 No.
	Electrode drying oven automatic with temp control	Capable of accommodating 6 or 8 packets electrodes	1 No.

	Camera for Iridium 192 5 curies isotope and manipulator rod. Iridium\ 192 isotope		1 No.
	Plastic cassettes 10 x 48 cm		2 Nos.
	Lead screens	10 X 48 cm	2 sets
	Lead letters	12 mm	2 sets
	Lead numbers	12 mm	2 sets
	Gevaret D-4 films	10 x 48 cm	2 pkts
	Developer to make 13.5 liter		1 tin
	Fixer to make 13.5 liter		1 No.
	Tube bending machine (5 to 25 mm)		1 No.
	Portable needle grinder pneumatic / electrical		1 No.
	All common tools like straight edge, fitters vice vernier calipers, micrometers, dial gauges, lever type dial gauges, feeler gauges, surface plate, spanners, screw drivers, hammers, mallets etc. tools as required by RE at site to be brought by the Contractor.		
D.	**MISCELLANEOUS:**		
	Gas Hose Oxygen and Acetylene	Bore dia, 10 mm 25, 50 & 75M lengths each	2 sets
	Wire brushes for welders	150 x 25 mm 3 rows wire bristles 5 rows wire bristles	 6 Nos. 6 Nos.
	Gas cutting nozzles cleaning kit		2 sets
E	**TOOLS AND TACKLES:**		
	1. Set of Torque spanners (M 6 to M 64) 2. Feeler gauges (length 300; 200 mm of different widths) 3. Flexible Torch lights with mirror 4. Inside and outside micrometers (0 to 250 mm, dia in different steps) 5. Lever type and plunger type dial indicators 6. Micron dial indicators 7. Leaf feeler gauges (0.03 and 0. 05 mm) 8. Depth gauges up to 400 mm 9. Lead wire measuring gauges 10. Magnifying glasses		

F. CONSUMABLES:-

1. Birkosit
2. Hylomer
3. Led plate 200
4. Loctite 221,601,621
5. Molykote 321 R
6. Industrial Grease

NOTE: -

i) All the tools should be procured in sufficient quantities by the Contractor.

ii) The list of tools & tackles mentioned above are indicative only. The contractor has to mobilize the required tools & Plant in sufficient quantity to carry out the erection, testing and commissioning. However, on instruction of Resident Construction Manager, additional tools and tackles has to be arranged by Bidder for smooth E & C activities of the project.

BHEL will not provide any tool, plants or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained on account of this.

However, subject to availability, BHEL may provide few T&P to the contractor for expediting and in larger interest of the project. In case any such facility is provided to the contractor, BHEL will make necessary recovery in the running account/final bills towards the hire charges. A departmental charge @ 5% will also be affected such cases. The decision of BHEL on the hire charges will be final and binding on contractor.

6.1 TIME SCHEDULE

6.1.1
The entire work of erection testing and commissioning of Sewage Treatment Plant as detailed elsewhere in the Tender Specification shall be completed within Six months for execution+3 months for testing, commissioning, handing over & demobilization from the date of commencement of work at site.

6.1.2
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

6.1.3
The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

6.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer will be final.

6.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIOING ETC.,

6.3.1
The activities for erection of equipments, Screens, Blowers, etc. shall be started as per directions of Construction manager of BHEL.
6.3.2
The contractor has to augment his resources in such a manner that following major milestones of the project are achieved on specified schedules:

TENTATIVE SCHEDULE

Activity	**Tentative schedule**	
	Start Month	**End Month**
Mobilization for Site Establishment	**Apr'15**	**Apr'15**
Erection of Pumps	**May'15**	**May'15**
Erection of Membranes	**June'15**	**June'15**
Erection of MCC panels	**July'15**	**July'15**
Testing & Commisioning	**Sept'15**	**Sept'15**
Handing Over	**Oct'15**	**Oct'15**

In order to meet above schedule in general, and any other intermediate targets set, to meet customer/project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

6.2 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as Six months for execution+3 months for testing, commissioning, handing over & demobilization. Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower on two-shift basis during erection and during pre-commissioning and commissioning period manpower should be provided round the clock basis as per site requirement without any extra cost to BHEL.

6.3 GUARANTEE PERIOD

The guarantee period of twelve months shall commence from the date of completion of all works as certified by the BHEL site engineer

7.1 Mechanical Items :

The bidder shall quote "FIRM" Prices only.

7.1.1. For equipment erection shall be paid on tonnage rate, other items as per rate schedule. The payment shall be on actual net weight of equipment erected. The terms of payment shall be strictly governed as defined below. Any deviation to the terms of payment will be evaluated in terms of loading on the prices. The tonnage indicated is only approximate and may vary. Bidder shall agree to keep the rates valid for any variation of quantity.

7.1.2 ERECTION,TESTING COMMISSIONING AND PAINTING APPLICATION

Sl No	Item Description	Qty	Unit	Total Wt (MT)
7.1.2.1	DAF feed pumps with motor & accessories (submersible)	4	Set	0.6
7.1.2.2	Auto Screen and accessories	1	Set	0.4
7.1.2.3	Manual Screen and accessories	1	Set	0.2
7.1.2.4	Air compressor	1	set	0.5
7.1.2.5	Oil & grease skimmer	1	Set	0.35
7.1.2.6	Equilisation tank transfer pumps with motor & accessories (submersible)	4	Set	1.8
7.1.2.7	Auto Screen and accessories	1	Set	1
7.1.2.8	Manual Screen and accessories	1	Set	1
7.1.2.9	Mixing blower with motor & accessories for Sludge holding tank	3	Set	3.15
7.1.2.10	Polymer dosing system for Sludge	1	Set	0.2
7.1.2.11	Centrifuge	1	Set	2.5
7.1.2.12	Sludge Transfer pump with motor & accessories	2	Set	0.3
7.1.2.13	Auto Drum screen and accessories	2	Set	3
7.1.2.14	Coagulant dosing system prior to MBR	1	Set	0.2
7.1.2.15	Process blowers with motor & accessories	3	Set	9.45
7.1.2.16	UF membrane cassettes	8	Set	24
7.1.2.17	UF permeate/ backpulse pumps with motor & accessories	4	Set	2.8
7.1.2.18	RAS pumps with motor & accessories	6	Set	9
7.1.2.19	Membrane aeration blowers with motor & accessories	3	Set	3.15
7.1.2.20	Sodium hypochlorite dosing system	1	Set	0.2
7.1.2.21	Citric acid dosing system	1	Set	0.2
7.1.2.22	Backpulse tank	1	Set	1
7.1.2.23	Sodium hypochlorite dosing system	1	Set	0.2
7.1.2.24	DAF system & accessories	2	Lot	8
7.1.2.25	Air compressor for DAF	2	Set	0.3
7.1.2.26	DAF recirculation pumps with motor & accessories	2	Set	0.5
7.1.2.27	Coagulant dosing system for DAF	1	Set	0.2

7.1.2.28	Polymer dosing system for DAF	1	Set	0.2
7.1.2.29	Drum floating oil collection tank	1	No	0.1
7.1.2.30	Material handling arrangement for UF system	1	No	1
7.1.2.31	Material handling arrangement for pump areas	1	No	0.2
7.1.2.32	uPVC pipes and fittings	1	Lot	3
7.1.2.33	GRP pipes and fittings	1	Lot	20
7.1.2.34	Heavy duty GI pipes and fittings	1	Lot	15
7.1.2.35	cPVC piping & fittings PN10 rating	1	Lot	0.5
7.1.2.36	Valves (Butterfly, check, ball valves)	1	Lot	3.5
7.1.2.37	Steel for Fabrication (Plate & rolled section)	1	Lot	15
7.1.2.38	Hand rail, Floor grill & Toe guard plates	1	Lot	9
7.1.2.39	Emergency D.G set 450KVA, 415V	1	Nos	4.5
7.1.2.40	AMF Panel	1	Nos	1.9
7.1.2.41	LT Switchgear 415V MLDB (WALL MOUNTED)	1	Nos	1.5
7.1.2.42	LT Switchgear 415V ACDB	1	Nos	1.8
7.1.2.43	415/415V, 35 kVA Lighting Transformer	1	Nos	0.55
	Total Weight (Metric Ton)			151.95
7.1.2.44	Additional misc. equipments & accessories @ 10%=			15.195
	Total equiment weight (MT) =			167.145

7.1.3 ERECTION,TESTING COMMISSIONING of HVAC System

Sl No	Equipment description	Qty (Nos)	Wt. of each equip. (tons)
AC SYSTEM			
7.1.3.1	2 TR Split Acs - Outdoor Unit	3	0.05
7.1.3.2	2 TR Split Acs - Indoor Unit	3	0.02
Ventilation System			
7.1.3.3	Tube Axial Ventilation Fans	7	0.3

7.1.4 PIPING FABRICATION, RADIOGRAPHY, ERECTION,TESTING COMMISSIONING AND PAINTING APPLICATION

SL. No	Item Description	Matl	Qty	UOM	Weight(Kg)
7.1.4.1	2"-SCH HVY-CS PIPE-GALV	CS	30	mts	224.4
7.1.4.2	1"-SCH HVY-CS PIPE-GAL	CS	50	mts	162
7.1.4.3	24" -CAST IRON PIPE SPOOL -1	CS	2	Nos	2540.16
7.1.4.4	18"- CAST IRON PIPE SPOOL-2	CS	2	Nos	1893.06
7.1.4.5	16"-CAST IRON PIPE SPOOL -3	CS	1	Nos	839.43
7.1.4.6	16"-CAST IRON PIPE SPOOL -4	CS	1	Nos	839.43

7.1.4.7	16"-CAST IRON PIPE SPOOL -5	CS	1	Nos	839.43
7.1.4.8	16"-CAST IRON PIPE SPOOL -6	CS	1	Nos	839.43
7.1.4.9	12"-CAST IRON PIPE SPOOL-7	CS	1	Nos	664.74
7.1.4.10	ELBOW 90DEG CS GAL.2"-NPT-F #3000	CS	5	Nos	3.25
7.1.4.11	EQUAL TEE CS GAL.2"-NPT-F #3000	CS	5	Nos	9.65
7.1.4.12	TEE REDR,CS,GALV,2"X2"X1"-NPT-F #3000	CS	5	Nos	13.5
7.1.4.13	STRAIGHT COUPLING ,CS,GALV,2"-NPT,CL3000	CS	8	Nos	11.2
7.1.4.14	EQUAL TEE CS GAL.1"-NPT-F #3000	CS	5	Nos	3.35
7.1.4.15	ELBOW 90D,CS,GALV,1"NPT-F,CL3000-SCRD	CS	20	Nos	23.6
7.1.4.16	STRAIGHT COUPLING 1"-NPT,CL3000-SCRD	CS	6	Nos	2.46
7.1.4.17	REDUCING COUPLING-SCRD	CS	6	Nos	10.2
7.1.4.18	12"- Sch STD 90 DEG LR ELBOW -FLAT FACED FLANGED	CS	2	Nos	120
7.1.4.19	24" -NON METALIK GASKET-class 125 -FLAT FACED	PTFE	3	Nos	9.78
7.1.4.20	28" -NON METALIK GASKET-class 125 -FLAT FACED	PTFE	3	Nos	11.25
7.1.4.21	16" -NON METALIK GASKET-class 125 -FLAT FACED	PTFE	8	Nos	14
7.1.4.22	12" -NON METALIK GASKET-class 125 -FLAT FACED	PTFE	3	Nos	3.102
7.1.4.23	STUD 2 NUTS M33X 185		40	Nos	50
7.1.4.24	STUD 2 NUTS M30X 160		32	Nos	33.6
7.1.4.25	STUD 2 NUTS M27X 150		132	Nos	125.4
7.1.4.26	STUD 2 NUTS M24X 130		24	Nos	19.2
7.1.4.27	2"-CS GATE VALVE CL800 SCR NPT	CS	3	Nos	38.7
7.1.4.28	1" CS GATE VALVE CL800 SCR NPT	CS	6	Nos	33.06
7.1.4.29	24" CAST IRON GATE VALVE -FLAT FACE FLANGED END CLASS 125	CS	1	Nos	1466
7.1.4.30	18" CAST IRON GATE VALVE -FLAT FACE FLANGED END CLASS 125	CS	1	Nos	720
7.1.4.31	16" CAST IRON GATE VALVE -FLAT FACE FLANGED END CLASS 125	CS	1	Nos	524
7.1.4.32	12" CAST IRON GATE VALVE -FLAT FACE FLANGED END CLASS 125	CS	1	Nos	298
Total Metric Ton					**12.385382**

7.1.5 Fire Protection System : FABRICATION, RADIOGRAPHY, ERECTION,TESTING COMMISSIONING AND PAINTING APPLICATION

I	Hydrant System (Fabrication, Erection, Testing, Wrapping, Painting, Commissioning)	UOM	Qty
7.1.5.1	Pipes upto 150 NB & Below (U/G PIPES)	Mtrs	50
7.1.5.2	Pipes upto 150 NB & Below (A/G PIPES)	Mtrs	250

7.1.5.3	Single headed 63 mm dia hydrant landing valve (conforming to IS : 5290 : 1983) with MS matching flanges external	Nos	5
7.1.5.4	63 mm Branch pipe Nozzle as per IS : 903 (Internal)	Nos.	5
7.1.5.5	2 Nos of RRL Type - A with couplings as per IS:636 15 Mts	Nos.	5
7.1.5.6	Hose boxes (External)	Nos.	5
7.1.5.7	Pressure Indicator	Nos	1
7.1.5.8	Reducers, elbow, fittings for above hydrant system	Lot	1
7.1.5.9	Wrapping and coating of U/G hydrant pipes	SQM	30
7.1.5.10	Paint and primer	Lot	1
II	**Fire Extinguisher (Installation & Fixing)**		
7.1.5.11	CO2 Type 4.5 Kg . Fire extinguishers	Nos.	6
7.1.5.12	DCP 6 kg. capacity	Nos.	6
7.1.5.13	DCP 2 kg. capacity	Nos.	2
7.1.5.14	Foam Type 9 lit. capacity	Nos.	2

7.1.6 Electrical and C & I : ERECTION,TESTING COMMISSIONING AND PAINTING APPLICATION

Sl.No.	Description	Qty	UNIT	Total Weight in kg
7.1.6.1	Emergency D.G set 450KVA, 415V	1	Nos	4500
7.1.6.2	AMF Panel	1	Nos	1900
7.1.6.3	LT Switchgear 415V MLDB (WALL MOUNTED)	1	Nos	1500
7.1.6.4	LT Switchgear 415V ACDB	1	Nos	1800
7.1.6.5	415/415V, 35 kVA Lighting Transformer	1	Nos	550
7.1.6.6	1.1KV Armoured Cu.Cond. PVC /FRLS PVC Cable	2000	Mtrs	1100
7.1.6.7	1.1KV Armoured Cu. Cond. PVC /FRLS PVC Cable	500	Mtrs	400
7.1.6.8	1.1KV Armoured Al. Cond. PVC /FRLS PVC Cable	2000	Mtrs	2200
7.1.6.9	1.1KV Armoured Al. Cond. PVC /FRLS PVC Cable	300	Mtrs	1620
7.1.6.10	1.1kV Cu. Cond. PVC /FRLS PVC Cable	800	Mtrs	624
7.1.6.11	300mm width ladder type straight run cable tray along with accessories including coupler plates	100		16
7.1.6.12	150mm width perforated type straight run cable tray along with accessories including coupler plates	150		9
7.1.6.13	40mm Dia MS Rod	700	Mtrs	
7.1.6.14	50 x 6 mm GI Strips	400	Mtrs	

7.1.6.15	35 x 6 mm GI Strips	1100	Mtrs	
7.1.6.16	8 SWG GI wire(Solid)	1400	Mtrs	
7.1.6.17	GI pipe Electrode	8	Mtrs	
7.1.6.18	Copper Pipe electrode	4	Mtrs	
7.1.6.19	600x 600mm Recess mounted decorative mirror optic luminaire with electronic ballast and anodized aluminium reflector, paralite P5 louvers for glare free operation suitable for 2x36W CFL Lamp	10	Nos.	
7.1.6.20	Industrial type general purpose luminaire with high efficiency electronic ballast, MS sheet steel housing(CRCA) with external rflector and vitreous enamelled/Epoxy powder coated suitable for 2X36W Flourescent lamp -Surface mounted	18	Nos.	
7.1.6.21	Industrial type Corrosion proof luminaire with high efficiency electronic ballast,FRP housing and clear acrylic cover suitable for 2x36W Fluorescent lamps - Surface mounted	15	Nos.	
7.1.6.22	Industrial type Non-Integral Well glass luminaire with cast aluminium alloy mounting piece and sheet steel Al. canopy with stove enamell, white inside and grey outside reflector, heat resistant glass and wire gaurd suitable for 150W HPSV lamp in complete with control gear box, eyebolt and bracket for suitability of suspension/ceiling/pole mounting	40	Nos.	
7.1.6.23	Street Light luminaire with single piece die cast aluminium body ,bowl type aluminium reflector and with heat resistant clear arcylic cover, power factor improvement capacitor etc. suitable for 150W HPSV tubular lamp	32	Nos.	
7.1.6.24	Integral Flood Light luminaire with heat resistant toughened glass cover etc. suitable for 1x250W HPSV lamp	2	Nos.	

7.1.6.25	Non-integral Flood Light luminaire with heat resistant toughened glass cover etc. suitable for 2x400W HPSV lamp	6	Nos.	
7.1.6.26	36W CFL Lamp suitable for item Sl. No. 1	25	Nos	
7.1.6.27	36W Fluorescent Lamp suitable for Item no. 2and 3.	75	Nos	
7.1.6.28	150W HPSV Eliphtical Lamp suitable for Item no. 4	50	Nos	
7.1.6.29	150W HPSV tubular Lamp suitable for Item no. 5	40	Nos	
7.1.6.30	250W HPSV Tubular Lamp suitable for Item no. 6	3	Nos	
7.1.6.31	400W HPSV Tubular Lamp suitable for Item no. 7	15	Nos	
7.1.6.32	6 way AC Indoor Lighting/Power Panel with 6 nos. 20A DP MCB outgoing with necessary cable glands. Panel shall have cable entries suitable for 4Cx35sqmm al. cable (for incommer) and cable entries suitable for 3cx2.5 sqmm cable (for 6nos. outgoing feeder).	1	Nos	20
7.1.6.33	12 way AC Indoor Lighting/Power Panel with 12 nos. 20A DP MCB outgoing with necessary cable glands. Panel shall have cable entries suitable for 4Cx35sqmm al. cable (for incommer) and cable entries suitable for 3cx2.5 sqmm cable (for 12 nos. outgoing feeder).	1	Nos	25
7.1.6.34	12 way AC Indoor Lighting/Power Panel with 9 nos. 20A DP MCB outgoing and 3 nos. 32A TPN MCB outgoing with necessary cable glands. Panel shall have cable entries suitable for 4Cx35sqmm al. cable (for incommer & 3 nos. outgoing feeder) and cable entries suitable for 3cx2.5 sqmm cable (for 9 nos. outgoing feeder).	2	Nos	25
7.1.6.35	Sublighting Distribution Board with 32A TPN MCB incommer and 3nos. 20A SPN MCB at outgoing with necessary wiring and cable glands. Sub distribution board shall have cable entries at bottom suitable for 4Cx35sqmm al. cable (for incommer) and cable entries suitable for 3cx2.5 sqmm cable (for 3 nos. outgoing feeder).	4	Nos	15

7.1.6.36	4 way Indoor JB with - 4 nos. Of 2 Pin TB suiatble for 6 sqmm wire. (JB shall have IP-55 protection,16SWG sheet steel with cable entry suitable for 3Cx2.5sqmm Cu. Cable along with its DC cable glands).	5	Nos	3
7.1.6.37	4 way 250x200x100mm rectangular sheet steel JB outdoor type (IP55) with two cable entries suitable for 4Cx35sqmm al. cable and two cable entries suitable for 3Cx2.5sqmm (3/4") along with glands and TB 4 nos. suitable for 35sq.mm & 4 nos. 4sq.mm wire.	15	Nos	3
7.1.6.38	88mm dia GI 4 way Round JB with 3nos. TB suitable for 6sqmm wire & Flat cover. JB should have cable entries suitable for fitting with 25mm GI conduit.	25	Nos	2
7.1.6.39	1.1kV PVC Insulated Single Core Copper Conductor Flexible Wires	1000	Mtrs	
7.1.6.40	1.1kV PVC Insulated Single Core Copper Conductor Flexible Wires	700	Mtrs	
7.1.6.41	1.1kV PVC Insulated Single Core Copper Conductor Flexible Wires	600	Mtrs	
7.1.6.42	1.1kV PVC Insulated Single Core Copper Conductor Flexible Wires	2300	Mtrs	
7.1.6.43	1.1kV PVC Insulated Single Core Copper Conductor Flexible Wires	2300	Mtrs	
7.1.6.44	3000mm long 25mm GI conduit	500	Nos	
7.1.6.45	20mm GS stripped PVC coated Flexible conduit	75	Mtrs	
7.1.6.46	25mm GS stripped PVC coated Flexible conduit	70	Mtrs	
7.1.6.47	3000mm long 50mm GI conduit	5	Nos	
7.1.6.48	3000mm long 25mm PVC conduit	15	Nos	
7.1.6.49	3000mm long 50mm PVC conduit	5	Nos	
7.1.6.50	3000mm long 20mm GI conduit	30	Nos	
7.1.6.51	1200mm long 150 deg bend 50NB pipe with 2 nos suitable clamp with base	15	Nos	
7.1.6.52	7.5 meter Street lighting pole	17	Nos	
7.1.6.53	11 meter Flood lighting pole	1	Nos	
7.1.6.54	FSB-2 Flush mounted swbd with 2 nos 5A piano type switches (modular type).	1	Nos	
7.1.6.55	FSB-5 Flush mounted swbd with 5 nos 5A piano type switcheds(modular type).	5	Nos	
7.1.6.56	5/15A Socket with switch (Flush mounted Type)	8	Nos	

7.1.6.57	Industrial metal clad type 5/15A receptacle with switch (Indoor Type)	2	Nos	
7.1.6.58	63A TPN welding receptacles (Safe area)	2	Nos	
7.1.6.59	Saddle with saddle bar suitable for 25mm dia conduit with 2nos of 1.5"deep screws along with rawl plug for saddle and 1 No of 1.5" deep screw along with rawl plug for saddle bar.	3000	Nos	
7.1.6.60	25 mm GI conduit bends	500	Nos	
7.1.6.61	25mm GI inspection bends	200	Nos	
7.1.6.62	25mm GI conduit couplers	1500	Nos	
7.1.6.63	25mm PVC conduit bends	10	Nos	
7.1.6.64	25mm PVC conduit couplers	30	Nos	
7.1.6.65	Spring loaded ball and sockets suitable for 20mm dia GI down conduit	40	Nos	
7.1.6.66	GI Clamps for METSEC with washer, nut and bolt as per dwg. Attached with this document for suspension mounting METSEC & FTL Fixture	45	Nos	
7.1.6.67	GI Clamps for corrosion resistant FTL with washer, nut and bolt as per dwg attached with this document.	15	Nos	
7.1.6.68	GI Clamps for wall mounted FTL with washer, nut and bolt as per dwg attached with this document.	30	Nos	
7.1.6.69	Check nuts suitable for 20mm GI conduit	150	Nos	
7.1.6.70	4 way conduit branching JB for 25mm GI conduit	250	Nos	
7.1.6.71	4 way conduit branching JB for 25mm PVC conduit	10	Nos	
7.1.6.72	6mm dia x 35mm long anchor bolt with nuts and washers- Hook/half ring type	200	Nos	
7.1.6.73	6mm dia x 35mm long anchor bolt with nuts and washers - Bolt type	500	Nos	
7.1.6.74	Rawl Plug with 1.5" deep screw	4000	Nos	
7.1.6.75	S - Hook	50	Nos	
7.1.6.76	Rubber gromett (20mm)	50	Nos	
7.1.6.77	Rubber gromett (25mm)	50	Nos	
7.1.6.78	Double compression nickle plated brass cable glands for safe area suitable for 4Cx35sq.mm Al. Armoured cable	60	Nos	
7.1.6.79	Double compression nickle plated brass cable glands suitable for 3Cx4 sqmm cu armoured cable for safe area	325	Nos	

7.1.6.80	Cable clamps sutable for 3Cx2.5sqmm cu. Armoured cable along with its base and hardware	3000	Nos	
7.1.6.81	Cable clamps sutable for 4Cx35sqmm Al. Armoured cable along with its base and hardware	2000	Nos	
7.1.6.82	PVC shrroud (Gland hood) suitable for 3/4" cable gland & 3Cx2.5 sqmm cu. cable	275	Nos	
7.1.6.83	PVC shrroud (Gland hood) suitable for 1.5" cable gland & 4Cx35 sqmm Al. cable	60	Nos	
7.1.6.84	Galvanised Steel Chain	120	Mtrs	
7.1.6.85	Cable Glands & Lugs.	1	Lot	
7.1.6.86	1.1KV Unarmoured Cu. Cond. PVC /FRLS PVC Cable.(1CX70 Sq.mm)	120	Mtrs	
7.1.6.87	Structural Steel			
7.1.6.88	ISMC 100X50X6 mm channels	2500	kgs	2500
7.1.6.89	ISA 50X50X6mm Runner angles	1000	kgs	1000
7.1.6.90	Clamps for multicore cables---25x3mm Aluminium flats.	1	Lot	
7.1.6.91	3mm dia Nylon Cord	1	Lot	
7.1.6.92	GI Conduits of 100 or 150 mm diameter.Shall be medium duty, Class-"B" Type.Galvanizing thickness shall be minimum 75 microns	1	Lot	
7.1.6.93	PVC Conduits of 100 or 150 mm diameter	1	Lot	

7.1.7 Material Handling

Sl.No.	Description	Total Weight in MT
6.1	Equipments	167.15
6.2	Piping	12.39
6.3	Misc Equipments	35.91
	Total	215.44
6.4	Rehandling@ 10%=	21.54
	Grand Total =	236.98
	say,	**237.00**

The progressive payment for the work on accepted price of contract value will be released on the basis of running account bills & other bills as per the provisions of relevant clauses of GCC and SCC.

8.0 TAXES, DUTIES, LEVIES

8.1. For All types of works

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

Service Tax & Cess on Service Tax

Contractor's price/rates shall be exclusive of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 12.36 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

The name, address and the registration number of the contractor,

The name and address of the party receiving taxable service,

Description, classification and value of taxable service provided and,

The service tax payable thereon.

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. Contractor will submit all the details of VAT/CST paid for the contract in the prescribed format of the

respective state VAT laws. Also, the contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

Deduction of tax at source shall be made as per the provisions of law and is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor will be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of contractor, the same will be recovered from contractor's bill or otherwise as deemed fit.

8.2 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.3 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workmen, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-
It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

1.1
The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for construction, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipment's etc., in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

1.2
The work shall be executed under the usual conditions affecting industrial construction and in conjunction with numerous other operations at site. The Bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

1.3
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

1.4
The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

1.5
Contractor shall execute the work as per sequence prescribed by BHEL at site. The sequence of activities, methodology will be decided by the BHEL engineers depending upon the availability of material, drawings, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of construction advised and agreed by BHEL engineer or for any reasons whatsoever.

1.6
All the necessary certificates and licenses required to carry out this work are to be arranged by the Contractor expeditiously at his cost.

1.7
The work to be carried out under the scope of these specifications covers the complete work of collection from stores/storage yard(inside the factory), handling, transporting, unloading at construction site, temporary storage at site in open/closed stores of free issue of materials (cement, reinforcement & structural steel), temporary storing of contractor's own construction material, using the same in the work, carrying out all other activities, viz. survey, excavation, concreting, backfilling, and all the other activities as defined in the scope of work enumerated in chapter-2, Part-I of TCC document, Bill of Quantities and elsewhere till handing over of the entire work. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. That will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor.

1.8

The terminal points as decided by BHEL shall be final and binding on the Contractor.

1.9
During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication/dismantling/reconcreting etc. will be necessary on account of feedback from various other units completed earlier and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/rectification/fabrication/repairs etc., promptly and expeditiously. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.

1.10
Daily log sheets indicating the details of work carried out, man-hours, consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day.

1.11
All tools and tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables etc. required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

1.12
The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipment's issued to him for the work. Special care will have to be taken to guard against pilferage / theft of cement, steel and/or other materials.

1.13
Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

1.14
Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

1.15
As Built Drawings: Contractor shall be supplied with two extra copies of the layout & detailed drawings. Contractor to incorporate in one of the copy with Red ink all the changes / deviations / alterations etc carried out at site due to various reasons, with site engineer‘s endorsement. Marked up drawings shall be submitted to BHEL for approval.

1.16
Site Inspection: The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer

without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

1.17
Field Quality Assurance Formats: It is the responsibility of the contractor to collect and fill up the relevant concrete pour card/FQA Log sheets and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL / Customer in token of their acceptance. Monthly Running Bill Payment to the contractor will be linked with the submission of these Log sheets.

1.12 COLLECTION AND RETURN OF EQUIPMENT, MATERIALS & CONSUMABLES

1.12.1
Contractor shall take delivery of the components, equipment, lubricants, chemicals, special consumables, steel etc from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipment to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipment such as laboratory equipment, measuring and controls equipment, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

1.12.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

1.12.3
Transportation of lube oil, Chemicals, Gas cylinders etc. from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

1.13
Installation and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipment covered under this tender specification under the guidance of BHEL engineer. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

1.14

All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

1.15
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

1.16
The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

1.17
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to contractor's fault, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

1.18
The contractor shall perform any services, tests etc. Which may not be specified but nevertheless required for the completion of work within quoted rates.

1.19
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables etc required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.

1.20
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipment / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc., as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rates.

1.21
The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. BHEL will not provide any steel for this.

1.22
Plant materials should not be used for any temporary supports / scaffolding / preparing pre-assembly bed etc.

1.23
The details of equipment to be erected under this contract is generally as per the details of quantity given in Chapter-10. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipment will be based on the erection documents which will be furnished in the course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

1.24
All works such as cleaning, levelling, aligning, hot alignment, trial assembly, dismantling of certain equipment/components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

1.25
Cleaning, servicing, lubrication of actuators, pumps, headers, control valves, other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/packings for replacement will be provided by BHEL free of cost.

1.26
All equipment shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. All bearings of turbine rotors, generator rotor, and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

1.27
All racks or assembled units like Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor

free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

1.28
All the materials during pre-assembly, storing shall be stored well above ground level as necessary to avoid water ingress etc, by use of wooden/ concrete blocks/ sleepers. No material shall be stored directly on the ground at any time. Concrete blocks/ Sleepers have to be provided by the contractor.

1.29
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

1.30
After chemical cleaning/pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Rotating machinery and other system as per scope of tender specification before and after oil flushing is in the scope of work.

1.31
Transportation of oil drums from customer's/BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly, for various pre-commissioning/ commissioning activities/ processes mentioned in various clauses, transport of chemicals from BHEL/customer's stores, charging of chemicals into the system and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

1.32
No BHEL crane will be available under this tender specification for erection of Gas Turbine, Gas Turbine Generator, Bypass Stack, Feed Storage Tanks or any other equipment. Contractor shall take specific note of this aspect and shall arrange all necessary T&P and lifting/handling/transportation arrangements for placement on required foundation/elevation, erection of equipment including the heavier consignments/equipment like gas turbine, gas turbo-generator, GT inlet ducts, GT off base enclosure, Filter unit of GT, Feed storage Tanks etc.. Gas Turbines and Gas Turbine Generators shall be required to be lifted by suitable capacity Crane/ jacks & support structure etc. to take minimum possible time in lifting and placement then on respective foundations. The contractor shall take specific note of same and shall arrange required arrangements as per site requirement.

1.33
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL & suit the site requirement.

1.34
The contractor shall perform all required services which may not be specified herein but nevertheless required for the completion of work within quoted rates.

1.35
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables (excluding those indicated as BHEL scope), etc required for this scope of work shall be provided by the contractor and shall conform to Safety Requirements/ Load Testing etc. as per BHEL/CUSTOMER rules & Regulations at site.

1.36
All expenditure including taxes and incidentals in this connection will have to be borne by the contractor unless otherwise specified in the relevant clauses elsewhere here. The contractor's quoted rates shall include of all such contingencies. In this connection refer relevant clause of general conditions of contract.

1.37
The contractor shall take due precaution during Materials Handling and Erection, testing & commissioning of equipment/works under these specifications to avoid deface, injure, damages, destruction by contractor or his workmen or servants to any pipelines, railway lines, roads, canals, cables, culverts, drains, sewer, telephone &telegraph lines, water mains, dykes, poles, pillars, fences, wires, supports and embedment's and other underground or over ground works, Structural or constructions whatsoever and shall at his own cost and initiative forthwith restore and repair any damage thereto the entire satisfaction of customer/BHEL at his own expense or in default, the customer/ BHEL site engineer may cause the same to be made good by other agency or by other means and deduct the expense with BHEL overhead (of which the site engineer's decision is final) from any sums that may be then or at any time thereafter become due to the contractor or from his security deposit or any other money due.

1.38
As such, the marine cover and erection all risk cover insurance for the project for permanent incorporation of materials and services at site lies with customer. The contractor shall have to take necessary all risk insurance policy (motor vehicles act, worker's compensation act, fatal accidents act, personal injuries insurance act, emergency risk insurance act and/or other industrial legislation from time to time India with insurance company(ies) approved by owner) **for his manpower and his employees deployed at site under work compensation act including but not limited to third party insurance at STP Plant project along with his T&Ps before starting of the work and shall submit the necessary document/policy in support of above to BHEL/customer at site. This will be also essential for taking the gate pass/entry pass etc. from customer & their related departments/security at site. The insurance policy taken shall be kept in-force till completion of contract. The workmen's compensation insurance and third party insurance liability limits shall be as customer specification. Contractor shall indemnify the customer /BHEL harmless against such losses, which are on account of contractor.**

1.39
Recoveries will be made from contractor's bills for any liability accrued to BHEL/CUSTOMER for the accidents and refund of the same shall be considered later, after the claim is fully settled by insurance authorities.

1.40
Customer has taken the marine cover and erection all risk cover insurance for the project for permanent incorporation of materials and services at site. However contractor shall take all due precautions, arrange & follow the safety & security requirements/regulations for materials issued to him & works under his execution and shall be responsible for safety & security of these materials & works for any loss or damages. For any damage / loss to the material during inland transportation, storage, erection, final testing, commissioning stage etc., contractor shall intimate promptly to BHEL/customer and shall prepare & submit the necessary detailed report / documents / information, facilitating inspection / discussions by the officials / surveyors deputed by insurer with all expenditure on contractor's account. Contractor shall take care for timely information for conducting survey, submission of monetary estimate & furnish the requisite documents to surveyors/insurer, taking necessary precautions so that the loss/damage is not aggravated further, protecting damaged goods etc. As part of scope of work.

Contractor shall promptly make repair / rectify/replace and make good any damage or loss to HPEP/BHEL materials and works on above account as per instructions of BHEL engineer incharge at site without any delay & waiting for settlement of insurance claim from insurer. Contractor's claim (if any) for such works will be settled as per applicable item rate of contract after settlement of claim from insurer / customer & after ascertaining / establishing that contractor is not responsible for such loss or damages. The contractor's claim for such repair / replacement shall not be more than the payment settled by insurer / customer and in such case the contractor's payment will be limited to seventy percent of settled amount by insurer/customer against claim amount.

1.41
The contractor shall submit survey report/performance report of the tools and plants deployed by him and being utilized on the work under the scope. These survey reports/performance reports are to be obtained by contractor from the customer of BHEL/insurance authorities and submitted to BHEL at no extra cost.

1.42
Contractor shall deploy & maintain, the separate exclusive workforce / manpower arrangements and T&Ps resources including the Cranes & heavy lift equipment /arrangements for Material Handling and Erection & Commissioning scope of works.

1.43
All vehicles/ electrical motors devices shall have to be provision of fire extinguisher/muffler facilities etc.

1.44
Contractor shall provide FIRST AID / emergency medical facilities & Emergency Vehicle facilities at project premise/work site to meet any exigency / emergency requirement and shall maintain these facilities throughout the contract period & extension period (if any) as scope of work.

1.45
The equipment/systems/piping/components under these specification shall require to connect / hookup with other systems / equipment / piping / components / terminal points etc. of Customer / other erection vendors. Contractor shall carry out the termination of these systems / equipment / piping with customer/other vendor's terminal points and shall involve welding, bolting/flange joints, cutting, edge preparation, radiography, NDE etc. of terminal point systems (which may not be included in these specifications and may have been erected by other vendor) shall be carried out by contractor as per instruction of BHEL engineer at site including welding / bolting of counter/matching flange joints as scope of work. Decision of BHEL engineer shall be final and binding on contractor.

1.46
As such the external barricading of project plot area will be carried out by civil agency as scope of civil works. Contractor under these specification shall carry out his internal barricading/ cordoning off (as applicable) of area of his operations, providing safety nets, safety tapes, passenger trolley for high height working etc. as per safety requirements/safety concern and regulations enforced by CUSTOMER/BHEL at site before under taking the day-to-day works. All such works/arrangements shall be carried out by contractor as scope of work.

1.47
For structures, supports, stairways, platforms, galleries, hand rails, grills, etc. the structural materials may be supplied in random length which may have to be cut to required profile in order to suit the requirement a incidental to the work. Also it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger / pre-assembled equipment. In such cases, the removal and re-erection of such works as agreed by BHEL Engineer will have to be done by contractor as incidental to work.

1.48
All the handrails and toe guards shall be provided as per drawing and safety requirements. After cutting the floor grills to suit the site condition, the cut edges shall be painted with two coats of cold galvanizing paints conforming to Indian Standard.

1.49
For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, payment of these items/class of work shall be regulated on the basis of rate arrived at by either of the following methods:

a) Based on rate of identical/similar items in the rate schedule.
b) Based on the rate arrived from nearby items in the rate schedule.

Wherever any item rate for similar type of work or nearby item rate does not exist in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation.

1.50 Special care to be taken for handling, storage & preservation of membranes. Manufacturer's manual (Apendix-I) for Care, handling, storage & preservation is to be followed for the same

CHAPTER-2
CIVIL WORKS, FOUNDATION, GROUTING

2.0PREPARATION OF FOUNDATION AND GROUTING

2.1
Buildings, foundations and other necessary civil works for supporting structures, equipment etc, will be provided by the customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipment contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up to 25mm for achieving proper levels will be within the scope of contractor.

2.2
All minor foundations and anchor points required for installing erection equipment like winches, anchors etc. are to be cast by the contractor.

2.3
The complete work of Secondary Grouting of equipment is included in the scope of contractor. Contractor shall arrange all manpower; T&P, formwork and shuttering materials. However the grouting materials will be supplied by the BHEL/Customer free of charge. Contractor shall have proper record and storage of Grout materials issued by customer.

2.4
Contractor shall avoid the wastage of Grout material on any account. For any wastage of materials i.e. usage of more than designed / certified quantity of grout materials shall be recovered form contractor as per the rate charged by Customer. Decision of BHEL engineer shall be final and binding on contractor.

2.5
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

2.6
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

2.7

The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipment under scope wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

2.8

Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

2.9

Buildings, foundations and other necessary civil works for supporting structures, equipment etc, will be provided by the BHEL/customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipment contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 25mm for achieving proper levels will be within the scope of work/specification.

2.10

All minor foundations and anchor points required for installing erection equipment like winches, anchors etc. are to be cast by the contractor.

2.11

The complete work of secondary grouting of equipment is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary Portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

2.12

The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

In order to ensure the quality, the major grouting of equipment using any of above grout mixes shall essentially be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any

overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

2.13
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

2.14
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

2.15
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipment wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

2.16
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. Shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

CHAPTER-3
EQUIPMENT INSTALLATION - MECHANICAL

3.1
Erection of Common System Equipment and Balance of plant Equipment with other related equipment & auxiliaries at site is in the scope of work.

3.2
For the skid mounted equipment, the checking and realignment required at site is in the scope of work.

3.3
Components like generator filters, meshes etc., received loose are to be erected in position by contractor.

3.4
Air Compressor, Blowers will be supplied in individual assembled sections with inside insulation. Site job involves complete assembly and erection.

3.5
The piping shall be site routed. The contractor shall complete the job within quoted rate.

3.6
Fabricated/pre-fabricated parts/ components etc. have to be checked for dimensional accuracy, configuration, proper matching and minor rectifications, wherever necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete locks. Steel, in random sizes, for this purpose will be provided by BHEL from the packing materials / scraps etc., where as necessary concrete blocks shall be arranged by the contractor. Bed shall be fabricated as per requirement. These shall be dismantled & returned to BHEL at appropriate stage. No separate payment for making / dismantling such bed is envisaged.

3.7
Any fixtures, concrete block supports, steel structures, required for temporary supporting for pre-assembly or checking and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor.

3.8
It shall be the responsibility of the contractor to provide temporary ladders on un-accessible areas for inspection etc., in a manner prescribed by BHEL using their own material till such time as permanent stairways are completed.

3.9

Welding of all attachments on casing, non-pressure parts, pressure parts/ piping , equipment, tanks, vessels etc. including those required for insulation work is in the scope of work.

3.10
Ducts / expansion bellows are normally supplied in loose wall plates / segments and these are to be assembled and welded at site before erection. All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be tested by LPI and made leak proof as per technical instruction / requirement.

3.11
Certain structural items will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

3.12
The platforms of permanent nature for approaching different equipment like actuators, valves, instruments etc. as per site / BHEL client's requirements, which may not be indicated in drawings, but essential for safe access, shall be made by the contractor from structural steel / materials supplied in random lengths / sizes as per scope of work as per instruction of BHEL Engineer at site.

3.13
Rain hood protection shall be provided for the equipment etc. located outside/ in open space as per drawings & instructions.

3.14
Erection at site involving welding, bolting, tack welding, insulation at joints ,work and erection of Aviation Light and lightening arrestor. All these works are covered under the scope of work of contractor under these specifications.

CHAPTER- 4
PIPING INSTALLATION

4.1
The scope of work in piping system (air, Gas, Water, Oil, Steam etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/ guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per BHEL engineer's instructions and/or as per approved drawings. **Weld joints and NDT requirement for all Integral piping and other piping as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.**

4.2
Contractor shall carry out the erection and complete the piping works of respective system as per sequence, schedule and program decided by BHEL engineer/customer at site in order to achieve the commissioning schedule of respective equipment/ systems and over all commissioning schedule of project as whole.

4.3
Carrying out of piping as per the specifications between equipment constituting terminal points, whether the terminal equipment fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

4.4
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipment, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

4.5
Interconnection/ Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

4.6
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / sump / atmosphere etc. from the stubs on the piping and equipment erected by contractor is completely covered in the scope of this tender specification.

4.7
As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

4.8
All welded joints should be painted with anticorrosive paint immediately after completion of radiography and stress relieving works. Necessary paints and other consumables for the above work are in the scope of the contractor.

4.9
Spring suspension/constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc., have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/ instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

4.10
Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection. Such changes will be incidental to work hence no separate/ additional payment will be made.

4.11
Normally the high pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like "T" pieces, weld neck flanges, reducers, etc., shall be suitably matched with pipes for welding (this is applicable to piping work also).

4.12
Hydraulic / pressure testing of pipelines, wherever called for, shall be conducted as part of work till satisfactory results are obtained.

4.13
Connection (flanged, bolted, welded) of piping to the terminal points/equipment etc. is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, is also within the scope of work/specification.The terminal points work is inclusive of cutting of existing lines, edge preparation, welding/blanking and hook up work.

4.14
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipment. Necessary protocols have to be prepared for such fit-up alongwith BHEL /customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.

4.15
The non-IBR piping will be sent as plain pipes. The attachments for tapping points and / or supports will be sent as loose items. Site work will involve fabrication, drilling, fitting, pre-heating, welding, NDE & PWHT as per applicable BHEL documents. Rate quoted shall take account of all these work as no separate payment is envisaged for such work.

4.16
For integral piping all attachments etc will be supplied as loose items and are to be welded to the main pipes at site as per instructions. Necessary drilling of holes on main pipe for welding stub shall also be done at site by the contractor.

4.17
Underground / buried piping (if any) shall involve rapping & coating protective coating as per drawing requirement. Erection, laying, welding, Wrapping & Coating of this pipe shall be carried out and payment for all such work shall be paid as applicable carbon steel piping erection & commissioning.

4.18
The following items of work shall be incidental and forming part of piping fabrication and erection:

(1) To locate cause of vibrations in equipment/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.
(2) Fabrication and erection & welding of racks, steel supports, guides, restraints for all the piping. Steel for this purpose will be supplied by BHEL free of charge in random and running lengths.
(3) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.

(4) Erection of steam traps, filters, flow nozzles/ flow indicators/ flow orifices other measuring elements in the piping. These may have been supplied either by BHEL or their customer. This may involve cutting of pipe lines, fresh edge preparation and welding with stress relieving wherever applicable.
(5) Fabrication / making of bends for pipes and tubes of diameter upto 65mm.
(6) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
(7) Servicing of valves, Power Cylinders and actuators etc.
(8) Cleaning of all pipes by chemicals/wire brushing / blowing by compressed air.
(9) Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles/orifices/metering/ measuring elements fixed on piping.
(10) welding of blanks with stress relieving if required on a temporary basis.

4.19 SERVICE & INSTRUMENT AIR PIPES

4.19.1
Laying of S.S. /G.I. Pipes with fittings and supports of instrument air lines/process air shall include air blowing, hacksaw / cutting from running length to the size, threading, welding, installation of isolation valves, headers, root valves, moisture traps, check valves, supports and clamps etc by providing the required consumables shall be carried out by contractor.

4.19.2
Line shall be provided with proper slope as per drawing / standards and shall be supported at recommended pitching.

CHAPTER-5
WELDING, HEAT TREATMENT, RADIOGRAPHY AND INSULATION

5.1
The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL engineer will have the option of changing the method of welding as per site requirement.

5.2
Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.

5.3
Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

5.4
All the welders (structural and high pressure) shall be tested and approved by BHEL engineer before they are actually engaged on work though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.

5.5
Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

5.6
Removal of welding slag and burrs by hand files, with brushes and/or flexible grinders will be carried out simultaneously.

5.7
The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint etc will be in the contractor's scope.

5.8
Hp joint fit-ups, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The contractor shall supply consumables like protective paints/tapes etc.

5.9
Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with BHEL engineer's instructions. Normally the electric resistance heating method will be adopted. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labor, all heating elements, thermocouples and attachment units, graph sheets,

thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc., required for all heating and stress relieving works.

5.10
All the recorded graphs for heat treatment works shall be the property of BHEL and shall be handed over to BHEL engineer when demanded.

5.11
The contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL engineer as required. Interpretation of the BHEL engineer regarding acceptability of the welds shall be final.

5.12
Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the process. The contractor shall make all arrangements including labor required for the work as per direction of BHEL.

5.13
On all oil, instrument, gas, air (Instrument air/services air) piping, Cooling water Piping, etc. both TIG welding and subsequent arc welding or total TIG welding process is to be adopted as instructed by BHEL engineer.

5.14
All weld joints on piping shall be ground / filed / dressed on completion of welding and before NDE as per instructions BHEL engineer.

5.15
The Contractor shall procure all electrodes and filler wires of approved quality / brand as per the standards and specifications of BHEL and instruction of BHEL Engineer.

5.16
Contractor should purchase the electrodes as per the recommendations of BHEL engineer, welding manual, welding schedule and other relevant documents. The electrodes shall be purchased only from BHEL approved manufacturers.

5.17
The purchase of electrodes shall be accompanied by proper test certificate and these certificates should be submitted regularly for the scrutiny of BHEL engineer.

5.18
All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like

windows or ventilators. The temperature inside the room has to be kept in the range of 8-10^0 c above atmospheric temperature and humidity should be less than 50&. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipment and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

5.19
All racks and other items used for storage of electrodes shall be of steel and not of wood.

5.20
All electrodes soon after purchase shall be offered for inspection to the BHEL engineer. Contractor shall be strictly prohibited from using electrodes not inspected/approved by BHEL engineer.

5.21
All welding consumables shall be issued to the welders only by authorised person who is controlled by contractor's welding engineer. The necessary baking requirements are to be ensured by Contractor's welding engineer.

5.22
All welders shall be tested and approved by BHEL engineer/customer before they are actually engaged on work though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reasons. Statutory requirements like IBR approval for welders are to be complied with before starting of the work. If required, the welders may have to undergo Procedure Qualification test also. The decision of BHEL Engineer will be final in this regard.

5.23
All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test will be provided by BHEL. However, If deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

5.24
BHEL engineer is entitled to stop any welder from his work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by him, which, in the opinion of BHEL engineers, will adversely affect the quality of welding though the welder has earlier passed the tests prescribed. The fact that the welders have passed the test does not

relieve the contractor from his contractual obligations to check the performance of the welders. Contractor shall submit a monthly performance record of all welders.

5.25
All welded joints shall be subject to acceptance by BHEL engineer whose decision will be final and binding.

5.26
Pre-heating and stress relieving before and after welding are part of erection work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

5.27
For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

5.28
Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

5.29
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labour required for the same as per directions of BHEL.

5.30
Heat treatment requirements shall be as per the Welding Schedules of BHEL

5.31
For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

5.32

Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipment is within the scope of the work/specification.

5.33
TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. For manual arc welding shall be done as per weaving technique and the width of weaving shall not exceed 1.5 times of the dia of the electrodes.

5.34
Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

5.35
Joint fit up will be a stage for inspection.

5.36
All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

5.37 **SOCKET WELDING**:

5.37.1
In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained at a later date. The socket welding on hp parts/ hp piping shall be done by the IBR qualified welders contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

5.37.2
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

5.37.3
Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

5.38 RADIOGRAPHY

5.38.1
Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

5.38.2
The contractor shall provide the necessary skilled technician and labourers for taking the radiographs. While taking radiographs, the contractor has to use proper penetrameter/ image quality indicators as instructed by the BHEL engineer. All the processed and accepted films will be the property of BHEL. In this regard, the contractor has to adhere to the safety rules/regulations laid by BARC authorities from time to time. It may please be noted that invariably the radiographic work will be carried after the normal working hours.

5.38.3
Contractor shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

5.38.4
Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

5.38.5
100% radiography of weld joints of certain piping have to be carried out as per BHEL standards/drawings/specification.

5.38.6
Radiography work of welds connected with this contract shall be arranged by the contractor including provision of services of technician and necessary equipment and consumables like isotope camera, x-ray/gamma ray films, chemicals etc., and necessary labor required such as riggers, helpers, etc., to assist the technician for carrying out the radiography work and making other arrangements such as providing scaffolding, approaches, platform lighting arrangements, etc., at their cost and the work has to be arranged as per the instruction of BHEL. It may please be

noted that invariably the radiography work will be carried out after the normal working hours and close of other site activities only.

5.38.7
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL engineer. The quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL engineer/boiler inspecting authority.

5.38.8
All x-ray / gamma ray films of joints shall be preserved properly and be handed over to BHEL. These shall become the property of BHEL.

5.38.9
The field welded joints shall be subject to dye-penetrant / other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

5.38.10
Where required, surface preparation, like smooth grinding of welded area, prior to radiography shall be done as specified. It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account in his offer.

5.38.11
Welding of necessary instrumentation tapping points, thermocouple pads, root valves, flow metering & measurement devices, and control valves to be provided on GT & their respective auxiliaries, integral & external pipe/off base/system covered within the scope of this specification, will also be the responsibility of the contractor and shall be done as per the instructions of BHEL site engineer. The installation of all the above items will be contractor's responsibility even if:

A) Items are not specifically indicated under the respective product groups as given in the technical specifications.
B) Items are supplied by an agency other than BHEL.

NDE/NDT and post weld heat treatment for above shall be done as per the specifications and drawing requirement as part of scope of work.

5.39 INSULATION

5.39.1

Application of wool insulation/mattress, pipe sections etc., sheet metal cladding, welding of hooks/supports to hold insulation of equipment, piping, tanks, vessels, duct with fittings, common system equipment and balance of plant equipment covered under this contract, shall include, but are not limited to, the following :-

A) Where indicated, removable type of insulation to be provided for valves, expansion joints, etc. as per the drawings or as directed by BHEL engineer.

B) Wool insulations are received at site as bonded and unbounded mattresses in standard sizes. These are to be dressed / cut to suit work by the contractor.

C) Application of insulation and refractory works and sheet metal covering as given in various drawings/ specifications of BHEL, supplied to the contractor.

D) Outer sheet cladding by fabrication of aluminum/ GI sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets, crowning the sheets, if necessary, fixing the same to supports, over wool insulation with screws/retainers as specified in BHEL drawings or as instructed by BHEL engineer.

E) Welding of hooks/supports on equipment including on pr. Parts and piping to support wool insulation, as per the drawings or as instructed by BHEL engineers.

G) The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection by statutory(boiler) inspector or cut open during commissioning to fix gauges, fittings and instruments. These gaps will have to be finished as per drawings at a later date by the contractor at no extra cost to BHEL.

H) Wastage allowance for the materials issued shall be as under:-

i)	Wool Insulation	2%
ii)	Cladding sheets	2%

CHAPTER-6
EQUIPMENT INSTALLATION -ELECTRICAL AND C&I

The contractor's scope of services for various equipment indicated in Part-1, Chapter 11 are detailed in this chapter.

The work will comprise of, *but not limited to the following:*

6.1 Installation of Control panels and LT Switchgear

6.1.1

Electrical control panels, Electronic Control panels, Unit Supervisory Control DESK,LT Switchgear, 415V LT MCCs are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

6.1.2

The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the Switches, Lamps, Instruments etc. mounted on the panel does not get damaged during transit.

6.1.3

Installation of panel shall include fixing of base frame, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware's, Bus bar jointing, wiring interconnection, Welding and Grouting of panels and base frames, mounting of panel Canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Special material required for fireproof sealing of the panels shall be supplied by the contractor within the quoted rates. Proper sealing of all the holes and Cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

6.1.4

Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in end user's (M/s BHEL-HPEP) LT Switchgear room, Unit Control Room etc.

6.1.5

Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

6.1.6
Whenever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, Structural Steel fabrication & installation rate shall be applicable.
6.1.7
Normally the panels shall be supplied with meters, relays, electronic modules, contactors, pushbuttons etc mounted and pre-wired. However, if such devices are supplied loose/separately for safety in transit, contractor shall mount the same, as part of panel installation work and no extra payment shall be made for this.
6.1.8
Supplier's instruction manuals, packing slips, door keys etc. Received along with the panels will be handed over to BHEL's engineer on opening of the panels.
6.1.9
Regular cleaning of the panels as per the instruction of BHEL engineer till handing over of the set to customer is to be carried out by the contractor free of cost.

6.2 415V MOTOR CONTROL CENTERS (MCC) & DC DISTRIBUTION BOARDS

6.2.1

Motor control centers are single / double front draw out type consisting of circuit breakers units, contactor/starter, switch fuse units, protection & metering relays/ instruments etc. arranged in multi tier construction. These MCC are mainly supplied to cater to the requirements of drives, valve actuators etc.

6.2.2

DC distribution Board is single front non-draw out type consisting of MCCB/SFU, contactors, starters, fuse units, MCB etc arranged in multi-tier construction. DCDB shall be located in LT switchgear room to cater the dc supply requirement.

6.2.3

The scope of work for the LT switch board and DCDB covers receipt of materials from stores, transportation to the respective location, erection, testing, commissioning and handing over.

6.2.4

Rubber mats shall be supplied by BHEL for LT switchgear and the same shall be laid wherever required as part of work.

6.2.5

The scope of work for the LT switch board and DCDB covers receipt of materials from stores, transportation to the respective location, erection, testing, commissioning and handing over.

a) Checking of installation for correctness.

b) Mechanical functional checking/ adjustment of individual breaker.

c) Measurement of Insulation resistance of individual breaker, complete switchgear board and combined insulation resistance of individual breaker with cable connected to drives.

d) Testing of Protection Relay, Thermal over relay, Power transducers, Energy/ Ammeters, Voltmeters, Power factor, frequency & metering etc. in static & dynamic condition relay

e) Conducting test such as Insulation Resistance measurement, Ratio, polarity, magnetization characteristic, winding resistance on CT and PT.

f) Checking of electrical control & protection interlock of individual breaker and integration with other system.

g) Calibration of energy meters, tri-vector meters, voltmeters, ammeters, power current & voltage transducers etc.

h) Provide assistance for checking the electrical operation of individual breakers from remote panels / MMI package in End user's scope).

6.3 Cable Laying (Power / Control / Instrumentation shielded cables / Triad Cable / plug-in cables / UTP cables for Ethernet / armored / Un-Armored, single / multi-core, PVC/HR PVC / FRLS / Teflon / XLP insulation)

6.3.1 Cable laying (erection) will include:

a) Cutting to the required length, laying in overhead/underground cable trench/ through pipes/flexible conduits. Cable rollers have to be used as per requirement. The contractor shall prepare the drum schedule in order to minimize the wastage.

b) Dressing/Clamping in tray etc.

c) Drilling of holes in gland plates in panels and junction boxes for the entry of cable.

d) Cable glanding, splicing, dressing of spliced wire inside the panel and JBs

e) Providing printed ferrules. Wherever required ferrules shall be one-piece heat shrinkable type. **Contractor has to arrange for suitable ferrule printing machine(s).**

f) Termination by using crimp type lugs copper tinned/ aluminum (insulated/ un-insulated).

g) Providing identification cable tags, aluminum at both the ends and at appropriate interval (30m) throughout the route length. Tags to be arranged by the contractor.

h) Continuity checking, insulation resistance checking, High Voltage test on HT cables, as applicable.

i) LT Power cable trefoil clamps (Die cast Aluminum of good quality) are to be arranged by the contractor within the quoted rates.

6.3.2 Entry to the panels, JB may be from top, side or bottom. All cable shall be supported and clamped near the panels/JBs.

6.3.3 Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, suitable alternative arrangement as specified by BHEL/end user shall be done. Pre-Fab plug-in cables, for such cases, cables may have to be lifted inside the panel either making cut-out in gland plate and providing Rubber profile for sharp edge protection or alternatively, provide 4/6" PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

6.3.4 Copper Tinned lugs of various type (pin, ring, fork, snap-on), PVC cable ties, PVC ferrules (printed), PVC buttons and tapes, cable identification tag of metallic, clamping and dressing material with hardware, PVC sleeves etc shall be supplied by the contractor within the quoted rate for cable laying. The quality of material shall be got approved from BHEL engineer prior to their procurement.

6.3.5 All care should be taken to avoid abrasion, tension, twisting, kinking, and stretching of cables during installation.

6.3.6 Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield, generally shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and getting earth at panel end only. While terminating the shield wire either in panel or JBs, PVC sleeves is to be used to avoid two-point earthing. Supply of PVC sleeves of appropriate color is in contractor's scope.

6.3.7 Wherever cable ducts/tray, conduits pass through fire barriers such as walls, floors etc., the openings/ passage shall be sealed using fireproof/ weatherproof sealing compound. Similarly cable entry in panels, MCC, Instruments, Electrical Actuators etc are also required to be sealed. These shall be done as per the specifications of BHEL. Required consumable shall be in contractor scope of supply within quoted rate for cabling.

6.3.8 Normally, junction boxes are received with mounted cables glands. While terminating the cables as per drawings, the cable glands to be removed and fixed. Wherever cable glands are not received along with junction boxes, no separate payment will be made for fixing the cable glands to the junction boxes including the drilling of holes.

6.3.9 Many of the cables may have to be laid in the cable trenches constructed by end user. For this purpose, the cover of trenches has to be opened for working inside. All safety precautions have to be observed while laying the cables in the trench. After completing the work, the trench has to be cleaned and covers put back into position. The contractor, if required, shall do de-watering of trenches.

6.3.10 Terminations:

The types of cable terminations are as detailed below:

a) Power cable: Crimping hydraulic / Manual

b) Control cable: Manual crimping

c) Crimped/soldered plug-in-type Screwed type.

All console devices / computer peripherals shall be screwed, crimped, soldered plug in type.
UTP cable with RJ 45 connector. The contractor shall arrange for special tools and skilled manpower required for any type of cable termination (like fiber optic jointing kit and RJ45 crimping tool etc) as mentioned above. Additionally ferrule printing machine(s) for printing of sleeved ferrules of various sizes will also be arranged by the Contractor.

6.3.11

Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagram is to be done by contractor at no extra cost.

6.4 Wastage allowance

Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimized. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits;

Power Cables	**1.5%**
Control & Instrumentation Cables	**2.0%**
Fabrication steel	**2.0%**
Impulse pipe/tubes/GI pipes/copper tube	**1.0%**

If however, the bidder quotes for more wastage than specified above, the excess portion will be considered for adjustment during the tender evaluation at the quoted supply rate of material. If the actual wastage be more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill. Cable cut-pieces in lengths 10 m & above in both the above categories will be considered as useable and shall be taken in to account for computing net issued quantity when returned to BHEL stores/storage yard.

6.5 **CABLE TRAYS/CABLE DUCTS**

6.5.1

Various types of sheet metal, Galvanized Cable Tray, i.e. Perforated, Ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths along with accessories and hardware viz coupler plate, tray covers and tray clamps etc.

6.5.2

Installation of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, welding of tray supports as per tray route layout etc.

6.5.3

Fabrication of bends/tee/ reducers from straight length is within the scope of work and rate quoted shall be inclusive of this. All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

6.5.4

In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

6.5.5 Cable trays/duct etc may have to be routed underground in cable trench, overhead on structure, along the walls, floors etc. for various applications.

6.6 STRUCTURAL STEEL FABRICATION AND INSTALLATION

6.6.1

Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc., Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports and instruments etc.

6.6.2

This shall include cutting to size, contouring of ends for connections if required, Welding, Grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

6.6.3

All the fabricated supports/frames for instruments, trays, pipes, electrical equipments, etc., shall be epoxy painted after sand blasting and surface preparation as per painting specifications. Paints and other associated items are in the scope of the contractor.

6.6.4

Frame installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/grout mix, shuttering, labour etc., and meet all other requirements as part of work.

6.6.5

In certain packages, members of frames/rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

6.6.6

Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.

6.7 Earthing installations

6.7.1

All equipments shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.

6.7.2

The earthing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing / as per instruction of BHEL engineer.

6.7.3

A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All valve and damper motors and rapping motors will be earthed to this conductor.

6.7.4

All joints in the earthing system shall be welded type. Earthing connections to all equipments including motors shall be bolted type.

6.7.5

Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.

6.7.6

Metallic sheaths, screens/shields and armor of all multicore cables shall be bonded and earthed.

6.7.7

Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm.

6.7.8

Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanising zinc paint. Contractor to arrange the required paints and other items at his cost.

6.7.9

Mark VI panels, Control panels & Man-Machine-Interface

GT and electrical control system panels are based on digital distribution control philosophy. The various components / devices are located in control room / panel room and shift in charge room. The entire work of erection, testing, commissioning of the connected devices / equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per lay out. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of cable laying, termination and assembling / placement of furniture against each devices as given in the rate schedule. Loose devices like recorders, indicators, and monitors are supplied loose.

6.8 INTEGRATED TESTING OF CONTROLS AND PROTECTIONS & RELAY TESTING

6.8.1

Integrated electrical testing/commissioning of generator control and protection relay panels, LT MCC & other electrical panels and associated equipment shall involve various activities like relay testing/setting, simulation checks, testing of energy meters, on/off line functional checks on integrated system. The brief scope of work under the "integrated testing/ commissioning of generator controls and protections relay panel & associated equipments" is defined as below, but not limited to the following.

a) Relay testing in static condition for generator, transformers, and associated system by secondary current injection at different current and recording the time duration.

b) Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices.

c) Measurement of Insulations, Winding Resistance, Polarization Index of winding of Generator & associated equipment/ system, DC resistance test & Impedance test on rotor, Brushless excitation system at the time of rotor insertion as well as during pre-commissioning stage / commissioning stage/ post commissioning stage.

d) Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (open circuit characteristic) & SCC (short circuit characteristic)

e) Functional checks / testing of synchronizing schemes during the static and dynamic by simulation / back charging of generator transformer conditions.

f) Monitoring & recording the various parameters during open circuit and short circuit conditions test on generator & associated field equipment like generator transformer, unit auxiliary transformer. Recording and monitoring measurement.

g) Testing of protection current transformer for ratio test by primary injection, magnetization characteristic, polarity test, and IR measurement. Functional checks of relays of protection system by primary injection.

h) Testing of potential transformer for ratio test by voltage ratio, polarity test, insulation resistance measurement etc, testing of surge capacitors, PT isolator in PTPS cubicle etc. (theses are housed in generator side line & neutral cubicle).

i) Measurement of Insulation resistance of individual equipment and connected together.

j) Tan delta test on generator & other equipments as required.

k) Calibration of energy meters, tri-vector meters, voltmeters, ammeters, current & power transducers etc.

l) Providing temporary shorting link on bus duct or any other location while testing & normalization after the test.

m) Testing & commissioning generator circuit breaker.

n) High voltage test on inter connecting cable between generator and line/ neutral side cubicle.

o) Testing of relays, meters, internal devices, functional checks of electrical panels LT MCC and other panels/ equipments.

p) Contractor shall discuss & finalize testing procedure with BHEL engineer in-charge for the test to be conducted on generator control & relay panel testing. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and biding on the contractor.

q) Checking & testing of neutral grounding transformer & resistor.

r) Compilation of test records.

s) In case contractor has not done similar work, they are free to tie –up with experienced agency who has carried out similar nature of work and having adequate resources i.e.

Experienced manpower, T&P / testing/ measuring instruments. Contractor shall submit documents in support of such tie –up arrangement of such parties along with the offer. Credential of such parties shall be submitted with technical bid along with tie-up MOU.

t) It is to be noted in general that for any testing of protection relays, MCC etc., where the contractor is not sufficiently experienced, they shall arrange for the services of suitable agencies for carrying out the work, within the quoted rates.

u) In case of party quoting for the work have their own resource or resourced capability to take up relay testing etc. At site, the evidence of same is to be annexed to the technical bid

6.8.2 OR ALTERNATIVELY

a) As indicated, contractor is free to tie up with experienced agency that has done similar work. The following parties are recommended by BHEL as agencies capable of carrying out these activities:

i. M/S ELCON ENGG

701, CENTRE POINT, ALKAPURI
R C DUTT ROAD, VADODARA 390007
CONTACT PERSON: SHRI ARVIND MEHTA
PH NO 0265-2359152

ii. PINNEL POWER SYSTEM

PILLAIYAR KOIL STREET
JAFFER KHAN PET
CHENNAI 600083
PH NO 044-24718925, 24891975.

iii. CONSULT INDIA, MUMBAI

CONTACT PERSON: SHRI JINGRE.
PH NO 022-25333727

iv. HI TECH ENGINEERING SERVICES

PLOT NO 127, 5TH CROSS STREET, AVM COLONY
VIRUGAMBAKKAM
CHENNAI 600092
CONTACT PERSON: SHRI S. SUBRAMANIEM

PH NO 044-23763520

v. VOLTECH ENGINEERS

ARUNODAYA APARTMENTS,
FLAT B-4, I FLOOR,
27, 2ND MADLEY ST,
T.NAGAR, CHENNAI
CONTACT PERSON: GEETHA
PH NO: 044-28341230

In such event where the relay testing facilities are outsourced by the bidder, the tie-up action taken in this regard by the bidder should be clearly mentioned in their offer (technical bid) and it should be made clear that from which of the above recommended parties such services shall be sourced.
In case the tie-up for the above is with some other party other than those recommended by BHEL, then sufficient proof of the credentials and experience of the party in this field of work shall be annexed to the technical bid.

6.11CONTROL & INSTRUMENTATION

6.11.1
Contractor shall mount all flow indicators, centrifugal/speed switches of motors, accumulators, pressure regulators, etc which are received loose and which are to be erected/mounted at site on air lines, water lines, oil lines, auxiliaries and firemen floor and other operating floors on power house and other equipment. These are to be mounted during erection for finalizing routing/position etc. They are to be dismantled after completion of erection work and handed over to BHEL for calibration. After calibration, these instruments shall be remounted by the contractor in their respective positions just before commissioning.

6.11.2
Certain instrumentation like, pressure gauges, power cylinders, flow meters, valve actuators, flow indicators, etc are received in assembled condition as integral part of equipment. Contractor shall dismantle such equipment at an appropriate stage under the instruction of BHEL and hand them over to BHEL for calibration and storage. Contractor shall re-erect them in position just before commissioning of the equipment.

6.11.3
Seal welding of Thermowells, plugs before Hydro test of equipment and piping systems is also within the scope of this work/specification. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld Thermowells after Hydro test/steam blowing of lines.

6.11.4
Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT motors is within the scope of the work. Job includes testing the motor for

finding out PI & IR values and making necessary cabling connection for heating for dry out from the nearest source of supply and maintaining and controlling the temperature till the IR and PI values are achieved as per standards. However, BHEL will provide necessary motorised insulation testers for this purpose. The contractor shall provide necessary power cables and other tools and consumables for the above works free of charges. Before undertaking dry out/trial run of HT motors, the end shields and covers shall be opened on both the ends of the motor for inspection, cleaning and greasing of bearings.

6.11.5

Welding of all Thermowells, draft, pressure and temperature instrumentation points, and all other instrumentation points on piping, and auxiliaries is within the scope of this work.

6.11.6

All Motors shall be preserved with space heaters(if any) on, and provided with proper cover till the commissioning of the motors.

6.11. 7

Mounting of instrumentation on turbine, generator and exciter and auxiliaries which are the integral part and supplied with main equipment shall be the part of scope of work and contractor shall render necessary services for their commissioning.

6.11.8

Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

6.11.9

After initial trial of rotating equipment, control and power cabling for motors and other equipment/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

6.11.10

Certain instrumentation like pressure switches, air sets, filter regulators, pressure gauges, and junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators etc. are received in assembled condition as integral part of equipment. Contractor shall dismount such instruments for calibration and hand over the same to c & i erection agency of BHEL. Mounting of such instruments will be done by the C&I erection agency.

6.11.11 Field instrumentation

a) Various type of primary/secondary/ indicating/ recording instrument for pressure, temperature, flow, level, speed, turbo-supervisory and analytical measurement shall be supplied either loose or mounted along with the equipment.

b) Scope of work under calibration, erection// testing/ commissioning shall include calibration, setting, adjustment, supply and fixing of instrument tag plates as specified by

BHEL, report making, installation, servicing, minor repairs, putting instrument into service, signal checking from field upto the functional group panels and remote indicating/recording instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, trouble shooting during pre-commissioning/ commissioning and till the unit is handed over to the customer.

c) Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from the agencies approved by BHEL. Calibration report of the same should be submitted prior to start of calibration of the field instruments/devices.

d) It is the responsibility of contractor to make erection, calibration/ testing and commissioning protocols for various equipments/devices installed by them and they should get duly certified by customer/BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.

e) Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/panels and supply of hardware for mounting of the instrument.

f) Some devices line solenoid valves, position feedback transmitters, limit switches, air filter regulators, airlock relays, positioners etc., are supplied assembled along with mechanical equipments like pneumatic control valves, power cylinders, trip valves, dampers, motorised actuators, etc. These will need removal, calibration/testing, refixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipments (viz., pneumatic control valves, power cylinders, trip valves, dampers, etc.) should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment.

g) Transmitter enclosure / open racks for various packages which are to be erected and commissioned at various locations of the Boiler, turbine and outdoors, shall be supplied with internal tubing, air filter regulators, rotameters, provision of continuous or intermittent purging arrangements wherever required, etc. The quoted rates for these racks / enclosures shall include the erection and commissioning of all such items inside these racks / enclosures.

h) Sometimes recalibration of equipments may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

i) Recalibration Charges = 60% of the Percentage Stage Payment for Calibration as per split-up defined in Terms of Payment (Section-12)

j) The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.

k) **Note:** For recalibration of skid mounted items or other systems where lumpsum rates are quoted, the recalibration charges, if admissible, will be calculated from the relevant unit rates quoted for same / similar items elsewhere in the rate schedule. The decision of BHEL Engineer shall be final and binding on the contractor.

l) For the very few cases where required, the contractor shall carry out re-orientation of bottom/top entry arrangement for process connection if needed due to site condition in existing instrument rack/enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.

m) In certain cases instruments / devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such instrument duly certified by BHEL engineer. However for removal of such instrument, no separate rate/payment shall be applicable.

n) For such of those instruments/devices such as temperature gauge/switches, pressure gauge/switches, transmitter pressure/flow/ level/DP, level probe/switch etc, which are received, assembled with mechanical equipments and are to be calibrated, only calibration rate will be paid as per applicable rate for respective instruments/devices. No payments shall be made for removal and re-fixing of such instruments.

o) Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical engineer for identification and fixing of thermowells on the pipeline. However

actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

p) All field mounted instruments are to be located in such a way as not to obstruct walk-ways or plant equipment access but shall be easily accessible for maintenance. Hand rails shall not be used for mounting or supporting instruments.

q) Racks/stands and supports for instruments and transmitters shall be fixed on RCC column/floor by chipping and grouting or by welding to steel structure. In no case these shall be welded to floor grills.

r) The power cylinders support/base erection will be welded to steel structure or by grouting. The power cylinder will be properly aligned and linkage mechanism wherever required shall be connected to the driven equipment. All accessories for power cylinders line air sets, solenoid valves, air lock, limit switches, if supplied loose, shall be fixed, aligned and connected up.

s) When installing flow and pressure transmitters/switches for Liquid /steam/condensate vapor services, the instrument is to be mounted below its primary element or tapping point. For gas service applications, the instrument is to be mounted above Primary element tapping point.

t) During erection and commissioning stage, the site mounted instrument shall be protected suitably. Contractor shall provide suitable security arrangement in main control room, and other areas where equipments are positioned, at no extra cost.

u) All brackets/racks and support steel work for tubing impulse lines/instruments shall be painted with two coats of primer and two coats of final color prior to installation. Paints, etc supply in the scope of contractor.

v) Contractor shall arrange for own fire fighting equipments for the materials stored under contractor's custody.

6.11.12 LAYING OF PIPES/TUBES (IMPULSE PIPE)

a) Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from the running meter, edge preparation, cold bending, welding of sockets/ reducers/ tee/ cross/ isolating valves/union nut and nipples/tail pieces etc., mounting of SS/CS three/five valve manifolds and compression fittings, condensate pot/equalizing vessel, providing supports, clamping, conducting leak test/hydraulic pressure test, painting and other accessories as per instrument hook-up diagram. Piping works shall involve either arc or TIG welding.

b) IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

c) All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings as no separate rate is envisaged.

d) Contractor shall provide GI clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.

6.11.13 **INSTRUMENT & SERVICE AIR PIPING (SS/GI PIPE)**

Laying of pipe (SS/GI) for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of Elbows/ Tee/Reducer/ Moisture traps/Auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test etc. Threaded joints of air pipeline shall be made leak proof by using Teflon tapes or sealing compound. Seal welding of threaded joints may be called for if required. This shall be done within the quoted rate.

6.11.14 **COPPER TUBING/PIPE/SS TUBE**

Installation of Copper Tube/SS Tube/Copper pipe shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of fittings like compression Fittings/Tees/End connectors/straight connectors/bulk heads/valves etc. Supporting, clamping including supply of clamps and hardware, flushing and conducting leak test. Suitable tube cutters, benders and de burring tools will be used for such jobs.

6.11.15 Guidelines for handling and storage of electronic cubicles / subassemblies / loose items.

a) Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipments may get damaged due to vibration and shock.

b) After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.

c) Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.

d) After opening the case, all supports provided for transport are to be removed with due care.

e) Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.

6.11.16 Storage

a) The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.

b) The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around and to circulate air under the stored equipment. This will also help in lifting packing with fork-lifter.

c) Periodic inspection if silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when de - colorization takes place.

d) Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc., which can affect electrical contacts of relays and terminal boards.

e) The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., which can damage the equipment.

f) All the equipments, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.

g) The packing material shall be retained if the cubicle is to be repacked after inspection.

h) All subassemblies should be kept in a separate place where it is easily accessible.

i) Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.

j) Subassemblies should not be stacked one above the other.

k) The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units,

printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorised and stored separately.

6.11.17 Guidelines for handling of electronic modules

a) All the modules shall be handled by qualified persons only.

b) Electronic modules should only be touched when it is absolutely essential to do so.

c) Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.

d) The operator should not wear clothing made entirely from synthetic fibers, but a mixture containing at least 65% cotton.

e) The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.

f) The electronic modules should not be placed close to television sets or CRT units.

g) Soldering irons and any other tools used must be grounded.

h) All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

6.11.18 MISC. INSTRUMENT/ EQUIPMENT CALIBRATION, ERECTION, TESTING, AND COMMISSIONING

a. contractor shall carry out testing & commissioning of panels, electrically operated valves, pneumatic control valves, pneumatic trip valves, solenoid valves, limit switches, HT/LT motors including drying out, and any other integral devices forming part of various mechanical skids/equipments, & piping etc.

b. The scope of commissioning of electrically operated actuators for valves, dampers, gates etc., will include meggering, adjustments of mechanical/ electrical or electronic position transmitters, setting of limit/torque switches, cable checking, internal wiring checking, cleaning / heating for increase in IR value, local/remote operation, replacement of limit/torque switches if required, etc.

c. The scope of commissioning of devices like solenoid valves, feedback position transmitters, limit switches, air filter regulators, airlock relays, positioners etc.,

which are integral part of pneumatic control valves / power cylinders / trip valves electrically operated valves etc., will involve adjustments / servicing, calibration etc. As incidental to work, contractor shall remove such devices prior to erection either at site or at store to avoid damage/pilferage and for keeping in safe custody. These shall be installed at appropriate stage as instructed by BHEL. The above removal and re fixing will be done within the quoted rates.

d. Whenever additional instrumentation work viz gauges, transmitters, temperature elements and laying of impulse piping, is to be carried out for performance guarantee test, the same has to be executed by the contractor as per the rate applicable already provided in the rate schedule.

e. Certain instrumentation like pressure switches, pressure gauges, dial thermometers, transmitters etc. are received in assembled condition as integral part of equipments. Dismounting, calibration, and re-erection of such instruments, where required for safe keeping or any other purpose as instructed by engineer, is in the scope of work. Only the rate applicable for calibration for respective instrument item will be paid.

f. All batteries for various AC and DC systems are to be taken into service as per standard method of initial charging and discharging, recording specific gravity values, etc. Contractor has to make arrangement for suitable loads during charging / discharging cycle.

g. Battery charging/discharging is a continuous process and skilled manpower shall be deployed by the contractor round-the-clock.

h. Contractor shall arrange suitable load, cables, safety equipment and consumables for discharging the battery during charging and discharging cycle at his cost.

i. Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.

j. Wherever panels, pneumatic power cylinders and control valves have been erected by the mechanical contractor, calibration/ commissioning has to be carried out by the contractor..

k. In the case of electronic water level indicator, electrodes may be supplied loose and the same need to be fixed in the pressure vessel as per the drawings. No extra charges will be payable.

l. The calibration of position transmitters of the NRVs in the turbine extraction system has to be carried out by the contractor. Position transmitters are to be erected by contractor if supplied loose.

m. Dimension and weight as mentioned against control panels, MCCs, etc. in rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable on this account.

n. Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.

o. Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JBs will be supplied separately. These are to be suitably written and fixed onto the JBs. Wherever nameplates for JBs are not supplied, the JB no. are to be written with paint on JBs for identification. Separate payment will not be made for this.

p. The push buttons and indicators in C&I systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.

6.11.19 Calibration, testing & commissioning

Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipment, devices, systems etc. are broadly described hereunder. However, there may be some overlapping between the activities, i.e. Erection, calibration and

testing, commissioning. The classification of each activity is only a guideline for understanding the volume of work in each activity. The contractor shall have no claim for performing or providing manpower assistance for such overlapping work, which is also within the scope of work.

Scope of work under erection/calibration/testing/commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/servicing, putting instrument into service, signal checking from field upto the functional group panels and remote indicating instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, trouble shooting during pre-commissioning/post-commissioning till system is handed over to the customer.

Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/devices.

A. Calibration

- Verification of instruments for range, type etc; with respect to instrument schedule, data sheet or system document.
- Codification of instruments as per system tag numbers
- Calibration/adjustment of instrument as per system requirement/set values.
- Providing head correction in case of pressure measuring instruments.
- Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
- Checking and ensuring the proper functioning of instruments.
- All the recorders shall be made functional with proper chart movement and ink marking.
- Preparation of computerised calibration certificates in the formats specified by BHEL Engineers and getting those signed by the customer is in the scope of the contractor.

Completion of erection and commissioning protocols with customer.

B. Erection

- Drawal of material from store, verification, inspection as per shipping list, drawings and documents.
- Preservation, upkeep, safe custody of the erected equipment till handing over.
- Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.
- Continuity check & IR value of cables.
- Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.
- Checking earthing of the equipments and cable shield wire continuity.
- Energizing the functional group control panels and field devices.
- Flushing of impulse pipe before making the instruments process connections through.
- Any leakage damages to impulse pipe, field device connections, air connections etc. Shall be fully attended by contractor.

- Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical contractor for identification and fixing of thermowells on the pipeline. However actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

C. TESTING & COMMISSIONING

- Checking/verification of binary/analog input and output signal from field and panel and upto recording/indicating instrument/MMI monitors.
- Adjustment, testing, calibration of pneumatic drive (control valve, trip valve, power cylinder for gate/dampers etc), electrical actuator operated valve/gate/dampers of other functional elements.
- Checking and operating electrical/pneumatic drive through functional group panel, remote control desk, PMS/MMI, CRT operation and repeatability and smooth operation to be checked.
- Checking the interlock, protection and alarm for various processes by stimulation of field devices/process changes.
- Functional check of sub-loop control, sub group control and auto loop and fine-tuning.
- Adjustment of limit switches/feed back position transmitter checking the L.S. of actuator for correct position indication and repeatability shall be ensured.
- LT motor IR value measurement, bearing/winding RTD checking, checking the LT load connector, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
- Contractor shall prepare calibration/testing report/protocols.
- During trial run of various systems, the performance of any instrument found erratic, un-satisfactory are required re-adjustment, re-calibration etc. Contractor shall attend to the defects.
- Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same shall be attended promptly.
- Observe the proper functioning of sub-group/sub-loop control.
- Check the operation of various control in manual /auto mode for smooth functioning.
- Clearing of all defective signals arising during commissioning and during trial operation of unit.
- Any wiring correction or minor modification in control panel wiring noticed during the pre-commissioning, it shall be carried out.

D. Post-commissioning

- Contractor shall rectify the defect observed/informed by customer during the trial run.

- Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.
- After trial run/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance.

E. PG Test Assistance

- For PG test assistance, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. These activities may be carried out at any point of time before or after Completion of Facilities. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled and returned to BHEL Stores, after the completion of PG Test for which no separate payment is admissible.

6.11.20

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc. ***Non-establishment of above equipment will attract penalty @ Rs 20000 (Rs Ten thousand only) per month.***

6.12 TROUBLESHOOTING DURING PLANT OPERATION

During pre commissioning / commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc that may arise during such operation. The contractor will be required to put such personnel in shifts in both electrical and C&I area. The bidder must also take this aspect into consideration.

6.13

Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc. are received in assembled condition as integral part of equipment. Contractor shall dismount, where instructed so, such instruments for calibration and storage/re-erection. Calibration will be done by C&I erection agency.

6.14

Fixing and seal welding of thermo wells & plugs of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo wells after hydro test/ of lines as part of work.

6.15
Actuators/drives of valves, dampers, gates, powered vanes etc. May have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

6.16
All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

CHAPTER- 7
HYDROSTATIC TESTING, PRESERVATION AND OTHER TESTS

7.1

Contractor shall carry out the following tests required to complete the erection and commissioning of the STP Set:

(1) Hydraulic testing of piping & Vessels(if any):Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, Chemical cleaning of the equipment and piping as part of scope of work under this tender specification.
(2) Ultrasonic test
(3) Dye Penetrant test
(4) Magnetic Particle Test.

All above facilities (men, materials, equipment, consumables etc) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

7.2

Contractor shall lay all necessary temporary piping, welding, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Air leak test, Chemical cleaning etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipment for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

7.3

All the above tests shall be repeated till all the equipment, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

7.4

For the installation of temporary system as above BHEL will provide only the piping, structural items for supports and access platforms, tanks/ plates for fabrication of tank, valves, gauges and their fittings, and thermal insulation only. These will be supplied in random sizes / lengths. However, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the contractor. All above works shall be carried out by contractor. The works of all other temporary piping for remaining applicable tests shall be carried by contractor as scope of work. All pumps of adequate capacities and specifications to meet the requirement, suitable motors and their starters, foundation/ frames, cables, switches etc shall be arranged by the contractor (other than which are to be provided by BHEL free of hire charges on returnable basis).

Cleaning, servicing of tanks, valves, pumps, equipment, during various stages of erection and commissioning are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

7.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

7.6
While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro test. Wherever work is involved in the terminal points, Contractor shall carryout the same as per instruction of BHEL engineer. The decision of BHEL engineer is final and the same is binding on the contractor.

The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor.

7.7
For various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL/ customer's stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.

7.8
During trials/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipment like pumps, removal and cleaning / replacing of filters etc is within the scope of work.

7.9
In case any defect is noticed during tests, trial runs of all equipment and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the same shall be done as per BHEL engineer's instructions. Claim, if any, for these works from the contractor shall be governed by relevant clauseses.

7.10
Contractor shall cut / open / dismantle work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

Similarly, during the course of erection, if certain portion of equipment erected by the contractor has to be undone for enabling other contractors / agencies of BHEL / customer to carry out their work, contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed as per relevant clauses .

7.11 **PRESERVATION OF COMPONENTS**

Contractor shall arrange for preservation of components/ materials issue to him as per BHEL's storage and preservation manual and/or as per instructions of BHEL engineer.

One or more of following methods shall be adopted for preservation:

Coating with preservative paints/lubricant/inhibitors.

Capping/wrapping/covering.

Filling/immersion in oil/chemicals etc.

Special care to be taken for handling, storage & preservation of membranes. Manufacturer's manual (Apendix-I) for Care, handling, storage & preservation is to be followed for the same.

CHAPTER-8
PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING

8.1
Commissioning of the STP equipment with associated Aux. and other Equipment with auxiliaries shall involve the following tests though not limited to these, various testing, trial runs of various equipment erected and systems installed;

(a) Trial run of Pumps other various rotating machineries / pumps.

(b) Trial run of all motors/ drives for various auxiliaries.

(c) Chemical Cleaning of various systems & piping, Oil flushing of lube oil system, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.

(d) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.

(e) Servicing of all valves, Hydraulic Power cylinders, fittings.

(f) Manual/mechanical cleaning of Pumps, tanks /vessels and other various equipment erected by the contractor. This may have to be repeated several times during the commissioning process.

(g) Chemical cleaning of piping systems as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like gauges, instruments etc. as instructed by BHEL during this process.

(h) Cranking of GT

(i) FSNL and synchronisation.

(j) Trial operation

(k) Full load operation

The above activities/tests/trial runs may have to be repeated till satisfactory results are obtained and also to meet the technical and statutory requirements.

8.2

Contractor shall lay temporary pipelines with fittings and accessories etc. as instructed by BHEL engineer for the purpose of pre-commissioning and commissioning activities like chemical cleaning, oil flushing etc. of piping and other equipment as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this T.S.

8.3
The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipment under this scope of work, to BHEL and their Testing & Commissioning agency.

8.4
The contractor shall carry out any other test as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or parts of work performed by the contractor.

8.5
In case any malfunctioning and / or defect is found during tests / trial runs such as loose components, undue noise or vibrations, strain on connected equipment etc. The contractor shall immediately attend to these defects/ malfunctioning and take necessary corrective measures. If any readjustment and realignments are necessary, the same shall be done as per BHEL engineer's instructions, free of cost.

8.6
The cleaning of Lube oil tank etc. is in general by wire brush / abrasive paper etc. In case of tenacious rusting spots found if any, the same shall be cleaned thoroughly mechanically by buffing wheel etc. If manual / mechanical cleaning is not proper, the cleaning by sand blasting as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

8.7
The contractor shall associate for initial and subsequent fillings of gas in generator gas system as and when required till unit is handed over to Customer.

8.8
The contractor shall carry out leak test of generator air cooling system to the satisfaction of BHEL engineer.

8.9
Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

8.10
During the stages of commissioning, and till Unit is handed over, if any part of STP Plant and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/ replacement etc. for reasons not attributable to the contractor, will be governed by relevant clauses of this specification. The parts to be replaced shall however, be provided by BHEL free of cost.

8.11
During this period, though BHEL's and customer's engineers will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer.

8.12
In case any malfunctioning and/or defects are found during tests, trial run such as loose component, undue noise or vibration, strain on connected equipment etc., The contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment or realignment is necessary, same shall be done as per BHEL engineer's instruction.

8.13
The pre-commissioning activities will start prior to cleaning of Piping systems and will continue till STP Plant is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, chemicals etc. All these works need specialised gangs including electricians, Instrument Technicians, Fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilisation of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.

8.14
Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over, without any extra payment.

8.15
After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months **per Unit**.

1) Supervisor 2 Nos.
2) Pipe fitter/Millwright fitter 2 Nos.

3)	welder	2 Nos.
4)	Rigger	2 Nos.
5)	Electrician/instrument technician	1 No. each
6)	unskilled worker	6 Nos.

8.16
The above figures shows only minimum required over and above labour required for completing pending erection and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

8.17
It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers.

8.18
During commissioning, opening of valves, changing of gaskets, checking, realigning of rotating and other equipment, attending to leakages in piping, tanks etc. and adjustments of erected equipment may arise. Valves shall be serviced and lubricated to the satisfaction of BHEL engineer during the erection and commissioning as per BHEL engineer's instructions.

8.19
It is the responsibility of the contractor to provide for necessary resources till the completion of work under these specifications, even in case erection, testing and commissioning of the STP Plant and other equipment are delayed due to reasons not attributable to the contractor.

CHAPTER-9
PAINTING

9.1
All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.

9.1.1
The primer and thinner will be provided by contractor as part of scope of work along with other like arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work.

9.1.2
Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. **Contractor shall arrange required paints & primers and other consumables for above works.**

9.2
Preservation of all components/equipment during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. **Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.**

9.3
All exposed metal parts of the equipment including piping, supports, structures, railing, tanks/vessels, Common System Equipment, Balance of Plant Equipment with associated auxiliaries etc. as covered under these tender specifications, as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping etc; as specified in relevant erection documents.

The above parts shall then be painted with specified no. Of coats of specified paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification.

9.4
In addition, color banding, legend and identification marking, direction of flow/rotation marking etc. Is part of work.

9.5
The surface preparation/cleaning, treatment, Identification marking Colour Codes and Final/Finish painting works shall be carried out by contractor as per BHEL/ Customer Specification .For any non-confirmation/dispute between BHEL / Customer specification, the procedure/instructions as laid down in customer & their consultant's specification shall supersede BHEL specification and shall be binding on contractor.

Painted surface thickness as per standard shall be demonstrated by the contractor. Paint thickness measurement instrument shall be in the scope of contractor.

Painting the inner side of aluminum/GI/steel cladding, with anti-corrosive paint as specified. Also all other accessories for painting, cleaning the surfaces etc. shall be arranged by the contractor.

Touch-up painting of switchgear panel, 415 Volt LT MCC, Control Panels or any other equipment /devices wherever necessary.

9.6 STRUCTURALS

Structural components may be supplied by BHEL without any primer/paint coat. The surface of such items shall be cleaned as per specifications and then coated with two coats of Primer.

9.7 PANELS, JUNCTION BOXES

9.7.1
Panels and Junction Boxes shall be Touch-up painted as and where original shop paint is peeled off. Necessary surface cleaning and preparation shall be done by the contractor as per relevant painting codes followed by two coats of Primer and two coats of Finish Paint.

9.7.2
The contractor shall provide the Primer (ROZC as per IS:2074) for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P etc required for application of ROZC Primer. All paints and thinners shall be sourced only from BHEL approved manufacturers.

9.7.3
In addition, color banding, legend and identification marking; direction of flow/rotation marking etc. is part of the work.

9.7.4
Contractor shall ensure that all steel structure used for electrical installation shall be painted with one coat of Red Oxide Zinc Chromate primer and two coats of Aluminum Alkyd paints of approved shade for indoor installations. However for outdoor installations and corrosive areas like Battery room , contractors shall carry out hot dip Galvanization.

SERV-0001 ZeeWeed Membrane Care, Handling and Storage 500 a/b, 500c, 500d, ZW1000

1.0 Purpose

The purpose of this document is to outline the requirements associated with the receipt, unloading and storage of ZeeWeed® membranes and associated cassette assemblies. Information is also included on storing wetted membranes. If, after reading this document, questions exist on proper membrane handling, please contact your GE Water representative.

Although the ZeeWeed® membranes are designed for maximum durability in water filtering applications, membranes are susceptible to irreversible damage if mishandled. Any concerns regarding membrane handling and potential damage should be addressed with GE Water staff directly before any activities are undertaken at site that may cause an increased potential for membrane damage to occur. It should also be confirmed in advance that suitable Builders All Risk Insurance coverage is in place or other insurance coverages as deemed necessary by the project contract.

The installer in charge of the site is responsible for taking all reasonable precaution to prevent damage during installation and to prevent debris and foreign objects from falling in the membrane tanks after the cassettes are installed.

2.0 Applicability and Revisions

This document covers the ZeeWeed® product line, including all ZeeWeed 500 and 1000 series modules/elements and cassettes. Three important documents to accompany this procedure include:

I. **Equipment Acceptance Certificate and Checklist** – a document used to confirm the receipt of the goods to the satisfaction of the receiver (for membrane shipments, typically the Installer).
II. **Membrane Pre-Installation Checklist** – a checklist to be completed by the Installer prior to membrane uncrating and installation.
III. **ZeeWeed® Cassette Installation Procedure** – a procedure specific to each membrane type that details the steps involved in uncrating and installing new membrane cassettes (either ZeeWeed® 500c, ZeeWeed® 500d or ZeeWeed® 1000).

SERV-0001 ZeeWeed Membrane Care, Handling and Storage 500 a/b, 500c, 500d, ZW1000

3.0 Definitions

- **Installer** - Organization that is contractually responsible for the project site.
- **ZeeWeed®** - An ultrafiltration membrane in which the membrane surface is cast onto the outside of long thin hollow fibres. A large number of fibres are bound together in a top (sometimes also a bottom) collection header.
- **Module/Element** - An assembly to house and contain the membrane fibre. One ZeeWeed® membrane, containing numerous individual fibres grouped together, is called a module or an element. See pictures to the right.

500c

500d

ZW1000

ZW1000 V3

4. Membrane Shipment

During shipping of the ZeeWeed® membranes from the GE Water manufacturing facility to the intended site, the following conditions must be met:

- Shipment temperatures are to be controlled in the range of 2 - 35°C (35° - 95°F) (Setpoint 20° C or 68°F)
- The shipping crates housing the membrane cassettes should never be exposed to excessive vibration or large bumps. When shipping membrane cassettes by rail or truck, care is to be taken to ensure that air suspension cars or trailers are utilized.

In most cases membranes will be shipped in populated cassette form (modules are already installed) in cassettes.

SERV-0001 ZeeWeed Membrane Care, Handling and Storage 500 a/b, 500c, 500d, ZW1000

5. Handling of Factory Shipped GE Water Membranes

5.1 General Information

Cassettes

- Membrane cassettes are shipped in a plywood packing crate.
- The cassette itself is sealed in a plastic bag to retain moisture and prevent damage to the membranes due to drying.

Modules/Elements

- Individual membrane modules/elements are shipped in a cardboard box within a crate.
- The module or element itself is sealed in a plastic bag to retain moisture.
- Modules or elements in cardboard boxes should not be stacked more than six high.

5.2 Unloading Membranes

The Installer is responsible for the prompt and proper unloading of all membrane equipment and materials received into his custody.

- Dock level, off-loading facilities are recommended.
- The wooden shipping crates have been designed to be lifted from the bottom using a forklift.

Note that extended forks and an appropriately sized lift are required for the 500d product.

- Damage incurred or observed during equipment off-loading needs to be immediately reported to your GE Water representative.

- It is recommended that an experienced/qualified forklift truck driver unloads the membranes from the carrier.
- 500d and ZW1000 cassettes are shipped on their sides and will require uprighting - follow all procedures carefully to prevent injury
- Shipping crates are not to be stacked!

SERV-0001 ZeeWeed Membrane Care, Handling and Storage 500 a/b, 500c, 500d, ZW1000

5.3 Confirmation of Equipment and Materials

- A cross-check should be performed on the shipment using the packing slip to confirm the delivery of membrane equipment.

Note: membrane crates are not to be opened! Verification should be limited to external examination of crates.

- The equipment delivery will be checked for content and any damage that may have occurred during shipping or the unloading process.
- Any non-conformance shall be immediately reported to your GE Water representative (in writing). Digital pictures of damage should be provided.
- Refer to section 5.4 for "Confirmation of Handling Indicators"
- Once the equipment shipment has been checked, the document provided by GE Water (ref. "Equipment Acceptance Certificate and Checklist") is completed and signed by the Site Organization's representatives.
- The Installer shall expeditiously replace all materials and equipment that are lost or damaged while in the custody of the Installer.
- Replacement materials and equipment of a type and quality equal to the original materials and equipment shall be acceptable to GE Water and to the Owner.

5.4 Confirmation of Handling Indicators

GE Water includes a series of Shipping Indicators to protect the integrity of the membrane cassettes while they are being shipped. Indicators may include Freeze and/or Heat.

- The Installer's representative should document the indicator condition on the indicator check label located on the membrane crate.
- At the time of discovery the Installer must inform the ZENON representative of any triggered indicators. (A triggered indicator indicates ideal shipping conditions were not maintained. The ZENON FSR will evaluate membranes prior to installation).
- During membrane installation, the GE Water Representative onsite will also inspect and record the status of all indicators.

	Freeze Indicator	Heat Indicator
Indicator Location:	External	External
When to Check:	At time of receipt	At time of receipt

Indicators are located next to instruction labels.

Note: Duplicate indicators are inside crate. These indicators are for ZENON FSR use.

SERV-0001 ZeeWeed Membrane Care, Handling and Storage 500 a/b, 500c, 500d, ZW1000

6.0 Storage of Membranes

The Installer shall provide all facilities and services required for the storage, maintenance, protection and security of the equipment and materials delivered by ZENON.

The following conditions should be followed:

- Equipment and materials shall be stored in assigned lay-down areas.
- Stored equipment and materials shall be adequately supported and protected to prevent damage.
- Equipment shall be moved into the permanent building or onto its permanent foundation as soon as construction will permit.
- Stored materials and equipment shall not be allowed to contact the ground. In warehouses that do not have dry concrete or suspended floors, materials and equipment shall be stored on platforms or shoring.
- Indoor storage furnished by the Installer shall consist of suitable construction trailers or portable enclosures and shall be weather-tight, well ventilated, and secure against theft and vandalism.
- Access doors shall be adequate to accommodate the movement and handling of materials and equipment to be stored and shall be equipped with secure locks.
- Membrane cassettes will be stored upright on a level surface.
- The membrane cassette crates must remain closed until the Installer begins membrane installation to prevent permanent membrane damage due to drying out.

Membranes should be stored in a dark dry area with a storage temperature between 5° - 35° C (40° - 95° F)!

6.1 Storage Conditions – Crated Cassettes

The following conditions should be ensured when storing crated cassettes:

- Stored in a sheltered area protected from freezing, direct sunlight or extreme heat.
- Vacuum sealed bag should remain sealed until membrane installation is being performed.

It is recommended that the cassettes be stored no longer than necessary prior to installation. Coordinate with GE Water for appropriate shipment times. Maximum storage duration of a cassette is 12 months from the date of shipment.

6.2 Storage Conditions – Bagged Modules / Elements:

New modules / elements preserved with glycerin solution, bagged and factory sealed, may be stored for up to 12 months. The following conditions should be ensured when storing bagged modules / elements:

- Stored in a sheltered area protected from freezing, direct sunlight, extreme heat and winds that could accelerate drying.
- The module / element should be kept bagged and sealed at all times.

Disassembly of cassettes to replace modules/elements requires attention and care. Contact GE Water for re-assembly procedures, which include step-by-step instructions, bolt torques, and identification of non-reusable hardware.

6.3 Storage Conditions – Wetted Membranes

It is important to note that ZeeWeed® membranes should not be allowed to dry out as membrane properties will be adversely affected. **Drying may result in irreversible damage to the membranes.**

If the preservative is flushed out or if the module has been in contact with water, the membrane must not be allowed to dry out under any circumstances. The membranes may be left in air for a maximum of forty-five minutes out of direct sunlight and wind. After forty-five minutes, membranes should be immersed in water. Spraying the membranes after this period is not sufficient to prevent drying-out and will not allow a longer period of contact with air. If membranes are **frequently lightly misted** (not sprayed with fire hoses or pressure washers) from the time they have been taken out of the water, they may be left in air for a maximum of 6 hours (5° - 35°C (40° - 95°F)). Since the membranes are maintained wet, there is no need for specific re-wetting procedures. However, if necessary for other reasons (e.g., drinking water compliance, residual of preservatives) the standard procedures for rinsing and disinfection may be used before starting the operation. If it is impractical to immerse or repeatedly spray the membrane, the membrane should be cleaned, preserved in glycerin solution and re-bagged according to membrane preservation procedures. Please refer to the Operations and Maintenance manual supplied with the system for further information.

Longer storage durations are to be discussed with GE Water on a case by case basis.

6.4 Storage Durations – Wetted Cassettes

When membranes have been installed in a tank, they need to be kept wet at all times. When the protective glycerin solution is removed, the membranes become susceptible to drying.

For storage periods of up to approximately 15 days, simple immersion of the cassettes in water containing sodium hypochlorite (NaOCl) with a maximum residual concentration of 3 mg/L is suitable. Residual should be monitored every week and re-dosing will be required if the residual drops to less than 0.2 mg/L. Recovery cleaning of the membrane prior to storage is strongly recommended. If the membranes have been in service in a MBR application, inspection and debris removal (if necessary) of the membrane prior to storage is also required. Periodic aeration may also be necessary to prevent anoxic or anaerobic conditions from developing in the tank. Daily testing of the water to ensure that the residual chlorine concentration is within acceptable limits is required; a simple swimming pool chlorine test kit is acceptable. A log is to be maintained recording daily NaOCl concentration and water temperature. Longer storage durations are to be discussed with GE Water on a case-by-case basis.

6.5 Wetted Membranes – Long term removal from water

If membrane cassettes are to be re-configured or rebuilt for any reason, GE Water Field Service Representatives are required to maintain warranty. If short-term storage (<15 days) refer to section 6.4 in this document. If the module is to be out of service for a longer period, the module/cassette must be preserved and stored.

- Perform a recovery cleaning on membrane modules (refer to the appropriate process manual).
- Ensure that no sludge or solids are present on the membranes.

Please contact GE Water Customer Service for proper preservation instructions.

In the case that the membranes have spent time in storage, carefully check for any signs of mold on the fibres. Should any mold be present, immediately rebag and follow through with the steps outlined in SERV-0056 Disinfection of Moldy Cassettes/Modules.

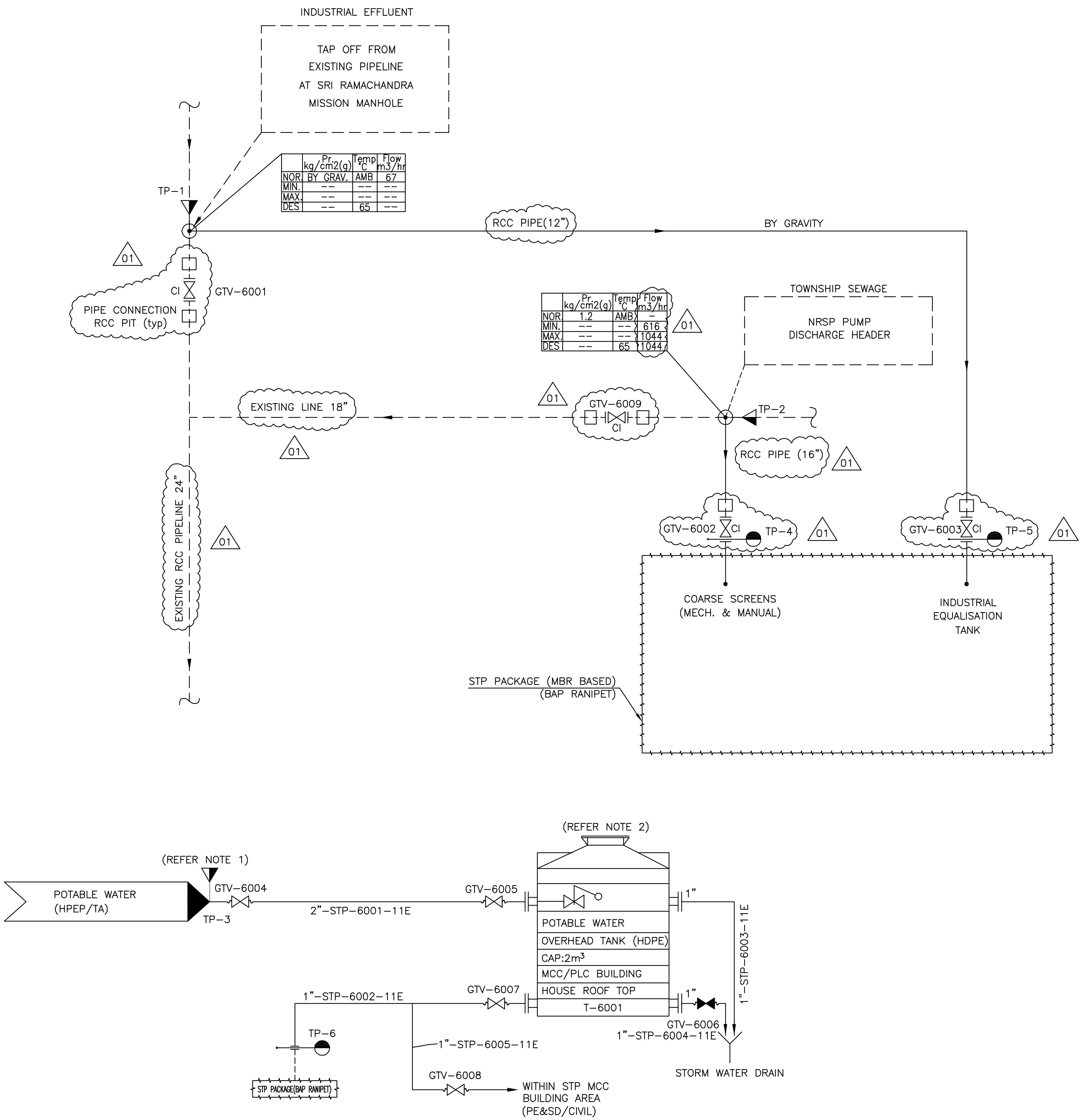
Contact your GE Water Representative for advice on returning a sample for analysis.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

DRG. NO. 1-38101-05512 SHT. 01 OF 01



	Pr. kg/cm2(g)	Temp °C	Flow m3/hr
NOR	BY GRAV.	AMB	67
MIN.	--	--	--
MAX.	--	--	--
DES	--	65	--

	Pr. kg/cm2(g)	Temp °C	Flow m3/hr
NOR	1.2	AMB	–
MIN.	--	--	616
MAX	--	--	1044
DES	--	65	1044

TAG NOS. ALLOCATION SUMMARY			
	USED IN THIS DRG. NO.	RANGE	NOT USED
VALVE TAG.	6001-6009 (01)	6001-6099	--
LINE NUMBERS	6001-6005	6001-6099	--

INTERNAL SCOPE OF SUPPLY
BAP RANIPET
PE&SD PIPING
PE&SD | HPEP/TA

LEGEND:-

TA – TOWNSHIP ADMINISTRATION
PE&SD – PROJECT ENGG. AND SYSTEMS DIVISION
BAP – BOILER AUXILIARY PLANT
NRSP – NEW RAW SEWAGE PUMP HOUSE
– SCREWED VALVE

NOTES:-

1. POTABLE WATER SHALL BE LEFT AT ONE POINT NEAR THE PLANT BOUNDARY.
2. POTABLE WATER STORAGE TANK SHALL BE SUPPLIED BY PE&SD/E&C.
3. ALL RCC PIPING SHALL BE SUPPLIED BY PE&SD/CIVIL.
4. THE PIPING & VALVES IN PESD ARE PART OF PE&SD/LAYOUT SCOPE OF SUPPLY.

REV.	DATE	ALTERED	CH.P
01	04.11.14	CHD/APPD	RS
ZONE		REVISED IN LINE WITH BAP & HPEP COMMENTS.	

PROJECT: 2x4.0MLD SEWAGE TREATMENT PLANT, BHEL HYDERABAD R.C PURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	CH.P	Sd-	11.07.14
CHD.	CH.P	Sd-	11.07.14
APPD.	RADHIKASISTA	Sd-	11.07.14

NO.OF VAR.: N.A.

DEPT. PED | CODE 450 | UNTOL. DIMS. GR. | SCALE N.T.S | WEIGHT (KG) N.A. | REF. TO ASSY. DRG. N.A. | ITEM NO. N.A. | NO.OF ITEMS N.A.

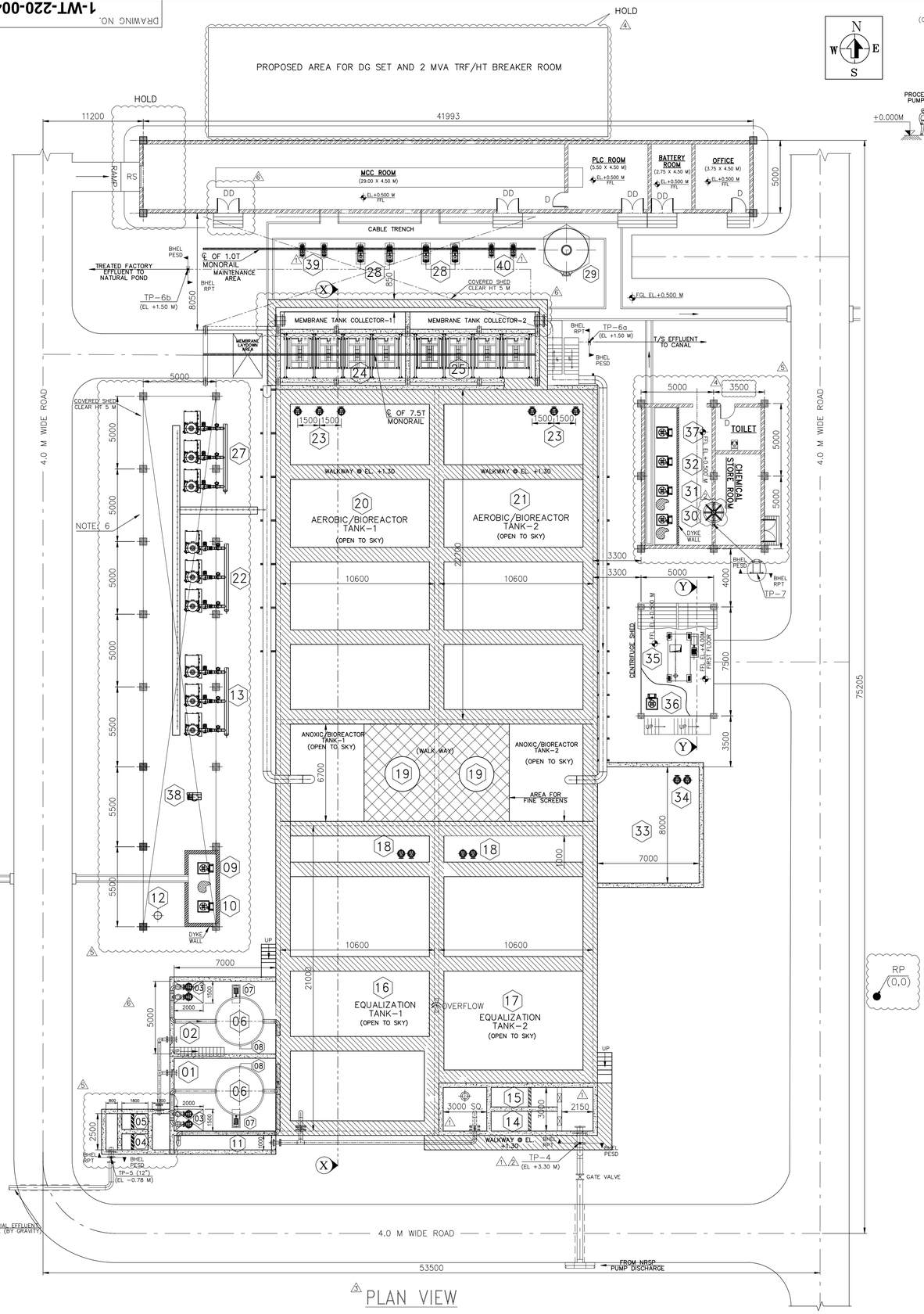
TITLE: P&ID FOR SEWAGE TREATMENT SYSTEM

CARD CODE NA | BHEL DRG NO. 1-38101-05512 | REV. 01 | SHT. No 01 | NO. OF SHT. 01

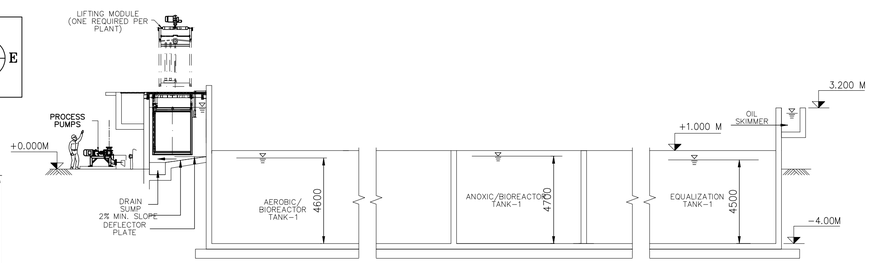
INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME

DRAWING NO. 1-WT-220-00458

ALL DIMENSIONS ARE IN MILLIMETRES



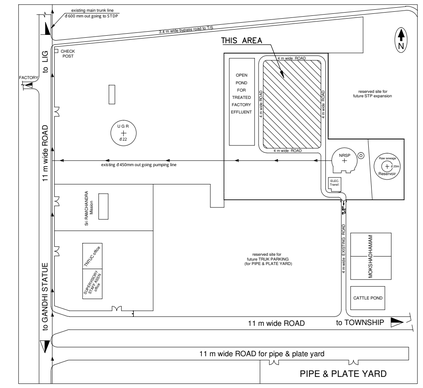
PLAN VIEW



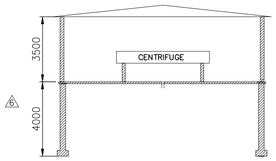
SECTION X-X

EQUIPMENT LIST:-

EQPT. NO	DESCRIPTION	QUANTITY	REMARKS
01	INDUSTRIAL INFFLUENT COLLECTION TANK – 1	1 NO.	BY BHEL PESD
02	INDUSTRIAL INFFLUENT COLLECTION TANK – 2	1 NO.	BY BHEL PESD
03	DAF FEED PUMP (2 nos. FOR EACH COLLECTION TANK)	4(2W+1S)	
04	AUTO COARSE SCREEN	1 W	
05	MANUAL COARSE SCREEN	1 S	
06	DAF TANK	2 W	
07	DAF RE-CIRCULATION PUMP	2 W	
08	DAF AIR COMPRESSOR	2(1W+1S)	
09	COAGULANT DOSG SKID FOR DAF	1 ST	
10	POLYMER DOSG SKID FOR DAF	1 ST	
11	OIL AND GREASE SKIMMER	1 W	
12	OIL COLLECTION DRUM	1 W	
13	MIXING AIR BLOWERS (COMMON FOR INFF. COLLECTION TANK, EQUA. TANK AND SLUDGE HOLDING TANK)	3(2W+1S)	
14	AUTO COARSE SCREEN FOR T/S SEWAGE	1 W	
15	MANUAL COARSE SCREEN FOR T/S SEWAGE	1 S	
16	EQUILISATION TANK –1	1 NO.	BY BHEL PESD
17	EQUILISATION TANK – 2	1 NO.	BY BHEL PESD
18	EQUALIZED EFFU. TRANSFER PUMPS (2 NOS. FOR EACH EQUA. TANK)	4(2W+2S)	
19	AUTO FINE SCREENS	2 W	
20	BIOREACTOR TANK – 1	1 NO.	BY BHEL PESD
21	BIOREACTOR TANK – 2	1 NO.	BY BHEL PESD
22	PROCESS AIR BLOWERS FOR BIOREACTOR TANK-1&2	3(2W+1S)	
23	RECIRCULATION (RAS) PUMPS (3 NOS. FOR EACH BIO-REACTOR TANK)	6(4W+2S)	
24	MEMBRANE TANK-1	1 NO.	BY BHEL PESD
25	MEMBRANE TANK-2	1 NO.	BY BHEL PESD
26	UF CASSETES	8 ST	
27	MEMBRANE BLOWERS	3(2W+1S)	
28	PERMEATE/BACKPULSE PUMPS	4(2W+2S)	
29	BACKPULSE TANK	1 W	
30	SODIUM HYPOCHLORITE DOSING SKID	1 ST	
31	CITRIC ACID DOSING SYS	1 ST	
32	COAGULANT DOSING SKID	1 ST	
33	SLUDGE HOLDING TANK	1 NO.	BY BHEL PESD
34	SLUDGE TRANSFER PUMPS	2(1W+1S)	
35	CENTRIFUGE	1 W	
36	POLYMER DOSING SKID	1 ST	
37	POST CHLORINATION DOSING SKID	1 ST	
38	COMPRESSOR FOR INST. AIR	1 W	
⚠1 39	DRAIN PUMPS	2(1W+1S)	
⚠1 40	SCREEN FLUSH PUMPS	2(1W+1S)	



KEY PLAN



SECTION Y-Y

TERMINAL POINT DETAILS

TP NO	X-COR.	Y-COR.	ELEVATION
04	20.5	10.00	+2.50
05	53.0	11.00	-0.78
06a	20.0	45.0	+2.00
06b	48.0	49.0	+2.00
07	11.2	32.5	+5.50

HOLD

1. THE DIMENSIONS MENTIONED ARE IN METERS.
2. ALL CO-RODINATES ARE FROM THE INDICATED REF. POINT RP (0,0)

NOTES:

1. FINISHED GRADED LEVEL ELEVATION OF THIS AREA IS 0.00 M WHICH CORRESPONDS TO SITE RL 544.7 M.
2. FINISHED FLOOR LEVEL ELEVATION OF LTMCC,PLC AND CHEM. DOSING ROOM ETC. IS +0.500 M.
3. PIPE LINES SHOWN ARE CONCEPTUAL ONLY.
4. CABLE TRENCH, DRAIN CHANNEL, SHOWN IN THIS DRG. IS PRELIMINARY. THESE LOCATION AND SIZE SHALL BE FINALISED AFTERORDERING OF EQPT, CABLES AND PIPES.
5. ALL THE CIVIL CONSTRUCTION WORK ARE IN THE SCOPE OF BHEL PESD.
6. AIR BLOWER SPACING SHOWN IN TENTATIVE IT SHALL BE FINALIZED DURING DETAILED ENGG.

REFERENCE DRGS :

1. HYDRAULIC FLOW DIAGRAM: 1-WT-220-00468 REV.01

LEGEND:

DD – DOUBLE DOOR
D – SINGLE DOOR
FGL – FINISHED GRADED LEVEL
FFL – FINISHED FLOOR LEVEL
RS – ROLLING SHUTTER
– CABLE ROUTING
– ACID RESISTANT TILING

REV	DATE	ALTERED : SV CHECKED: PP
06	09/12/14	
Zone	REVISED INLINE WITH • GE CIVIL INPUT: 5101029-PG-02 REV.01 • DAF CIVIL INPUT: KEL/GE_INDIA_SPC-10/03-A REV.00	
04	13/10/14	PP
Zone	REVISED BASED ON COMMENTS FROM BHEL-HYDERABAD VIDE E-MAIL DT: 27/09/14.	
02	23/08/14	IMRL/GR/PP
Zone	REVISED BASED ON COMMENTS FROM BHEL-HYDERABAD VIDE E-MAIL DT: 22/08/14.	
05	13/11/14	PP
Zone	LOCATION OF CHEMICAL BUILDING, BLOWER SHED CHANGED. ORIENTATION OF INDUSTRIAL EFF. INLET TANK MODIFIED.	
03	25/09/14	GR/PP
Zone	REVISED BASED ON DWG: 1-97-333-1083 REV.00 (PROPOSED NEW STP LAYOUT) FROM BHEL-HYDERABAD VIDE E-MAIL DT: 10/09/14	
01	19/08/14	IMRL/GR/PP
Zone	REVISED BASED ON COMMENTS FROM BHEL-HYDERABAD VIDE E-MAIL DT: 24/07/14. BATTERY ROOM AND EQPT NOS: 39,40 ADDED.	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: **SEWAGE TREATMENT PLANT - 8 MLD M/s BHEL , HYDRABAD**

BHARAT HEAVY ELECTRICALS LTD., UNIT: BOILER AUXILIARIES PLANT, RANIPET – 632 406.

	NAME	SIGN	DATE
DRN	BB SAHU	sd.	28.07.14
CHD	G.RAJENDIRAN	sd.	28.07.14
APPD	S.KAILASAM	sd.	28.07.14

DEPT NP	GRADE OF UNTOL.DIM	SCALE	WEIGHT (KG).	REF. TO ASSY/OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE 976	PR:QA:500	---	---			

TITLE: **PLANT EQUIPMENT LAYOUT**

CARD CODE: U 01

DRAWING NO.: **1-WT-220-00458**

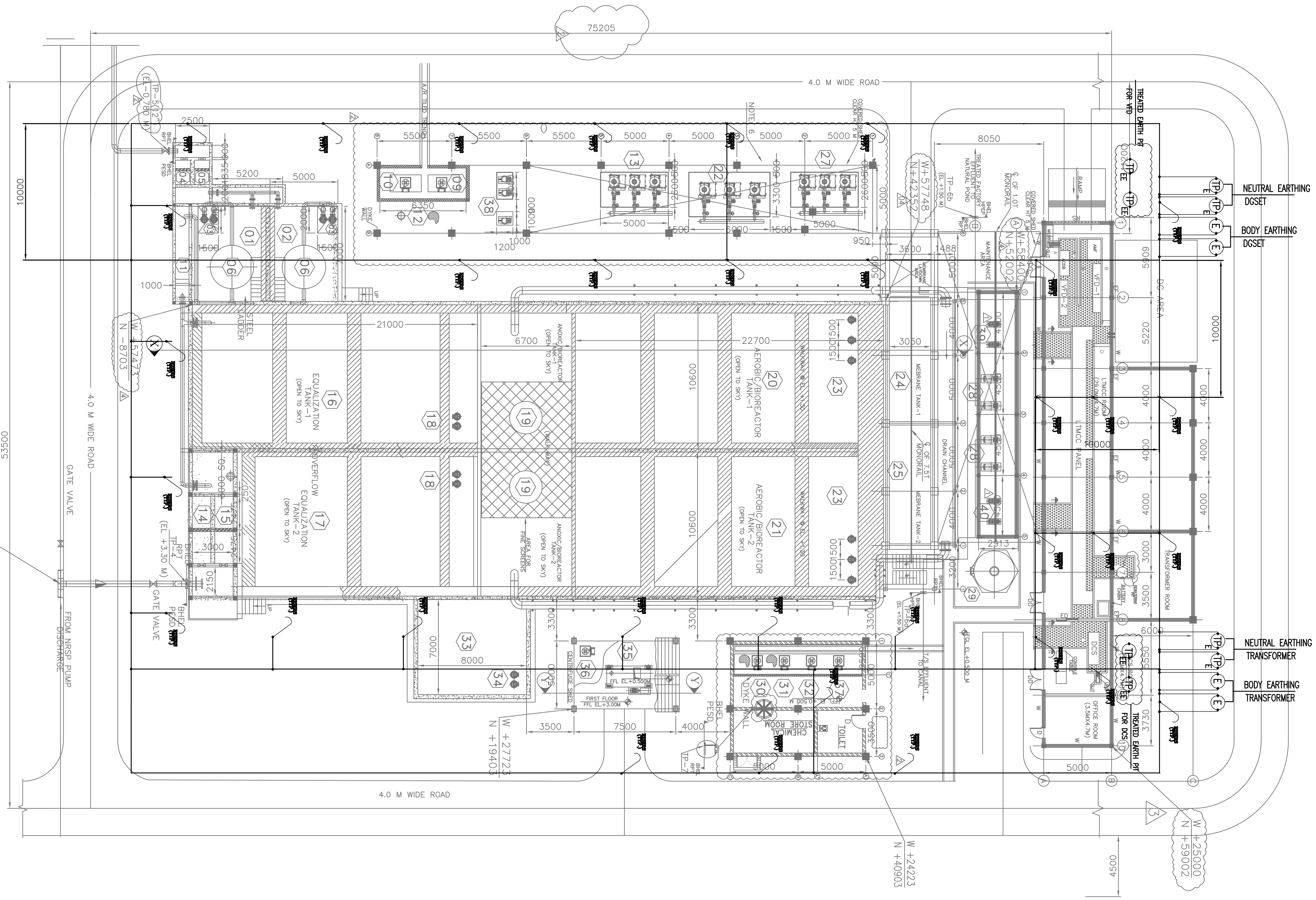
REV: 06

NO.OF VAR.:

Size A1

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)



UNDER GROUND EARTHMAT LAYOUT

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ELEVATION & CO-ORDINATES ARE IN METERS.
2. FOR GENERAL NOTES & DETAILS, REF. DOC:PEEC-04626.
3. ROUTING SHOWN IS TYPICAL, ACTUAL ROUTING TO BE DONE AT SITE CLEARING COLUMN/SKID FOUNDATION ETC.
4. IDENTIFICATION NUMBER AS GIVEN IN THE TABLE-2 WILL BE MARKED AT EACH PIT BY SITE.
5. EARTHING RISERS SHALL BE PROVIDED & NEAR EVERY ALTERNATE COLUMN OF SWITCH GEAR ROOM.
6. THE NO.OF RISERS & LOCATION INDICATED IN THIS LAYOUT IS TENTAIVE ONLY.HOWEVER RISERS SHALL BE PROVIDED FOR ALL MOTORS/SKIDS AND EXACT LOCATION OF RISERS TO BE DECIDED BY CIVIL/ELECTRICAL CONTRACTOR BASED ON SUIT AT SITE CONDITION.
7. EARTHING CONDUCTOR SHALL BE LAID AT A DEPTH OF 600mm BELOW GROUND LEVEL.
8. MINIMUM 300MM EARTH COVERAGE SHALL BE PROVIDED OVER THE GROUND CONDUCTOR WHILE CROSSING THE ANY UNDER GROUND FACILITIES/CONCRETRE FOUNDATIONS.

TABLE-1:- **BILL OF MATERIAL**

S.No	ITEM DESCRIPTION	QTY	REMARKS
	MAIN EARTHING CONDUCTOR		
	a) 40mm Dia MS ROD CONDUCTOR	470M	BURRIED IN SOIL
	b) 40mm Dia MS ROD CONDUCTOR FOR RISERS	50M	
	MISCELLANEOUS		
	a) 40mm DIA, 3000mm LONG MS ROD ELECTRODE IN TREATED EARTH PIT (ELECTRICAL) FOR NEUTRAL EARTHING	4	2 Nos FOR DGSET, 2 Nos FOR TRANSFORMER,,
	b) 40mm DIA, 3000mm LONG MS ROD ELECTRODE IN EARTH PIT FOR MACHINE BODY EARTHING.	4	2 Nos FOR DGSET, 2 Nos FOR TRANSFORMER,,
	c) 65mm DIA, 3000mm LONG Cu. PIPE ELECTRODE TREATED EARTH PIT (ELECTRONIC EQUIPMENT).	4	2 Nos FOR VFD, 2 Nos FOR DCS,,

TABLE-2:-

SNo.	symbol	Description	No of Pits	Pit Identific -ation No.
01	TP E	TREATED EARTH PIT (ELECTRICAL) FOR NEUTRAL EARTHING PROTECTION.	4	TPE1-TPE4
02	TP EE	TREATED EARTH PIT FOR ELECTRONIC EQUIPMENETS EARTHING.	4	TPEE1-TPEE4
04	E	PIT FOR BODY EARTHING	4	TP1-TP4

A — EARTHING CONDUCTOR BURIED IN SOIL (40mm Dia MS ROD)

TP E — 40mm DIA, 3000mm LONG MS ROD ELECTRODE IN TREATED EARTH PIT (ELECTRICAL) FOR NEUTRAL EARTHING/TEST PIT.

TP EE — 65mm DIA, 3000mm LONG Cu PIPE ELECTRODE IN TREATED EARTH PIT FOR ELECTRONIC EQUIPMENTS EARTHING.

E — 40mm DIA, 3000mm LONG MS ROD ELECTRODE IN DIRECTLY DRIVEN IN GROUND FOR MACHINE BODY EARTHING.

PIGTAIL RISERS (40mm Dia MS ROD)

REF. DWG.

1. PLOT PLAN,DWG NO: 0-381-01-01568 REV04
2. SIZING CRITERIA FOR PLANT GROUNDING SYSTEM, DOC. NO: PEEC-4644
3. NOTES & DETAILS FOR PLANT EARTHING SYSTEM, DOC. NO: PEEC-04626

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

REV.	DATE	ALTERED	CHD/APPD
ZONE			

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	K.V.NAGENDRA REDDY		08.04.2014
CHD.	P.SURESH		08.04.2014
APPD.	J.K.PATNAIK		08.04.2014

SCALE 1:180

TITLE: UNDER GROUND EARTH MAT LAYOUT

CARD CODE 1-381-21-02886 REV. 00

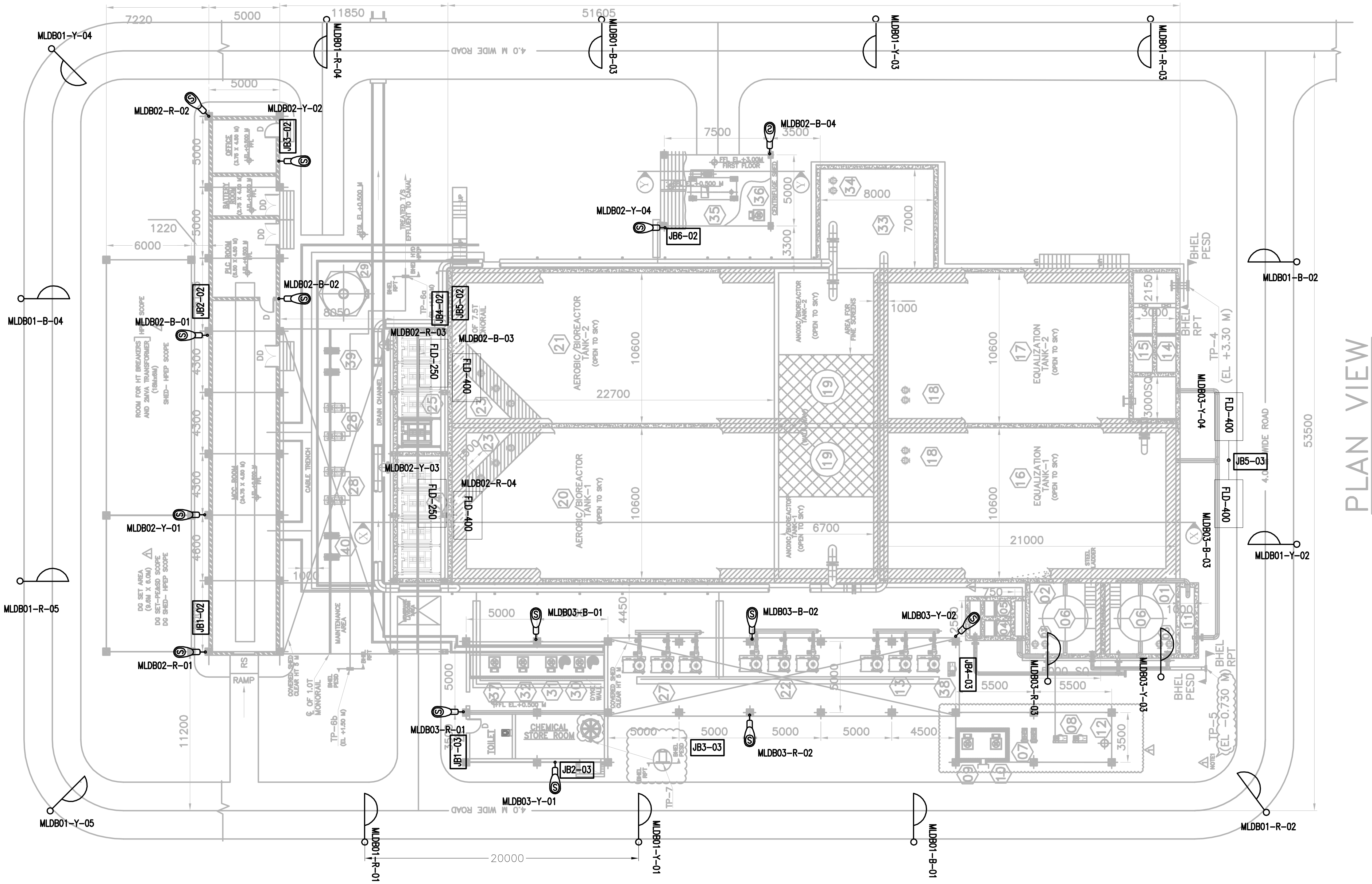
SHT. No 01 NO. OF SHT. 01

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. SHT. OF

NOTES:-
1.NOTES ,LEGEND & BOQ SHALL BE AS PER SHEET2



PROJECT:	SEWAGE TREATMENT PLANT 2x4 MLD
CUSTOMER :	BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.			18.11.2014
CHD.	P.SURESH		18.11.2014
APPD.	J.K.PATNAIK		18.11.2014

TITLE: OUTDOOR ILLUMINATION LAYOUT

CARD CODE: 0-381-21-02260 REV. 00

SHT. No 01 NO. OF SHT. 02

REV.	DATE	ALTERED	CHD/APPD	ZONE

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

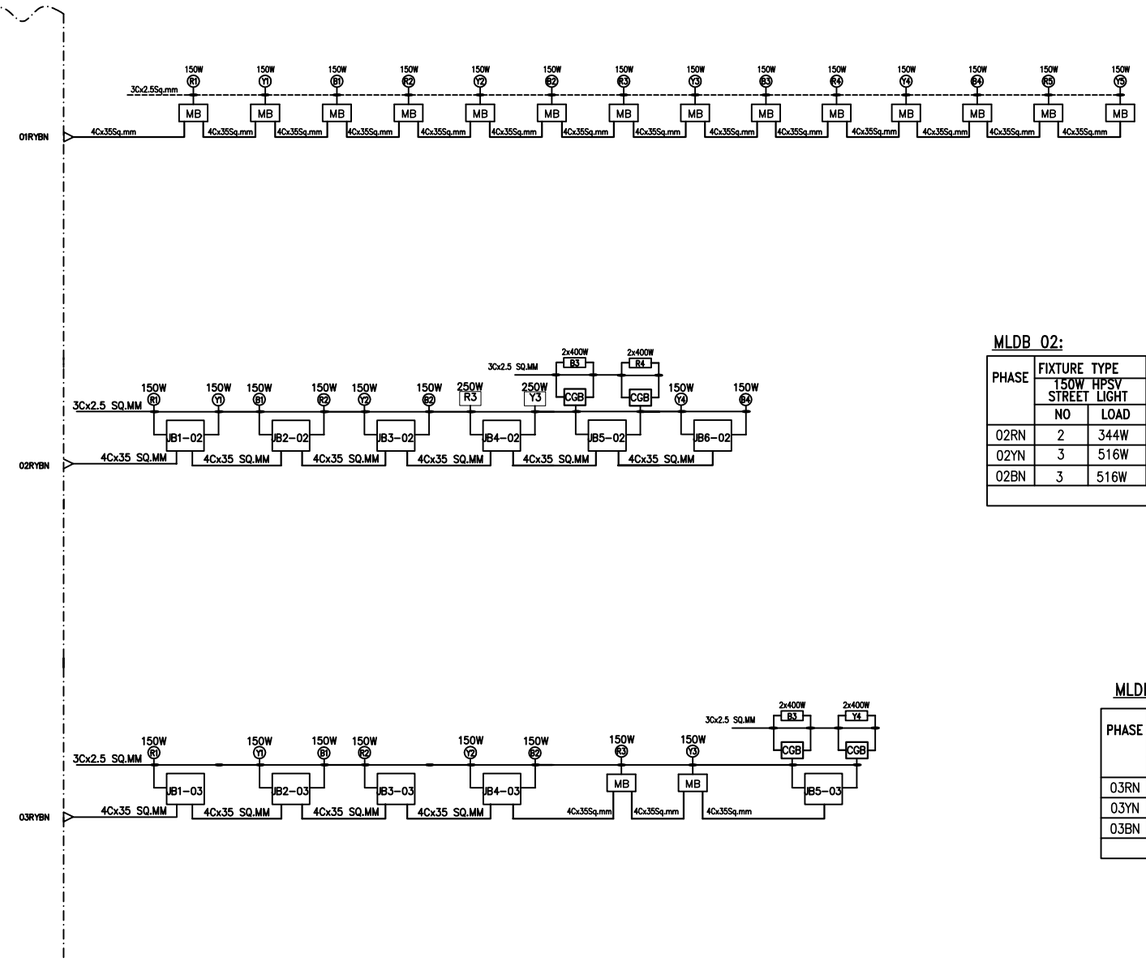
INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. | SHT. OF



LOCATION: ROAD LIGHTING AROUND STP PLANT

MLDB 01: CONNECTED LOAD: 2408W

PHASE	FIXTURE TYPE 150W HPSV STREET LIGHT		TOTAL
	NO	LOAD	
01RN	5	860W	860W
01YN	5	860W	860W
01BN	4	688W	688W
TOTAL			2408W

LOCATION: PERIPHERY AND OUTDOOR AREA OF MCC ROOM
MEMBRANE TANK AREA,OUTDOOR TANK,CENTRIFUGE SHED

MLDB 02: CONNECTED LOAD: 3694W

PHASE	FIXTURE TYPE 150W HPSV STREET LIGHT		FIXTURE TYPE 1X250W HPSV FLOOD LIGHT		FIXTURE TYPE 2X400W HPSV FLOOD LIGHT		TOTAL
	NO	LOAD	NO	LOAD	NO	LOAD	
02RN	2	344W	1	275W	1	884W	1503W
02YN	3	516W	1	275W	–	–	791W
02BN	3	516W	–	–	1	884W	1400W
TOTAL							3694W

LOCATION: PERIPHERY & OUTDOOR AREA OF CHEMICAL ROOM,AIR BLOWER SHED
DAF TANK,EQUALIZATION TANK
CONNECTED LOAD: 3104W

MLDB 03:

PHASE	FIXTURE TYPE 2X400W HPSV FLOOD LIGHT		FIXTURE TYPE 150W HPSV STREET LIGHT		TOTAL
	NO	LOAD	NO	LOAD	
03RN	–	–	3	516W	516W
03YN	1	884W	3	516W	1400W
03BN	1	884W	2	344W	1188W
TOTAL					3104W

NOTES:–

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATION LEVELS ARE IN METRES.
2. LOCATION OF LIGHTING FIXTURES, SWITCH BOARDS, PANELS AND SOCKETS ARE INDICATIVE ONLY. EXACT LOCATION SHALL SUIT AS PER SITE CONDITIONS TO CLEAR OTHER INTERFERENCES.
3. EACH LIGHTING FIXTURES/RECEPTACLES SHALL BE PROVIDED WITH AN EARTHING TERMINAL.
4. MOUNTING HEIGHT OF LIGHTING FIXTURES & SOCKET AS DETAILED BELOW
   a) 150W HPSV STREET LIGHT (ANGLE MOUNTED) – 5000mm FROM FFL.
   b) 150W HPSV STREET LIGHT – ON 7.5M POLE.
   c) 2X400W HPSV FLOOD LIGHT – ON 11M POLE.
5. FOR MOUNTING DETAILS REFER NOTES AND DETAILS FOR PLANT ILLUMINATION SYSTEM REFER DOC. No. PEEC–04631.
6. MOUNTING ARRENGEMENT SHOWN ARE INDICATIVE ONLY, TO BE DECIDED AS PER SITE REQUIREMENTS.
7. 150# HUME PIPE SHALL BE PROVIDED AT ROAD CROSSING FOR CABLE ROUTING.
8. POWER DISTRIBUTION, LOOPING FROM JB TO JB AND JB TO FIXTURE SHALL BE CARRIED OUT WITH FRLS PVC CU. CABLE. CABLE SIZE REQUIRED FOR THE SAME IS INDICATED IN THE SLD.
9. THE SPACING BETWEEN STREET LIGHTING POLES & FIXTURE ABOVE PIPE RACK IS CONSIDERED AS 20M(MAX).

REFERENCE DRAWINGS

1. PLOT PLAN – DRG. NO. 0–381–01–01568
2. STP PLANT EQUIPMENT LAYOUT – DRG. NO. 1–381–01–06095
3. NOTE AND DETAIL FOR PLANT ILLUMINATION SYSTEM – DOC. NO. PEEC–04631

BILL OF MATERIALS:–

S.No	LEGEND	DESCRIPTION	QUANTITY
1		SINGLE PIECE DIE CAST ALUMINIUM BODY STREET LIGHT LUMINAIRE WITH BOWL TYPE AL. REFLECTOR AND CLEAR ACRYLIC COVER SUITABLE FOR 150W HPSV TUBULAR LAMP.(POLE MOUNTED)	16 Nos.
2		SINGLE PIECE DIE CAST ALUMINIUM BODY STREET LIGHT LUMINAIRE WITH BOWL TYPE AL. REFLECTOR AND CLEAR ACRYLIC COVER SUITABLE FOR 150W HPSV TUBULAR LAMP.(WALL/COLUMN MOUNTED)	14 Nos.
3	FLD–250	INTEGRAL FLOOD LIGHTING CONSIST OF FLOOD LIGHTING FIXTURE SUITABLE FOR 250W HPSV LAMP MOUNTED ON WALL/COLUMN.	2 Nos.
4	FLD–400	NON–INTEGRAL FLOOD LIGHTING CONSIST OF FLOOD LIGHTING FIXTURE SUITABLE FOR 2X400W HPSV LAMP MOUNTED ON WALL/COLUMN.	2 Nos.
5		NON–INTEGRAL FLOOD LIGHTING CONSIST OF QTY 2 FLOOD LIGHTING FIXTURE SUITABLE FOR 2x400W HPSV LAMP MOUNTED ON FLOOD LIGHTING POLE.	1 Nos.
6	JB	4 WAY 200x150x150mm RECTANGULAR SHEET STEEL JB WEATHER PROOF WITH TWO 1" AND TWO 3/4" CABLE ENTRIES ALONG WITH GLANDS AND TB SUITABLE FOR 4 Nos. 35 SQ.MM AL. CABLE & 4Nos. 2.5SQ.MM Cu. CABLE.	11 Nos.
7		7.5M STREET LIGHTING POLE	16 Nos.
8		11M FLOOD LIGHTING POLE	1 Nos.
9		150 DEGREE ANGLE BENT	14 Nos.
10		3CX2.5 SQMM CU. CABLE	AS REQD.
11		4CX35 SQMM AL. CABLE	AS REQD.

CQB – CONTROL GEAR BOX SUITABLE FOR TYPE OF FIXTURE.

MB – MARSHALLING BOX FITTED WITH 11M STREET LIGHTING POLE.

REV.	DATE	ALTERED	CHD/APPD
ZONE			

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	K.NARENDRA BABU		19.11.2004	
CHD.	P.SURESH		19.11.2004	
APPD.	J.K.PATNAIK		19.11.2004	

DEPT. | CODE | UNTOL. DIMS. OR +/-1/2 | SCALE | WEIGHT (KG) | REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE: OUTDOOR ILLUMINATION LAYOUT

CARD CODE | 0–381–21–02260 | REV. 00

SHT. No 01 | NO. OF SHT. 02

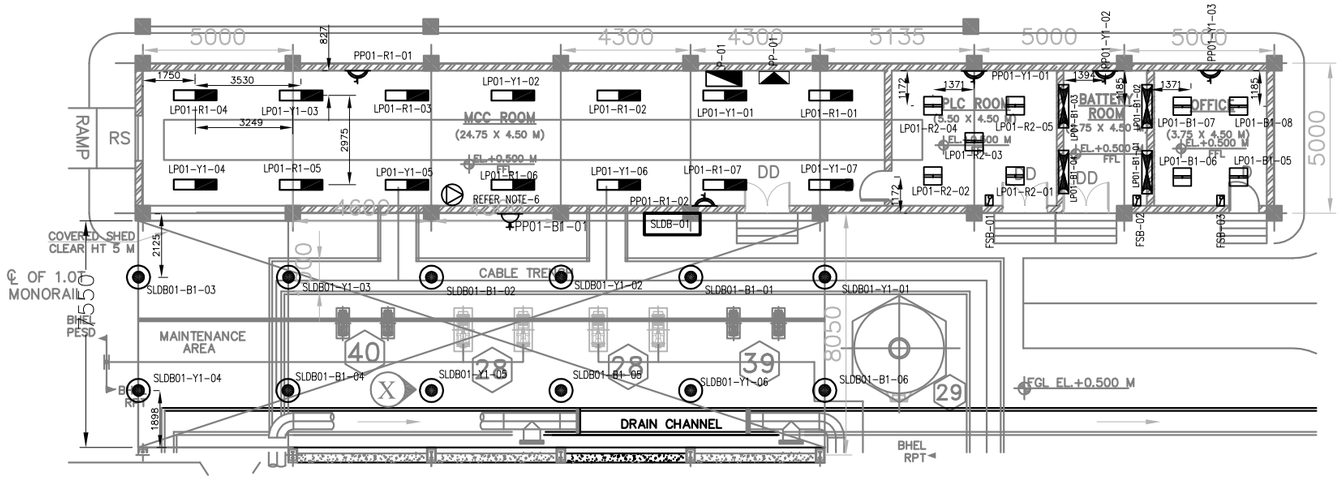
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

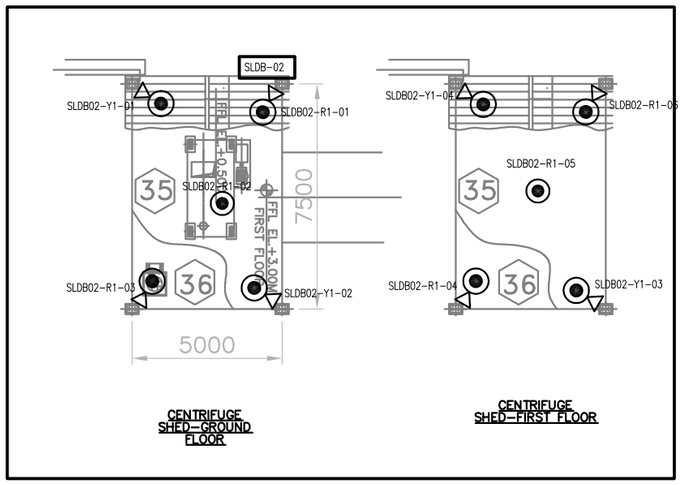
DRG. NO.

SHT. OF

N



MCC,PLC,BATTERY,OFFICE ROOM,BACKPULSE PUMP SHED



CENTRIFUGE SHED-GROUND FLOOR

CENTRIFUGE SHED-FIRST FLOOR

NOTES:-

1.NOTES ,LEGEND & BOQ SHALL BE AS PER SHEET2

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	K.VAMSIDHRA REDDY		18.11.2014	
CHD.	P.SURESH		18.11.2014	
APPD.	J.K.PATNAIK		18.11.2014	

DEPT. CODE	UNTOL. DIMS. OR ONLY	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS

TITLE: INDOOR ILLUMINATION LAYOUT OF MCC,PLC,BATTERY ROOM BACK PULSE,CENTRIFUGE SHED

CARD CODE: 1-381-21-02851 REV. 00

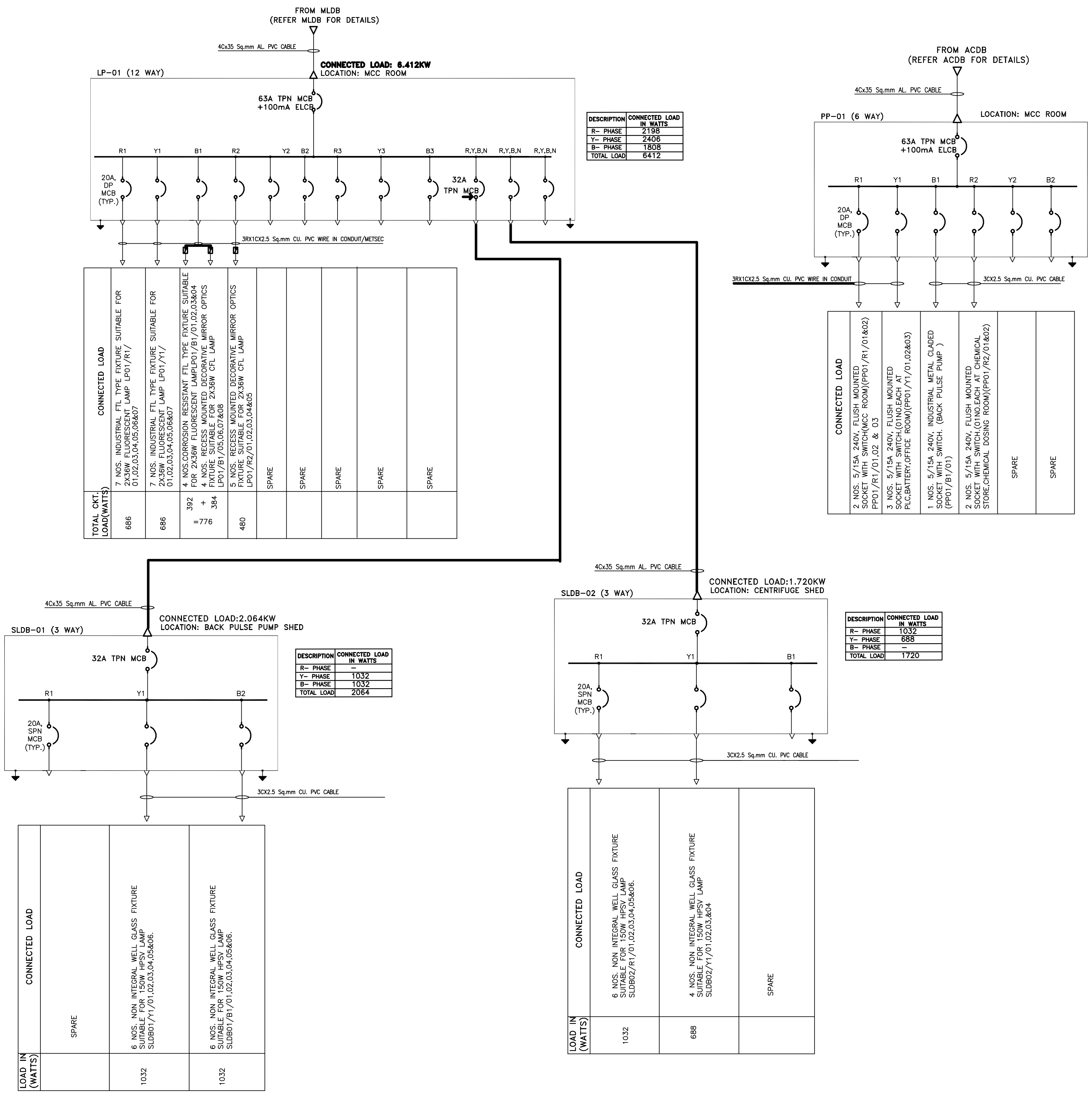
SHT. No 01 NO. OF SHT. 02

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261



DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	2198
Y- PHASE	2406
B- PHASE	1808
TOTAL LOAD	6412

DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	–
Y- PHASE	1032
B- PHASE	1032
TOTAL LOAD	2064

DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	1032
Y- PHASE	688
B- PHASE	–
TOTAL LOAD	1720

REF.DRAWINGS

S.No.	DRAWING TITLE	DRAWING No.
1	STP PLANT EQUIPMENT LAYOUT	1-381-01-06095
2		

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATION LEVELS ARE IN METRES.
2. LOCATION OF LIGHTING FIXTURES, SWITCH BOARDS, PANELS AND SOCKETS ARE INDICATIVE ONLY.EXACT LOCATION SHALL SUIT AS PER SITE CONDITIONS TO CLEAR OTHER INTERFERENCES SITE TO ENSURE THAT FIXTURES ARE NOT PLACED EXACTLYY TOP OF ANY PANEL/EQUIPMENT.
3. EACH LIGHTING FIXTURES/RECEPTACLES SHALL BE PROVIDED WITH AN EARTHING TERMINAL.
4. MOUNTING HEIGHT OF LIGHTING FIXTURES & SOCKET AS DETAILED BELOW
   - a) 2X36W FTL – 3500MM FROM FFL
   - b) 2X36W CR FTL – 3500MM FROM FFL
   - c) 2X36W CFL – 3000MM FROM FFL(INLINE WITH FALSE CEILING)
   - d) 150W HPSV – 5000MM FROM FFL
   - e) TOP OF LIGHTING PANELS/SLDB – 1800mm FROM FFL
   - f) SOCKETS/RECEPTACLES – 450mm(FLUSH MOUNT TYPE) FROM FFL – 1200mm(METAL CLAD TYPE) FROM FFL
   - g) TOP OF SWITCH BOARD – 1200mm FROM FFL
5. MOUNTING ARRANGEMENT OF THE FIXTURES ARE INDICATIVE ONLY.TO BE DECIDED AT SUITE AT SITE CONDITION.
6. 63A TPN WELDING RECEPTACLES SHALL BE FED FROM "ACDB". MAXIMUM 2 NOS. RECEPTACLES CAN BE FED FROM ONE FEEDER WITH CONDITION THAT AT A TIME ONE RECEPTACLE WILL BE IN USE.
7. FOR MOUNTING DETAILS REFER NOTES AND DETAILS FOR PLANT ILLUMINATION SYSTEM (DOC. No. PEEC-04631).
8. MOUNTING ARRENGAMENT SHOWN IN THE LAYOUT IS INDICATIVE ONLY, EXACT ARRANGEMENT TO BE DECIDED AS PER SITE REQUIREMENTS.

LEGEND & BOQ.

SYMBOL	DESCRIPTION	QTY.
	INDUSTRIAL TYPE FTL FIXTURE WITH FABRICATED POWDER COATED BODY AND REFLECTOR ARRANGEMENT SUITABLE FOR 2 X 36W FLOUROSCENT LAMP WITH ELECTRONIC BALLAST.	14 Nos.
	RECESS MOUNTED DECORATIVE TYPE FIXTURE WITH P5 LOUVERS AND REFLECTOR ARRANGEMENT SUITABLE FOR 2 X 36W CFL LAMP WITH ELECTRONIC BALLAST.	09 Nos.
	INDUSTRIAL TYPE DUST PROOF VAPOUR PROOF NON INTEGRAL WELL GLASS FIXTURE SUITABLE FOR 150W HPSV LAMP (BRACKET/CEILING MOUNTED)	08/14 Nos.
	5/15A 240V, FLUSH MOUNTED SOCKET WITH SWITCH	05 Nos.
SLDB	INDOOR AC SUB LIGHTING DISTRIBUTION BOARD WITH ONE TPN MCB(32A) AS INCOOMER AND 3NOS. SPN MCB(20A) AS OUTGOING.	02 No.
	INDOOR AC LIGHTING PANEL (12WAY)	01 No.
	INDOOR AC POWER PANEL (6WAY)	01 No.
	FLUSH MOUNTED SWITCH BOARD WITH 5NOS. PIANO TYPE SWITCH (5A).	03 No.
	200X150X100MM 4 WAY JUNCTION BOX WITH TERMINAL BLOCK	– Nos.
	63A TPN WELDING RECEPTACLE	01 Nos.
	INDUSTRIAL CORROSION PROOF LUMINAIRE WITH INJECTION MOULDED PC BOIDY AND PC COVER SUITABLE FOR 2X36W FLURESCENT LAMP.	04. Nos.
	INDUSTRIAL METAL CLADED 5/15A SOCKET WITH SWITCH.	01 Nos.
	4Cx35 Sq.mm AL. PVC CABLE	AS REQD
	1Cx2.5 Sq.mm CU. PVC WIRE IN CONDUIT	AS REQD

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	K.V.NAGENDRA REDDY		19.11.2014
CHD.	P.SURESH		19.11.2014
APPD.	J.K.PATNAIK		19.11.2014

UNTOL. DIMS. GR. G/M/F

TITLE: INDOOR ILLUMINATION LAYOUT OF MCC,PLC,BATTERY ROOM BACK PULSE,CENTRIFUGE SHED

CARD CODE: 1-381-21-02851 REV. 00

SHT. No 02 NO. OF SHT. 02

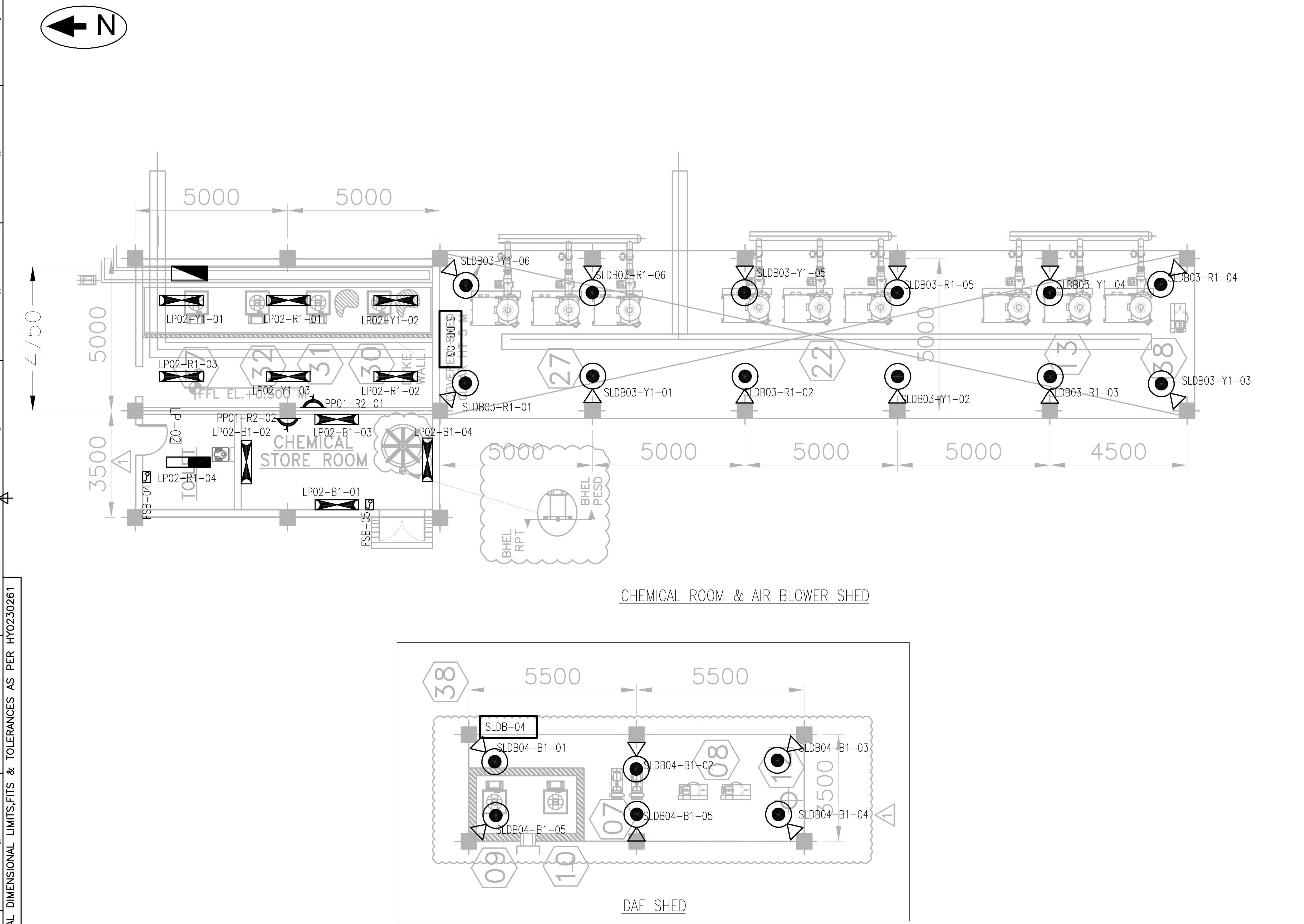
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. SHT. OF

NOTES:-

1.NOTES ,LEGEND & BOQ SHALL BE AS PER SHEET2



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GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME

REV.	DATE	ALTERED CHD/APPD	ZONE

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	K.V.NAGENDRA REDDY		18.11.2014	
CHD.	P.SURESH		18.11.2014	
APPD.	J.K.PATNAIK		18.11.2014	

DEPT. | CODE | UNTOL. DIMS. GR. g/M/f | SCALE | WEIGHT (KG) | REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE: INDOOR ILLUMINATION LAYOUT OF CHEMICAL ROOM AIR BLOWER ,DAF SHED

CARD CODE: 1-381-21-02852 | REV. 00

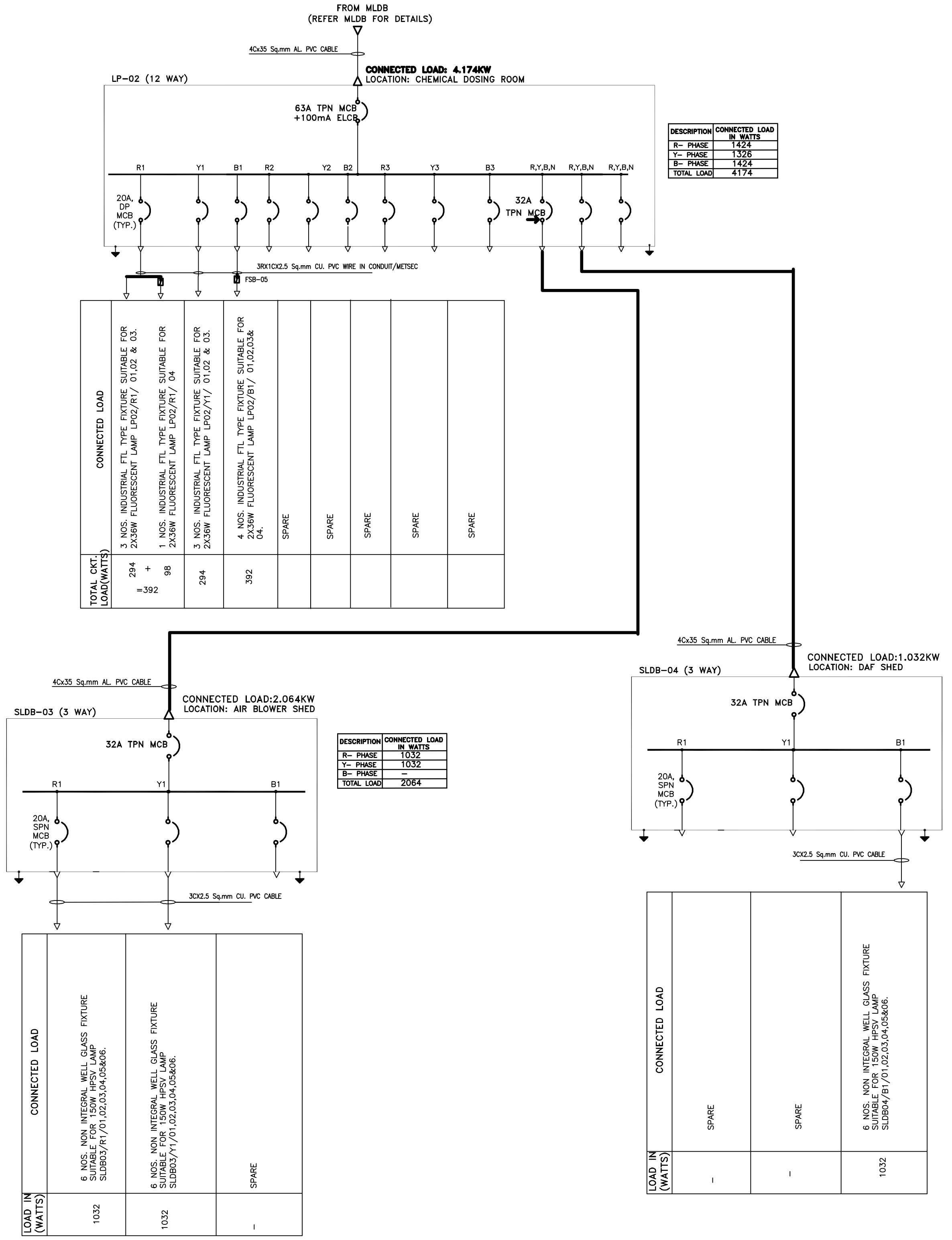
SHT. No 01 | NO. OF SHT. 02

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. SHT. OF



DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	1424
Y- PHASE	1326
B- PHASE	1424
TOTAL LOAD	4174

DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	1032
Y- PHASE	1032
B- PHASE	–
TOTAL LOAD	2064

DESCRIPTION	CONNECTED LOAD IN WATTS
R- PHASE	–
Y- PHASE	–
B- PHASE	1032
TOTAL LOAD	1032

REF.DRAWINGS

S.No.	DRAWING TITLE	DRAWING No.
1	STP PLANT EQUIPMENT LAYOUT	1-381-01-06095
2		

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATION LEVELS ARE IN METRES.
2. LOCATION OF LIGHTING FIXTURES, SWITCH BOARDS, PANELS AND SOCKETS ARE INDICATIVE ONLY.EXACT LOCATION SHALL SUIT AS PER SITE CONDITIONS TO CLEAR OTHER INTERFERENCES SITE TO ENSURE THAT FIXTURES ARE NOT PLACED EXACTLYY TOP OF ANY PANEL/EQUIPMENT.
3. EACH LIGHTING FIXTURES/RECEPTACLES SHALL BE PROVIDED WITH AN EARTHING TERMINAL.
4. MOUNTING HEIGHT OF LIGHTING FIXTURES & SOCKET AS DETAILED BELOW
   a) 2X36W FTL – 3500MM FROM FFL
   b) 2X36W CR FTL – 3500MM FROM FFL
   c) 2X36W CFL – 3000MM FROM FFL(INLINE WITH FALSE CEILING)
   d) 150W HPSV – 5000MM FROM FFL
   e) TOP OF LIGHTING PANELS/SLDB – 1800mm FROM FFL
   f) SOCKETS/RECEPTACLES – 450mm(FLUSH MOUNT TYPE) FROM FFL
      – 1200mm(METAL CLAD TYPE) FROM FFL
   g) TOP OF SWITCH BOARD – 1200mm FROM FFL
5. MOUNTING ARRANGEMENT OF THE FIXTURES ARE INDICATIVE ONLY.TO BE DECIDED AT SUITE AT SITE CONDITION.
6. 63A TPN WELDING RECEPTACLES SHALL BE FED FROM "ACDB". MAXIMUM 2 NOS. RECEPTACLES CAN BE FED FROM ONE FEEDER WITH CONDITION THAT AT A TIME ONE RECEPTACLE WILL BE IN USE.
7. FOR MOUNTING DETAILS REFER NOTES AND DETAILS FOR PLANT ILLUMINATION SYSTEM (DOC. No. PEEC-04631).
8. MOUNTING ARRENGAMENT SHOWN IN THE LAYOUT IS INDICATIVE ONLY, EXACT ARRANGEMENT TO BE DECIDED AS PER SITE REQUIREMENTS.

LEGEND & BOQ.

SYMBOL	DESCRIPTION	QTY.
	INDUSTRIAL TYPE FTL FIXTURE WITH FABRICATED POWDER COATED BODY AND REFLECTOR ARRANGEMENT SUITABLE FOR 2 X 36W FLOUROSCENT LAMP WITH ELECTRONIC BALLAST.	1 No.
	INDUSTRIAL TYPE DUST PROOF VAPOUR PROOF NON INTEGRAL WELL GLASS FIXTURE SUITABLE FOR 150W HPSV LAMP (BRACKET MOUNTED)	18 Nos.
	5/15A 240V, FLUSH MOUNTED SOCKET WITH SWITCH	02 Nos.
SLDB	INDOOR AC SUB LIGHTING DISTRIBUTION BOARD WITH ONE TPN MCB(32A) AS INCOOMER AND 3NOS. SPN MCB(20A) AS OUTGOING.	02 Nos.
	INDOOR AC LIGHTING PANEL (12WAY)	01 No.
	FLUSH MOUNTED SWITCH BOARD WITH 5NOS. PIANO TYPE SWITCH (5A).	02 No.
	INDUSTRIAL CORROSION PROOF LUMINAIRE WITH INJECTION MOULDED PC BOIDY AND PC COVER SUITABLE FOR 2X36W FLURESCENT LAMP.	10. Nos.
	4Cx35 Sq.mm AL. PVC CABLE	AS REQD
	1Cx2.5 Sq.mm CU. PVC WIRE IN CONDUIT	AS REQD

REV.	DATE	ALTERED	CHD/APPD	ZONE

PROJECT: SEWAGE TREATMENT PLANT 2x4 MLD

CUSTOMER : BHEL HYDERABAD RAMACHANDRAPURAM

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	K.V.NAGENDRA REDDY		19.11.2014	
CHD.	P.SURESH		19.11.2014	
APPD.	J.K.PATNAIK		19.11.2014	

DEPT. | CODE | UNTOL. DIMS. GR. | SCALE | WEIGHT (KG) | REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE: INDOOR ILLUMINATION LAYOUT OF CHEMICAL ROOM AIR BLOWER ,DAF SHED

CARD CODE: 1-381-21-02852 REV. 00

SHT. No 01 NO. OF SHT. 02

COMPUTER FILE NAME | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

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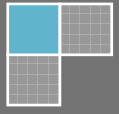
GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

Rev 00
11th Mar
2014

VOLUME - IB
SPECIAL CONDITIONS OF CONTRACT (SCC)

(Document No PESD:E&C:SCC)

BHARAT HEAVY ELECTRICALS LIMITED



Contents

1.0	**INTENT OF THE SPECIFICATION**
1.1	The intent of this erection specification is to provide services for execution of the project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / price shall deem to be inclusive of all such contingencies.
1.2	The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of works is found to be defective in workmanship and not conforming to drawings / documents or other stipulations, the contractor shall dismantle and re-do the work duly replacing the defective materials at their own cost, failing which recoveries, as determined by BHEL, shall be effected from contractor's bills.
1.3	It is not the intent of this specification to specify herein all the details of erection and commissioning. However, the system shall conform in all respects to high standards of quality and workmanship for 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 judgments is not in full accordance herewith.
1.4	The omission of specific reference to any fabrication / erection or other method, equipment or material necessary for proper and efficient working of the plant shall not relieve the tenderer of the responsibility of providing such facilities to complete the work at quoted rates. Any mismatch/ defect found due to mistake in fabrication / erection shall have to be rectified by the vendor free of cost. Inspection by BHEL/Customer does not relieve vendor of his responsibility of executing quality erection.
1.5	The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The contractor should ensure proper planning and successful and timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

1.6	Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.
1.7	Following shall be the minimum responsibility of contractor and have to be provided within finally accepted rates / prices:
1.7.1	Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated IMTEs (Inspection, measuring and testing equipment) as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling
1.7.2	Achieving Proper out-turn / Turn-over as per BHEL plan and commitment.
1.7.3	Completion of work as per BHEL Schedule
1.7.4	Good quality and accurate workmanship for proper performance of the equipment
1.7.5	Repair and rectification
1.7.6	Preservation / Re-conservation of all components during storage / erection / commissioning till handing over.

2.0	**GENERAL SERVICES TO BE RENDERED BY THE BIDDER**
2.1	Services for construction, fabrication, equipment erection testing as well as trial run & commissioning of various equipment and accessories under the contract shall include but not be limited to the following:
2.2	Issuing materials from store/open yard from time to time for erection as per the construction programme. The Contractor shall be the custodian of all the materials issued till the plant/equipment is officially taken over by the owner / BHEL after complete erection any successful trial run & commissioning.
2.3	Transport of material to their respective places of erection and erection of the complete plant & equipment as supplied under this specification.
2.4	Trial run and commissioning of individual equipment / sub-systems to the satisfaction of Owner/BHEL.
2.5	Deployment of all skilled and unskilled manpower required for erection, supervision of erection, watch & ward, commissioning and other services to the rendered under this specification.
2.6	Deployment of all erection tools & tackle, construction machinery, transportation vehicles and all other implements in adequate number and size, appropriate for the erection work to be handled under scope of this specification except otherwise specified.
2.7	Supply of all consumables, eg welding electrodes, cleaning agents, diesel oil, lubricant etc as well as materials required for temporary supports, scaffolding etc as necessary for such erection work, unless specified other wise.
2.8	Providing support services for the contractor's erection staff eg construction of site offices, temporary stores, residential accommodation and transport to work site for erection personnel, watch and ward for security and safety of the materials under the Contractor's custody etc. as required.
2.9	Maintaining proper documentation of all the site activities undertaken by the Contractor as per the proforma mutually agreed with BHEL, Submission of monthly progress reports and any such document as and when desired by BHEL/owner, taking approval of all statutory authorities i.e Boiler Inspector, Factory Inspector, Inspector of Explosives etc , as applicable for respective portions of work fall under the jurisdiction of such statutes of laws.
2.10	Any other service, although not specifically called for but required for a contract of the size and nature indicated in the specification.

SPECIAL CONDITIONS OF CONTRACT (SCC)
Chapter - III : General Technical Requirements (Codes and Standards)

3.0	**GENERAL TECHNICAL REQUIREMENTS (CODES AND STANDARDS)**
3.1	Except where otherwise specified, the plant/equipment shall comply with the appropriate Indian Standard or an agreed internationally accepted Standard Specification as mentioned elsewhere in contract specifications, each incorporating the latest revisions at the time of tendering. Where no internationally accepted standard is applicable, the Bidder shall give all particulars and details as necessary, to enable BHEL to identify all of the plant/equipment in the same detail as would be possible had there been a Standard Specification.
3.2	Where the Bidder proposes alternative codes or standards he shall include in his tender one copy (in English) of each Standard Specification to which materials offered shall comply. In such case, the adopted alternative standard shall be equivalent or superior to the standards mentioned in the specification.
3.3	In the event of any conflict between the codes and standards referred above, and the requirements of this specification, the requirements which are more stringent shall govern.
3.4	Tools used during erection and commissioning shall not be accepted except with the specific approval of the Engineer.

4.0	**OBLIGATIONS OF CONTRACTOR**
4.1	**CONSUMABLES & OTHER ITEMS**
4.1.1	The contractor shall provide within finally accepted price / rates, all consumables (excepting those indicated in BHEL scope) like welding electrodes (including alloy steel and stainless steel), filler wires, TIG filler wires (over & above as supplied by the unit along with the plant materials, which will be given free of cost to bidder), gases (inert, welding, cutting), soldering material, dye penetrants, radiography films, etc. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, packers, shims, wooden planks, scaffolding materials hardware items etc required for temporary works such as supports, scaffoldings are to be arranged by the contractor. Sealing compounds, gaskets, gland packing, wooden/concrete sleepers, for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by the contractor.
4.1.2	All the shims, gaskets and packing, which go finally as part of plant equipment, shall be supplied by BHEL free of cost.
4.1.3	It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non-availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.
4.1.4	**<u>TIG Filler wire for Boiler and Filler wires for Electrodes for P91/T91 piping:</u>** These shall be supplied by BHEL free of cost as supplied by BHEL Manufacturing Units as part of regular supply. Required quantity as arrived at by calculation / standards will only be supplied. It would be the contractors' responsibility to account for the consumption of these filler wires. Additional consumption beyond standard / calculated quantity will be at cost recovery basis only unless and otherwise accounted for. Surplus quantity of TIG filler wire, if any, shall be properly stored and returned to BHEL stores.
4.1.5	It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc before procurement of welding electrodes. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number, date of expiry etc and produce test certificate for each lot / batch with correlation of batch / lot number with respective test certificate. No electrode without a valid test certificate will to be used.

4.1.6	BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.
4.1.7	Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost.
4.1.8	In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the departmental charges of BHEL from time to time. Postponement of such recovery is normally not permitted. The decision of BHEL Engineer in this regard shall be final and binding on the Contractor.
4.1.9	All lubricants and chemicals required for pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL / BHEL's client. All services including labour and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants / chemicals shall be properly accounted for. Surplus material if any shall be properly stacked/tagged and returned to BHEL/ CUSTOMER stores at no extra cost to BHEL. BHEL reserves the right to recover costs for wastage by the contractor.
4.1.10	Transportation of oil drums, from stores, filling of oil for flushing, first filling, subsequent changeover if any, topping/making up till the unit is fully commissioned and handed over to customer is included in scope of this contract. The contractor shall have to return all the empty drums to BHEL / BHEL's client store at no extra cost. Any loss / damage to above drums shall be to contractor's account.
4.1.11	All charges on account of Octroi, terminal or sales tax and other duties on materials obtained from any source for carrying out the works in the scope of the contractor shall be borne by the contractor.
4.2	**TOOLS AND PLANTS / MEASURING AND MONITORING EQUIPMENT (MMEs)**
4.2.1	**T&Ps and MMEs to be provided by Contractor**
4.2.1.1	All T&Ps and MMEs are to be provided by the Contractor. Contractor has to make his own arrangement at his cost for completing the formalities (including arrangement of Road permits, if any) if required with Sales Tax/VAT authorities, for bringing their materials, plants and equipments at site for the execution of work under this contract.

4.2.1.2	All suitable cranes, lifting and transport equipments for material handling at stores/yard/siding of BHEL/Customer are included in scope.
4.2.1.3	All T&Ps to be deployed by the contractor shall have the approval of BHEL Engineer with regard to brand, quality and specification.
4.2.1.4	Indicative list of Major T&Ps in the scope of Contractor are given in the Technical Conditions of Contract. Bidders to note that these are only indicative and as such all other T&P necessary for timely and satisfactory completion of work in scope shall be mobilized by Contractor
4.2.1.5	Timely deployment of adequate T&Ps is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.
4.2.1.6	Contractor shall maintain and operate his tools and plants in such a way that breakdowns are avoided. In the event of breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.
4.2.1.7	In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make alternative arrangement at the risk and cost of the contractor. Decision of BHEL shall be final and binding on the contractor
4.2.1.8	The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes, and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility.
4.2.1.9	Use of welding generators/ rectifiers only shall be permitted for welding. Use of welding transformers will be subject to specific approval of BHEL engineer.
4.2.1.10	The contractor at his cost shall carry out periodical testing of his construction equipments. Test certificates shall be furnished to BHEL.
4.2.1.11	Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, manila ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Fitness certificate / Test Certificates of T&P shall have to be submitted before it is put in use. Identification for such T&Ps will be done as per BHEL Engineer's advice. BHEL reserves the right to permit only new slings up to 20 mm and lifting tackles up to 3 MT capacities.

4.2.1.12	Contractor shall ensure deployment of reliable and calibrated MMEs (Inspection measuring and Monitoring equipment). The MMEs shall have test / calibration certificates from authorized / Government approved / accredited agencies traceable to National / International standards. Each MME shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.
4.2.1.13	Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MME so that work does not suffer when the particular instrument is sent for calibration. If any MMEs not found fit for use, BHEL shall have the right to stop the use of such item. It will be necessary for the contractor to deploy proper item. Any readings taken by the defective instrument will be recalled and repeat the readings taken by that instrument with a proper one. In case he fails to do so, BHEL may deploy MMEs and retake the readings at contractor's cost.
4.2.1.14	BHEL shall have lien on all T&P, MMEs and other equipment of the contractor brought to the site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of contract / extended period. The contractor and / or his sub-contractors, without the prior written approval of the Engineer, shall remove no material brought to the site.
4.2.1.15	The month wise T&P deployment plan to execute the work is to be submitted as per relevant format as per the instruction of BHEL. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent.
4.2.1.16	The area and infrastructure development of the area to be carried out by the customer. However in construction projects of this magnitude it is possible that all the areas / approaches may not be ready. In such cases backfilling of approaches where ever necessary, consolidation of ground and arrangement of sleepers / sand bag filling etc for safe operation / movement of equipment including cranes / trailers etc shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

5.0	**RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF LABOUR, SUPERVISORY STAFF, ETC.**
5.1	Refer relevant clauses of General Conditions of Contract (GCC) also in this regard
5.2	The contractor shall deploy all the necessary skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him.
5.3	Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc.
5.4	It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the targets set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the erection and commissioning targets will be final and binding on the contractor.
5.5	Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangement including construction of septic tank. These installations shall be maintained in hygienic condition at all times.
5.6	The Contractor in the event of engaging 10 or more workmen, shall obtain Independent license under the Contract labour (Regulation and Abolition) Act 1970 from the concerned authorities based on Form-V issued by the Principal Employer/Customer. In order to issue Form-V by Customer, Contractor shall fulfill all Statutory requirements like Insurance Policy, PF Code/PF Account number etc as per the requirement of BHEL/Customer
5.7	Contractor shall deduct the necessary amount towards Provident Fund and contribute equal amount as per Government of India laws. This amount will be deposited regularly to the provident Fund Commissioner. BHEL/Customer may insist for submission of the account code duly certified by PF Commissioner
5.8	Contractor may also be required to comply with provisions of ESI Act in vogue if applicable and submit evidence to BHEL.
5.9	BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / Customer.

5.10	Contractor shall deploy only qualified and experienced engineers/ supervisors. They shall have professional approach in executing the work.
5.11	The contractor's supervisory staff shall execute the work in the most professional manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/instructions given by BHEL engineer from time to time.
5.12	The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor. Also in general they should see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.
5.13	It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours.
5.14	The actual deployment will of Labour and Engineer/supervision staff shall be so as to satisfy the erection and commissioning targets set by BHEL. If at any time, it is found that the contractor is not in a position to deploy the required engineers/supervisors/workmen due to any reason, BHEL shall have the option to make alternate arrangements at the contractor's risk and cost. The expenditure incurred along with BHEL overheads thereon shall be recovered from the contractor
5.15	Contractor shall not deploy women labour at night.

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6.0	**MATERIAL HANDLING, STORAGE AND PRESERVATION ETC**
6.1	**MATERIAL HANDLING AND STORAGE**
6.1.1	All the equipments/materials furnished under this contract shall be received from the project stores, sheds / storage yards and transported to pre assembly area / erection site and stored in the storage spaces in a manner so that they are easily retrievable till the contractor erects them. **While drawing/lifting material from BHEL / customer stores, the contractor shall ensure that the balance / other materials are stacked back immediately. No claim is admissible on this account**
6.1.2	While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection. They should take the delivery of the same, following the procedure indicated by BHEL, and transport the material safely to pre-assembly yard / erection site in time, according to program.
6.1.3	The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.
6.1.4	The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.
6.1.5	All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes / slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
6.1.6	Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor.
6.1.7	Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above

	circumstances without any extra cost. . The contractor may familiar himself with soil conditions at site.
6.1.8	Contractor shall be responsible for examining all the plant and materials issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc before they are moved out of the stores / storage area. The contractor shall be solely responsible for any shortages or damages in transit, handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient number of watch / ward personal to avoid any pilferage of material
6.1.9	The contractor shall maintain an accurate and exhaustive record-detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.
6.1.10	All the material in the custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.
6.1.11	If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.
6.1.12	The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL / customer stores), which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard, which item in his opinion will require indoor storage, and the contractor shall comply with Engineer's decision.
6.1.13	The contractor shall ensure that all surplus / damaged / scrap / unused material, packing wood/ containers/ special transporting frames etc are returned to BHEL at a place in project area identified by the Engineer. The contractor will maintain an account for all items received and returned to BHEL. Any shortage in returning such items shall be chargeable to the contractor except allowable wastage for packing wood only.
6.1.14	The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the stores as directed by the concerned BHEL engineer.
6.1.15	The contractor shall ensure that all the packing materials and protective devices installed on equipment during transit and storage are removed before installation.

6.1.16	It shall be the responsibility of the contractor to keep the work / storage areas in neat, tidy and working conditions. All surplus/unusable packing and other materials shall be removed and deposited at location(s) specified by BHEL within the project premises. If required weighing of the same within the project premises will have to be carried out.
6.2	**PRESERVATION OF COMPONENTS**
6.2.1	Plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.
6.2.1.1	Items stored outdoors shall be stacked up at least six inches (6") off the ground. Items should not be stored in a low lying area where water logging is a possibility. Contractor should have sufficient numbers of wooden / concrete / steel sleepers for the job.
6.2.1.2	Motors, valves, electrical equipment, control equipment and instruments, and special or precision items requiring special care, etc shall be stored indoors. Motor windings shall be kept dry by use of external heat or space heaters.
6.2.1.3	Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean and should be regularly monitored.
6.2.1.4	Insulation materials shall be stored indoors or otherwise protected against getting wet/ damaged, using suitable measures and should be protected from direct rain.
6.2.2	It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of final painting. It shall be contractor's responsibility to arrange for required paints (primer), thinners, labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc, cleaning of surface and provide one coat of preservatives / paints (primer) from time to time as decided by BHEL engineer. The accepted rate shall include this work also. It is to be noted that such painting may have to be done as and when required till such time the final painting is carried out.
6.2.3	The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts then and there for their protection.
6.2.4	Any failure on the part of contractor to carry out works according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.

7.0	**DRAWINGS AND DOCUMENTS**
7.1	The detailed drawings, specifications available with BHEL engineers will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.
7.2	Necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan, which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.
7.3	The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawings / data / documents and removal of obsolete ones from work place and returning to BHEL.
7.4	The data furnished in various annexure enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work. The contractors quoted rates shall be inclusive of the above factor
7.5	Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.
7.6	Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.

8.0	**INSPECTION AND QUALITY**
8.1	**Inspection, Quality Assurance, Quality Control**
8.1.1	Preparation of quality assurance log sheets and protocols with customer/ consultants/statutory authority, welding logs, NDE records, testing & calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.
8.1.2	The protocols between contractor and customer/ BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/ BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.
8.1.3	A daily log book should be maintained by every supervisor/engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/clearance / centering / leveling readings and inspection details of various equipments etc. High pressure welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc. will be documented in welding log as per BHEL Engineer's instructions. Record of radiography containing details like serial number of weld joints, date of radiography, repairs, if any, re-shots etc shall also be maintained as per BHEL Engineer's instructions. **Record of heat treatments performed shall be maintained as prescribed by BHEL**
8.1.4	The performance of welders will be reviewed from time to time as per the BHEL standards. Welders' performance record shall be furnished periodically furnished for scrutiny of BHEL's Engineer. Corrective action as informed by BHEL shall be taken in respect of those welders not conforming to these standards. This may include removal/ discontinuance of concerned welder(s). Contractor shall arrange for the alternate welders immediately
8.1.5	All the welders shall carry identity cards as per the proforma prescribed by BHEL/Customer/Consultant. Only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.1.6	Contractor shall provide all the Measuring Monitoring Equipments (MMEs) required for completion of the work satisfactorily. These MMEs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor. BHEL may give an indicative list of MMEs required for this work and to be made available by the contractor. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed wherever required.
8.1.7	It is the responsibility of the contractor to prove the accuracy of the testing/measuring/calibrating equipments brought by him based on the periodicity of calibration as called for in the BHEL's quality assurance standards/BHEL Engineer's instructions.
8.1.8	Any re-laying or re-termination of cables/re-erection of instruments/ recalibration of instruments etc. required due to contractor's mistake or design requirement and found at any stage inspection, shall be carried out by the contractor at no extra cost.
8.1.9	Contractor shall ensure deployment of reliable and calibrated MMEs (Measuring and Monitoring Equipments). The MMEs shall have test / calibration certificates from authorised / Government approved / Accredited agencies traceable to National / International Standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMEs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall ie repeat the readings taken by that instrument, failing which BHEL may deploy MME and retake the readings at Contractor's cost.
8.1.10	Re-work necessitated on account of use of invalid MMEs shall be entirely to the contractor's account. He shall be responsible to take all corrective actions, including resource augmentation if any, as specified by BHEL to make-up for the loss of time.
8.1.11	In the courses of erection, it may become necessary to carry repeated checks

	of the work with instruments recently calibrated, re-calibrated. BHEL may counter/ finally check the measurements with their own MMEs. Contractor shall render all assistance in conduct of such counter/final measurements.
8.1.12	Total Quality is the watchword of the work and Contractor shall strive to achieve the Quality Standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and Quality Standards.
8.2	**Stage Inspection By FES/QA Engineers**
8.2.1	Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, stage inspection of equipments under erection and commissioning at various stages shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from Field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc along with proper access for such stage inspections free of cost.
8.2.2	Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per Section 13, and provided such modifications have not arisen for reasons attributable to the contractor.
8.3	**Statutory Inspection of Work**
8.3.1	The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work completion, to various statutory authorities for compliance with applicable regulations. The work related statutory inspections, though not limited to, are as under: 1) Inspectorate of Steam Boilers and Smoke Nuisance 2) Electrical Inspector 3) Factory Inspector, Labour Commissioner, PF Commissioner and other authoritiy connected to this project work The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHEL Engineer's instructions, arranging materials for ground inspection, taking rub outs for the pressure parts to be offered for inspection, submitting co-related inspection reports, documents, radiographs etc and following up the matter with them. Contractor shall also make all arrangements for offering the Products / Systems for inspection at location, as applicable, to the concerned

	authority.
8.3.2	Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state concerned. contractor also should be aware of the latest IBR regulations and Electricity Act, including the amendments thereof.
8.3.3	Contractor shall comply with 'Qualification Tests for welders engaged in welding of Boilers and Steam Pipes under Construction, Erection and Fabrication at Site in India and in repairing Boilers and steam pipes by welding' in line with Chapter XIII of Indian Boiler Regulations-1950, for testing his welders / men / workers, including all associated fees, procedures, required instruments and equipments and their calibration there of. It shall be contractor's responsibility to obtain approval of Statutory Authorities, wherever applicable, for the conducting of any work which comes under the purview of these authorities, at his cost.
8.3.4	The following fees shall be excluded from scope of Contractor: 1. Registration Fee as per Regulation 385 of Chapter IX of Indian Boiler Regulations-1950 2. Fees for inspection of Boiler at the site of Construction as per Regulation 395 A, sl no 4 of Chapter IX of Indian Boiler Regulations-1950 However all other fees like visit fees charged by the Boiler Inspector and other arrangements for his visit or visits till satisfactory completion of work, shall be included in scope of Contractor
8.4	The basic philosophy of the Quality Management System is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/vendors of various products/services contributing in the work are also considered as part of the quality management system. .as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

8.5	**Field Quality Assurance**
8.5.1	Contractor shall carry out all activities conforming to the approved Field Quality Plan (FQP) as revised from time to time. Total quality shall be the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide the services of quality assurance engineer as per the relevant clauses.

9.0	**OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME** : Quality of work to customer's satisfaction and fulfillment of system requirements are the essence of ISO 9001 certification. Contractor shall organise/ plan/ perform all their activities to meet with the applicable requirements of these standards.
9.1	**HSE (Health, safety & Environment):** Contractor will comply with HSE (Health, safety & Environment) requirements of BHEL. HSE requirements in brief, are given below :-
9.1.1	Contractor will nominate one of their qualified and experienced employees as Safety Officer, who will be responsible for all HSE related issues of contractors work area. Safety Officer will have authority to stop any activity, in case he observes that the activity is not being carried out in safe manner. He will conduct surprise inspection as well as periodic inspection/drill (at least once in a month) and submit such reports to BHEL. He will conduct periodic meetings with supervisors of different working groups and explain HSE issues and use of PPEs to them. Reports of such meetings will be submitted to BHEL. Contractor will develop suitable work procedures based upon HSE guidelines and OCPs and implement it. Such work procedures will consist of Area of work, T&P Details, Work Procedure, PPE requirements etc. Contractor should highlight the requirement of safety to staff and labour through daily tool box meeting before start of the days job
9.1.2	The contractor shall ensure that proper job specific health check-up is done by medical professional for their employees during initial mobilization and thereafter if there is any change of job.
9.1.3	Following personnel protective equipments (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured :-
	- HELMET
	- SAFETY GOGGLES & WELDING FACE SHIELDS
	- SAFETY BELTS AND PROTECTIVE NET FOR WORKING AT HEIGHT
	- SAFETY SHOES
	- EAR PLUG
	- ANY OTHER SAFETY EQUIPMENT REQUIRED FOR SAFE COMPLETION OF THE WORK
9.1.4	Providing appropriate First Aid facilities for prompt treatment of injuries and illness at work place. Arranging training to contractor workmen/ employees for giving first aid.

9.1.5	Arranging ambulance in case of any emergency situation .
9.1.6	Identification of nearest hospital and health check-up of workmen/employees
9.1.7	Providing filtered drinking water at work place in cool container.
9.1.8	Providing Canteen, Rest Room, Washing facilities to the contracted employees as per provisions of Contract Labour Regulation Act 1970 (Chapter V).
9.1.9	Providing appropriate fire fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
9.1.10	Identification of nearest fire station and display contact telephone nos. / person's name around work places for cases of emergencies .
9.1.11	Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts.
9.1.12	Fulfilling safety requirements at all power tapping points.
9.1.13	Red & White caution tape of proper width(1.5 to 2 inch) to be used for cordoning unsafe area such as open trench, excavation area etc.
9.1.14	Providing contractors company logo on cloths /uniform/ proper identity cards with photographs, for correct identification of people working at project site .
9.1.15	High/ Low pressure welders to be identified with separate colour clothings. No welders will be deployed without passing appropriate tests and holding valid welding certificates. Approved welding procedure should be displayed at work place.
9.1.16	Displaying safe handling procedures for all chemicals such as lube oil, acid, alkali, sealing compounds etc , at work place .
9.1.17	All scaffolding/ platforms should be made from materials of appropriate quality/grade so that these are safe for use. It should be certified/declared safe for use by an experienced contractor person, before any scaffolding/platform is used.
9.1.18	All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test/calibration certificates bearing endorsement from competent authority of BHEL.
9.1.19	Ensure that the regulatory requirement of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.
9.1.20	Safety slogan, Safety/ Caution boards , wherever required to be displayed in consultation with BHEL.
9.1.21	Take suitable measures for waste management and environment related laws/legislation as a part of normal construction activities. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty

	ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained. Ensure proper cleanliness of work place, housekeeping and waste management (including proper waste disposal) on daily basis.
9.1.22	It is imperative on the part of the contractor to join and effectively contribute in joint measures such as tree plantation, environment protection, contributing towards social upliftment, conversion of packing woods to school furniture, keeping good relation with local populace etc.
9.1.23	The contractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.
9.1.24	The Contractor is required to provide proper safety net systems where ever the hazard of fall from height is present as per instruction of BHEL Engineer. The safety nets shall be fire resistant, duly tested and shall be of ISI Mark and the nets shall be located as per site requirements to arrest or to reduce the consequences of a possible fall of persons working at different heights.
9.1.25	All applicable OCPs (Operational control procedures) will be followed by contractor as per BHEL instructions. This will be done as part of normal scope of work. List of such OCPs is given below . In case any other OCP is found to be applicable during the execution of work at site, then contractor will follow this as well, within quoted rate. These OCPs (applicable ones) will be made available to contractor during work execution at site. However for reference purpose, these are kept with Safety Officer of BHEL,HYDERABAD or available in downloadable format in the website, which may be refereed by contractor, if they so desire.
	■ OCP for safe handling of chemicals
	■ OCP for Electrical safety
	■ OCP for energy conservation
	■ OCP for safe welding and gas cutting operation
	■ OCP for fire safety
	■ OCP for safety in use of hand tools
	■ OCP for first aid
	■ OCP for food safety at canteen
	■ OCP for safety in use of cranes
	■ OCP for storage and handing of gas cylinders
	■ OCP for manual arc welding
	■ OCP for safe use of helmets
	■ OCP for good house keeping

	■ OCP for working at height
	■ OCP for safe excavation
	■ OCP for safe filling of Hydrogen in cylinder
	■ OCP for illumination
	■ OCP for handling and erection of heavy metals
	■ OCP for safe acid cleaning
	■ OCP for safe alkali boil out
	■ OCP for safe oil flushing
	■ OCP for steam blowing
	■ OCP for safe working in confined area
	■ OCP for safe operation of passenger lift, material hoists & cages
	■ OCP for Vehicle maintenance
	■ OCP for safe radiography
	■ OCP for waste disposal
	■ OCP for working at night
	■ OCP for blasting
	■ OCP for DG Set
	■ OCP for handling & storage of mineral wool
	■ OCP for drilling, reaming and grinding(machining) etc.
	■ OCP for hydraulic test
	■ OCP for spray insulation
	■ OCP for trial run of rotary equipment
	■ OCP for stress relieving
	■ OCP for material preservation
	■ OCP for cable laying/tray work
	■ OCP for electrical maintenance
	■ OCP for transformer charging
	■ OCP for safe handling of battery system
	■ OCP for computer operation
	■ OCP for storage in open yard
	■ OCP for sanitary maintenance
	■ OCP for batching
	■ OCP for piling rig operation
	■ OCP for gas distribution test
	■ OCP for cleaning of hotwell / deaerator
	■ OCP for electro-resistance heating
	■ OCP for compressor operation

	■ OCP for O&M of control of AC plant & system
	■ OCP for air compressor
	■ OCP for passivation
	■ OCP for Safe EDTA Cleaning
	■ OCP for Safe Chemical cleaning of Pre boiler system
	■ OCP for Safe Boiler Light up
	■ OCP for Safe Rolling and Synchronisation
	■ OCP for Safe Loading of Unit
9.2	SAFETY AND CLEANLINESS : The contractor shall take all necessary safety precautions and arrange for appropriate appliances as per discretion of BHEL or its authorised officials (Site Construction Manager) to prevent loss of human lives, injuries, to personnel engaged and damage to property. Before commencing the work, the contractor shall submit a "Safety Plan" to the above authorised BHEL official and obtain approval on the same. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety of men, equipment, materials and environment during execution of the work. This will also include an organization structure, role and responsibilities of the concerned key personnel, the safety practices that will be followed, PPEs deployed, plan for handling critical activities and emergencies.
9.3	If the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions issued by the authorised BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor.
9.4	During the course of construction, alternation or repairs, scrap with protruding nail, sharp edge etc and all other debris shall be kept clean from working areas, passage, ways and stairs in and around site.
9.5	Combustible scrap and debris shall be removed at regular intervals during the course of execution. Safe means shall be provided to facilitate such removal. The combustible scrap should be stored in safe place away from the plant materials to avoid fire accidents. The area shall be chosen in consultation with the Engineer and to be cordoned off.
9.6	Rigging equipment for materials handling shall be inspected prior to use in each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment will be removed from service.
9.7	Rigging equipment shall not be loaded in excess of its recommended safe working load. Rigging equipment, when not in use, shall be removed from the

	original work area so as not to present a hazard to employees.
9.8	Contractor shall notify the engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard. The BHEL Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the contractor shall strictly adhere to such instructions. The BHEL Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.
9.9	Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the contractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The contractor shall be responsible for obtaining the same.
9.10	Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.
9.11	When cylinders are transported by powered vehicle they shall be secured in a vertical position.
9.12	All workmen of the contractor working on construction area shall wear safety shoes, hand gloves, safety helmets and safety belt as applicable. The contractor shall provide to its workforce and ensure the use of following personnel protective equipment as found necessary and as directed by BHEL.
9.12.1	Safety Helmets conforming to IS-2965 : 1984
9.12.2	Safety Belts conforming to IS-3521:1983
9.12.3	Safety Shoes conforming to IS-1989 : 1978
9.12.4	Eye and face protection devices conforming to IS – 8620 : 1977 & IS – 8950 : 1978.
9.12.5	Hand and body protection devices conforming to IS – 2575 : 1975 and IS – 6994 : 1973, IS – 8907 : 1970 & 8619 : 1977

9.13	The contractor shall insure his workmen against all accidents and the policy shall be presented to BHEL Engineer on demand. Other wise, BHEL will arrange the same and the expenditure towards this will be debited to the contractor. In case of a fatal or disabling injury accident to any person at construction site due to lapses by the contractor, the victim and/or his/her dependants shall be compensated by the contractor as per statutory requirements. However, if considered necessary BHEL shall have the right to impose appropriate financial penalty on contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependence before imposing any such penalty. Appropriate enquiry shall be held by BHEL giving opportunity to the contractor for presenting his case. Above safety conditions are not exhaustive but gives an idea for the contractor and contractor shall adhere to all safety precaution given by the Engineer at site.
9.14	The contractor shall arrange at his cost adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. at various levels for safe and proper working operations during night hours at the work spot as well as at the pre-assembly area.
9.15	The contractor shall be responsible for provision of all the safety notices and safety equipment as enjoined on him by the application of relevant statutory regulation / provisions and/or as called upon by BHEL from time to time. He shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instruction that may endanger safety of men, equipment and material.
9.16	The contractor shall provide temporary fencing wherever required as a safety measure against accident and damage to properties. Suitable caution notices shall be displayed where access to any part is found to be unsafe and hazardous.
9.17	Contractor shall ensure safety of all the workmen, material and equipment either belonging to him or to others working at site. He shall observe safety rules and codes applied by BHEL without exception.
9.18	It will be the responsibility of the contractor to ensure safe lifting of the equipment, taking due precaution to avoid any accident and damage to other equipment and personnel. All requisite tests and inspection of handling equipment, tools & tackle shall be periodically done by the contractor. Defective equipment shall be removed from service. Any equipment shall not be loaded in

	excess of its recommended safe working load.
9.19	The contractor shall provide necessary first aid facilities for all his employees, representatives and workmen at site and BHEL shall have no obligation in this regard. The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time. The contractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.
9.20	All the contractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Contractor should nominate his supervisor to coordinate and implement the safety measures.
9.21	Contractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labour colony etc. Such fire protection equipment shall be easy and kept open at all times. The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders. All other fire safety measures as laid down in the "codes for fire safety at construction site" issued by safety coordinator of BHEL shall be followed. Non-compliance of the above requirement under fire protection shall in no way relieve the contractor of any of his responsibility and liabilities to fire accident occurring either to his materials or equipment or those of others.
9.22	The contractor shall at his cost, remove from vicinity of work at least once each day all combustible waste, scrap, panting materials, rubbish, unused or other materials and deposit them in places specified by BHEL to keep the work site clear and tidy. Use of undercoated canvas paper, corrugated paper, fabricated carton, plastic or other flammable materials shall be restricted to the minimum and promptly removed.
9.23	The contractor shall not use any hand lamp energized by Electric power with supply voltage of more than 24 volts in confined spaces like inside water boxes, turbine casings, condensers etc.
9.24	All portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed. Only electricians licensed by appropriate statutory authority shall be employed by the contractor to carry out all types of electrical works.
9.25	In case of any delay in completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such

	delay from the payments due to the contractor, after notifying the contractor suitably.
9.26	Valve protection caps shall be kept in place and secured.
9.27	The contractor shall be responsible for the safe storage and handling of his radio-active sources as per BARC rules and regulations.
9.28	Tarpaulin being inflammable should not be used (instead, only non infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.
9.29	If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety issued by BHEL, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.
9.30	If the contractor succeeds in carrying out its job in time with out any fatal or disabling injury accident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the contractor suitably for the performance.
9.31	The contractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.
9.32	The contractor shall use only properly insulated and armored cables which conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site. BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the cost of the contractor. All electrical appliances used in the work shall be in good working condition and shall be properly earthed. No maintenance work shall be carried out on live equipment. The contractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
9.33	The contractor shall arrange adequate number of persons specifically for clearing any debris and for house keeping of the erection area including restacking of components in the erection areas.
9.34	In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover the cost of such damages from the contractor after holding an appropriate enquiry.

9.35	The contractor shall submit report of all accidents, fires and property damage etc to the Engineer immediately after such occurrence, but in any case not later then 24 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. In addition periodic reports on safety shall also be submitted by the contractor to BHEL from time to time as prescribed by the Engineer.
9.36	Before commencing the work, the contractor shall appoint/nominate a responsible person to supervise implementation of all safety measures and liaison with his counterpart of BHEL.
9.37	Suitable scaffolds shall be provided for workman for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration of work which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made of steel. The steps shall have a minimum width of 45 cm and a maximum rise of 30 cm. Suitable handholds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper then ¼ horizontal and 1 vertical.
9.38	Scaffolding or staging more than 3.6 m above the ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly bolted, braced or otherwise secured, at least 90 cm above the floor or platform of such scaffolding or staging and extending along the entire length of the out side and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it form saver, from swaying, from the building or structure.
9.39	Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or floor level, they shall be closely boarded and shall have adequate width which shall not be less than 750 mm and be suitably fenced as described above.
9.40	Every opening in the floor or a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 90 cm.
9.41	Wherever there are open excavation in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

9.42	Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m in the length while the width between side rails in rung ladder shall in no case be less than app. 29.2 cm for ladder upto and including 3 m in length. For longer ladders this width shall be increased at least ¼" for each additional foot of length.
9.43	A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to Construction.
9.44	All personnel of the Contactor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal worker shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.
9.45	Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.
9.46	All trenches, four feet or more in depth, shall at all times be supplied with at least one ladder for each 30 m in length or fraction thereof. The ladder shall be extended from bottom of the trench to at least 90 cm above the surface of the ground. Sides of the trenches which are 1.50 m or more in depth shall be stepped back to give suitable slope or securely held by timer bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.
9.47	The Contactor shall take all measures at the sites of the work to protect all persons from accidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding at law that may be brought by any persons for injury sustained or death owing to neglect of the above precautions and to pay any such persons such compensation or which may with the consent of the Contractor be paid to compromise any claim by any such person should such claim proceeding be filed against BHEL, the Contractor hereby agrees to indemnify BHEL against the same.
9.48	Before any demolition work is commenced and also during the process of the work the following shall be ensured:
9.48.1	All roads and open areas adjacent to the work site shall either be closed or suitably protected.

9.48.2	No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.
9.48.3	All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.
9.49	All necessary personnel safety equipment as considered adequate by the Engineer should be kept available for the use of the persons employed in the Site and maintained in a condition suitable for immediate use and the Contactor should take adequate steps to ensure proper use of equipment by those concerned.
9.49.1	Workers employed on mixing asphalted materials, cement and lime mortars shall be provided with protective foot wear and protective goggles.
9.49.2	Those engaged in white washing and mixing or stacking of cement bags or any materials which is injurious to the eyes shall be provided with protective goggles.
9.49.3	Those engaged in welding works shall be provided with welder's protective eyesight lids.
9.49.4	Stone breakers shall be provided with protective goggles and protective clothing and seated sufficient to safe intervals.
9.49.5	Where workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.
9.49.6	The Contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precautions should be taken.
9.49.6.1	No paint containing lead or lead products shall be used except in the form of paste or ready made paint.
9.49.6.2	Suitably face masks should be supplied for use by the workers where paints are applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

9.49.6.3	Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
9.50	When the work is being done near any place where there is risk of drowning all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.
9.51	Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safe guards. Hoisting appliance should be provided with such means as will reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers employed on electrical installations which are already energized, insulting mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductor of electricity.
9.52	All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near the places of work.
9.53	The contractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend test etc as applicable, to enable. inspection Agency for performing Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.
9.54	The Contractor shall notify BHEL of his intention to bring to site any equipment or material which may create hazard. BHEL shall have the right to prescribe the conditions under which such equipment or materials may be handled and the contractor shall adhere to such instructions. BHEL may prohibit the use of any construction machinery, which according to him is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.
9.55	All safety precautions shall be taken for welding and cutting operations as per IS-818. All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

9.56	These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent, place at work spot. The persons responsible for compliance of the safety code shall be named therein by the Contractor.
9.57	To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangement made by the contract shall be open to inspection by the Engineer of the Engineer's Representative.
9.58	Keeping the work area clean/ free from debris, removed scaffoldings, scraps, insulation/sheeting wastage /cut pieces, temporary structures, packing woods etc. will be in the scope of the contractor. Such cleanings has to be done by contractor within quoted rate, on daily basis by an identified group. If such activity is not carried out by contractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost alongwith BHEL overheads will be deducted from contractor's bill. Such decisions of BHEL shall be binding on the contractor.
9.59	Notwithstanding the above clauses there is nothing to exit the Contractor from the operations of any other Act or Rule in force in area of work in this respect. Provided always that all safety measures apart from those specifically provided in this agreement which are brought to the notice of the Contractor from time to time by the Engineer shall be complied by the Contractor. Provided further that all consequences, damages, or losses arising by reason of any safety code shall be met with by the Contractor.
9.60	**NON COMPLIANCE:-** NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-

	09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
	10.	Not Removing Small Scrap From Platforms	200/-
	11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
	12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
	13.	Improper Earthing Of Electrical T&P	500/-
	14.	Accident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
	15.	Fatal Accident/Accidents Resulting in total loss in Earning Capacity	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilized for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.61 **CITATION:**-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job

9.62 **MEMORANDUM OF UNDERSTANDING**

After Award Of Work, Contractors Are Required To Enter Into A Memorandum Of Understanding As Given Below:

Memorandum of Understanding

- BHEL PESD, HYDERABAD is committed to Health, Safety and Environment Policy (EHS Policy).
- M/s _____ do hereby also commit to the same EHS Policy while executing the Contract Number ID1111103.
- M/s _____ shall ensure that safe work practices not limited to the above are followed by all construction workers and supervisors. Spirit and content therein shall be reached to all workers and

	supervisors for compliance. ➢ BHEL PESD, HYDERABAD will be carrying out EHS audits twice a year and M/s _____ shall ensure to close any non-conformity observed/reported within fifteen days. Signed by authorized representative of M/s ---------- Name : Place & Date:

10.0	**RA Bill Payments**
10.1	The contractor shall submit his monthly RA bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month.
10.2	Mode of payment and measurement of work completed shall be as per relevant clauses of General Conditions of Contract
10.3	Release of payment in each running bill including PVC Bills will be restricted to 95% of the value of work admitted as per stages of progressive pro rata payments.
10.4	The 5% thus remaining shall be treated as 'Retention Amount' and shall be released as per terms specified in the General Conditions of Contract.
10.5	The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc and other dues in the meanwhile.
10.6	BHEL shall release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, Contractor to furnish details pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker, as per prescribed formats: Note: BHEL may also choose to release payment by other alternative modes as applicable
10.7	Paying Authority shall be the Construction Manager of the Site. Any change in the paying Authority shall be intimated to the Contactor accordingly.

<table>
<tr><td>11.0</td><td>Performance Monitoring</td></tr>
<tr><td>11.1</td><td>Performance of the contractor is monitored through various reports/reviews and shall be jointly evaluated every quarter as per prescribed formats. Based on the net weighted score obtained, Contractors shall be rated ‘Good’ or ‘Satisfactory’ or ‘Unsatisfactory’</td></tr>
<tr><td>11.2</td><td>Annual performance (Financial Year wise) and Over all Performance (for the Contract) shall be based on the averages of Quarterly net weighted scores.</td></tr>
<tr><td>11.3</td><td>In case Annual/Quarterly performance is found ‘Unsatisfactory’, BHEL reserves the right to put on hold such Contractors as given below:
<table>
<tr><td>Sl No</td><td>Performance status</td><td>Type of suspension</td></tr>
<tr><td>1</td><td>‘Unsatisfactory’ in the Annual performance in the last Financial Year (if the agency is executing only one job in the Region)</td><td>Hold for a period of six months for similar Work</td></tr>
<tr><td>2</td><td>‘Unsatisfactory’ in the Annual performance in the last Financial Year or in the ‘Overall’ Performances, for 2 or more Works/Contracts being executed by the Contractor in the Region</td><td>Hold for a period of six months for similar Works for which performance is ‘Unsatisfactory’.</td></tr>
</table>
Note: If there is any conflict between the “Overall” performance and the latest “Annual” performance, then the ‘Overall’ performance shall prevail. However, BHEL reserves the right on the decision of ‘Hold’, in case of consistent ‘Annual’ improvement notwithstanding the vendors ‘Overall’ performance being unsatisfactory.</td></tr>
</table>

12.0	**Suspension of Business dealings**
12.1	BHEL reserves the right to take action against contractors who fail to perform or indulge in malpractices, by suspending business dealings with them.
12.2	Suspension could be in the form of 'Hold', 'De-listing' or 'Banning' a contractor.
12.3	A bidder may be put on HOLD for a period of 6 months, for future tenders for specific works on the basis of one or more of the following reasons: a) Bidder does not honour his own offer or any of its conditions within the validity period. b) Bidder fails to respond against three consecutive enquires of BHEL. c) After placement of order, Bidder fails to execute a contract. d) Bidder fails to settle sundry debt account, for which he is legitimately liable, within one year of its occurrence. e) Bidder's performance rating falls below 60% in specific category (more fully described in chapter 'Performance Monitoring') f) Bidder works are under strike/ lockout for a long period.
12.4	A Bidder may be de-listed from the list of registered Bidders of the region for a period of 1 year on the basis of one or more of the following reasons:- a) Bidder tampers with tendering procedure affecting ordering process or commits any misconduct which is contrary to business ethics. b) Bidder has substituted, damaged, failed to return, short returned or unauthorizedly disposed off materials/ documents/ drawings/ tools etc of BHEL. c) Bidder no longer has the technical staff, equipment, financial resources etc. required to execute the orders/ contracts.
12.5	A Bidder can be banned from doing any business with all Units of BHEL for a period of 3 years on the basis of one or more of the following reasons: a) Bidder is found to be responsible for submitting fake/ false/ forged documents, certificates, or information prejudicial to BHEL's interest. b) In spite of warnings, the Bidder persistently violates or circumvents the provisions of labour laws/ regulations/ rules and other statutory requirements. c) Bidder is found to be involved in cartel formation

	d) The Bidder has indulged in malpractices or misconduct such as bribery, corruption and fraud, pilferage etc which are contrary to business ethics. e) The Bidder is found guilty by any court of law for criminal activity/ offences involving moral turpitude in relation to business dealings. f) The Bidder is declared bankrupt, insolvent, has wound up or been dissolved; i.e ceases to exist for all practical purposes. g) Bidder is found to have obtained Official Company information/ documentation by questionable means. h) Communication is received from the administrative Ministry of BHEL to ban the Bidder from business dealings.
12.6	Contracts already entered with a contractor before the date of issue of order of 'HOLD' or 'DE-LISTING' shall not be affected.
12.7	All existing contracts with a 'BANNED' contractor shall normally be short closed
12.8	Once the order for suspension is passed, existing offers/new offers of the contractor shall not be entertained
12.9	The above guidelines are not exhaustive but enunciate broad principles governing action against contractors

DOCUMENT NO: PESD: E&C: GCC, REV 00, 11TH MAR. 2014

VOLUME – I C
General Conditions of Contract

BHARAT HEAVY ELECTRICALS LIMITED

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CHAPTER -1

1. GENERAL INSTRUCTION TO TENDERERS

1.1. DESPATCH INSTRUCTION

i) The General Conditions of Contract form part of the Tender specifications. **All pages of the tender documents shall be duly signed, stamped and submitted along with the offer in token of complete acceptance thereof.** The information furnished shall be complete by itself. The tenderer is required to furnish all the details and other documents as required in the following pages

ii) Tenderers are advised to study all the tender documents carefully. Any submission of tender by the tenderer shall be deemed to have been done after careful study and examination of the tender documents and with the full understanding of the implications thereof. Should the tenderers have any doubt about the meaning of any portion of the Tender Specification or find discrepancies or omissions in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, the scope of work etc., he shall at once, contact the authority inviting the tender well in time (so as not to affect last date of submission) for clarification before the submission of the tender. Tenderer's request for clarifications shall be with reference to Sections and Clause numbers given in the tender documents. The specifications and terms and conditions shall be deemed to have been accepted by the tenderer in his offer. Non compliance with any of the requirements and instructions of the tender enquiry may result in the rejection of the tender.

iii) Integrity pact (IP) shall be applicable for all tenders / contracts if indicated in NIT. This integrity pact shall be issued as part of the Tender documents and shall be returned by the bidder along with Techno-commercial bid duly filled, signed and stamped by the authorized signatory who signs the bid. Only those vendors / bidders who have entered into such an IP with BHEL shall be considered qualified to participate in the bidding. Entering into this pact shall be a preliminary qualification.

1.2. SUBMISSION OF TENDERS

1.2.1 The tenderers must submit their tenders to Officer inviting tender as per instructions in the NIT

1.2.2 Tenders submitted by post shall be sent by 'REGISTERED POST ACKNOWLEDGEMENT DUE / by COURIER' and shall be posted with due allowance for any postal/courier delays. BHEL takes no responsibility for delay, loss or non-receipt of tenders sent by post/courier. **The tenders received after the specified time of their submission are treated as 'Late Tenders' and shall not be considered under any circumstances.** Offers received by Fax/Email/Internet shall be considered as per terms of NIT.

1.2.3 Tenders shall be opened by authorised Officer of BHEL at his office at the time and date as specified in the NIT, in the presence of such of those tenderers or their authorised representatives who may be present

1.2.4 Tenderers whose bids are found techno commercially qualified shall be informed the date and time of opening of the Price Bids and such Tenderers may depute their representatives to witness the opening of the price bids. BHEL's decision in this regard shall be final and binding.

1.2.5 Before submission of Offer, the tenderers are advised to inspect the site of work and the environments and be well acquainted with the actual working and other prevalent conditions, facilities available, position of material and labor, means of transport and access to Site, accommodation, etc. No claim will be entertained later on the grounds of lack of knowledge of any of these conditions.

1.3. LANGUAGE

1.3.1 The tenderer shall quote the rates in English language and international numerals. These rates shall be entered in figures as well as in words. For the purpose of the tenders, the metric system of units shall be used.

1.3.2 All entries in the tender shall either be typed or written legibly in ink. Erasing and over-writing is not permitted and may render such tenders liable for rejection. All cancellations and insertions shall be duly attested by the tenderer.

1.4 **PRICE DISCREPANCY:**

1.4.1 **Conventional (Manual) Price Bid opening** : In the case of price bid opening without resorting to Reverse Auction, if there are differences between the rates given by the tenderer in words and figures or in amount worked out by him, the following procedure for evaluation and award shall be followed:

i) When there is a difference between the rates in figures and in words, the rates which corresponds to the amounts worked out by the contractor, shall be taken as correct

ii) When the amount of an item is not worked out by the contractor or it does not correspond with the rate written either in figure or in words, then the rate quoted by the contractor in words shall be taken as correct

iii) When the rate quoted by the contractor in figures and words tallies but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.

iv) In case of lumpsum price, if there is any difference between the amount in figures and in words, the amount quoted by the bidder in words shall be taken as correct.

v) In case of omission in quoting any rate for one or more items, the evaluation shall be done considering the highest quoted rate obtained against the respective items by other tenderers for the subject tender. If the tenderer becomes L-1, the notional rates for the omission items shall be the lowest rates quoted for the respective items by the other tenderers against the respective omission items for the subject job and the 'Total quoted price (loaded for omissions)' shall be arrived at. However the overall price remaining the same as quoted originally, the rates for all the items in the 'Total quoted price (loaded for omissions)' shall be reduced item wise in proportion to the ratio of 'Original' total price and the 'Total quoted price (loaded for omissions)''.

1.4.2 **Reverse Auction**: In case of Reverse Auction, the successful bidder shall undertake to execute the work as per overall price offered by him during the Reverse Auction process. In case of omission of rates, the procedure shall be as per 'Guidelines for Reverse Auction' enclosed.

1.5. **QUALIFICATION OF TENDERERS**

i) Only tenderers who have previous experience in the work of the nature and description detailed in the Notice Inviting Tender and/or tender specification are expected to quote for this work duly detailing their experience along with offer.

ii) Offers from tenderers who do not have proven and established experience in the field shall not be considered.

iii) Offers from tenderers who are under suspension (banned) by any Unit/Region/Division of BHEL shall not be considered.

iv) Offers from tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt of India shall not be considered.

1.6. EVALUATION OF BIDS

i) Technical Bids submitted by the tenderer will be opened first and evaluated for fulfilling the Pre Qualification criteria and other conditions in NIT/Tender documents, based on documentary evidences submitted along with the offer

ii) In case the same qualifying experience is claimed by more than one agency, then the agency who has executed the work as per documentary evidence submitted shall only be qualified. Scope of qualifying work should be totally with the agency who has executed and in case it is only labor+ consumables without T&P, then the responsibility of execution is assigned to the first agency and not to the agency who has executed only as labor supply contractor. Further, BHEL reserves the right to ask for further proofs including submission of TDS certificates for the said job

iii) In case the qualifying experience is claimed by private organizations based on Work Order and completion certificates from another private organization, BHEL reserves the right to ask for further proofs including submission of TDS certificates for the said job.

iv) Assessing Bidder Capacity for executing the current tender shall be as per Notice Inviting Tender

v) Price Bids of shortlisted bidders shall only be opened either through the conventional price bid opening or through electronic Reverse Auction, at the discretion of BHEL

vi) Price Bids of unqualified bidders shall not be opened. Reasons for rejection shall be intimated in due course after issue of LOI/LOA to successful bidder and receipt of unqualified acceptance from the successful bidder

vii) Bidders are advised to also refer to clause no 2.9.4 regarding evaluation of their performance in ongoing projects for the current tender

1.7. **DATA TO BE ENCLOSED**

Full information shall be given by the tenderer in respect of the following. Non-submission of this information may lead to rejection of the offer.

i) INCOME TAX PERMANENT ACCOUNT NUMBER

Certified copies of Permanent Account Numbers as allotted by Income Tax Department for the Company/Firm/Individual Partners, etc. shall be furnished along with tender.

ii) ORGANIZATION CHART

The organization chart of the tenderer's organization, including the names, addresses and contact information of the Directors/Partners shall be furnished along with the offer.

iii) An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor

iv) **IN CASE OF INDIVIDUAL TENDERER:**

His / her full name, address and place & nature of business.

v) **IN CASE OF PARTNERSHIP FIRM**

The names of all the partners and their addresses, A copy of the partnership deed/instrument of partnership dully certified by the Notary Public shall be enclosed.

vi) **IN CASE OF COMPANIES:**

a. Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and articles of Association are also to be furnished).
b. Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.

1.8 **AUTHORISATION AND ATTESTATION**

Tenders shall be signed by a person duly authorized/empowered to do so. An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor shall be submitted along with the tenders

1.9 **EARNEST MONEY DEPOSIT**

1.9.1 Every tender must be accompanied by the prescribed amount of Earnest Money Deposit (EMD) in the manner described herein.

i) EMD shall be furnished along with the offer in full as per the amount indicated in the Special Conditions of Contract / NIT
ii) EMD is to be paid in cash (as permissible under Income Tax Act), Pay order or Demand Draft in favour of 'Bharat Heavy Electricals Limited' and payable at Hyderabad(PESD HQ) issuing the tender.
iii) No other form of EMD remittance shall be acceptable to BHEL
iv) Bidder may opt to deposit "One Time EMD" of Rs. 2.0 lakhs (Rupees Two lakhs only) with BHEL Hyderabad(PESD HQ) issuing the tender, which will enable them to participate in all the future tender enquiries in respect of Erection and Commissioning services issued from the respective office. Interested bidders may clearly send their consent for converting the present EMD into a "One Time EMD" in their offer.
    - Note : The 'One Time EMD' cannot be withdrawn by the tenderers within 3 years from the date of deposit, under any circumstances. The Tenderer who wishes to withdraw after three years will not be allowed to submit 'One Time EMD' again.
v) Bidders who have already deposited such "One Time EMD" of Rs. 2.00 lakh are exempted from submission of EMD for this tender. However a copy of 'One Time EMD' certificate issued by BHEL PESD HQ issuing the tender shall be enclosed along with the offer.

1.9.2 EMD by the bidder will be forfeited as per Tender Documents if

i) After opening the tender, the bidder revokes his tender within the validity period or increases his earlier quoted rates.
ii) The bidder does not commence the work within the period as per LOI/Contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

1.9.3 EMD shall not carry any interest.

1.9.4 In the case of unsuccessful bidders, the Earnest Money will be refunded to them within a reasonable time after acceptance of award by successful tenderer.

1.10 SECURITY DEPOSIT

1.10.1 Upon acceptance of Tender, the successful Tenderer should deposit the required amount of Security Deposit for satisfactory completion of work, as per the rates given below:

SN	Contract Value	Security Deposit Amount
1	Up to Rs. 10 lakhs	10% of Contract Value
2	Above Rs. 10 lakhs up to Rs.50 lakhs	1 lakh + 7.5% of the Contract Value exceeding Rs. 10 lakhs.
3	Above Rs. 50 lakhs	Rs 4 lakhs + 5% of the Contract Value exceeding Rs. 50 lakhs.

1.10.2 The security Deposit should be furnished before start of the work by the contractor.

1.10.3 Security Deposit may be furnished in any one of the following forms

i) Cash (as permissible under the Income Tax Act)
ii) Pay Order / Demand Draft in favour of BHEL.
iii) Local cheques of scheduled banks, subject to realization.
iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).
v) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats
vi) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be deposited in any form as prescribed before start of the work and the balance 50% may be recovered from the running bills.
viii) EMD of the successful bidder can be converted and adjusted against the cash portion of Security Deposit excepting for such bidders who have remitted One Time EMD.

NOTE: Acceptance of Security Deposit against Sl. No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

1.10.4 The Security Deposit shall not carry any interest.

1.10.5 In case the value of work exceeds / reduces from the awarded / accepted value, the Security Deposit shall be correspondingly enhanced / reduced as given below:

i) The enhanced part of the Security Deposit shall be immediately deposited by the Contractor or adjusted against payments due to the Contractor.
ii) There will be no reduction in Security Deposit value in case of variation in contract value upto the lower limit specified in Quantity variation clause. In case of reduction of contract value beyond the lower limit specified in Quantity Variation clause, then the Security Deposit shall be re adjusted in proportion.
iii) In case of reduction, the reduced Contract value shall be certified by BHEL Construction Manager after ascertaining / freezing of BOQ / Drawings from the Design / Engineering Centre. The reduced Security Deposit value can only be considered after taking into account the adequacy of the

securities held by BHEL to meet the liabilities of the contractor for the contract, and the performance of the contract in general. **In such cases, the revised value of Security Deposit shall be worked out only after execution of not less than the lower limit of the revised scope of work/contract value as per quantity variation clause, and as certified by Construction Manager. This reduction in value of Security Deposit shall not entitle the contractor to any amendment of Contract and shall be operated at the discretion of BHEL**

iv) Contract value for the purpose of operating the reduced/increased value of Security Deposit due to Quantity Variation, shall be exclusive of Extra works done on manday rates.

1.10.6 The validity of Bank Guarantees towards Security Deposit shall be initially upto the completion period as stipulated in the Letter of Intent/Award + 3 months, and the same shall be kept valid by proper renewal till the acceptance of Final Bills of the Contractor, by BHEL

1.10.7 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.

1.11 RETURN OF SECURITY DEPOSIT

Security Deposit shall be refunded/Bank Guarantee(s) released to the Contractor along with the 'Final Bill' after deducting all expenses / other amounts due to BHEL under the contract / other contracts entered into with them by BHEL.

1.12 BANK GUARANTEES

Where ever Bank Guarantees are to be furnished/submitted by the contractor, the following shall be complied with

i) Bank Guarantees shall be from Scheduled Banks / Public Financial Institutions as defined in the Companies Act.

ii) The Bank Guarantees shall be as per prescribed formats.

iii) It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period (subject to a minimum period of six months), as per the advice of BHEL Site Engineer / Construction Manager. BHEL shall not be liable for issue of any reminders regarding expiry of the Bank Guarantees.

iv) In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly endorsed by the Construction Manager and submitted to PESD HQ.

v) In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.

vi) Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.

vii) The Original Bank Guarantee shall be sent directly by the Bank to BHEL under Registered Post (Acknowledgement Due), addressed to the Subcontracting Department of the PESD.

1.13 VALIDITY OF OFFER

The rates in the Tender shall be kept open for acceptance for a minimum period of **SIX MONTHS** from latest due date of offer submission (including extension, if any) . In case BHEL (Bharat Heavy Electricals Ltd) calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

1.14 **EXECUTION OF CONTRACT AGREEMENT**

The successful tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent by Bharat Heavy Electricals Limited. The Tenderer shall submit an unqualified acceptance to the Letter of Intent/Award within the period stipulated therein.

The successful tenderer shall be required to execute an agreement in the prescribed form, with BHEL, within a reasonable time after the acceptance of the Letter of Intent/Award, and in any case before releasing the first running bill. The contract agreement shall be signed by a person duly authorized/empowered by the tenderer. The expenses for preparation of agreement document shall be borne by BHEL

1.15 REJECTION OF TENDER AND OTHER CONDITIONS

1.15.1 The acceptance of tender will rest with BHEL which does not bind itself to accept the lowest tender or any tender and reserves to itself full rights for the following without assigning any reasons whatsoever:-

a. To reject any or all of the tenders.

b. To split up the work amongst two or more tenderers as per NIT

c. To award the work in part if specified in NIT

d. In case of either of the contingencies stated in (b) and (c) above, the time for completion as stipulated in the tender shall be applicable.

1.15.2 Conditional tenders, unsolicited tenders, tenders which are incomplete or not in the form specified or defective or have been materially altered or not in accordance with the tender conditions, specifications etc., are liable to be rejected.

1.15.3 Tenders are liable to be rejected in case of unsatisfactory performance of the tenderer with BHEL, or tenderer under suspension (hold/banning /delisted) by any unit / region / division of BHEL or tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt of India. BHEL reserves the right to reject a bidder in case it is observed that they are overloaded and may not be in a position to execute this job as per the required schedule in line with clause no. 9.0 of the 'NIT'. The decision of BHEL will be final in this regard.

1.15.4 If a tenderer who is a proprietor expires after the submission of his tender or after the acceptance of his tender, BHEL may at their discretion, cancel such tender. If a partner of a firm expires after the submission of tender or after the acceptance of the tender, BHEL may then cancel such tender at their discretion, unless the firm retains its character.

1.15.5 BHEL will not be bound by any Power of Attorney granted by changes in the composition of the firm made subsequent to the execution of the contract. They may, however, recognise such power of Attorney and changes after obtaining proper legal advice, the cost of which will be

chargeable to the contractor concerned.

1.15.6 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money/Security Deposit/any other money due.

1.15.7 Canvassing in any form in connection with the tenders submitted by the Tenderer shall make his offer liable to rejection.

1.15.8 In case the Proprietor, Partner or Director of the Company/Firm submitting the Tender, has any relative or relation employed in BHEL, the authority inviting the Tender shall be informed of the fact as per specified format, along with the Offer. Failing to do so, BHEL may, at its sole discretion, reject the tender or cancel the contract and forfeit the Earnest Money/Security Deposit.

1.15.9 The successful tenderer should not sub-contract part or complete work detailed in the tender specification undertaken by him without written permission of BHEL's Construction Manager/Site Incharge. The tenderer is solely responsible to BHEL for the work awarded to him.

1.15.10 The Tender submitted by a techno commercially qualified tenderer shall become the property of BHEL who shall be under no obligation to return the same to the bidder. However unopened price bids and late tenders shall be returned to the bidders

1.15.11 Unsolicited discount received after the due date and time of Bid Submission shall not be considered for evaluation. However, if the party who has submitted the unsolicited discount/rebate becomes the L-I party, then the awarded price i.e contract value shall be worked out after considering the discount so offered.

1.15.12 BHEL shall not be liable for any expenses incurred by the bidder in the preparation of the tender irrespective of whether the tender is accepted or not.

1.15.13 Additional security deposit (SD) has to be submitted by the successful bidder with value as follows :

a) In case the Final Price of the successful bidder is greater than equal to Rs 100 Crores:

The value of additional SD shall be equal to:
0.30 X { the difference of (95% of BHEL's estimate OR 95% of the party's 'online sealed bid' (in case of RA)/ Paper price bid (in case of conventional paper bid), whichever is higher) and the final offered price of the successful bidder}

b) In case the Final Price of the successful bidder is less than Rs 100 Crores:

The value of additional SD shall be equal to:
0.30 X { the difference of (90% of BHEL's estimate OR 90% of the party's 'online sealed bid' (in case of RA)/ Paper price bid, whichever is higher) and the final offered price of the successful bidder}

This additional SD shall have the same validity as that of the Security Deposit and shall be revalidated /released in the manner as spelt out for the Security Deposit as per relevant clause of GCC.

The BHEL's estimated value shall be disclosed after RA/Paper Bid opening

CHAPTER-2

2.1 **DEFINITION:** The following terms shall have the meaning hereby assigned to them except where the context otherwise requires

i) BHEL shall mean Bharat Heavy Electricals Limited (PESD, Hyderabad), a company registered under Indian Companies Act 1956, with its Registered Office at BHEL HOUSE, SIRI FORT, NEW DELHI – 110 049, or its Power Sector Regional Offices/PESD HQ or its Authorised Officers or its Site Engineers or other employees authorised to deal with any matters with which these persons are concerned on its behalf.

ii) "EXECUTIVE DIRECTOR" or 'GROUP GENERAL MANAGER' or "GENERAL MANAGER (Incharge)" or "GENERAL MANAGER" shall mean the Officer in Administrative charge of Project Engineering & System Division, Hyderabad.

iii) "COMPETENT AUTHORITY" shall mean Executive Director or Group General Manager or General Manager (Incharge) or General Manager or BHEL Officers who are empowered to act on behalf of the Executive Director or General Manager (Incharge) or General Manager of BHEL.

iv) "ENGINEER" or "ENGINEER IN CHARGE" shall mean an Officer of BHEL as may be duly appointed and authorized by BHEL to act as "Engineer" on his behalf for the purpose of the Contract, to perform the duty set forth in this General Conditions of Contract and other Contract documents. The term also includes 'CONSTRUCTION MANAGER' or 'SITE INCHARGE' as well as Officers at Site or at the Headquarters of the PESD.

v) "SITE" shall mean the places or place at which the plants/equipments are to be erected and services are to be performed as per the specification of this Tender.

vi) "CLIENT OF BHEL" or "CUSTOMER" shall mean the project authorities with whom BHEL has entered into a contract for supply of equipments or provision of services.

vii) "CONTRACTOR" shall mean the successful Bidder/Tenderer who is awarded the Contract and shall include the Contractor's successors, heirs, executors, administrators and permitted assigns.

viii) "CONTRACT" or "CONTRACT DOCUMENT" shall mean and include the Agreement of Work Order, the accepted appendices of Rates, Schedules, Quantities if any, General Conditions of Contract, Special Conditions of Contract, Instructions to the Tenderers, Drawings, Technical Specifications, the Special Specifications if any, the Tender documents, subsequent amendments mutually agreed upon and the Letter of Intent/Acceptance issued by BHEL. Any conditions or terms stipulated by the contractor in the tender documents or subsequent letters shall not form part of the contract unless, specifically accepted in writing by BHEL in the Letter of Intent/Award and incorporated in the agreement.

ix) "GENERAL CONDITIONS OF CONTRACT" shall mean the 'Instructions to Tenderers' and 'General Conditions of Contract' pertaining to the work for which above tenders have been called for.

x) "TENDER SPECIFICATION" or "TENDER" or "TENDER DOCUMENTS" shall mean General Conditions, Common Conditions, Special Conditions, Price Bid, Rate Schedule, Technical

	Specifications, Appendices, Annexures, Corrigendum, Amendments, Forms, procedures, Site information, etc and drawings/documents pertaining to the work for which the tenderers are required to submit their offers. Individual specification number will be assigned to each Tender Specification.
xi)	"LETTER OF INTENT" shall mean the intimation by a Letter/Fax/email to the tenderer that the tender has been accepted in accordance with provisions contained in the letter. The responsibility of the contractor commences from the date of issue of this letter and all terms and conditions of the contract are applicable from this date.
xii)	"COMPLETION TIME" shall mean the period by 'date/month' specified in the 'Letter of Intent/Award' or date mutually agreed upon for handing over of the intended scope of work, the erected equipment/plant which are found acceptable by the Engineer, being of required standard and conforming to the specifications of the Contract.
xiii)	"PLANT" shall mean and connote the entire assembly of the plant and equipments covered by the contract.
xiv)	"EQUIPMENT" shall mean equipment, machineries, materials, structural, electricals and other components of the plant covered by the contract.
xv)	"TESTS" shall mean and include such test or tests to be carried out on the part of the contractor as are prescribed in the contract or considered necessary by BHEL, in order to ascertain the quality, workmanship, performance and efficiency of the contractor or part thereof.
xvi)	"APPROVED", "DIRECTED" or "INSTRUCTED" shall mean approved, directed or instructed by BHEL.
xvii)	"WORK or CONTRACT WORK" shall mean and include supply of all categories of labour, specified consumables, tools and tackles and Plants required for complete and satisfactory site transportation, handling, stacking, storing, erecting, testing and commissioning of the equipments to the entire satisfaction of BHEL.
xviii)	"SINGULAR AND PLURALS ETC" words carrying singular number shall also include plural and vice versa, where the context so requires. Words imparting the masculine Gender shall be taken to include the feminine Gender and words imparting persons shall include any Company or Associations or Body of Individuals, whether incorporated or not.
xix)	"HEADING" – The heading in these General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken as instructions thereof or of the contract.
xx)	"MONTH" shall mean calendar month unless otherwise specified in the Tender.
xxi)	Day' or 'Days' unless herein otherwise expressly defined shall mean calendar day or days of twenty four (24) hours each. A week shall mean continuous period of seven (7) days.
xxii)	"COMMISSIONING" shall mean the synchronization testing and achieving functional operation of the Equipment with associated system after all initial adjustments, trials, cleaning, re-assembly required at site if any, have been completed and Equipment with associated system is

	ready for taking into service.
xxiii)	"WRITING" shall include any manuscript type written or hand written or printed statement or electronically transmitted messages, under the signature or seal or transmittal of BHEL.
xxiv)	"TEMPORARY WORK" shall mean all temporary works for every kind required in or for the execution, completion, maintenance of the work.
xxv)	'CONTRACT PRICE' or 'CONTRACT VALUE' shall mean the sum mentioned in the LOI/LOA/Contract Agreement subject to such additions thereto or deductions there from as may be made under provisions hereinafter contained
xxvi)	"COMMENCEMENT DATE" or "START DATE" shall mean the commencement/start of work at Site as per terms defined in the Tender
xxvii)	"SHORT CLOSING" or "FORE CLOSING" of Contract shall mean the premature closing of Contract, for reasons not attributable to the contractor and mutually agreed between BHEL and the contractor
xxviii)	"TERMINATION" of Contract shall mean the pre mature closing of contract due to reasons as mentioned in the contract
xxix)	"DE MOBILISATION" shall mean the temporary winding up of Site establishment by Contractor leading to suspension of works temporarily for reasons not attributable to the contractor
xxx)	"RE MOBILISATION" shall mean the resumption of work with all resources required for the work after demobilization.

2.2 **LAW GOVERNING THE CONTRACT AND COURT JURISDICTION**

The contract shall be governed by the Law for the time being in force in the Republic of India. The Civil Court having original Civil Jurisdiction at *Hyderabad for PESD*, Delhi for PSNR, at Kolkata for PSER, at Nagpur for PSWR and at Chennai for PSSR, shall alone have exclusive jurisdiction in regard to all claims in respect of the Contract. No other Civil Court shall have jurisdiction in case of any dispute, under this contract

2.3 **ISSUE OF NOTICE**

2.3.1 **Service of notice on contractor**

Any notice to be given to the Contractor under the terms of the contract shall be served by sending the same **by Registered Post / Speed Post to** or leaving the same at the Contractor's last known address of the principal place of business (or in the event of the contractor being a company, to or at its Registered Office). In case of change of address, the notice shall be served at changed address as notified in writing by the Contractor to BHEL. Such posting or leaving of the notice shall be deemed to be good service of such notice and the time mentioned to the condition for doing any act after notice shall be reckoned from the date so mentioned in such notice.

2.3.2 **Service of notice on BHEL**

Any notice to be given to BHEL in-charge/Region under the terms of the Contract shall be served by sending the same by **Registered Post / Speed Post** to or leaving the same at BHEL address or changed address as notified in writing by BHEL to the Contractor.

2.4 **USE OF LAND**

No land belonging to BHEL or their Customer under temporary possession of BHEL shall be occupied by the contractor without written permission of BHEL.

2.5 **COMMENCEMENT OF WORK**

2.5.1 The contractor shall commence the work as per the time indicated in the Letter of Intent from BHEL and shall proceed with the same with due expedition without delay.

2.5.2 If the contractor fails to start the work within stipulated time as per LOI or as intimated by BHEL, then BHEL at its sole discretion will have the right to cancel the contract. The Earnest Money and/or Security Deposit with BHEL will stand forfeited without any further reference to him without prejudice to any and all of BHEL's other rights and remedies in this regard.

2.5.3 All the work shall be carried out under the direction and to the satisfaction of BHEL.

2.6 **MEASUREMENT OF WORK AND MODE OF PAYMENT:**

2.6.1 All payments due to the contractors shall be made by e mode only, unless otherwise found operationally difficult for reasons to be recorded in writing
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2.6.2 For progress running bill payments: - The Contractor shall present detailed measurement sheets in triplicate, duly indicating all relevant details based on technical documents and connected drawings for work done during the month/period under various categories in line with terms of payment as per contract. The basis of arriving at the quantities, weights shall be relevant documents and drawings released by BHEL. These measurement sheets shall be prepared jointly with BHEL Engineers and signed by both the parties.

2.6.3 These measurement sheets will be checked by BHEL Engineer and quantities and percentage eligible for payment under various groups shall be decided by BHEL Engineer. The abstract of quantities and percentage so arrived at based on the terms of payment shall be entered in Measurement Book and signed by both the parties.

2.6.4 Based on the above quantities, contractor shall prepare the bills in prescribed format and work out the financial value. These will be entered in Measurement Book and signed by both the parties. Payment shall be made by BHEL after effecting the recoveries due from the contractor.

2.6.5 All recoveries due from the contractor for the month/period shall be effected in full from the corresponding running bills unless specific approval from the competent authorities is obtained to the contrary.

2.6.6 Measurement shall be restricted to that portion of work for which it is required to ascertain the financial liability of BHEL under this contract.

2.6.7 The measurement shall be taken jointly by persons duly authorized on the part of BHEL and by the Contractor.

2.6.8 The Contractor shall bear the expenditure involved if any, in making the measurements and testing of materials to be used/used in the work. The contractor shall, without extra charges, provide all the assistance with appliances and other things necessary for measurement.

2.6.9 If at any time due to any reason whatsoever, it becomes necessary to re-measure the work done in full or in part, the expenses towards such re measurements shall be borne by the contractor unless such re measurements are warranted solely for reasons not attributable to contractor.

2.6.10 Passing of bills covered by such measurements does not amount to acceptance of the completion of the work measured. Any left out work has to be completed, if pointed out at a later date by BHEL.

2.6.11 Final measurement bill shall be prepared in the final bill format prescribed for the purpose based on the certificate issued by BHEL Engineer that entire works as stipulated in tender specification has been completed in all respects to the entire satisfaction of BHEL. Contractor shall give unqualified "No Claim" Certificate. All the tools and tackles loaned to him should be returned in satisfactory condition to BHEL. The abstract of final quantities and financial values shall also be entered in the Measurement Books and signed by both parties to the contract. The Final Bill shall be prepared and paid within a reasonable time after completion of work.

2.7 **RIGHTS OF BHEL**

BHEL reserves the following rights in respect of this contract during the original contract period or its extensions if any, as per the provisions of the contract, without entitling the contractor for any compensation.

2.7.1 To withdraw any portion of work and/or to restrict/alter quantum of work as indicated in the contract during the progress of work and get it done through other agencies to suit BHEL's commitment to its customer or in case BHEL decides to advance the date of completion due to other emergent reasons/ BHEL's obligation to its customer.

2.7.2 To terminate the contract or get any part of the work done through other agency or deploy BHEL's own/hired/otherwise arranged resources , at the risk and cost of the contractor after due notice of a period of two weeks by BHEL, in the event of:-

i) Contractor's continued poor progress
ii) Withdrawal from or abandonment of the work before completion of the work
iii) Contractor's inability to progress the work for completion as stipulated in the contract
iv) Poor quality of work
v) Corrupt act of Contractor
vi) Insolvency of the Contractor
vii) Persistent disregard to the instructions of BHEL
viii) Assignment, transfer, sub-letting of contract without BHEL's written permission
ix) Non fulfillment of any contractual obligations
x) In the opinion of BHEL, the contractor is overloaded and is not in a position to execute the job as per required schedule

2.7.3 To meet the expenses including BHEL overheads on the differential cost at 5%, over and above the liquidated damages/penalties arising out of "Risk & Cost" as explained above under Sl.No. 2.7.2. BHEL shall recover the amount from any money due from Contractor, from any money due to the Contractor including Security Deposit or by forfeiting any T&P or material of the contractor under this contract or any other contract of BHEL or by any other means or any combination thereof

2.7.4 To terminate the contract or to restrict the quantum of work and pay for the portion of work executed in case BHEL's contract with their customer are terminated for any reason, as per mutual agreement.

2.7.5 To effect recovery from any amounts due to the contractor under this or any other contract or in

any other form, the moneys BHEL is statutorily forced to pay to anybody, due to contractor's failure to fulfill any of his obligations. BHEL shall levy overheads of 5% on all such payments alongwith the interest as defined elsewhere in the GCC.

2.7.6 While every endeavor will be made by BHEL to this end, they cannot guarantee uninterrupted work due to conditions beyond their control. The Contractor will not be normally entitled for any compensation/extra payment on this account unless otherwise specified elsewhere in the contract.

2.7.7 In case the execution of works comes to a complete halt or reaches a stage wherein worthwhile works cannot be executed and there is no possibility of commencement of work for a period of not less than two months, due to reasons not attributable to the contractor and other than Force Majeure conditions, BHEL may consider permitting the contractor to de mobilize forthwith and re mobilize at an agreed future date. Cost of such demobilization/remobilization shall be mutually agreed. The duration of contract/time extension shall accordingly get modified suitably. In case of any conflict, BHEL decision in this regard shall be final and binding on the contractor.

2.7.8 In the unforeseen event of inordinate delay in receipt of materials, drawings, fronts, etc, due to which inordinate discontinuity of work is anticipated, BHEL at its discretion may consider contractor's request to short close the contract in the following cases

a) The balance works (including but not limited to Trial Operation, PG Test, etc) are minor vis a vis the scope of work envisaged as per the contract.
b) There has been no significant work in past 6 months OR no significant work is expected in next 6 months (example in Hydro projects or in projects where work has stopped due to reasons beyond the control of BHEL)
c) The balance works cannot be done within a reasonable period of time as they are dependent on unit shutdown or on other facilities of customer or any other reasons not attributable to the contractor

At the point of requesting for short closure, contractor shall establish that he has completed all works possible of completion and he is not able to proceed with the balance works due to constraints beyond his control. In such a case, the estimated value of the unexecuted portion of work(or estimated value of services to be provided for carrying out milestone/stage payments like Trial Operation/PG Test, etc) as mutually agreed, shall however be reduced from the final contract value.

2.7.9 **LIQUIDATED DAMAGES/PENALTY**

If the contractor fails to maintain the required progress of work which results in delay in the completion of the work as per the contractual completion period, BHEL shall have the right to impose Liquidated Damage/Penalty at the rate of 0. 5% of the contract value, per week of delay or part thereof subject to a maximum of 10% of the contract value. For this purpose, the period of delay shall be the delay attributable to the Contractor for the completion of work as per contract. Contract Value for this purpose, shall be the final executed value exclusive of Extra Works executed on Man day rate basis, Supplementary/Additional Items.

2.8 **RESPONSIBILITIES OF THE CONTRACTOR IN RESPECT OF LOCAL LAWS, EMPLOYMENT**

OF WORKERS ETC.

The following are the responsibilities of the contractor in respect of observance of local laws, employment of personnel, payment of taxes etc. The subcontractor shall fully indemnify BHEL against any claims of whatsoever nature arising due to the failure of the contractor in discharging any of his responsibilities hereunder:

2.8.1 As far as possible, Unskilled Workers shall be engaged from the local areas in which the work is being executed.

2.8.2 The contractor at all times during the continuance of this contract shall, in all his dealings with local labor for the time being employed on or in connection with the work, have due regard to all local festivals and religious and other customs.

2.8.3 The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Disputes Act, Employers Provident Act, Employees State Insurance Scheme, Contract Labor (Regulation and Abolition) Act 1970, Payment of Bonus & Gratuity Act and other Acts, Rules and Regulations for labor as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also give to the local Governing Body, Police and other relevant Authorities all such notices as may be required by the Law.

2.8.4 The contractor shall obtain independent License under the Contract Labor (Regulations and Abolition Act, 1970)as required from the concerned Authorities based on the certificate (Form-V) issued by the Principal Employer/Customer

2.8.5 The contractor shall pay all taxes, fees, license charges, deposits, duties, tolls, royalties, commission or other charges which may be levied on account of his operations in executing the contract.

2.8.6 While BHEL would pay the inspection fees and Registration fees of Boiler/Electrical Inspectorate, all other arrangements for site visits periodically by the Inspectorate to site, Inspection certificate etc. will have to be made by contractor. However, BHEL will not make any payment to the Inspectorate in connection with contractor's Welders/Electricians qualification tests etc.

2.8.7 Contractor shall be responsible for provision of Health and Sanitary arrangements (more particularly described in Contract Labor Regulation & Abolition Act), Safety precautions etc. as may be required for safe and satisfactory execution of contract.

2.8.8 The contractor shall be responsible for proper accommodation including adequate medical facilities for personnel employed by him.

2.8.9 The contractor shall be responsible for the proper behavior and observance of all regulations by the staff employed by him.

2.8.10 The contractor shall ensure that no damage is caused to any person/property of other parties working at site. If any such damage is caused, it is responsibility of the contractor to make good the losses or compensate for the same.

2.8.11 All the properties/equipments/components of BHEL/their Client loaned with or without deposit to the contractor in connection with the contract shall remain properties of BHEL/their Client.

2.8.12 The contractor shall use such properties for the purpose of execution of this contract. All such properties/equipments/components shall be deemed to be in good condition when received by the contractor unless he notifies within 48 hours to the contrary. The contractor shall return them in good condition as and when required by BHEL/their Client. In case of non-return, loss, damage, repairs etc, the cost thereof as may be fixed by BHEL Engineer will be recovered from the contractor

2.8.13 In case the contractor is required to undertake any work outside the scope of this contract, the rates payable shall be those mutually agreed upon if the item rates are not mentioned in existing contract

2.8.14 Any delay in completion of works/or non achievement of periodical targets due to the reasons attributable to the contractor, the same may have to be compensated by the contractor either by increasing manpower and resources or by working extra hours and/or by working more than one shift. All these are to be carried out by the contractor at no extra cost.

2.8.15 The contractor shall arrange, coordinate his work in such a manner as to cause no hindrance to other agencies working in the same premises.

2.8.16 All safety rules and codes applied by the Client/BHEL at site shall be observed by the contractor without exception. The contractor shall be responsible for the safety of the equipment/material and works to be performed by him and shall maintain all light, fencing guards, slings etc. or other protection necessary for the purpose. Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer with a view to prevent pilferage, accidents, fire hazards. Due precautions shall be taken against fire hazards and atmospheric conditions. Suitable number of Clerical staff, watch and ward, store keepers to take care of equipment/materials and construction tools and tackles shall be posted at site by the contractor till the completion of work under this contract.

The contractor shall arrange for such safety devices as are necessary for such type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per prescribed standards and practices.

Contractor has to ensure the implementation of Health, Safety and Environment (HSE) requirements as per directions given by BHEL/Customer. The contractor has to assist in HSE audit by BHEL/Customer and submit compliance Report. The contractor has to generate and submit record/reports as per HSE plan/activities as per instruction of BHEL/Customer

2.8.17 The contractor will be directly responsible for payment of wages to his workmen. A pay roll sheet giving all the payments given to the workers and duly signed by the contractor's representative should be furnished to BHEL site for record purpose, if so called for.

2.8.18 In case of any class of work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer.

2.8.19 Also, no idle charges will be admissible in the event of any stoppage caused in the work resulting in

contractor's labor and Tools & Plants being rendered idle due to any reason at any time.

2.8.20 The contractor shall take all reasonable care to protect the materials and work till such time the plant/equipment has been taken over by BHEL or their Client whichever is earlier.

2.8.21 The contractor shall not stop the work or abandon the site for whatsoever reason of dispute, excepting force majeure conditions. All such problems/disputes shall be separately discussed and settled without affecting the progress of work. Such stoppage or abandonment shall be treated as breach of contract and dealt with accordingly

2.8.22 The contractor shall keep the area of work clean and shall remove the debris etc. while executing day-to-day work. Upon completion of work, the contractor shall remove from the vicinity of work, all scrap, packing materials, rubbish, unused and other materials and deposit them in places specified by the Engineer. The contractor will also demolish all the hutments, sheds, offices, etc. constructed and used by him and shall clean the debris. In the event of his failure to do so, the same will be arranged to be done by the Engineer and the expenses recovered from the contractor.

2.8.23 The contractor shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and timely execution shall be the essence of this contract. The contractor shall be responsible to ensure that the quality, assembly and workmanship conform to the dimensions and clearance given in the drawings and/ or as per the instructions of the Engineer.

2.8.24 The Contractor to note that equipment taken on loan basis from BHEL/ their client may not be insured. The Contractor will take necessary precautions and due care to protect the same while in his custody from any damage/ loss till the same is handed over back to BHEL. In case the damage / loss is due to carelessness/ negligence on the part of the contractor, the Contractor is liable to get them repair/ replaced immediately and in case of his failure to do so within a reasonable time, BHEL will reserve the right to recover the loss from the contractor.

2.9 **PROGRESS MONITORING, MONTHLY REVIEW AND PERFORMANCE EVALUATION**

2.9.1 A detailed plan/program for completion of the contractual scope of work as per the time schedule given in the contract shall be jointly agreed between BHEL and Contractor, before commencement of work . The above program shall be supported by month wise deployment of resources viz Manpower, T&P, Consumables, etc. Progress will be reviewed periodically (Daily/Weekly/Monthly) vis a vis this jointly agreed program. The Contractor shall submit periodical progress reports (Daily/Weekly/Monthly) and other reports/information including manpower, consumables, T&P mobilization etc as desired by BHEL.

2.9.2 Monthly progress review between BHEL and Contractor shall be based on the agreed program as above, availability of inputs/fronts etc, and constraints if any, as per prescribed formats. Manpower, T&P and consumable reports as per prescribed formats shall be submitted by contractor every month. Release of RA Bills shall be contingent upon certification by BHEL Site Engineer of the availability of the above prescribed formats duly filled in and signed.

2.9.3 The burden of proof that the causes leading to any shortfall is not due to any reasons attributable to the contractor is on the contractor himself. The monthly progress review shall record shortfalls attributable to (i) Contractor, (ii) Force Majeure Conditions and (iii) BHEL

2.9.4 Performance of the contractor shall be assessed as per prescribed formats and shall form the basis for 'Annual/Overall Performance Evaluation' of the Contractor. BHEL reserves the right to revise

the evaluation formats during the course of execution of the works.

2.10 **TIME OF COMPLETION**

2.10.1 The time schedule shall be as prescribed in the Contract. The time for completion shall be reckoned from the date of commencement of work at Site as certified by BHEL Engineers

2.10.2 The entire work shall be completed by the contractor within the time schedule or within such extended periods of time as may be allowed by BHEL under clause 2.11

2.11 **EXTENSION OF TIME FOR COMPLETION**

2.11.1 If the completion of work as detailed in the scope of work gets delayed beyond the contract period, the contractor shall request for an extension of the contract and BHEL at its discretion may extend the Contract.

2.11.2 Based on the monthly reviews jointly signed, the works balance at the end of original contract period less the backlog attributable to the contractor shall be quantified, and the number of months of 'Time extension' required for completion of the same shall be jointly worked out. Within this period of 'Time extension', the contractor is bound to complete the portion of backlog attributable to the contractor. Any further 'Time extension' or 'Time extensions' at the end of the previous extension shall be worked out similarly.

2.11.3 However if any 'Time extension' is granted to the contractor to facilitate continuation of work and completion of contract, due to backlog attributable to the contractor alone, then it shall be without prejudice to the rights of BHEL to impose penalty/LD for the delays attributable to the contractor, in addition to any other actions BHEL may wish to take at the risk and cost of contractor.

2.11.4 A joint program shall be drawn for the balance amount of work to be completed during the period of 'Time Extension', along with matching resources (with weightages) to be deployed by the contractor as per specified format. Review of the program and record of shortfall shall be done every month of the 'Time extension' period in the same manner as is done for the regular contract period.

2.11.5 During the period of 'Time extension', contractor shall maintain their resources as per mutually agreed program

2.11.6 At the end of total work completion as certified by BHEL Engineer, and upon analysis of the total delay, the portion of time extensions attributable to (i) Contractor, (ii) Force majeure conditions, and (iii) BHEL, shall be worked out and shall be considered to be exhausted in the same order. The total period of time extensions shall be the sum of (i), (ii) and (iii) above and shall be equal to period between the scheduled date of completion and the actual date of completion of contract. LD shall be imposed/ levied for the portion of time extensions attributable to contractor and recoverable from the dues payable to the contractor.

2.12 **OVERRUN COMPENSATION**

NOT APPLICABLE

2.13 **INTEREST BEARING RECOVERABLE ADVANCES**

2.13.1 Normally no advance is payable to the contractor. However, advance payment in exceptional circumstances shall be interest bearing and secured through an equivalent Bank Guarantee and shall be limited to a maximum of 5% of contract value. This 'Interest Bearing Recoverable Advance' shall be payable in not less than two installments with any of the installment not exceeding 60% of the total eligible advance.

2.13.2 In exceptional circumstances, with due justification, Competent Authority of BHEL is empowered to approve proposals for payment of additional interim interest bearing advance against matching Bank Guarantee, for resource augmentation towards expediting work for project implementation.

2.13.3 Bank Guarantee towards 'Interest Bearing Recoverable Advance' shall be at least 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.

2.13.4 Contractor shall establish the utilization of advance drawn before the release of next installment.

2.13.5 Payment and recovery of Interest Bearing Recoverable advance shall be at the sole discretion of BHEL and shall not be a subject matter of arbitration.

2.13.6 The rate of interest applicable for the above advances shall be the prime lending rate of State Bank of India prevailing at the time of disbursement of the advance + 2%, and such rate will remain fixed till the total advance amount is recovered

2.13.7 Unadjusted amount of advances paid shall not exceed 5% of the total contract value at any point of time. Recovery of advances shall be made progressively from each Running Bill such that the advance amounts paid along with the interest is fully recovered by the time the contractor's billing reaches 80% of contract value.

2.13.8 Recovery rate per month shall be the sum of:

a. 10% of Running Bill amount
b. Simple interest up to the date of RA Bill on the outstanding Principle amount/amounts

2.13.9 Contractor to submit Bank Guarantee as per prescribed formats for each of the advance and shall be valid for at least one year or the recovery duration or the balance contract period which ever is later. In case the recovery of dues does not get completed within the aforesaid BG period, the contractor shall renew the BG or submit fresh BG for the outstanding amount and the remaining recovery period.

2.13.10 BHEL is entitled to make recovery of the entire outstanding amount in case the contractor fails to comply with the BG requirement

2.14 **QUANTITY VARIATION**

2.14.1 The quoted rates shall remain firm irrespective of any variations in the individual quantities. No compensation becomes payable in case the variation of the final executed contract value is within the limits of Plus (+) or Minus (-) 15% of awarded contract value

2.14.2 Compensation due to variation of final executed value in excess of the limits defined in clause above, shall be as follows:

i) In case the finally executed contract value reduces below the lower limit of Contract Value due to quantity variation specified above, the contractor will be eligible for compensation @ 15% of the difference between the lower limit of the contract value and the actual executed value.

ii) In case the finally executed contract value increases above the upper limit of Contract Value due to quantity variation specified above, there will be no revision in the rates within the contract period.

2.15 **EXTRA WORKS**

2.15.1 All rectifications/modifications, revamping, and reworks required for any reasons not due to the fault of the contractor, or needed due to any change in deviation from drawings and design of equipments, operation/maintenance requirements, mismatching, or due to damages in transit, storage and erection/commissioning, and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, will be considered as extra works.

2.15.2 Extra works arising on account of the contractor's fault, irrespective of time consumed in rectification of the damage/loss, will have to be carried out by the contractor free of cost. Under such circumstances, any material and consumable required for this purpose will also have to be arranged by the contractor at his cost.

2.15.3 All the extra work should be carried out by a separately identifiable gang, without affecting routine activities. Daily log sheets in the pro-forma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered/ entertained in the absence of the said supporting documents i.e. daily log sheets. Signing of log sheets by BHEL Engineer does not necessarily mean the acceptance of such works as extra works.

2.15.4 BHEL retains the right to award or not to award any of the major repair/ rework/modification/rectification/fabrication works to the contractor, at their discretion without assigning any reason for the same

2.15.5 After eligibility of extra works is established and finally accepted by BHEL engineer/designer, payment will be released on competent authority's approval at the following rate.

MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS: Single composite average labor man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework/ repairs/ rectification/ modification/ fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at Rs 60/- per man hour.

2.15.6 The above composite labor man hour rate towards extra works shall remain firm and not subject to any variation during execution of the work. Rate revision, Over Run Charges/compensation etc will not be applicable due to extra works.

2.15.7 **Extra Works for Civil Packages** shall be regulated as follows

i) Rates for Extra Works arising due to (1) non availability of BOQ (Rate Schedule), OR (2) change in Specifications of materials/works (3) rectification/modification/dismantling & re erecting etc due to no fault of Contractor, shall be in the order of the following:

a) Item rates are to be derived from similar nature of items in the BOQ (Rate Schedule) with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities.
b) As per CPWD-DSR-2007 (or latest edition) with applicable escalation derived from All India Consumer price Index for Whole Sale Commodities, OR, Notification issued by the office of CPWD for 'Cost Index' in that Region where the project is being executed, whichever is less
c) Item rates are to be worked out on the basis of prevailing market rates mutually agreed between BHEL and Contractor, plus 15% towards Contractor's overheads and profit.

2.16 **SUPPLEMENTARY ITEMS**

2.16.1 **For Non Civil Works**

Supplementary items are items/works required for completion of entire work but not specified in the scope of work. Subject to certification of such items/works as supplementary items by BHEL Engineer, rates shall be derived on the basis of any one of the following on mutual agreement:

i) Based on percentage breakup/rates indicated for similar/nearby items

ii) In case (i) above does not exist, then BHEL/site may derive the percentage breakup/rates to suit the type of work

2.16.2 **For Civil Works**

i) Rates for Supplementary Works/Additional Works arising out due to additions/alterations in the original scope of works as per contract subject to certification of BHEL Engineer shall be worked out as under:

a) Item rates which are available in existing BOQ (Rate Schedule) shall be operated with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities

b) Items of works which are not available in existing BOQ shall be operated as an 'Extra Works' and rate shall be derived as per clause no 2.15.7

ii) Execution of Supplementary Works/Additional Works through the Contractor shall be at the sole discretion of BHEL, and shall be considered as part of executed contract value for the purpose of Quantity Variation as per clause 2.14

iii) BHEL Engineer's decision regarding fixing the rate as above is final and binding on the contractor.

2.17 **PRICE VARIATION COMPENSATION**

NOT APPLICABLE

2.18 **INSURANCE**

2.18.1 BHEL/their customer shall arrange for insuring the materials/properties of BHEL/customer covering the risks during transit, storage, erection and commissioning.

2.18.2 It is the sole responsibility of the contractor to insure his materials, equipments, workmen, etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen's compensation Act. The work will be carried out in a protected area and all the rules and regulations of the client /BHEL in the area of project which are in force from time to time will have to be followed by the contractor.

2.18.3 If due to negligence and or non-observation of safety and other precautions by the contractors, any accident/injury occurs to the property / manpower belong to third party, the contractor shall have to pay necessary compensation and other expense, if so decided by the appropriate authorities.

2.18.4 The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss due to theft or otherwise till the same is taken over by BHEL or customer. For lodging / processing of insurance claim the contractor will submit necessary documents. BHEL will recover the loss including the deductible franchise from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody , matter shall be reported to police by the

contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance. However this will not relieve the contractor of his contractual obligation for the material in his custody.

2.19 **STRIKES & LOCKOUT**

2.19.1 The contractor will be fully responsible for all disputes and other issues connected with his labor. In the event of the contractor's labor resorting to strike or the Contractor resorting to lockout and if the strike or lockout declared is not settled within a period of one month, BHEL shall have the right to get the work executed through any other agencies and the cost so incurred by BHEL shall be deducted from the Contractor's bills.

2.19.2 For all purposes whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL

2.20 **FORCE MAJEURE**

The following shall amount to Force Majeure:-

2.20.1 Acts of God, act of any Government, War, Sabotage, Riots, Civil commotion, Police action, Revolution, Flood, Fire, Cyclones, Earth quake and Epidemic and other similar causes over which the contractor has no control.

2.20.2 If the contractor suffers delay in the due execution of the contractual obligation due to delays caused by force majeure as defined above, the agreed time of completion of the job covered by this contract or the obligations of the contractor shall be extended by a period of time equal to period of delay, provided that on the occurrence of any such contingency, the contractor immediately reports to BHEL in writing the causes of delay and the contractor shall not be eligible for any compensation.

2.21 **ARBITRATION & RECONCILIATION**

2.21.1 In case amicable settlement is not reached in the event of any dispute or difference arising out of the execution of the Contract or the respective rights and liabilities of the parties or in relation to interpretation of any provision by the Contractor in any manner touching upon the Contract, such dispute or difference shall (except as to any matters, the decision of which is specifically provided for therein) be referred to the sole arbitration of the arbitrator appointed by BHEL/In charge PESD.

The award of the Arbitrator shall be binding upon the parties to the dispute
Subject as aforesaid, the provisions of Arbitration and Reconciliation Act 1996 (India) or statutory modifications or re enactments thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. The venue of the arbitration shall be the place from which the contract is issued or such other place as the Arbitrator at his discretion may determine

2.21.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable :

In the event of any dispute or difference relating to the interpretation and application of the

provisions of the Contract, such dispute or difference shall be referred to by either party to the arbitration of one of the arbitrators in the department of public enterprises. The award of the arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law and Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary or Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the parties hereto finally and conclusively.

2.21.3 The cost of arbitration shall be borne equally by the parties.

2.21.4 Work under the contract shall be continued during the arbitration proceedings

2.22 **RETENTION AMOUNT**

2.22.1 Retention Amount shall be 5% of executed contract value and shall be recovered at the rate of 5% from each Running Bill admitted. Retention amount shall always be retained in cash and shall not be released against BG under any circumstance.

2.22.2 Refund of Retention Amount shall be as follows.

i) 50% of retention amount along with 'Final Bill'

ii) Balance 50% of retention amount shall be retained towards 'Performance Guarantee for Workmanship' and shall become refundable after expiry of Guarantee period, provided all the defects noticed during the guarantee period have been rectified to the satisfaction of BHEL Site Engineer/BHEL Construction Manager, and after deducting all expenses/other amounts due to BHEL under the contract/other contracts entered into by BHEL with them. Bank Guarantees are not acceptable towards this portion of retention

2.23 **PAYMENTS**

Payments to Contractors are made in any one of the following forms

2.23.1 **Running Account Bills (RA Bills)**

i) These are for interim payments when the contracts are in progress. The bills for such interim payments are to be prepared by Contractor in prescribed formats (RA Bill forms).

ii) Payments shall be made according to the extent of work done as per measurements taken up to the end of the calendar month and in line with the terms of payments described in the Tender documents

iii) Recoveries on account of electricity, water, statutory deductions, etc are made as per terms of contract

iv) Full rates for the work done shall be allowed only if the quantum of work has been done as per the specifications stipulated in the contract. If the work is not executed as per the stipulated specifications, BHEL may ask the contractor to re do the work according to the required specifications, without any extra cost. However, where this is not considered necessary 'OR' where the part work is done due to factors like non-availability of material to be supplied by BHEL 'OR' non availability of fronts 'OR' non availability of drawings, fraction payment against full rate, as is considered reasonable, may be allowed with due regard for the work remaining to be done. BHEL decision in this regard will be final and binding on the contractor.

v) In order to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work

2.23.2 **Final Bill**

Final Bill' is used for final payment on closing of Running Account for works or for single payment after completion of works. 'Final Bill' shall be submitted as per prescribed format after completion of works as per scope and upon material reconciliation, along with the following.

i) 'No Claim Certificate' by contractor
ii) Clearance certificates where ever applicable viz Clearance Certificates from Customer, various Statutory Authorities like Labor department, PF Authorities, Commercial Tax Department, etc
iii) Indemnity bond as per prescribed format

BHEL shall settle the final bills after deducting all liabilities of Contractor to BHEL

2.24 **PERFORMANCE GUARANTEE FOR WORKMANSHIP**

2.24.1 Even though the work will be carried out under the supervision of BHEL Engineers the Contractor will be responsible for the quality of the workmanship and shall guarantee the work done for a period of twelve months from the date of commencement of guarantee period as defined in Special Conditions of Contract, for good workmanship and shall rectify free of cost all defects due to faulty construction/erection detected during the guarantee period. In the event of the Contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such defective works at the Contractor's risk and cost, without prejudice to any other rights and recover the same from the Guarantee money.

2.24.2 BHEL shall release the guarantee money subject to the following

i) Contractor has submitted 'Final Bill'
ii) Guarantee period as per contract has expired
iii) Contractor has furnished 'No Claim Certificate' in specified format
iv) BHEL Site Engineer/Construction Manager has furnished the 'No Demand Certificate' in specified format
v) Contractor has carried out the works required to be carried out by him during the period of Guarantee and all expenses incurred by BHEL on carrying out such works is included for adjustment from the Guarantee money refundable.

2.25 **CLOSING OF CONTRACTS**

The Contract shall be considered completed and closed upon completion of all contractual obligations and settlement of Final Bill or completion of Guarantee period whichever is later. Upon closing of Contract, BHEL shall issue a completion certificate as per standard format, based on specific request of Contractor.

2.26 **REVERSE AUCTION**:

BHEL reserves the right to go for Reverse Auction for Price Bid Opening by BHEL appointed service provider, instead of opening the submitted sealed price bid in the conventional way. The Business Rules for Reverse Auction shall be as per BHEL guidelines issued from time to time.

2.27 **SUSPENSION OF BUSINESS DEALINGS**

BHEL reserves the right to take action against Contractors who either fail to perform or Tenderers/Contractor who indulge in malpractices, by suspending business dealings with them in line with BHEL guidelines issued from time to time.

2.28 **OTHER ISSUES**

2.28.1 Value of Non judicial Stamp Paper for Bank Guarantees and for Contract Agreement shall be not less than Rs 100/- unless otherwise required under relevant statutes.

2.28.2 In case of any conflict between the General Conditions of Contract and Special Conditions of Contract, provisions contained in the Special Conditions of Contract shall prevail.

2.28.3 Unless otherwise specified in NIT, offers from consortium /JVs shall not be considered.

2.28.4	BHEL may not insist for signing of Contract Agreements in respect of low value and short time period contracts like providing services for Hot water flushing, Chemical Cleaning, Transportation, etc

REVERSE AUCTION GUIDELINES

ANNEXURE – I to GCC

Annexure – I

Terms & Conditions of Reverse Auction

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of "online sealed bid" by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

6. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

8. Reverse auction will be conducted on scheduled date & time.

9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

Annexure - I

10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL‟s standard practice.

12. Bidders shall be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction‟, which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

15. In case BHEL decides to go for reverse auction, the H1 bidder(s) (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

Rev00
11th Mar
2014

VOLUME I - D
FORMS & PROCEDURES

(Doc.No. HY/BHEL/PESD/RUPPL-HMD/DMD/F&P/001)

BHARAT HEAVY ELECTRICALS LIMITED

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: will be released later

Form No: F-01 (Rev 00)

OFFER FORWARDING LETTER / TENDER SUBMISSION LETTER

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

Offer Reference No:……. Date:……

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Submission of Offer against Tender Specification No: ……

I/We hereby offer to carry out the work detailed in the Tender Specification issued by Bharat Heavy Electricals Limited, Power Sector-……., in accordance with the terms and conditions thereof.

I/We have carefully perused the following listed documents connected with the above work and agree to abide by the same.

1. Amendments/Clarifications/Corrigenda/Errata/etc. issued in respect of the Tender documents by BHEL
2. Notice Inviting Tender (NIT)
3. Price Bid
4. Technical Conditions of Contract
5. Special Conditions of Contract
6. General Conditions of Contract
7. Forms and Procedures

Should our Offer be accepted by BHEL for Award, I/we further agree to furnish 'Security Deposit' for the work as provided for in the Tender Conditions within the stipulated time as may be indicated by BHEL.

I/We further agree to execute all the works referred to in the said Tender documents upon the terms and conditions contained or referred to therein and as detailed in the appendices annexed thereto.

I/We have deposited/depositing herewith the requisite Earnest Money Deposit (EMD) as per details furnished in the Check List.

Authorized Representative of Bidder
Signature:
Name:
Address:

Place:
Date:

DECLARATION BY AUTHORISED SIGNATORY OF BIDDER

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **Declaration by Authorised Signatory**

Ref : 1) NIT/Tender Specification No: ……,
2) All other pertinent issues till date

I/We, hereby certify that all the information and data furnished by me with regard to the above Tender Specification are true and complete to the best of my knowledge. I have gone through the specifications, conditions, stipulations and all other pertinent issues till date, and agree to comply with the requirements and Intent of the specification.

I further certify that I am authorised to represent on behalf of my Company/Firm for the above mentioned tender and a valid Power of Attorney to this effect is also enclosed.

Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Date:

Enclosed : Power of Attorney

Form No: F-03 (Rev 00)

NO DEVIATION CERTIFICATE

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **No Deviation Certificate**

Ref : 1) NIT/Tender Specification No: ……,
2) All other pertinent issues till date

We hereby confirm that we have not changed/ modified/materially altered any of the tender documents as downloaded from the website/ issued by BHEL and in case of such observance at any stage, it shall be treated as null and void.

We also hereby confirm that we have neither set any Terms and Conditions and nor have we taken any deviation from the Tender conditions together with other references applicable for the above referred NIT/Tender Specification.

We further confirm our unqualified acceptance to all Terms and Conditions, unqualified compliance to Tender Conditions, Integrity Pact (if applicable) and acceptance to Reverse Auctioning process.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized representative of the bidder)

DECLARATION CONFIRMING KNOWLEDGE ABOUT SITE CONDITIONS

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **Declaration confirming knowledge about Site conditions**

Ref : 1) NIT/Tender Specification No: ……,
2) All other pertinent issues till date

I/We, _____ hereby declare and confirm that we have visited the Project Site as referred in BHEL Tender Specifications and acquired full knowledge and information about the Site conditions including Wage structure, Industrial Climate, the Law & Order and other conditions prevalent at and around the Site. We further confirm that the above information is true and correct and we shall not raise any claim of any nature due to lack of knowledge of Site conditions.

I/We, hereby offer to carry out work as detailed in above mentioned Tender Specification, in accordance with Terms & Conditions thereof.

Yours faithfully,

(Signature, Date & Seal of Authorized Representative of the Bidder)

Date :
Place:

DECLARATION FOR RELATION IN BHEL

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder failing which the offer of Bidder is liable to be summarily rejected)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **Declaration for relation in BHEL**
Ref : 1) NIT/Tender Specification No: ……,

I/We hereby submit the following information pertaining to relation/relatives of Proprieter/Partner(s)/Director(s) employed in BHEL

Tick(√) any one as applicable:

1. The Proprieter, Partner(s), Director(s) of our Company/Firm DO NOT have any relation or relatives employed in BHEL

OR

2. The Proprieter, Partner(s), or Director(s) of our Company/Firm HAVE relation/relatives employed in BHEL and their particulars are as below:

   (i)

   (ii)

Signature of the Authorised Signatory

Note:

1. Attach separate sheet, if necessary.
2. If BHEL Management comes to know at a later date that the information furnished by the Bidder is false, BHEL reserves the right to take suitable against the Bidder/Contractor.

NON DISCLOSURE CERTIFICATE

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

NON DISCLOSURE CERTIFICATE

I/We understand that BHEL PESD is committed to Information Security Management System as per their Information Security Policy.

Hence, I/We M/s…….
who are submitting offer for providing services to BHEL PESD __ against Tender Specification No:_____,
hereby undertake to comply with the following in line with Information Security Policy of BHEL PESD.

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.
- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PESD.

(Signature, date & seal of Authorized Signatory of the bidder)

Date:

BANK ACCOUNT DETAILS FOR E-PAYMENT

(To be given on Letter head of the Company /Firm of Bidder, and **ENDORSED (SIGNED & STAMPED) BY THE BANK** to enable BHEL release payments through Electronic Fund Transfer (EFT/RTGS)

---

1. Beneficiary Name :
2. Beneficiary Account No. :
3. Bank Name & Branch :
4. City/Place :
5. 9 digit M ICR Code of Bank Branch :
6. IFSC Code of Bank Branch :
7. Beneficiary E-mail ID (for payment confirmation) :

NOTE: In case Bank endorsed certificate regarding above has already been submitted earlier, Kindly submit photocopy of the same

Form No: F-08 (Rev 00)

FORMAT FOR SEEKING CLARIFICATION

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : **Request for Clarification**

Ref : 1) NIT/Tender Specification No: ……,
2) All other pertinent issues till date

Sl no	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
1				
2				
3				
4				
5				
6				

Yours faithfully,

(Signature, date & seal of Authorized Representative of the Bidder)

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
PE&SD –Hyderabad.
……..
…….

CONTRACT AGREEMENT

AGREEMENT NO._____ _____

NAME OF WORK	
NAME OF THE CONTRACTOR WITH FULL ADDRESS	
VALUE OF WORK AWARDED	
LETTER OF INTENT NO.	
TIME ALLOTTED FOR COMPLETING THE WORK (DATE OF COMPLETION)	

_____ _____
SIGNATURE OF CONTRACTOR (SIGNATURE OF BHEL OFFICER)

CONTRACT AGREEMENT

THIS AGREEMENT MADE THIS _____DAY OF_____ between BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Enterprise) a Company incorporated under the Companies Act, 1956, having its Registered Office at BHEL House, Siri Fort New Delhi-110049 (herein after called BHEL) of the ONE PART.

AND

M/S _____ _____ (hereinafter called the `Contractor') of the SECOND PART.

WHEREAS M/s ----------state that they have acquired and possess extensive experience in the field of ---------- ----------

And Whereas in response to an Invitation to Tender No. ---------- issued by BHEL for execution of ---------- the contractor submitted their offer No.----------dated ----------And whereas BHEL has accepted the offer of the Contractor on terms and conditions specified in the Letter of Intent No.----------dated ----------read with the references cited therein.

THIS AGREEMENT WITNESSES AND it is hereby agreed by and between the parties as follows:

1. That the contractor shall execute the work of ----------and more particularly described in Tender Specification No ----------including Drawings and Specifications (hereinafter called the said works) in accordance with and subject to terms and conditions contained in these presents, instructions to Tenderers, General Conditions of Contract, Special Conditions, Annexures, Letter of Intent dated ---------- and such other instructions, Drawings, Specifications given to him from time to time by BHEL.

2. The Contractor is required to furnish to BHEL Security deposit in the form of cash/ approved securities/ Bank Guarantee valid upto ---------- for a sum of Rs.---------- towards satisfactory performance and completion of the Contract.

3. The Contractor has furnished a Bank Guarantee bearing no.----------dated ----------for a sum of Rs.----------executed by ---------- in favour of BHEL towards Security Deposit valid upto ---------

OR

The Contractor has furnished to BHEL an initial Security Deposit of Rs.----------in the form of cash / approved Securities/ B.G No.---------- dated ---------- for Rs.----------executed by ---------- in favour of BHEL valid upto ---------- and has agreed for recovery of the balance security deposit by BHEL @ 10% of the value of work done from each running bill till the entire Security Deposit is recovered.

OR

The contractor has furnished to BHEL an initial Security Deposit of Rs.-----(Rs.---------- vide Bank draft No.----------dated ----------and by adjusting EMD of Rs.---------- submitted vide Bank draft No.---------- dt.---------) and has agreed for recovery of balance Security Deposit by BHEL @ 10% of the value of work done from each running bill till the entire security deposit is recovered.

4. The Contractor hereby agrees to extend the validity of the Bank Guarantee for such further period or periods as may be required by BHEL and if the Contractor fails to obtain such extension(s) from the Bank, the Contractor, shall pay forthwith or accept recovery of Rs.---------- from the bills in one installment and the contractor further agrees that failure to extend the validity of the Bank Guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum of Rs.----------

OR

In case the contractor furnishes the bank guarantee at a later date the contractor hereby agrees to extend the validity of bank guarantee for such further period or periods as may be required by BHEL and if the contractor fails to obtain such extension(s) from the bank, the contractor shall pay forthwith or accept recovery of the amount of bank guarantee given in lieu of security deposit from the bills in one installment and the contractor further agrees that failure to extend the validity of bank guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum.

5. That in consideration of the payments to be made to the Contractor by BHEL in accordance with this Agreement the Contractor hereby covenants and undertakes with BHEL that they shall execute, construct, complete the works in conformity, in all respects, with the terms and conditions specified in this Agreement and the documents governing the same.

6. That the Contractor shall be deemed to have carefully examined this Agreement and the documents governing the same and also to have satisfied himself as to the nature and character of the Works to be executed by him.

7. That the Contractor shall carry out and complete the execution of the said works to the entire satisfaction of the Engineer or such other officer authorised by BHEL, within the agreed time schedule, the time of completion being the essence of the Contract.

8. That BHEL shall, after proper scrutiny of the bills submitted by the Contractor, pay to him during the progress of the said works such sum as determined by BHEL in accordance with this Agreement.

9. That this Agreement shall be deemed to have come into force from -------- the date on which the letter of intent has been issued to the Contractor.

10. That whenever under this contract or otherwise, any sum of money shall be recoverable from or payable by the Contractor, the same may be deducted in the manner as set out in the General Conditions of Contract or other conditions governing this Agreement.

11. That all charges on account of Octroi, Terminal and other taxes including sales tax or other duties on material obtained for execution of the said works shall be borne and paid by the Contractor.

12. That BHEL shall be entitled to deduct from the Contractor's running bills or otherwise Income Tax under Section 194 (C) of the Income Tax Act, 1961.

13. That BHEL shall be further entitled to recover from the running bills of the Contractor or otherwise such sum as may be determined by BHEL from time to time in respect of

consumables supplied by BHEL, hire charges for tools and plants issued (Where applicable) and any other dues owed by the Contractor.

14. That it is hereby agreed by and between the parties that non- exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents and the liability of the Contractor with respect to compensation payable to BHEL or Contractor's obligations shall remain unaffected.

15. It is clearly understood by and between the parties that in the event of any conflict between the Letter of Intent and other documents governing this Agreement, the provisions in the Letter of Intent shall prevail.

16. The following documents

1. Invitation to Tender No---------- and the documents specified therein.
2. Contractor's Offer No---------- dated----------.
3. _____
4. _____
5. _____
6. Letter of Intent No_____ dated_____.
7. _____

shall also form part of and govern this Agreement.

IN WITNESS HEREOF, the parties hereto have respectively set their signatures in the presence of

WITNESS

1.

2.

(CONTRACTOR)
(to be signed by a person holding a valid Power of Attorney)

WITNESS

1.

2.

(For and on behalf of BHEL)

BANK GUARANTEE FOR SECURITY DEPOSIT

B.G. NO. Date

This deed of Guarantee made this ---------- day of ----------two thousand ----- by <Name and Address of Bank> hereinafter called the "The Guarantor" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) in favour of M/s Bharat Heavy Electrical Limited (A Govt. of India Undertaking) a company incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its unit at Bharat Heavy Electricals Limited, PE&SD ,Ramachandrapuram , Hyderabad-502 032 hereinafter called "The Company" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns)

WHEREAS < Contractor's Name and Address> (hereinafter referred to as the Contractor) have entered into a contract arising out of Letter of Intent no. < LOI REF & Date > (hereinafter referred to as "the contract") for < Name of Work > with the company.

AND WHEREAS the contract inter-alia provides that the contractor shall furnish to the company a sum of Rs.---------- (Rupees----------) towards security deposit for due and faithful performance of the contract in the form and manner specified therein.

AND WHEREAS the contractor has approached the Guarantor and in consideration of the arrangement arrived at between the contractor and the Guarantor, the Guarantor has agreed to give the Guarantee as hereinafter mentioned in favour of the company.

The Guarantor do hereby guarantee to the company the due and faithful performance, observance or discharge of the Contract by the contractor and further unconditionally and irrevocably undertake to pay to the Company without demur and merely on a demand, to the extent of Rs.----------(Rupees----------) against any claim by the company on them for any loss, damage, costs, charges and expenses caused to or suffered by the company by reasons of the contractor making any default in the performance, observance or discharge of the terms, conditions, stipulations or undertakings or any of them as contained in the contract.

The decision of the company whether any default has occurred or has been committed by the contractor in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them as contained in the contract and / or as to the extent of loss, damage, costs, charges and expenses caused to or suffered by the company by reason of the contractor making any default in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the Guarantor irrespective of the fact whether the contractor admits or denies the default or questions the correctness of any demand made by the company in any Court, Tribunal or Arbitration proceedings or before any other Authority.

The company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the contract or extend time of performance by the contractor or to postpone for any time and from time to time any of the powers exercisable by it against the contractor and either enforce or forebear from enforcing any of the terms and conditions governing the contract or securities available to the company and the Guarantor shall not be released from its liability under these presents by any exercise by the company of the liberty with reference to the matters aforesaid or by reasons of time being given to the contractor or any other forbearance, act or commission on the part of the company or any indulgence by the company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would, but for this provision have the effect of so releasing the Guarantor from its liability under this guarantee.

The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the contract and its claim satisfied or discharged and till the company certifies that the terms and conditions of the contract have been fully and properly carried out by the contractor and accordingly discharges this Guarantee, subject however, that the company shall have no claim under this Guarantee after ---------- i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time, as the case may be) unless a notice of the claim under this Guarantee has been served on the Guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor not withstanding the fact that the same is enforced after the expiry of the said period.

BANK GUARANTEE FOR SECURITY DEPOSIT

The Guarantor undertakes not to revoke this Guarantee during the period it is in force except with the previous consent of the Company in writing and agrees that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

It shall not be necessary for the company to proceed against the contractor before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealized.

Notwithstanding anything contained herein before, our liability under the Guarantee is restricted to Rs.---------- (Rupees----------). Our guarantee shall remain inforce until ----------, i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time) unless a claim or demand under this guarantee is made against us on or before ---------- we shall be discharged from our liabilities under this Guarantee thereafter.

Any claim or dispute arising under the terms of this documents shall only be enforced or settled in the courts of at Hyderabad only.

The Guarantor hereby declares that it has power to execute this guarantee and the executant has full powers to do so on behalf of the Guarantor.

IN WITNESS whereof the ---------- (Bank) has hereunto set and subscribed its hand the day, month and year first, above written.

(Name of the Bank)

Signed for and on behalf of the Bank
(Designation of the Authorized Person Signing the Guarantee)

(Signatory No.----------)

DATED:

SEAL

==========

Notes :

1. The BG shall be executed on non-judicial stamp papers of adequate value procured in the name of the Bank in the State where the Bank is located.

2. The BG is required to be sent by the executing Bank directly to BHEL at the address where tender is submitted / accepted under sealed cover.

BANK GUARANTEE FOR INTEREST BEARING REFUNDABLE ADVANCE

B.G. No. Date

This deed of Guarantee made this _____day of_____two thousand_____by **< Name and Address of Bank>** hereinafter called the "The Guarantor" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) in favour of M/S Bharat Heavy Electricals Limited a Company incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, New Delhi - 110049 through its unit at Bharat Heavy Electricals Limited, PE&SD ,Ramachandrapuram , Hyderabad-502 032, hereinafter called "The Company" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns).

WHEREAS M/s. _____(hereinafter referred to as the Contractor) have entered into a Contract arising out of Letter of Intent no._____dtd_____(hereinafter referred to as "the Contract") for the < **Name of work** > with the Company.

AND WHEREAS the Contract inter-alia provides that the Company will pay to the Contractor interest bearing advance of Rs._____ (Rupees_____ only) on certain terms and conditions specified in the Contract subject to the Contractor furnishing a Bank Guarantee for Rs._____ (Rupees_____ only) in favour of the Company.

AND WHEREAS the Company has agreed to accept a Bank Guarantee from a Bank to cover the said advance.

AND WHEREAS the Contractor has approached the Guarantor and in consideration of the arrangement arrived at between the Contractor and the Guarantor, the Guarantor has agreed to give the Guarantee as hereinafter mentioned in favour of the Company.

NOW THIS DEED WITNESSES AS FOLLOWS:-

(1) In consideration of the Company having agreed to advance a sum of Rs._____ (Rupees_____ only) to the Contractor , the Guarantor do hereby guarantee the due recovery by the Company of the said advance with interest thereon as provided according to the terms and conditions of the Contract. If the said Contractor fails to utilise the said advance for the purpose of the Contract and /or the said advance together with interest as aforesaid is not fully recovered by the Company the Guarantor do hereby unconditionally and irrevocably undertake to pay to the Company without demur and merely on a demand, to the extent of the said sum of Rs._____ (Rupees_____ only) any claim made by the Company on them for the loss or damage caused to or suffered by the Company by reasons of the Company not being able to recover in full the advance with interest as aforesaid.

BANK GUARANTEE FOR INTEREST BEARING REFUNDABLE ADVANCE

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(2) The decision of the Company whether the Contractor has failed to utilise the said advance or any part thereof for the purpose of the Contract and / or as to the extent of loss or damage caused to or suffered by the Company by reason of the Company not being able to recover in full the said sum of Rs._____ with interest if any shall be final and binding on the Guarantor, irrespective of the fact whether the Contractor admits or denies the default or questions the correctness of any demand made by the Company in any Court Tribunal or Arbitration proceedings or before any other Authority.

(3) The Company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the Contract or extend time of performance by the Contractor or to postpone for any time and from time to time any of the powers exercisable by it against the Contractor and either enforce or forebear from enforcing any of the terms and conditions governing the Contract or securities available to the Company and the Guarantor shall not be released from its liability under these presents by any exercise by the Company of the liberty with reference to the matters aforesaid or by reasons of time being given to the Contractor or any other forbearance, act or commission on the part of the Company or any indulgence by the Company to the Contractor or of any other matter or thing whatsoever which under the law relating to sureties would, but for this provision have the effect of so releasing the Guarantor from its liability under this guarantee.

(4) The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect during the period till the Company discharges this Guarantee, subject to however, that the Company shall have no claim under this Guarantee after_____ i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time, as the case may be) unless a notice of the claim under this Guarantee has been served on the Guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor not withstanding the fact that the same is enforced after the expiry of the said period.

(5) The Guarantor undertakes not to revoke this Guarantee during the period it is in force except with the previous consent of the Company in writing and agrees that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the Contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

(6) It shall not be necessary for the Company to proceed against the Contractor before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealised.

(7) Notwithstanding anything contained herein before, our liability under the Guarantee is restricted to Rs._____(Rupees_____). Our guarantee shall remain in force until _____, i.e. the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time. Unless a claim or demand under this guarantee is made against us on or before---------, we shall be discharged from our liabilities under this Guarantee thereafter.

BANK GUARANTEE FOR INTEREST BEARING REFUNDABLE ADVANCE

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(8) Any claim or dispute arising under the terms of this document shall only be enforced or settled in the courts at Nagpur only.

(9) The Guarantor hereby declares that it has power to execute this Guarantee under its Memorandum and Articles of Association and the executant has full powers to do so on its behalf under the Power of Attorney dated_____ (To be incorporated by the Bank) granted to him by the proper authorities of the Guarantor.

IN WITNESS whereof the _____(Bank) has hereunto set and subscribed its hand the day, month and year first, above written.

(Name of the Bank)

Signed for and on behalf of the Bank
(Designation of the Authorized Person Signing the Guarantee)

(Signatory No.----------)

DATED:

SEAL

==========

Notes :

1. The BG shall be executed on non-judicial stamp papers of adequate value procured in the name of the Bank in the State where the Bank is located.

2. The BG is required to be sent by the executing Bank directly to BHEL at the address where tender is submitted / accepted, under sealed cover.

FORM for EXTENSION OF VALIDITY OF BANK GUARANTEE

1. To be typed on non judicial Stamp Papers of value as applicable in the State of India from where the BG has been issued or the State of India where the BG shall be operated
2. The non judicial stamp papers shall be purchased in the name of the Party on whose behalf the BG is being issued or the BG issuing Bank

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BANK GUARANTEE No:
Date:……..

To

(Write Designation and Address of Officer of BHEL inviting the Tender)

Dear Sir

Sub : Validity of Bank Guarantee No:……. Dated ……. for ……. Rs …… in favour of yourself, expiry date ……., on account of M/s …… in respect of Contract Number..……., (herein after called the Original bank Guarantee)

At the request of M/s……., we …….. Bank, having its branch Office at …….. and having Head office at ……, do hereby extend our liability under the above mentioned Bank Guarantee number…….. dated …… for a further period of ……..Months/years from …… to expire on ……..

Except as provided above, all other terms and conditions of the Original Bank Guarantee No ……. Dated…… shall remain unaltered and binding on us.

Kindly treat this extension as an integral part of the original Bank Guarantee to which it would be attached.

Yours faithfully

Signature…….
Name & Designation……..
Power of Attorney/Signing Power No
Seal of Bank

PE&SD

MONTHLY PLAN & REVIEW WITH CONTRACTOR

Name of Site		Contract No.	
		Name of Contractor	
Review for the month of		Brief Scope of work	
Date of Review			

PART- A PHYSICAL REVIEW

Sl.No.	Description of work	Unit of Measurement	Original Plan (QTY Planned for the month as per joint review of previous month)	Last months shortfall (attributable to Contractor)	Total Planned for the month (including previous month backlog attributable to Contractor)	Achieved	Shortfall attributable to (in Qty)		REMARKS
			(a)	(b)	C=(a)+(b)		BHEL	Contractor	
		UOM	Phy.	Phy	Phy	Phy.	Phy.	Phy.	

Use separate sheets if necessary

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

PE&SD	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 2 of 4

CONTRACT NO:

CONTRACTOR:

PART – B-1 REVIEW OF DEPLOYMENT OF MAJOR T&Ps

SUPPLIER SCOPE:-

SN.	MAJOR T&P TO BE DEPLOYED AS PER WORK PLANNED FOR THE MONTH	QTY.	DEPLOYMENT STATUS (ACTUAL DEPLOYED)	REMARKS (WORKS EFFECTED DUE TO NON-DEPLOYMENT OF T&Ps

BHEL SCOPE:-

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

PE&SD	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 3 of 4

CONTRACT NO:

CONTRACTOR:

PART – B-2 REVIEW OF DEPLOYMENT OF MANPOWER

SUPPLIER SCOPE:-

SNO.	AREA OF WORK	CATEGORY OF LABOUR	NO. OF LABOUR REQUIRED AS PER CATEGORY	DEPLOYED FOR THE PERIOD	REMARKS (WORKS AFFECTED DUE TO NON-AVAILABILITY OF LABOUR)

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

PE&SD	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 4 of 4

CONTRACT No.:

Date of Report:

PART C1 : PLAN FOR THE NEXT MONTH (PHYSICAL)

SL NO.	DESCRIPTION OF WORK (Area Wise)	PLANNED MT/ % / QTY (EXCLUDING SHORTFALLS ATTRIBUTABLE TO CONTRACTOR TILL DATE)	T&Ps REQUIRED	MANPOWER REQUIRED	REMARKS

NOTE: USE SEPARATE SHEETS, IF REQUIRED

PART C2: PLAN FOR THE NEXT MONTH (OTHERS)

SL NO.	DESCRIPTION OF WORK (Area Wise)	PLANNED MT/ % / QTY	T&Ps REQUIRED	MANPOWER REQUIRED	REMARKS

NOTE: USE SEPARATE SHEETS, IF REQUIRED

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

PE&SD	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page 5 of 4

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

QUARTERLY EVALUATION OF OF CONTRACTOR PERFORMANCE

NOTE: This evaluation should be done **EVERY QUARTER *** by the respective Regions for all Contracts under executions

* : March, June, September & December of every year

A	GENERAL	
1	Reporting Period	Quarter ending : Year :
2	Name of Site	
3	Name of Contractor	
4	Contract Number/LOI Number & Date	
5	Name of Work	
6	Contract Start Date	
	I. As per Conctract	
	II.Actual Date of Start	
7	Completion Status (as on date)	
	I.Physical completion in %age	
	II.Running Bill amount paid in %age of Contract Value	
8	Scheduled Completion Time	
9	Actual Date of Completion	
10	Awarded Contract Value	
11	Final contract Value	

BHEL	Contractor
(Signature with Name, Designation & date)	(Signature with Name, Designation & date)

QUARTERLY EVALUATION OF CONTRACTOR PERFORMANCE

		MAX SCORE
1.0 QUALITY		
1.1	Amenability to Quality System	5
1.2	Adherence to Quality Standards	5
1.3	Preventing recurrence of Defects/Complaints	5
1.4	Finishing and aesthetics	5
1.5	Housekeeping	5
1.6	Rating of Quality Officer for Quality Control of Job	5
2.0 DELIVERY		
2.1	Achievements vis a vis Requirements/Commitments	5
2.2	Timely Depoyment of Manpower	5
2.3	Timely Depoyment of T&Ps and MMEs	5
2.4	Timely arrangement of Consumables	5
3.0 MANPOWER		
3.1	Experience and Job knowledge of Supervisory personnel	5
3.2	Aptitude of supervisory Personnel (w.r.t. Attitude, Initiative, Leadership, Cooperativeness, etc.)	5
3.3	Adequacy of Manpower (Work Force) deployed	5
3.4	Competence of Manpower (Work Force) deployed	5
4.0 T&P, IMTEs &CONSUMABLES		
4.1	Adequacy of T&P & MMEs as per Site requirement	5
4.2	Condition of T&P & MMEs	5
4.3	Ensuring Fitness & Calibration of T&P & MMEs	5
4.4	Adequacy of Consumables as per Site requirement	5
5.0 SITE INFRASTRUCTURE AND SERVICE		
5.1	Site Organization vis a vis Commitment	5
5.2	Readiness to rectify Defects	5
5.3	Providing support Documents and Records	5
5.4	Speed of responce	5
5.5	Cooperativeness in Delivering and Implementing Improvement Measures	5
5.6	Approachability of Top Management during critical requirements and its cooperation	5

BHEL

(Signature with Name, Designation & date) (Signature with Name, Desig

QUARTERLY EVALUATION OF CONTRACTOR PERFORMANCE

6.0	**SITE FINANCE**	
6.1	Regularity in Payment to Staff and Workers	5
6.2	Financing Site Operation	5
7.0	**HSE (Health Safety & Environment) & SA (Social Accountability)**	
7.1	Health & Safety Awareness among Employess	5
7.2	Rating of Safety Supervisor on HSE Aspects	
7.2.1	Experience and Job knowledge of Safety Supervisor	5
7.2.2	Rating of safety Supervisor for controlling Safety at Site	5
7.3	Quality &Usage of Safety gadgets	
7.3.1	Personal Protective Equipments (PPE)	5
7.3.2	Use of Safety Equipments & Safety in Equipments (Safety Net, Toeguard, Proper earthing,Fire-fighting Equipments etc.)	5
7.4	Use of Safety Posters	5
7.5	Compliance to Social Accountablity Norms	5
7.6	Rating based on feed back of HSE & SA Audits	5
8.0	**OTHERS**	
8.1	Concern for Employees Welfare and Health (like First Aid)	5
8.2	Compliance to Statutory Requirements, State and Local Laws/Regulations	5
8.3	Tendency of taking undue advantage by interpreting Contract Clauses in their favour (Score 5 for no tendency)	5
8.4	Understanding of Contract (Scope & Contract Clauses)	5
8.5	Planning of Work Activities(Monthly/Weekly/Daily)	5
8.6	Submission of Monthly/Weekly/daily Report	5

BHEL

(Signature with Name, Designation & date) (Signature with Name, Desig

SCORE OBTAINED

Contractor
nation & date)

Contractor
nation & date)

QUARTERLY EVALUATION OF CONTRACTOR PERFORMANCE

Sl No	Category	Max Score	Score obtained	Weightage factor	Weighted Score
1	Quality	30		0.4	
2	Delivery	20		0.75	
3	Manpower	20		0.6	
4	T&Ps, MMEs & Consumables	20		0.75	
5	Site Infrastructure & Service	30		0.4	
6	Site Finance	10		1.1	
7	HSE & SA	40		0.35	
8	Others	30		0.3	
9	**Total Weighted Score**				
10	Any detail which Construction Manager wants to share with Management				
11	**Less** Score for Accidents attributable to Contractor during the Reporting Period (Major at@3 Minor@1)				
a	Major Accidents-----Fatal,Permanent Disability, Major Damage to Equipment.				(-)
b	Minor Accidents ----- All others				(-)
12	**Net Weighted Score (OUT OF 100):**				

Overall Performance Evaluation : **Good / Satsfactory / Unsatisfactory**

Net Weighted Score

80% and Above - Good
Between 60% To 80% -Satisfactory
60% and Below -Unsatisfactory

Dated: **Section Head/ Site Engineer**

Specific Recommendation of Construction Manager:

Construction Manager

FOR SUB CONTRACT DEPT.

Dated **Head (S/C)**

GM/PROJECTS

Note:This summary evaluation sheet is to be sent to Contractor after every Evalution

BHEL	**ANNUAL EVALUATION OF CONTRACTOR PERFORMANCE** **(EVALUATED FINANCIAL YEAR WISE AT HQ)**	**Page 1 of 1**

1. **Contract No.:**
2. **Contractor:**
3. **Name of Site :**
4. **Reporting Period (Financial Year):**

Sl No	QUARTER	Net Weighted score
1	Quarter-I	
2	Quarter-II	
3	Quarter-III	
4	Quarter-IV	
5	Total for the 4 Quarters	
6	Average for the Year (Financial Year)	
7	**Annual Evaluation of Contractor Performance** **(based on net weighted score)**	➢ **80% and above : Good** ➢ **Between 60% to 80% : Satisfactory** ➢ **60% and below : Unsatisfactory**

Comments if any:

Head/Subcontracts

Date: **General Manager/Projects**

BHEL	**OVERALL PERFORMANCE OF CONTRACTOR FOR THE CONTRACT** **(EVALUATED CONTRACT WISE AT HQ)**	**Page 1 of 1**

1. **Contract No.:**
2. **Contractor:**
3. **Name of Site :**
4. **Reporting period (From : To :)**

Sl No	FINANCIAL YEAR	QUARTER	Net Weighted score
1		Quarter-I	
		Quarter-II	
		Quarter-III	
		Quarter-IV	
2		Quarter-I	
		Quarter-II	
		Quarter-III	
		Quarter-IV	
3		Quarter-I	
		Quarter-II	
		Quarter-III	
		Quarter-IV	
4		Quarter-I	
		Quarter-II	
		Quarter-III	
		Quarter-IV	
5		Total for all the quarters	
6		Average for the all the Quarters (Contract Period)	
7		**Overall Performance for the Contract** **(based on net weighted score)**	➢ **80% and above : Good** ➢ **Between 60% to 80%: Satisfactory** ➢ **60% and below : Unsatisfactory**

Comments if any:

Head/Subcontracts

Date:

General Manager/Projects

Form No: F-19 (Rev 00)

MILESTONE COMPLETION CERTIFICATE
(issued by BHEL on the specific request of Contractor)

Ref :
Date:

To,

(Name & address of Contractor)

Dear Sir,

References
1. Contract No:
2. Job Description:

This is to hereby confirm that the following Milestone Activity has been achieved in respect of the Contract /Job under reference

Sl No	Milestone Activity	Remarks

This certificate is issued as per your request vide letter no ……. without any prejudice to the rights of BHEL in line with the terms and conditions of the above referred Contract

Yours faithfully,

For and on behalf of Bharat Heavy Electricals Limited

Construction Manager/Head (Subcontracts)

CONTRACT COMPLETION CERTIFICATE
(Issued by BHEL/HQ on the specific request of Contractor)

Ref :
Date:

To Whom so ever it may concern

1	DESCRIPTION OF WORK	
2	NAME AND ADDRESS OF THE CONTRACTOR	
3	CONTRACT NO	
4	CONTRACT VALUE	
5	LETTER OF INTENT NO & DATE	
6	CONTRACT PERIOD//CONTRACT DURATION	
7	FINAL EXECUTED VALUE	
8	PERFORMANCE	GOOD SATISFACTORY UNSATISFACTORY

This certificate is issued as per your request vide letter no …….
without any prejudice to the rights of BHEL to use this certificate for evaluation of your offers for future tenders

Yours faithfully,

For and on behalf of Bharat Heavy Electricals Limited

Head (Subcontracts)

INDEMNITY BOND

(To be executed on a Non Judicial Stamp Paper of the requisite value as per Stamp Duty prevalent in the respective State)

This Indemnity Bond executed by <name of company> having their Registered Office at <xxxxxxxxxx> in favour of M/s Bharat Heavy Electricals Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at BHEL House, Siri Fort, Asiad, New Delhi - 110049 through its Unit at Bharat Heavy Electricals Limited, PE&SD ,Ramachandrapuram , Hyderabad-502 032.

And whereas the Company has entered into a Contract with M/s xxxxxxxxx, the executants of this Deed (hereinafter referred to as the Contractor) as its contractor in respect of the work of "xxxxxxxxxxxxxxxxxxxxxxxxxx".

AND WHEREAS under the provisions of GCC further stipulates that the Contractor shall indemnify the Company against all claims of whatever nature arising during the course of execution of Contract including defects liability period of <xx Months > i.e till <xx xx xxxx>

Now this deed witness that in case the Company is made liable by any Authority including Court to pay any claim or compensation etc. in respect of all labourers or other matters at any stage under or relating to the Contract with the Contractor , the Contractor hereby covenants and agrees with the Company that they shall indemnify and reimburse the Company to the extent of such payments and for any fee, including litigation charges, lawyers' fees, etc, penalty or damages claimed against the Company by reason of the Contractor falling to comply with Central/States Laws, Rules etc, or his failure to comply with Contract (including all expenses and charges incurred by the Company).

The Contractor further indemnifies the Company for the amount which the Company may be liable to pay by way of penalty for not making deductions from the Bills of the Contractor towards such amount and depositing the same in the Government Treasury.

The Contractor further agree that the Company shall be entitled to with hold and adjust the Security Deposit and/or with hold and adjust payment of Bills of Contractor

INDEMNITY BOND

(To be executed on a Non Judicial Stamp Paper of the requisite value as per Stamp Duty prevalent in the respective State)

---

pertaining to this Contract against any payment which the Company has made or is required to make for which the Contractor is liable under the Contract and that such amount can be withheld, adjusted by the Company till satisfactory and final settlement of all pending matters and the Contractor hereby gives his consent for the same.

The Contractor further agrees that the terms of indemnity shall survive the termination or completion of this contract.

The contractor further agrees that the liability of the contractor shall be extended on actual basis notwithstanding the limitations of liability clause, in respect of :

1. breach of terms of contract by the contractor
2. breach of laws by the contractor
3. breach of Intellectual property rights by the contractor
4. breach of confidentiality by the contractor

Nothing contained in this deed, shall be construed as absolving or limiting the liability of the Contractor under said Contract between the Company and the Contractor. That this Indemnity Bond is irrevocable and the condition of the bond is that the Contractor shall duly and punctually comply with the terms and the conditions of this deed and contractual provisions to the satisfaction of the Company.

In witness where of M/s xxxxxxxxxxxx these presents on the day, month and year first, above written at xxxxxxxx by the hand of its signatory Mr. xxxxxxxxxx.

Signed for and on behalf of
M/s xxxxxxxxxxxxxx

Witness:
1
2

CONSORTIUM AGREEMENT

(To be executed on Rs. 50/- Non – Judicial Stamp Paper)

THIS AGREEMENT is made and executed on this _____ day of _____, by and between (1) M/s _____ , (The First Party, i.e, the Bidder) a company incorporated under the Company's Act 1956, having its registered office at _____(herein after called the "Bidder", which expression shall include its' successors, administrators, executors and permitted assigns) and (2) M/s _____, (The Second Party, i.e, the associates (Guarantor)), a company incorporated under the Company's Act 1956, having its registered office at _____ (herein after called the " Guarantor", which expression shall include its' successors, administrators, executors and permitted assigns).

WHEAEAS the Owner, Bharat Heavy Electricals Ltd, a Government of India Undertaking, proposes to issue / issued an NIT (herein after referred to as the said NIT) inviting bids from the individual Bidders for undertaking the work of _____, at _____ (herein after referred to as the said works).

WHEREAS the said NIT enables submission of a bid by a Consortium subject to fulfillment of the stipulations specified in the said NIT.

AND WHEREAS M/s _____ (The First Party, i.e, the Bidder) will submit its proposal in response to the aforesaid invitation to bid by the Owner for _____ as detailed in the Bid doc. no. < TENDER REF-------->

AND WHEREAS M/s _____ (The First Party, i.e the Bidder) is willing to execute the said work under the complete supervision of M/s_____ (The Second Party, the Guarantor) and this tie-up agreement is being entered into with M/s _____ (The Second Party, the Guarantor) , who has guaranteed the first party entire technical support and supervision for executing said works (_____).

WHEREAS the First Party and the Second Party are contractors engaged in the business of carrying out various items of works. WHEREAS the two parties have agreed to constitute themselves into a consortium for the purpose of carrying out the said works by the First Party under the support and supervision of second party, and that the consortium will be continued till the completion of the works in all respects.

WHEREAS the parties have agreed to certain terms and conditions in this regard:

CONSORTIUM AGREEMENT

NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS :

1. First and Second parties hereby constitute themselves into a Consortium for the purpose of bidding and undertaking the said works by the first party under the support and supervision of second party pursuant to the said NIT as hereinafter stated.

2. The First Party will be the Prime bidder (Lead Partner) and will be responsible for the entire works and Second Party shall be Back-up Guarantor.

3. The First Party shall undertake the entire scope of work detailed in the NIT namely _____
_____

4. The Second Party shall undertake/guarantee to provide technical support and supervision to first party to carry out entire scope of work.

5. The parties hereby declare and confirm that each of them will fulfill the required minimum qualifying requirements as prescribed in the said NIT.

6. It is also agreed between the parties hereto that all of them shall be individually and severally responsible for the completion of the said works as per the schedule. Further, if the Employer/Owner sustains any loss or damage on account of any breach of the Contracts, we the, Consortium partners individually and severally undertake to promptly indemnify and pay such losses / damages caused to the Employer/Owner on its written demand without any demur, reservation, contest or protest in any manner whatsoever.

7. The parties hereby agree and undertake that they shall provide adequate finances, suitable Tools, Plants, Tractors, Trailers, other transportation equipment, other Tools & Plants, Measuring & Monitoring Equipments (MMEs), Men and Machinery etc. for the proper and effective execution of the works to be undertaken by them as specified here-in-above.

8. It is agreed interse between the parties hereto that all the consequences liabilities etc., arising out of any default in the due execution of the said works shall be borne by the party in default, that is by party in whose area of works default has occurred, provided however, so far as M/s Bharat Heavy Electricals Limited is concerned, all the parties shall be liable jointly and severally.

IN WITNESS HEREOF the parties above named have signed this agreement on the day month and year first above written at _____(Place) .

CONSORTIUM AGREEMENT

WITNESS For

1. NAME (FIRST PARTY)
2. OFFICIAL ADDRESS

WITNESS For

1. NAME (SECOND PARTY)
2. OFFICIAL ADDRESS

[The successful bidder shall have to execute the " JOINT DEED OF UNDERTAKING " in the format to be made available by BHEL at the time of awarding].

Form No: F-23 (Rev 00)

REFUND OF SECURITY DEPOSIT

To,

The Construction Manager
BHEL Site Office

Dear Sir,

Sub : **Refund of Security Deposit**
Ref : Contract No: ……,
Work:……..

I/We have submitted Final Bill in respect of the above Contract/Work vide our letter no:…… dated …….. . In line with Tender conditions (GCC clause no 1.11), kindly arrange to release/refund the Security Deposit along with Final Bill payments.

The details of Security Deposit are as below:

1. Cash Portion :
2. BG Portion :

Thanking You

Date: _____ Authorised representative of Contractor

==========

To be filled up by BHEL

1. Security Deposit to be refunded:
    a. Cash Portion:
    b. BG Portion :
2. Less
    a. Amount spent by BHEL on behalf of Contractor:
    b. Payments made by BHEL on behalf of Contractor:
    c. Other recoveries for Services etc
    d. Any other recoveries
    e. Total of 'a' to 'd':
3. Net Amount to be released (1-2) :
4. Certified that
    a. The payment recommended for release is in order and there are no demands other than those included in the claim outstanding from the Contractor
    b. Contract Guarantee period of ……. Months commenced wef :_____
    c. All objections raised so far have been settled
    d. A note for refund of Security Deposit has been made in the Measurement Book

Signature of BHEL Engineer

Construction Manager

Date:----------

REFUND OF GUARANTEE MONEY

BHARAT HEAVY ELECTRICALS LIMITED
PE&SD,HYDERABAD.

Ref No: Date:

1. Name and Address of Contractor :
2. Contract Agreement/LOI No :
3. Date of Contract Agreement/LOI :
4. Name of the Work undertaken :
5. Date of commencement of the Work :
6. Date of Completion of the Work :
7. Period of Maintenance : (Guarantee Period)
8. Date on which the Final Bill was paid :
9. Last date of making good the defect : during Maintenance Period
10. Expenditure incurred by BHEL during : Maintenance Period, if any, recoverable
11. Date on which Guarantee Money refund: falls due as per Contract
12. Amount of Guarantee Money to be refunded:
13. Less Amounts recoverable (with details)
    a. Amount spent by BHEL on maintenance :
    b. Payments made by BHEL on behalf of Contractor:
    c. Court dues/penalties/compensation :
    d. Other recoveries for Services, etc :
    e. Total of 'a' to 'd' :
14. Net Amount recommended for release (12-13) :

Signature of BHEL Engineer

Date: _____

REFUND OF GUARANTEE MONEY

BHARAT HEAVY ELECTRICALS LIMITED
PE&SD,HYDERABAD.

CERTIFICATE TO BE FURNISHED BY THE CONTRACTOR

I/We have no claim or demand outstanding against BHEL_____, for the work done or for labour or material supplied or any other account arising out of or connected with the Contract Agreement/LOI (No_____ dated _____) and the payment of this bill shall be in full and final settlement of all my/our claims and demands including the 'Deposits' of the Contract Agreement/LOI referred to.

Signature of Contractor

Date:

CERTIFICATE TO BE FURNISHED BY SENIOR ENGINEER/CONSTRUCTION MANAGER

1. Certified that
    a. The payment recommended for release is in order and there are no demands other than those included in the claim outstanding from the Contractor
    b. Maintenance period (Contract Guarantee period) is over and the Contractor has carried out the works required to be carried out by him during the period of maintenance (Guarantee) to our satisfaction, and all expenses incurred by the Company on carrying out such works have been included for adjustment
    c. All objections raised so far have been settled
    d. A note for refund of Guarantee Amount has been made in the Measurement Book and Contract Agreement/Work Order

Signature of BHEL Engineer

Construction Manager

Date:----------

FOR USE IN ACCOUNTS DEPARTMENT

Passed for Rs_____ (Rupees _____ only)

Accountant Accounts Officer

ACKNOWLEDGE BY THE CONTRACTOR

Received Rs _____ in full and final settlement of my/our claim

Signature of Contractor

Date:

POWER OF ATTORNEY for SUBMISSION OF TENDER/SIGNING CONTRACT AGREEMENT

(To be typed on non judicial Stamp Papers of appropriate value as applicable and Notarised)

KNOW ALL MEN BY THESE PRESENTS, that I/We do hereby make, nominate, constitute and appoint Mr …….. , whose signature given below herewith to be true and lawful Attorney of M/s……. hereinafter called 'Company', for submitting Tender/entering into Contract and inter alia, sign, execute all papers and to do necessary lawful acts on behalf of Company with Bharat Heavy Electricals Limited, PE&SD, Ramachandrapuram , Hyderabad-502 032 in connection with ……
……
…… vide Tender Specification No : _____, dated _____.

And the Company do hereby agree to ratify and confirm all acts, deeds, things or proceedings as may be lawfully done by the said attorney and by or on behalf of the company and in the name of the company, by virtue of the powers conferred herein and the same shall be binding on the company and shall have full force and effect.

IN WITNESS WHEREOF the common seal of the company has been hereunto affixed in the manner hereinafter appearing on the document.

Dated at _____, this _____ day of _____

Director/CMD/Partner/Proprietor

Signature of Mr……(Attorney)

Attested by: Director/CMD/Partner/Proprietor

Witness

Notary Public

ANALYSIS OF UNIT RATES QUOTED

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

Offer Reference No:…… Date:……

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : Analysis of Unit Rates Quoted
Ref : Tender Specification No: ……

Analysis of Unit Rates quoted by us in respect of above Tender is as detailed

SN	DESCRIPTION	% OF QUOTED RATE	REMARKS
01	SITE FACILITIES VIZ., ELECTRICITY, WATER OTHER INFRASTRUCTURE.		
02	SALARY AND WAGES + RETRENCHMENT BENEFITS		
03	CONSUMABLES		
04	T&P DEPRECIATION & MAINTENANCE		
05	ESTABLISHMENT & ADMINISTRATIVE EXPENSES		
06	OVERHEADS		
07	PROFIT		
	TOTAL	100%	

Yours faithfully,

(Signature, Date & Seal of Authorized Representative of the Bidder)

Form WAM 6

BHARAT HEAVY ELECTRICALS LIMITED

DIVISION……

Running Account Bill

(Para 4.31.1 of Works Accounts Manual)

Name of the Contractor: Departmental Bill no: Date:

Name of the Work: Division: Sub-Division:

Sanctioned Estimate: Date of written order to commence the work :

Code No: Date of commencement of the Work:

Contract Agreement No : Dated: Due date of completion as per Agreement:

1. ACCOUNT OF WORK EXECUTED

On account payment for work not previously previously measured**			Item No of	Description of Work	Quantity as per agree-ment	Quantity executed up to date	Rate	Unit	Payment on the basis of actual measure-ment up to date	Quantity since last running account bill	Payment on the basis of actual measurement since last running account bill	Remarks
Total As per Running Account bill	since last running account bill	Total up to date										
Rs.	Rs.	Rs.					Rs.	P.	Rs.	P.	Rs. P.	
1	2	3	4	5	6	7	8	9	10	11	12	13

* *1. Whenever payment is made on 'on account' basis without actual measurements the amount in whole rupees should be entered in columns 1 to 3 only and not in columns 7 to 12.

2. whenever there is an entry in column 12 on the basis of actual measurement, the whole of the amount previously paid without detailed measurement should be adjusted by a minus entry in column 2 equivalent to the amount shown in column 1, so that the total up to date in column 4 may become nil.

Form WAM 6 (contd…)

1	2	3	4	5	6	7	8	9	10	11	12	13

Total value of work done up to date	(A) …
Deduct value of work shown on the last Running Account Bill	(B) …
Net value of work done since last	(C) …

Rupees (in words) ……only.

Form WAM 6 (contd…)

II.MEMORANDUM OF PAYMENTS

		Rs. P.	I Rs. P.	II Rs. P.
1. Total value of work actually measured as per Account No. I. Column 10	(A)	……		……
2. Total up to date 'on account' payment for work covered by approximate Or plan measurements as per Account No. I, Column 3	(B)	……		……
3. Total up to date secured advances on security of materials as per column 8 Of the enclosed Account (Form WAM 10)	(C)	……		……
4. Total up to date payments [(A) + (B) + (C)]	(D)	……		……
5. Total amount of payments already made as per Entry (D) of last Running Account Bill No…….. Dated……..forwarded to the Accounts Office on …….	(E)			
6. Balance [(D)-(E)]		……		
7. Payments now to be made:				
a) by cash/cheque			……	
b) by deduction for value of materials supplied				
c) by BHEL vide Annexure A attached			……	
d) by deduction for hire of tools and plant vide Annexure B attached			……	
e) by deduction for other charges vide Annexure C Attached			……	
f)by deduction on account of security deposit			……	
h) by deduction on account of Income Tax			……	……

Note: Amounts relating to items 4 to 6 above should be entered in column II and those relating to item 7 in column I. The amount shown against item 6 and the total of item 7 should agree with each other.

III.CERTIFICATE OF THE ENGINEER IN CHARGE **Form WAM 6 (contd…)**

1. The measurements on which the entries in column 7 to 12 of Part I of this Bill (Account of work executed) are based were made by……and are recorded at pages……..of
(Name and Designation)
Measurement Book No ……..
2. Certified that the methods of measurement are correct and the work has been carried out in accordance with the terms and conditions, schedules, specifications and drawings etc, forming part of the contract agreement, subject to deviations included in the deviation statement (Annexure D).
3. Certified that in addition to and quite apart from the quantities of work actually executed as shown in column 10 of Part I, some work has actually been done in connection with several items and the value of the such work is, in no case, less than 'on account' payments as per column 3 of Part I, made or proposed to be made, for the convenience of the contractor in anticipation of, and subject to the results of, detailed measurement which will be made as soon as possible.

Signature of Contractor — Signature of Engineer in charge
Date: — Designation:
Date:

IV. CERTIFICATE OF THE SENIOR ENGINEER

1. Certified that measurements have been check measured to the prescribed extent by …….. ……at site and also by the undersigned and the relevant entries have been intialled in the Measurement book. (vide pages……)
(Name and Designation)
2. Certified that all the measurements recorded in the measurement book have been correctly billed for
3. Certified that all recoberable amounts in respect of materials tools and plant etc, and other charges have been correctly made vide Annexures A to C attached.

Certified for payment * of Rs…….(Rupees……only)
To be paid in cash/by cheque in the presence of …….

ALLOCATION

The expenditure is chargeable as under and to be included in the accounts for……20……

Ledger Head	Debit (Gross amount) Rs. P.	Credit (Deductions) Rs. P.
Total		

* Here specify the net amount payable.

Signature of Senior Engineer
Date:

V.ENTRIES TO BE MADE IN THE ACCOUNTS OFFICE

Accounts Bill No ……Dated……..
Entered in Journal Book vide entry No…….Dated…….
Passed for……Rs……
Less Deductions……..Rs……
Net Amount Payable…….Rs……...
(Rupees…….only)
Payable to Shri/M/s……by cheque/cash
Entered in Contractor's Ledger No……Page……..

ALLOCATION

Estimate No: Code no:
Name of the Work:

Ledger Head	Debit (Gross amount) Rs. P.	Credit (Deductions) Rs. P.
_ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _
	_ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _
Total	_ _ _ _ _ _ _	_ _ _ _ _ _ _ _

Assistant Date:
Accountant Date:
Account Officer Date:

VI. Received Rs……(Rupees……only) as per Memorandum of Payments on account of this work.

Signature of witness
Address :

Date:

Revenue Stamp
Signature of Contractor
Date:

VII. ENTRIES TO BE MADE BY TREASURY SECTION

Cash Book entry No. and date:

Amount paid Rs…….

Amount unpaid Rs…….

Total Rs…….

Signature of Cashier
Date:

Form WAM 6 (contd…)

ANNEXURE A

Statement showing details of materials issued to the contractor Shri/M/s……

In respect of Contract Agreement No ……..Dated……

Sl. No.	Stores issue Voucher No. and date	Issue voucher No. and date allotted by stores to the SIV	Description of material issued to the contractor	Quantity issued	Quantity actually incorp-rated in the work	Whether recover-able from the contrac-tor or supplied free	If recoverable from the contractor				REMARKS
							Rate at which recover-able	Amount recover-able	Amount recover-ed up to previous bill	Balance now recover-ed	
							Rs. P.	Rs. P.	Rs. P.	Rs. P.	
1	2	3	4	5	6	7	8	9	10	11	12
			Total								

Signature of contractor
Date:

Signature of Engineer in Charge
Date:

Signature of Senior Engineer
Date:

Form WAM 6 (contd…)

ANNEXURE B

Statement showing tools and plant issued to the contractor Shri/M/s……

In respect of Contract Agreement No ……..Dated……

Sl. No	Description of tools and plant issued	Period for which Issued	Rate at which recovery Is to be Made Rs. P.	Amount recover-able Rs. P.	Amount recovered upto previous bill Rs. P.	Balance now recovered Rs. P.	Remarks
1	2	3	4	5	6	7	8
			Total				

Signature of contractor
Date:

Signature of Engineer in Charge
Date:

Signature of Senior Engineer
Date:

Form WAM 6 (contd…)

ANNEXURE C

Statement showing details of other recoveries to be made from the contractor Shri/M/s……

In respect of Contract Agreement No ……..Dated……

Sl. No	Particulars	Unit	Quantity	Rate	Amount recover-able	Amount recovered upto pre-vious bill	Amount now recovered	Remarks
				Rs. P.	Rs. P.	Rs. P.	Rs. P.	
1	2	3	4	5	6	7	8	9
1.		Water Charges						
2.		Electricity charges						
3.		Seignorage charges						
4.		Medical charges						
5.	Empty containers not returned	Cost of empty gunny bags and						
6.								
7.								
8.								
9.								
10.								
				Total				

Signature of contractor
Date:

Signature of Engineer in Charge
Date:

Signature of Senior Engineer
Date:

Form WAM 6 (contd…)

ANNEXURE D

Name of the Contractor: Contract Agreement No:
Name of the Work: Date:

Sl. No.	Description of item	Unit	Quantity as per Agreement	Quantity as executed	Quantity further anticipated	Total quantity anticipated on completion	Rate as per agreement Rs. P.
1	2	3	4	5	6	7	8

Rate as executed Rs. P.	Amount as per agreement Rs. P.	Amount as executed Rs. P.	Amount further anticipated Rs. P.	Total amount anticipated on completion Rs. P.	Difference Excess Rs. P.	Difference savings Rs. P.	Reason for the deviation with authority, if any
9	10	11	12	13	14	15	16

Signature of Engineer in Charge
Date:

Signature of Senior Engineer
Date:

ANNEXURE G

QUESTIONNAIRE TO BE ANSWERED BY ENGINEER IN CHARGE AND SENIOR ENGINEER	
(Correct particulers and answers to be recorded)	
Name of the work :	
Name of the Contractor :	
Date of commencement of the work:	
Contract agreement/work ordered no. and date:	
Reference to supplementary agreement no,if any :	
Whether adminstrative approval and techanical sanction has been accorded by the cmpetent authority ? If so ,citc reference	
Whether sanction of the competent authority and financial concurrencr of the Accounts Departnment for award of the work has been accorded ? If so,cite reference.	
Wheter the work has been completed in time ? If not ,wheter penalty has been levied or sanction of the competent authority for extension of time granted and communicated to the Accounts Department with reasons for grant of extension? (Due and actual date of completion of the work and reference to letter no. and date granting the extension of time should be given)	
(a) Wheter the rates allowed in the bill have been checked with the contract agreement ? (b) Wheter the rates for extra/supplemental items have been approved by the competent authority and the sanction communicated to the accounts Department together wiht rate analysis? If so,cite reference.	
Wheter deviations have been approved by the competent authority? If yes, give reference to the approval; if not, give reasons.	
Whether the rates of recovery of stores issued to the contractor which are not provided for in the Contract Agreement have been settled in counsultation with Finance?	
Whether discrepancies pointed out by the Accounts Department in the store statement have been reconciled and accepted by the Accounts Department?	

ANNEXURE G

QUESTIONNAIRE TO BE ANSWERED BY ENGINEER IN CHARGE AND SENIOR ENGINEER	
(Correct particulers and answers to be recorded)	
Whether materials issued to the contractor in excess of the theoretical requirements have been returned to the Stores Department and the no. and date of such retuened stores vouchers have been shown in stores statement? If not ,whether the cost of such excess material has been recovered at the prescribed rate? Whethre consumption statements in respect of materials chargeabale to the work have been attached to the bill?	
Whether consumption of materials shown has been technicaly checked by Senior Engineer?	
Whether materials isshued and used in the work is not less then that required for consumption in work accroding to our specification? If comsumption is less, whether necessary recovery has been made in the bill?	
Whether mesurments have been checked by the Engineer and Sr. Engineer to the extent required and certificates of check recorded in the mesurments books?	
Whether contractor has signed the bill and the mesurments books without reservations? If not; whether resones have been intimated to the Accounts Department?	
Whethet arithmatical calculations have been checked and certificate recorded in the mesurment books by a person other than the one who calculated initially	
Whether any work was done at the risk and cost of the contractor and whether such cost has been recovered from him? Give particulers.	
Whether all advance payments on running Accounts have been recovered?	
Whether tall the recovries due to services given to the contractor like rent of accommodation, water charges, electricity charges etc. have been recovered and wheather payments made by the company on behalf of the contractor have been adjusted?	
Whether the files containing abstracts from mesurments books/ standared mesurment books have been completed/ updated?	
Whether hire charges of tools and plant have been recovered and the statement of hire charges with full details attached?	

ANNEXURE G

QUESTIONNAIRE TO BE ANSWERED BY ENGINEER IN CHARGE AND SENIOR ENGINEER	
(Correct particulers and answers to be recorded)	
Whether the certificate of workmanship and completion of work according to specifications, drawings etc. is recorded by Engineer/ Sr. Engineer and whether recoveries have been made for defective works, if any?	
Whether all corrections in the bill/measurement books etc. have been neatly made and attasted and there are no overwriting?	
Whether final measurments have been taken as soon as possibal after completion of work and the cretificate of complition issued? If not, whether resons for delay have been recorded and communicated to Accounts?	
In respect of Quintites reduced in the final bill as compare to the running payment, whether adequate reasons have been recorded and communicated to Accounts	
Whether the Expeinditure has been classified correctly according to heads of Account recorded in the sanctioned estimate?	
Whether the work has been completed within the estimated cost? If not, what is the percentage of excess over thw sanctioned estimate/ addministrative approval? In case the excess is beyond the competency of Sr. Engineer, what action has been taken for the obtaining the approval of the authority complent to sanction the excess?	
(a) If the contractor has furnished bank guarantee in lieu of cash sequrity deposit towards proper exicuation of works and guarantee against defectsduring the maintenance period, whether the period of currency of the bank guarantee cover the entire maintenance period? (b) If not, whether sequrity deposite has been proposed to be recovred from the final bill?	
Whether all the previous audit objections raised on running Account bills have been settled? If so, cite refrence.	
Signature of Engineer in Charge	Signature of Engineer in Charge
Date:	Date:

BHARAT HEAVY ELECTRICALS LIMITED
DIVISION……
……And Final bill
(Para 4.3.2 Of Works Accounts Manual)

Name of Contractor		Departmental Bill no		Date	
Name of the Work		Division		Division	
Sanctioned Estimate		Date of written order to commence the work			
Contract Agreement/work Order No		Date of commencement of work			
		Due date of completion as per agreement			
		Date of actual completion of the work			

I. ACCOUNT OF WORK EXECUTED

On Account payment for the work not previously measured **			Item No of the agreement/ work order	Description of work	Quantity as per agreement	Quantity executed up to date	Rate Rs. P	Unit	Payment on the basis of actual measurement up to date Rs P	Quantity since last running account bill	Payment on the basis of actual measurement since last running account bill Rs P	Remarks
Total as per last running account bill Rs.	Since last running account bill Rs	Total up to date Rs										
1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

Total Value of Work Done up to date (A)	
Deduct Value of work shown on the last running account bill (B)	
Net value of work done since last running account bill (C)	

Rupees (In Words)…….Only

II MEMORANDUM OF PAYMENT

		Rs.	P
1	Total Value of work actually measured as per Account no I coloumn 10	(A)	
	Deduct amount of paym,ents already made as per last running account bill No …… Dated…….		
2	Forwarded to the Accounts Office on ……	(B)	
3	Payments now to be made { (A) - (B)}	(C)	
4	Deduct ammounts recoverable from the contractor on account of :	Rs	P
	a Material suplied by BHEL vide annexure A attached		
	b Hire of Tools & Plants vide Annexure B attached		
	c Other charges vide Annexure C attached		
	d Income Tax		
	Total deduction		
5	Balance		
6	Refund of 50% of security deposite on completion of work		
7	Net amount to be paid to the Contractor		

III. CERTIFICATE OF THE ENGINEER IN CHARGE

The measurement on which the entries in coulmns 7 to 12 of Part I of this bill (Account of work executed) are based were made by

……..

1 (Name and designation)

2 A statement showing the quantities of stores issued to the contractor (whether free or on recovery basis) and their disposal is attached.

Date:

Signature of Engineer in charge
Designation

IV CERTIFICATE OF THE SENIOR ENGINEER

1 Certified that I have personally inspected the work and that the work has been physically completed on the due date in accordance with the terms and Cretified that the measurements have been check measured to the prescribed extent by ……. ……. (Name & designation). And by the the undersigned at site and relevent entries have been initiated in the measurement book

2 (vide pages…… ….)

3 Certified that the methods of measurement are correct

4 Certified that the measurements have been technically checked with reference to contract drawings, deviations etc

5 Certified that all the measurements recorded in the measurement book have been correctly billed for at the contract rates or approved rates.

6 Certified that all the recoverable amounts in respect of stores, tools and pa\lant, e\water, electricity charges etc, have been correctly made vide Annexures A

7 Certified that the issues of all stores as per statement atytached (whether charged to the contractor or direct to the work) have been technically checked and

Certified for payment of * Rs ……. (Rupees…… (Only). To be paid in cash/by cheque in the presence of ……..

ALLOCATION

The expenditure as under and to be included in the accounts for ……..19

Ledger Head	Debit (Gross Amount) Rs. P	Credit (Deduction) Rs. P
…….	…….	……
Total	……	……

* Here specify the net amount payable

Signature of Senior Engineer
Date

V. ENTRIES TO BE MADE IN THE ACCOUNTS OFFICE

Account Bill no…… Dated …….
Entered in Journal book vide entry No……Dated……
Passed for……Rs……..
Less Deductions……..Rs……
(Rupees…….Only)
Payable to Shri/M/s…….... by cheque/cash
Entered in contractors' Ledger no..... Page

Assistant Accountant Accounts officer
Date: Date: Date:

ALLOCATION

Estimate No: Code No

Name of the Work ……

Ledger Head	Debit (Gross Amount) Rs P	Credit (Deduction) Rs
……	.....	.....
Total	.....	.....

VI. Received Rs……..(Rupees……..Only) in full and final settlement of all moneys due under this contract and I / we have no further claims of this contract.

Signature of Witness
Address

Revenue Stamp
Signature of Contractor
Date:

VII . ENTRIES TO BE MADE BY TREASURY SECTION

Cash book entry no and date :

Amount Paid Rs……
Amount unpaid Rs……..
Total Rs……..

Signature of Cashier
Date:

ANNEXURE A

Part I

Statement showing details of material issued to the contractor Shri/M/s…….. In respect of Contract Agreement/Work Order No…….. Dated …….

Sl No	Stores Issue voucher No and date	Issue voucher No and date alloted by stores to the SIV	description of material issued to the contractor	Quantity issued	Quantity actually incorporated in the work	Whether recoverable from the contractor or supplied free	If recoverable from contractor						Remarks
							Rate at which recoverable		Amount Recoverable		Amount recoverable upto previous bill		Balance Now recovered		
							Rs	P	Rs	P	Rs	P	Rs	P	
1	2	3	4	5	6	7	8		9		10		11		12

Total ……

Signature of Contractor
Date

Signature of Engineer in charge
Date

Signature of Senior Engineer
Date

ANNEXURE A

Part II

Statement showing details of material issued to the contractor Shri/M/s…….. in respect of Contract Agreement/Work Order No…….. Dated ……..and not covered by the agreement

Sl No	Stores Issue voucher No and date	Issue voucher No and date alloted by stores to the SIV	description of material issued to the contractor	Quantity issued	Quantity actually incorporated in the work	Issue Rate Rs P	Amount Recoverable Rs P	Amount recoverable upto previous bill Rs P	Balance Now recovered Rs P	Remarks
1	2	3	4	5	6	7	8	9	10	11

Total ……

Add Departmental Charges

Add Sales Tax (wherever applicable) ……..

Total ……..

Signature of Contractor
Date

Signature of Engineer in charge
Date

Signature of Senior Engineer
Date

ANNEXURE B

Statement showing TOOLS & PLANTS issued to the contractor Shri/M/s…….. in respect of Contract Agreement/Work Order No…….. Dated ……..and not covered by the agreement

Sl No	Description of tools & plants issued	Period for which issued	Rate at which Recivery is to be made	Amount recoverable Rs P	Amount recoverable upto previous bill Rs P	Balance Now recovered Rs P	Remarks
1	2	3	4	5	6	7	8

Total ……

Signature of Contractor
Date

Signature of Engineer in charge
Date

Signature of Senior Engineer
Date

ANNEXURE C

howing detail of other recoveries to be made from the contractor Shri/M/s……

ıent/Work Order No……Dated……

Sr.No	Particulars	Unit	Quantity	Rate Rs. P.	Amount recoverable Rs. P	Amount recovered upto previous bill Rs. P.	Amount now recovered Rs. P.	Remarks
1	2	3	4	5	6	7	8	9
1	Water Charges							
2	Electricity Charges							
3	Seignorage Charges							
4	Medical Charges							
5	Cost of empty gunny bags and empty containers not returned							
6								
7								
8								
9								
10								
	Total							

Signature of Contractor
Date

Signature of Engineer Incharge
Date

Signature of Sr. Engineer
Date

ANNEXURE F

Statement showing detail of materials issued to the contractor Shri/M/s……
t of Contract Agreement/Work Order No……Dated……

Name of work; **FREE OF COST**

Sr.No	Stores issue voucher No.	ription of ma	Unit	Quantity issued	Quantity requried as per data	Quantity consumed in the work	Balance(If any)	Nature of disposal for the balance	Rate chargeable for material not returned Rs.P.	Amount recoverable for material not returned Rs. P	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
			Total								

Signature of Contractor
Date

Signature of Engineer Incharge
Date

Signature of Sr. Engineer
Date

Note:Data statement of therotical consumption should be attached in support of the quantity specified in coloumn 6